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The Avifauna of Wadi Gaza Nature Reserve, Gaza Strip - Palestine

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Abstract: Birds are considered as good indicators of the degree of human disturbance to the various ecosystems. In this work, we present the birds of Wadi Gaza Nature Reserve and its environs, drawing upon a two-year field survey from October 2002 to September 2004. Two different sites were addressed for carrying out this study. Site I is almost hydric and represents a unique wetland ecosystem. Site II is almost dry except for some stormwater ponds occurring during the rainy season. A total of 118 avifaunistic species belonging to 38 families and 11 orders were determined and listed. Aquatic birds comprised 49 (41.5%) of the species counted, while terrestrial birds comprised 69 (58.5%) species. The Passeriformes was the biggest order and comprised 41 (34.7%) of the recorded species. Non-passerines comprised 77 species (65.3%), of which Charadriiformes formed the biggest order and comprised 27 species. Eighty five (72.0%) of the bird species were migratory while the others were resident. The House Sparrow was the most common bird species in Wadi Gaza Nature Reserve. The common species were the Cattle Egret, Chukar, Moorhen, Coot, Spur-winged Plover, Rock Dove, Laughing Dove, Barn Swallow, Yellow-vented Bulbul, White Wagtail, Palestine Sunbird and Hooded Crow. The major potential threats to avifauna included over-population, urbanization, residential and agricultural encroachment on the expense of natural areas, habitat destruction and fragmentation, hunting and poaching, intensive pesticide use and human disturbance at nest sites. The Israeli Occupation is still adversely affecting bird ecology in the area by uprooting and demolishing vast vegetated areas. The authors recommend improving cooperation of different parties to rehabilitate Wadi Gaza Nature Reserve and its environs and to enhance public awareness and to implement environmental laws and legislations to protect wildlife and to ensure sustainability of the system for both humans and biota.

Key Words: Avifauna, survey, threats, Wadi Gaza Nature Reserve, Gaza Strip.

The Avifauna of Wadi Gaza Nature Reserve,

الطيور البرية في محمية وادي غزة الطبيعية، قطاع غزة – فلسطين

ملخص: تعتبر الطيور كواشف جيدة لمدى التأثيرات البشرية على مختلف النظم البيئية. تم في هذه الدراسة تسجيل طيور محمية وادي غزة الطبيعية و بيئاتها من خلال مسح ميـداني لمـدة عـامين (أكتوبر 2002 – سبتمبر 2004) حيث تناولت الدراسة موقعين في وادي غزة تغلب على الموقـع الأول الطبيعة المائية و يمثل نظاما بيئيا رطبا فريدا من نوعه على مستوى فلسطين الساحلية بينمـا تغلب على الموقع الثاني الطبيعة الجافة. أظهرت الدراسة وجود 118 نوعا من الطيور تنتمي إلـى 38 عائلة و 11 رتبة، حيث مثلت الطيور المائية منها 49 نوعا (41.5%) في حين مثلت طيـور اليابسة 69 نوعا (58.5%). مثلت العصفوريات (Passeriformes) الرتبة الأكبر و احتـوت 41 نوعا (34.7%) في حين مثلت الرتب الأخرى 77 نوعا (65.3%) كان أكبرهـا رتبـة الطيـور الخائضة و البحرية (Charadriiformes) التي شملت 27 نوعا. بينت الدراسة أن 72.0% مـن الطيور المسجلة مهاجرة و 28.0% مقيمة و أن العصفور المنزلي (*Passer domesticus*) هـو النوع الأكثر شيوعا بين طيور محمية وادي غزة الطبيعية. شملت الأنواع الشائعة عدة أنواع منهـا أبو قردان، الشنار، دجاج الماء، الغرة، أبو ظفر (الزقزاق الشامي)، الحمـام الصـخري، الحمـام الضاحك، السنونو، البلبل أصفر العجز، الذعرة البيضاء، عصفور الشمس الفلسـطيني و الغـراب البلدي. تضمنت المهددات الفعلية التي تواجه طيور المنطقة الازدحام السكاني، التحضـر، زحـف العمران و الزراعة على حساب المناطق الطبيعية، تدمير و تجزئة المواطن البيئيـة، المطـاردة و الصيد، الاستخدام المكثف للمبيدات الكيميائية و التدمير البشري لمواقع التعشيش. ما زال الاحتلال الإسرائيلي يؤثر سلبا على بيئة الطيور في المنطقة باقتلاعه للأشجار و تدميره لمساحات واسعة من الأراضي الخضراء. ختاما، يوصي الباحثون بضرورة تكاتف جهود مختلف المحافل لإعادة تأهيـل محمية وادي غزة الطبيعية و بيئاتها و لزيادة الوعي البيئي الجمـاهيري و لتفعيـل التشـريعات و القوانين البيئية التي تحمي الحياة البرية و تضمن استدامة نظام وادي غزة البيئي للمجتمع الفلسطيني و كافة الأحياء البيئية.

الكلمات المفتاحية: الطيور، مسح بيئي، المهددات، محمية وادي غزة الطبيعية، قطاع غزة.

Introduction

Palestine is located on major migration routes in the Palearctic region. Every year, millions of migratory birds pass through the area following three main migratory routes; the coast and coastal plain, the mountains and the Jordan Valley. Its geography and climatic variations form a suitable environment for numerous species. Despite its small area, more than 500 of the 9600 bird species worldwide are found in Palestine (Ali- Shtayeh and Hamad, 1995 and 1997; The Palestinian Institute for Arid Land and Environmental Studies – PIALES, 1996; The Palestinian Central Bureau of Statistics –

PCBS, 2000 and The United Nations Environment program – UNEP, 2003). This number becomes significant when compared with far greater size countries such as Britain, France or Spain in which only 400 to 440 species can be found (Alon, 1978). What makes this avifaunistic diversity is the mix of Mediterranean, Oriental and African desert influences. However, the replacement of natural ecosystems by human-made and artificial environments has been changing the structure of animal and plant communities in Palestine, chiefly in relation to the composition and abundance of bird species. Protection of wildlife resources seem to be of low importance to Palestinians. In autumn, scores of fine nets are erected each year along the Gaza coastline to illegally catch migratory birds such as Quail *Coturnix coturnix* and many other species (Personal Observations).

Birds are among the best known parts of the Earth's biodiversity, as they are the most conspicuous groups in any fauna (Pomeroy, 1992 and Bibby *et al.,* 1998). However, birds are universal, penetrating the remote deserts, oceans and mountains on Earth (Jonsson, 1992 and Forshaw *et al.,* 1999). They are considered as good indicators of the degree of human disturbance in the various ecosystems worldwide. They have long served humans for game, food, and feathers, as well as in their predatory capacity as destroyers of insects and rodents (Collins, 1981). In Palestine, no place is deprived of birds; they occupy all habitats extending from the Mediterranean coast in the west to the mountainous, semi-tropical landscapes and the Dead Sea in the east, and from the very productive ecosystems in the north to the very dry Negev Desert and Red Sea coast in the south. Urbanization, industrialization, the draining of wetlands and the wide spread use of pesticides impose threat to birds (Donald and Gregory, 2002 and Liven-Schulman *et al.*, (2004).

The diversity of birds was surveyed and studied in forests of different countries for different reasons including population assessment and conservation, e.g. China (Wang *et al.,* 2000), Tanzania (Baker, 2001) and the United States of America (USA) (Francl and Schnell, 2002). In contrast to forests, wetlands are considered the best areas to survey birds due to their open nature and water domination (Pomeroy, 1992; Bibby *et al.,* 1998 and Forshaw *et al.,* 1999) as the case in the wetland ecosystem of Wadi Gaza. Wetlands support wide range of avifaunistic species of which waterfowls are the most abundant (Kirby, 1995), where wetlands grasses and fishes are the most important food for waterfowls (Middleton, 1988 and Degani *et al.,* 1998). Mamo and Bolen (1999) recorded 51 resident and migratory bird species in Carolina bays, which are non-tidal palustrine wetlands in the USA. Ashkenazi and Dimentman (1998) recorded 180 bird species

including herons, dabbling ducks, kingfishers, waders, wagtails and raptors in different habitats in a newly created Agmon wetland and surrounding cultivated peat land in the Hula Valley, Palestine. Mishra and Humbert-Droz (1998) identified 34 bird species in Tsomoriri Lake and the adjoining Nuro Sumdo wetland in Ladakh, Indian trans-Himalaya. A study in Tunisian oases indicated the presence of 19 bird species using theses habitats for breeding (Selmi and Boulinier, (2003).

In Turkey, the work on avifauna seemed to be extensive including national parks and nature reserves (Kirwan, 1998; Erdogdu, 2001; Aslan and Kiziroglu, 2003; Karakas and Kilic; 2004; Sert and Erdogan, 2004 and Perktas and Ayas, 2005). In Sudan, studies on avifauna and their seasonal variation have been carried out by Hamad and Evans (1982) and Hamad (1998) in various locations including the Dinder National Park. In Jordan, Evans *et al.* (2005) recorded 142 avifaunistic species of which more than 34 species were actually breeders in the proposed Rum Wildlife Reserve.

Work on bird fauna in Palestine seemed to be very rare, fragmentary and not comprehensive. Phillips (1915) described as many as 90 bird species belonging to 30 families in Palestine and the Sinai Peninsula. The Ostrich *Struthio camelus* which is completely extinct since decades in Palestine was common at that times. Brett (1988) indicated the presence of about 40 raptors in Palestine which were threatened by pesticides and habitat destruction. Al-Safadi (1997 and 1999) carried out studies on the behavior and developmental stages of two resident bird species in the Gaza Strip; the Spur-winged Plover *Vanellus spinosus* and the Chukar *Alectoris chukar*. Recently, Yassin *et al.* (2005) surveyed about 86 bird species in the Northern Governorate of the Gaza Strip. Moreover, Abd Rabou (2005) studied the ecology of Wadi Gaza Nature Reserve and pointed out the presence of 154 terrestrial vertebrate species, of which avifauna was the most conspicuous. In spite of that, the scarcity of scientific literature concerning avifauna in Palestine promoted the conduction of the present work which aims at (1) determining the bird species at the vicinity of Wadi Gaza Nature Reserve; particularly its wetland ecosystem, in addition to their seasonal variations and ecological habitats and thereby determining their ecological status and abundance and (2) contributing to the knowledge of the Palestinians about their avifaunistic resources. The determination of bird species will help the conservationists to evaluate and compare the changes in the bird fauna of the region in the future.

Methodology

Study Area

Wadi Gaza lies in the mid of the Gaza Strip and is bordered in the north-west by the Mediterranean Sea, the south-east by the Al-Bureij Camp, the south-west by Al-Nuseirat Camp, and the north by Al-Zahra City (Figure 1). In recognition of its importance as a natural area and as the only coastal wetland in Palestine, Wadi Gaza was declared a nature reserve in June 2000 by the Palestinian National Authority. Wadi Gaza springs from the Negev Mountains and the Southern Heights of Hebron City in Palestine. The total length of the Wadi is 105 km from its source to its end. The final portion of the Wadi which lies in the Gaza Strip extends 9 km from the Truce line in East Gaza to the coast where it discharges into the Mediterranean Sea. The width of the Wadi varies from one place to another, and is widest near its mouth where it forms a wetland or an estuary lake which is the most important habitat for migratory and resident water birds. The wetland is bordered by tall emergent plants like *Phragmites australis* and *Arundo donax*. *Tamarix nilotica* covers considerable areas as part of the maritime influence of the estuary lake. The maximum elevation of the Wadi is 30 meters above sea level, dropping to sea level where it reaches the Mediterranean (The Project for the Conservation of Wetland and Coastal Ecosystems in the Mediterranean Region - MedWetCoast, 2003).

Wadi Gaza has a typical semi-arid Mediterranean climate, hot in summer and cold in winter. Peak months for rainfall are December and January. Since the early 1970s and after the implementation of retaining dams and diversion schemes by Israel on the upper course of the Wadi, the volume of water reaching Wadi Gaza began to diminish considerably, and large flows are restricted to occasional flash floods sweeping down the Wadi bed in wet years (Awadallah, 2000). The resident population of the Wadi Gaza Nature Reserve area accounts for approximately 10,000 people distributed in discrete, extended family groups of variable densities (MedWetCoast, 2003).

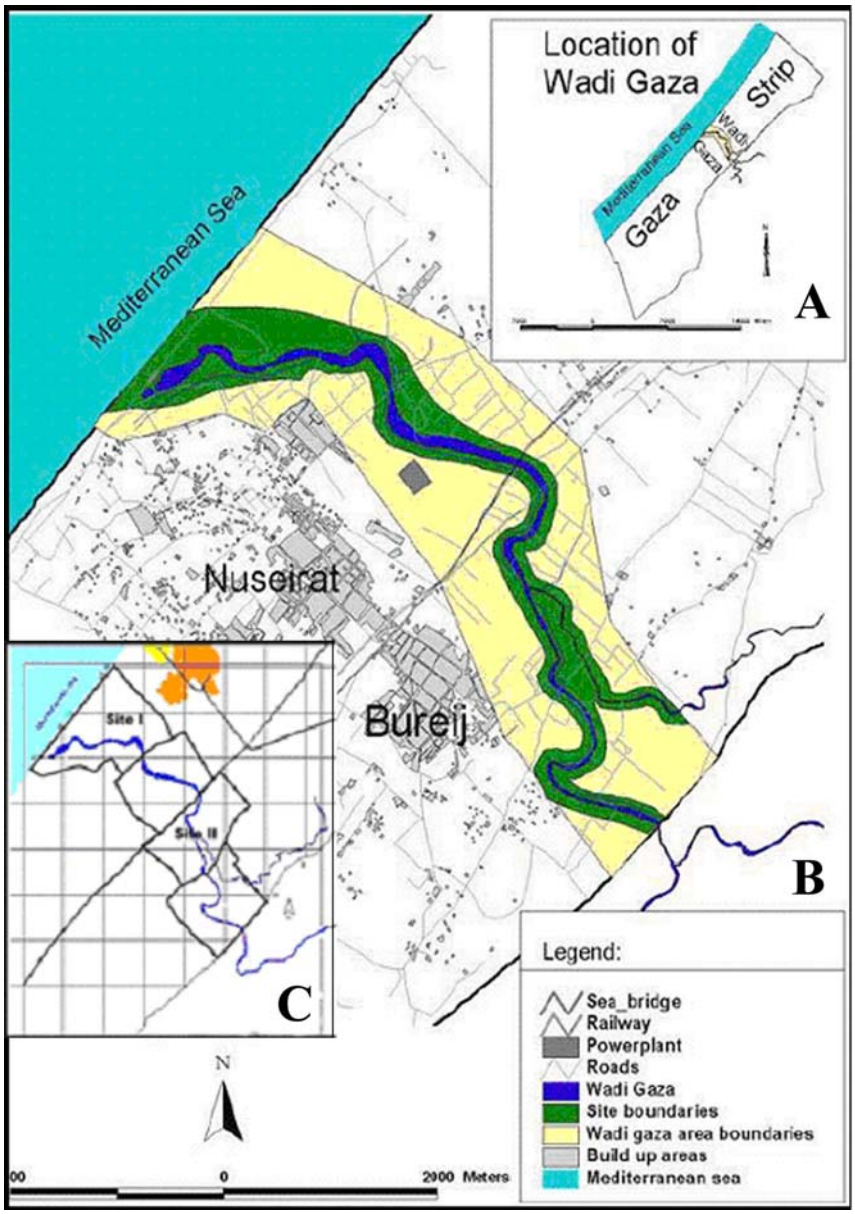

Figure 1: Wadi Gaza and its Location in the Gaza Strip (A), its site boundaries (B) and its study design (C)

In the present work, the area of Wadi Gaza was divided into four parts each with approximate length of 2-2.5 kilometers. Due to their topography, water persistence and other demographic and environmental aspects, only two parts were selected and surveyed for avifauna. These parts were denoted to

as site I and site II starting from the west to the east (Figure 1). Site I represents the western portion of the Wadi where the very important wetland ecosystem (about 1000-1200 meters length, 150-250 meters width and 1-2 meters depth) and many occasional or temporary storm water or sewage ponds are present. Many wild trees especially those of Sycamore, Zizyphus, Reeds, Tamarisk, Typha, and Palms and many agricultural fields of grapeviness, figs, olives, citrus and vegetables are present in the areas around, mainly the coastal sand dunes. This area provides a refuge to wildlife including floral species. Site II is almost dry except for some storm water ponds occurring during the rainy season. Site II harbors Tamarisk trees in the bed and many other wild trees and agricultural fields that to a high degree resemble those of site I. It is worth mentioning that the eastern part of the Wadi which is very close to the political borders between the Gaza Strip and Israel was unreachable or inaccessible by the surveyor due to security reasons.

Field Methods and Tools Used

Frequent site visits and observations and discussions with local people were used to determine avifaunistic species and their ecological importance in Wadi Gaza. Observations started at 7:00 and ended at 18:00. However, many visits were carried out in earlier hours and others extended to later hours for monitoring some nocturnal species. The survey period covered two years (October 2002–September 2004). Additional visits to the area have been conducted after the study period for confirmatory purposes. Data collected in the field were recorded in a special sheet designed for this purpose. Field work was done by a qualified person who has a Ph.D. in Environmental Studies and who used to teach the courses of ecology and vertebrate and invertebrate zoology at the Biology Department, Islamic University of Gaza - Palestine.

The use of survey tools was somewhat incomplete, inadequate and limited due to the Israeli security measures and road closures. A field binocular (Vivitar 35X7-15, made in Japan) and an N 90 Zoom Nikon camera were used for observation and documentation. Mist nets and live traps and aquatic nets were used as relevant and appropriate. Examination of dead bird species or their parts; their eggs or frocks and identification of birds' sound and tracks were also used to supplement the direct field observation methods. Many hunters and local people in the area were good contributors to this work through their provisions to live as well as dead specimens to the surveyor. Road kills are good indicators for identifying such bird species. Many captured and dead specimens were taken to the Biology Department

at the Islamic University of Gaza for further taxonomy and preservation.
A variety of international, regional and even local guide books were used in the present study to identify bird species (Vere Benson, 1984; Baha El-Din and Atta, 1990; Disi and Hatoug-Boran, 1990; Richardson, 1992; Harrison and Greensmith, 1993; Porter *et al.,* 1996; Shirihai, 1996; Abu Shammalah and Baha El-Din, 1999; Jonsson, 1999 and Cottridge and Porter, 2000). The identification process for avian species was performed at the site or at the Biology Department, the Islamic University of Gaza for captured and dead specimens.

Bird Species Status and Abundance
Individuals' count of different bird species was carried out during the site visits. In most visits, counting started at sunrise and continued until sunset. The possible status of recorded species is given as follows:

1. Resident (R): Virtually always present in Wadi Gaza
2. Winter Visitor (W): Present from November to March
3. Summer Visitor (S): Present from spring to late summer
4. Passage Migrant (PM): Only present in spring and/or autumn migration periods
5. Vagrant (V): A category used for migratory species that swerved from normal migratory routes
6. Unknown (?): The status of the species is not known

Moreover, the surveyor depended on the times the animals seen throughout the study period in addition to the numbers recorded for each species in order to display the abundance of each species as follows:

1. Very Rare (VR): The species seen once or twice throughout the year or even the study period
2. Rare (R): The species seen in very low numbers in many visits throughout the year or even the study period
3. Uncommon (U): The species seen in small numbers throughout the year or throughout parts of the year
4. Common (C): The species seen in reasonable numbers throughout the year or throughout parts of the year
5. Very Common (VC): The species seen in large numbers throughout the year or throughout parts of the year

Results

A total number of 118 bird species belonging to 38 families and 11 orders were recorded in sites I and II of Wadi Gaza Nature Reserve. The monthly averaged numbers of birds seen in the Reserve were illustrated in figure 2. The numbers of bird species slightly increased during seasonal migration especially during 2004 spring passage. Aquatic birds comprised 49 (41.5%) of the species counted, while terrestrial birds comprised 69 (58.5%) species (Figure 3). The Passeriformes was the biggest order and comprised 41 (34.7%) of the recorded species. The second biggest order was the Charadriiformes which comprised 27 species (22.9%). Non-passerines comprised 77 species (65.3%) of the whole recorded species (Figure 4).

Forty eight (40.7%) bird species were seen restricted to site I only and 2 (1.7%) were seen in site II only. Sixty three (53.4%) species were seen in both sites and 5 (4.2%) were neither seen in site I nor in site II, but they were captured and brought by hunters to the surveyor. These were the Hen Harrier *Circus cyaneus*, Long-legged Buzzard *Buteo rufinus*, Golden Eagle *Aquila chrysaetos* or reared by farmers such as the Helmeted Guineafowl *Numida meleagris* or preserved at local universities, such as the Pheasant *Phasianus colchicus*, where 3 males and 1 female were seen there. It is worth mentioning that the surveyor had never seen this species before and it is probably found in the eastern parts of the Gaza Strip or imported from outside. Eighty five (72.0%) were migratory while resident species comprised 31 (26.3%). The two species; the Helmeted Guineafowl *Numida meleagris* and the Pheasant *Phasianus colchicus* were not included in this categorization because the first was domesticated and the other was not recorded in the field (Figure 5). The recorded avifaunistic species in both Wadi Gaza sites are listed in Table 1. Table 2 illustrated seasonal variations, current status and relative abundance of bird species in Wadi Gaza Nature Reserve. The species in the tables were arranged taxonomically according to the available guides and textbooks.

From tables 1 and 2, it can be seen that the study area has quite a rich bird fauna, especially during the migration seasons; spring and autumn. Herewith is a brief description of each recorded bird species with its habitat in both sites of the study area. Some documenting photos concerning certain bird species are also provided.

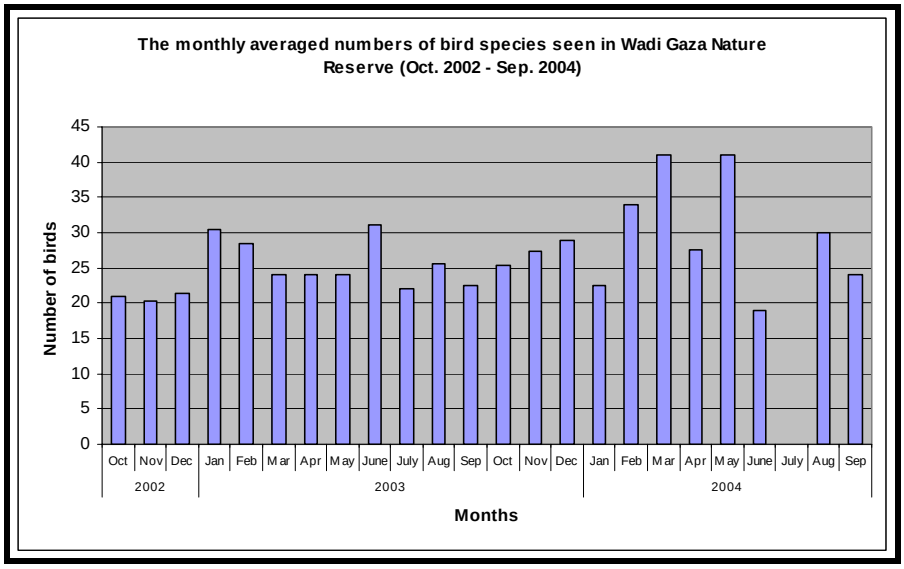

Figure 2: A diagram showing the monthly averaged numbers of bird species observed in Wadi Gaza Nature Reserve during the study period

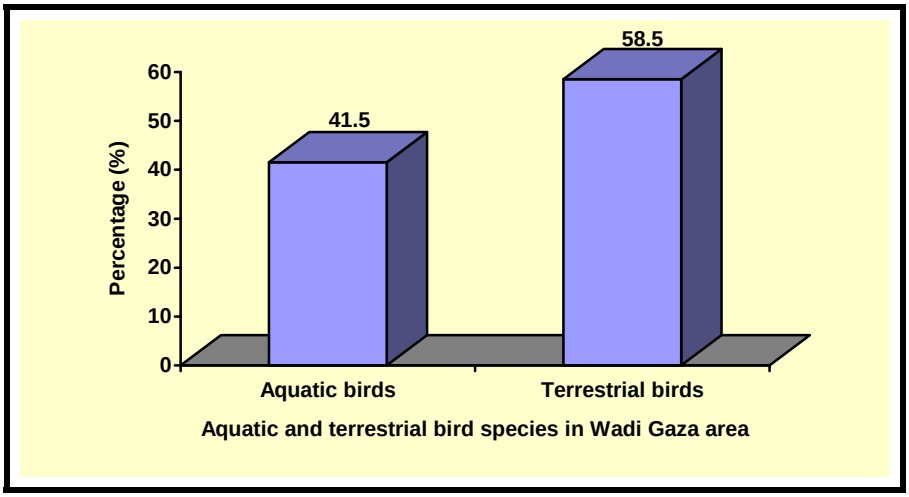

Figure 3: A diagram showing the percentages of aquatic and terrestrial birds observed in Wadi Gaza Nature Reserve and its adjacent areas

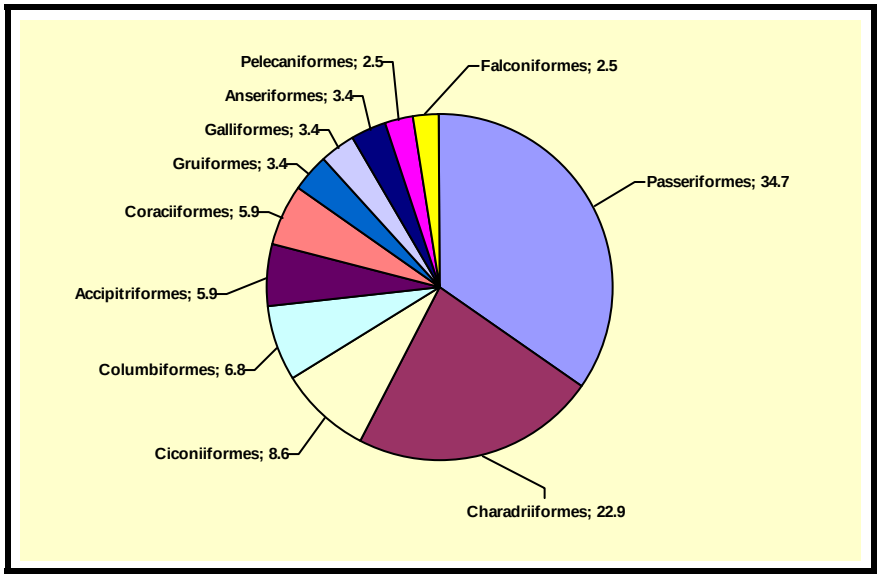

Figure 4: The percentage of the orders Passeriformes and Charadriiformes in relation to the other avian orders recorded in Wadi Gaza Nature Reserve and its adjacent areas

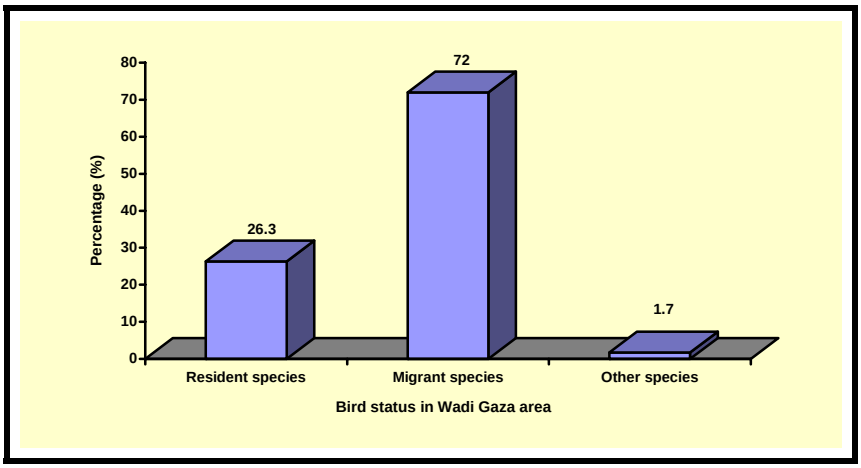

Figure 5: A diagram showing the percentages of bird status in Wadi Gaza Nature Reserve and its adjacent areas

The Avifauna of Wadi Gaza Nature Reserve,

Table 1: Avifauna recorded in the Wadi Gaza Nature Reserve and its environs.

Family	Scientific Name	Common Name	Site*	Arabic or Local Name
Order Pelecaniformes				
Phalacrocora-cidae الغرابية البحرية - الغواق	*Phalacrocorax carbo*	Great Cormorant	I	غاق الماء – غراب البحر
	Phalacrocorax aristotelis	European Shag	I	غاق الماء
Pelecanidae البجعيات	*Pelecanus onocrotalus*	Great White Pelican	I	البجع الأبيض
Order Ciconiiformes				
Ardeidae البلشونية	*Ixobrychus minutus*	Little Bittern	I	الواق الصغير
	Nycticorax nycticorax	Night Heron	I	غراب الليل
	Butorides striatus	Striated Heron	I	مالك حزين مخطط
	Ardeola ralloides	Squacco Heron	I	مالك حزين
	Bubulcus ibis	Cattle Egret	I, II	أبو قردان
	Egretta garzetta	Little White Egret	I, II	بلشون أبيض (بيضوي) صغير
	Egretta alba	Great White Egret	I	بلشون أبيض كبير
	Ardea purpurea	Purple Heron	I	مالك حزين أرجواني
Ciconiidae اللقلقية	*Ciconia ciconia*	White Stork	I	لقلق أبيض
Threskiorn-ithidae الحارسيات	*Platalea leucorodia*	Spoonbill	I	أبو ملعقة
Order Anseriformes				
Anatidae البطية	*Anas strepera*	Gadwall	I	بط
	Anas platyrhynchos	Mallard	I	الخضيرى
	Anas querquedula	Garganey	I	بط - حذف صيفى
	Anas clypeata	Shoveler	I	كيش – بط شرشير
Order Accipitriformes				
Accipitridae الكواسر	*Milvus migrans*	Black Kite	I,II	الحدأة السوداء
	Circus aeruginosus	Marsh Harrier	I	مرزة البطائح
	Circus cyaneus	Hen Harrier	?	مرزة الدجاج
	Buteo buteo	Common Buzzard	I, II	صقر حوام
	Buteo rufinus	Long-legged Buzzard	?	صقر (حميمق) طويل الساقين
	Aquila heliaca	Imperial Eagle	II	ملك العقبان
	Aquila chrysaetos	Golden Eagle	?	العقاب الذهبية

Family	Scientific Name	Common Name	Site*	Arabic or Local Name
Order Falconiformes				
Falconidae الصقرية	*Falco naummani*	Lesser Kestrel	I, II	عويسق
	Falco tinnunculus	Common Kestrel	I, II	عوسق – صقر الجراد
	Falco subbuteo	Eurasian Hobby	I	الكونج - الشويهين
Order Galliformes				
Phasianidae التدرجية	*Alectoris chukar*	Chukar	I, II	شنار – حجل رومي
	Coturnix coturnix	Quail	I	فر – سمان - سلوى
	Phasianus colchicus	Pheasant	?	التدرج
	Numida meleagris	Helmeted Guineafowl	?	دجاج فرعون – دجاج الوادي
Order Gruiformes				
Rallidae التقلقية	*Porzana porzana*	Spotted Crake	I	المرعة المنقطة
	Gallinula chloropus	Moorhen	I	دجاجة الماء
	Porphyrio porphyrio	Purple Gallinule	I	فرخة سلطانية
	Fulica atra	Coot	I	الغرة
Order Charadriiformes				
Recurvirostr-idae النكاتية	*Himantopus himantopus*	Black-winged Stilt	I	أبو المغازل – كرسوع
	Recurvirostra avosetta	Avocet	I	النكات – نكات الماء
Burhinidae الكروانيات	*Burhinus oedicnemus*	Stone Curlew	I, II	كروان صحراوي – كروان جبلي
Charadriidae القطقاطية	*Charadrius hiaticula*	Ringed Plover	I	أبو الرؤوس المطوق
	Charadrius alexandrius	Kentish Plover	I	أبو الرؤوس الإسكندراني
	Hoplopterus (Vanellus) spinosus	Spur-winged Plover	I, II	زقزاق شامي- قطا - أبو ظفر
	Vanellus vanellus	Lapwing	I	زقزاق شامي- أبو طيط
Scolopacidae الطياطي	*Calidris minuta*	Little Stint	I	دريجة صغيرة - القطيرة
	Gallinago gallinago	Common Snipe	I	جهلول عادي - شنقب
	Philomachus pugnax	Ruff	I	حجوالة - الشفى
	Tringa erythropus	Spotted Redshank	I	طيطوي أحمر الساق مرقط
	Tringa totanus	Redshank	I	طيطوي أحمر الساق
	Tringa stagnatilis	Marsh Sandpiper	I	زمار الرمل الخواض
	Tringa ochropus	Green Sandpiper	I	زمار الرمل الأخضر
	Actitis hypoleucos	Common Sandpiper	I	زمار الرمل الشلئع

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Family	Scientific Name	Common Name	Site*	Arabic or Local Name
Laridae النورسية	*Larus melanocephalus*	Mediterranean Gull	I	نورس البحر المتوسط
	Larus ridibundus	Black-headed Gull	I	نورس أسود الرأس
	Larus fuscus	Lesser black-backed Gull	I	نورس أسود الظهر الصغير
	Larus argentatus	Herring Gull	I	نورس
	Larus cachinnas	Yellow-legged Gull	I	نورس أصفر القدم - فضي
	Larus marinus	Great black-backed Gull	I	نورس أسود الظهر الكبير
Sternidae الخراشن	*Gelochelidon nilotica*	Gull-billed Tern	I	الخطاف النيلي
	Sterna hirundo	Common Tern	I	خطاف البحر الشائع
	Sterna albifrons	Little Tern	I	خطاف البحر الصغير
	Chlidonias hybridus	Whiskered Tern	I	خطاف بحر
	Chlidonias leucopterus	White-winged Tern	I	خطاف بحري أبيض الجناح
Apodidae السمامية	*Apus apus*	Common Swift	I, II	السمامة
Order Columbiformes				
Columbidae الحمامية	*Columba livia*	Rock Dove (Pigeon)	I, II	حمام بري – طوراني (صخري)
	Streptopelia decaocto	Collared Dove	I, II	يمامة مطوقة
	Streptopelia turtur	Turtle Dove	I, II	يمامة قمرية – قمري - حمام رقطي
	Streptopelia senegalensis	Laughing (Palm – Senegal) Dove	I, II	يمامة (سنغالية) ضاحكة (حمام) – دبسية – فاختة النخيل
Cuculidae الوقواقية	*Clamator glandarius*	Great Spotted Cuckoo	I, II	وقواق مرقط
Strigidae البومية	*Otus scops*	European Scops Owl	II	بومة أذناء صغيرة - التّبج
	Athene noctua	Little Owl	I, II	أم قويق - بومة صغيرة
	Tyto alba	Barn Owl	I, II	بومة الجرن – بومة بيضاء
Order Coraciiformes				
Alcedinidae القاوندية	*Halycon smyrnensis*	White-breasted Kingfisher	I, II	السماك أبيض الصدر - القاوند
	Alcedo atthis	Common Kingfisher	I	السماك الشائع - رفراف
	Ceryle rudis	Pied Kingfisher	I	السماك الأبقع / الأرقط
	Merops apiaster	European Bee-eater	I, II	الوروار الأوروبي

Family	Scientific Name	Common Name	Site*	Arabic or Local Name
Meropidae الوروارية	*Merops apiaster*	European Bee-eater	I, II	الوروار الأوروبي
	Coracius garrulus	European Rollar	I, II	الشرقرق - الشقراق
Upupidae الهدهدية	*Upupa epops*	Hoopoe	I, II	هدهد
Picidae اللوائية	*Dendrocopos syriacus*	Syrian Woodpecker	I, II	نقار الخشب السوري
Passeriformes				
Alaudidae القبرية	*Galerida cristata*	Crested Lark	I, II	قبرة متوجة
	Alauda arvensis	Skylark	I, II	قنبرة الحقول
Hirundinidae السنونية	*Hirundu rustica*	Barn Swallow	I, II	سنونو – عصفور الجنة
Motacillidae الفتاحية (الذعريات)	*Motacilla flava*	Yellow Wagtail	I, II	ذعرة صفراء - سفرية
	Motacilla citreola	Citrine Wagtail	I, II	ذعرة ليمونية - سفرية
	Motacilla alba	White Wagtail	I, II	ذعرة بيضاء – كركز
Pycnonotidae البلبلية	*Pycnonotus xanthopygos*	Yellow-vented Bulbul	I, II	بلبل أصفر العجز
Turdidae المغردات	*Erithacus rubecula*	European Robin	I, II	أبو الحناء – أبو الحن - حمرية
	Luscinia svecica	Bluethroat	I, II	مسهر – دجل – هازجة زرقاء الزور
	Phoenicurus phoenicurus	Common Redstart	I, II	الحميراء
	Saxicola torquata	Stonechat	I, II	أبلق الرعيان – قايعي أحمر
	Oenanthe isabellina	Isabelline Wheatear	I, II	الأبلق
	Oenanthe oenanthe	Northern Wheatear	I, II	الأبلق الاعتيادي
	Oenanthe hispanica	Black-eared Wheatear	I, II	الأبلق أسود الأذن
	Turdus merula	Blackbird	I, II	شحرور – دج
	Turdus philomelos	Song Thrush	I,II	السمنة المغنية - سمن
Sylviidae الخناشع -	*Prinia gracilis*	Graceful Prinia (Warbler)	I, II	فسية - فسيوة
	Acrocephalus scirpaceus	European Reed Warbler	I, II	هازجة القصب

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Family	Scientific Name	Common Name	Site*	Arabic or Local Name
الدخل	*Hippolais pallida*	Olivaceous Warbler	I, II	الخنشع الزيتوني الباهت
	Hippolais olivetorum	Olive-tree Warbler	I, II	خنشع شجر الزيتون
	Sylvia atricapilla	Blackcap	I, II	أبو قلنسوة
	Phylloscopus collybita	Chiffchaff	I, II	نقشرة ذهبية - نقشارة
Muscicapidae الشوريية (مذبابيات)	*Muscicapa striata*	Spotted Flycatcher	I, II	خاطف الذباب المنقط
Paridae القرقفيات (الصعوية)	*Parus major*	Great Tit	I, II	قرقف كبير
Nectariniidae	*Nectarinia osea*	Palestine Sunbird	I, II	عصفور الشمس الفلسطيني
Laniidae الصرود	*Lanius senator*	Lesser grey Shrike	I, II	دقناش رمادي صغير
	Lanius nubicus	Great grey Shrike	I, II	دقناش رمادي كبير
	Lanius senator	Woodchat Shrike	I, II	دقناش شامي - صرد
	Lanius nubicus	Masked Shrike	I, II	صرد
Corvidae الغرابية	*Corvus corone*	Hooded Crow	I, II	غراب بلدي رمادي
Sturnidae الزرزورية	*Sturnus vulgaris*	Starling	I, II	الزرزور
Passeridae العصفورية	*Passer domesticus*	House Sparrow	I, II	عصفور منزلي - دوري
	Passer hispaniolensis	Spanish Sparrow	I, II	عصفور أسباني – دوري أسباني
Fringillidae الحساسين	*Fringilla coelebs*	Chaffinch	I, II	الصغنج – عصفور ظالم - زرعي
	Serinus serinus	European Serin	I, II	نعار أوروبي - بسيوس
	Serinus syriacus	Syrian Serin	I, II	نعار سوري
	Carduelis chloris	Green Finch	I, II	خضر - خضيري
	Carduelis carduelis	Goldfinch	I, II	حسون ذهبي
	Carduelis spinus	Siskin	I, II	طزليك
	Carduelis cannabina	Linnet	I, II	عصفور تفاحي
	Rhodospiza obsoleta	Desert Finch	I, II	حسون صحراوي - هرد

*Site: I= Site I, II= Site II, I, II= Both Sites

Table 2: Seasonal status and abundance of avifauna recorded in the Wadi Gaza ecosystem and its environs.

No.	Common Name	2002						2003																				2004														Status	Abundance
		Oct		Nov		Dec		Jan		Feb		Mar	Apr		May	Jun	Jul	Aug		Sep		Oct		Nov		Dec	Jan		Feb	Mar	Apr		May	Jun		Jul			Aug			Sep			
		1	2	1	2	1	2	1	2	1	2		1	2				1	2	1	2	1	2	1	2		1	2			1	2							2	1	2			
1	Great Cormorant								4			3	3																2		6												WV	R
2	European Shag																								1																		WV,V	VR
3	Great White Pelican																				200	150																					PM	VR
4	Little Bittern							2				1	2															1		3			3										WV	R
5	Night Heron																			20											7		4										SV	R
6	Striated Heron																																	2									V	VR
7	Squacco Heron																3			2													3	2							2	SV,WV	VR
8	Cattle Egret			15		23	27	17	40	14	40				25	14	4			13	30	20	50	52	35	22	55		30	55		30	50	25	6			55	70	3	R	C
9	Little White Egret	5	3	2		20		7	23					13		5		4						2	4			5				2	3									R	U
10	Great White Egret																		1														2									PM	VR
11	Purple Heron		1	2																3	1		4		3																WV	VR
12	White Stork														80				200																							PM	VR
13	Spoonbill													1																												PM	VR
14	Gadwall																				1				3																	WV	VR
15	Mallard				2			3	1		2											1																					WV	R
16	Garganey	3		5		4	4							3				8	4	4	3	5	2	4		3			2											2			R,PM	U
17	Shoveler			4			5	10						2	1																											WV	R
18	Black Kite		7					2						12							3																					R	R
19	Marsh Harrier					3			1	1											1	2	3	3	3																	WV	R
20	Hen Harrier			1																																					WV	VR
21	Common Buzzard		1						3		1											1						1														WV	VR
22	Long-legged Buzzard						1					1																														WV	VR
23	Imperial Eagle		2	2																	3					2																WV	VR
24	Golden Eagle																						1						2													WV	R
25	Lesser Kestrel															3				5	22	2										2										R,WV	R
26	Common Kestrel								1	2	2				3							1		1	1		2	4	4													SV	R
27	Eurasian Hobby													1		2								1								1										WV,SV	VR
28	Chukar	10		40	10				15		9		3		12				10		6	9			6		10	11	10			9					26			R	C
29	Quail	13			3															1	13	12	4							1						3	14	20	WV	U
30	Pheasant**																																								?	?
31	Helmeted Guineafowl*																	4			2				3																D*	?
32	Spotted Crake																					1			1																WV	VR

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No.	Common Name	2002						2003																				2004												Status	Abundance
		Oct		Nov		Dec		Jan		Feb		Mar	Apr		May	Jun	Jul	Aug		Sep		Oct		Nov		Dec	Jan		Feb	Mar	Apr		May	Jun		Jul		Aug		Sep			
		1	2	1	2	1	2	1	2	1	2		1	2				1	2	1	2	1	2	1	2		1	2			1	2		1	2			2	1	2			
33	Moorhen	40	23	32		20	15	20	50	40	6	40	20	20			25	28	50	40	30	20	28	34	40	20	63		50	15	5	15	25	4	6				4	13	17	R	C
34	Purple Gallinule																			1	2	2				2			1													WV,V	VR
35	Coot	20	15	18		10	20	20	20	15	4	12	8	20		7			4	19	20	20	20	22	23	20	35		20	30	20	25							1			R	C
36	Black-winged Stilt		6			6	8	2	4	12	5	8	6			8	4			2			10	11	14		11						7		2							R	U
37	Avocet																								3																WV	VR
38	Stone Curlew				50						15					1			7				2			3					2	2	12						3			R	C
39	Ringed Plover			2										15						7	8	12	14		13				8										11	11	20	WV	C
40	Kentish Plover			3				8																		7	6															WV	R
41	Spur-winged Plover	35	25	40	22	30	60	30	300	40	200	40	35	40		18	25	30	40	50	60	40	40	35	40	33			35	60	15	30	30	25	35				33	35	15	R	C,VC
42	Lapwing																							2																		WV	VR
43	Little Stint																			1																						WV	VR
44	Common Snipe					7	9					5	7							3	4		2			6	7			3											4	WV	U
45	Ruff																				20				20		13															WV	R
46	Spotted Redshank																						3		7																	V	VR
47	Redshank			7		4	2		3	7	3									1				4	7	3	4		10										10		4	WV	U
48	Marsh Sandpiper	2										7	9	8						20	4	3	10			10			12	10			18						7		7	WV,SV	U
49	Green Sandpiper																													40												WV	VR
50	Common Sandpiper																			7		14									3	7		3								WV,SV	R
51	Mediterranean Gull			2																			2	2																		WV	VR
52	Black-headed Gull			12		30	4	10	5	3		15	4	4									200		35				2													WV	U
53	Lesser Black-backed Gull													3							12	1	1						5	1												WV	R
54	Herring Gull								2	3																																WV	VR
55	Yellow-legged Gull									1																				1												WV	VR
56	Great Black-backed Gull											3	2	4																													WV	VR
57	Gull-billed Tern				3															4				4		1																WV	VR
58	Common Tern																														2		2	5								SV	VR
59	Little Tern											4	3	7				6			3											6			4								SV	U
60	Whiskered Tern																			2																						SV	VR
61	White-winged Tern																6		4	4																						SV	VR
62	Common Swift															7		4												8			12									SV	R
63	Rock Dove (Pigeon)	13	11	17	12	12	18	15	40			15		10	12	12	14	13	8	15	20	22	19	19	17	10	16	7	10	10	8	7	20	10				8	4	12	R	C
64	Collared Dove																													2												?	VR
65	Turtle Dove							4		3		3	2		10	3		3	3	8	10			2		2						30	3	4				7	5		R	U

No.	Common Name	2002						2003																						2004												Status	Abundance
		Oct		Nov		Dec		Jan		Feb		Mar	Apr		May	Jun	Jul	Aug		Sep		Oct		Nov		Dec	Jan		Feb	Mar	Apr		May	Jun		Jul			Aug		Sep			
		1	2	1	2	1	2	1	2	1	2		1	2				1	2	1	2	1	2	1	2		1	2			1	2		1	2				2	1	2			
66	Laughing Dove	12	14	25	11		22	20	33	14	3	16	23	11	20	12	30	30	2	20	25	30	25	22	22	20	18	15	10	35	15	15	10	10	12				15	3	2	R	C
67	Great Spotted Cuckoo																														1		1									SV	VR
68	European Scops Owl																															1	1									SV,V	VR
69	Little Owl					1				1									1												1				1							R	VR
70	Barn Owl		2	2					3						4			10					2				4		4					9				3			R	U
71	White-breasted K.	3	4	5						2					8	4	7	5	2	4	8	6	4		6	6	4		6		2	3	2	2	1				2			R	U
72	Common Kingfisher	2		1								2					3		4	6		3	2						3			1						3	25	6	R	U
73	Pied Kingfisher			2					2	3						1													1		3		2								R	R
74	European Bee-eater	5														9						25										1	7									SV	U
75	European Rollar																														5			7								SV	VR
76	Hoopoe		2	5			1	5	5	4	1	5	1			3	3	10	4	7	7			10	3	6	7		6	6		5		2					4		R	U
77	Syrian Wood-pecker							1							1				1				1				1															R	R
78	Crested Lark	10		3			1		30	3	6			12	6					5	10	5	4	5	7	3		3	3	7		15	7	20	2					2	1	R	C
79	Skylark							3	3	4															3								1									WV	VR
80	Barn Swallow	25	15	40		20	25		35	40		25	30	45	4	3	35	40	40	40	50	22	35	35	50			20	25	50	30	40	35	70	10				16	13	8	R	C
81	Yellow Wagtail															3		12	30	50	80									40		5								25	8	SV	C
82	Citrine Wagtail														15		7													20			4	9						8		SV	R
83	White Wagtail		17	30	10	60	70	30		30	30										5	45	40	45	40	38	40	23		60										4		WV	C
84	Yellow-vented Bulbul	8	8	13	8	45		8	15	8	100	8	10	8	13	10	20	22	8	30	25	13	17	10	23	18		7	13	10	3	10	8	7					6	7	6	R	C
85	European Robin						2				1														10	15	4		10	1		1										WV	R
86	Bluethroat		3	7			11	8	5	7														35	31		21			10												WV	C
87	Common Redstart																						5	5																		SV	VR
88	Stonechat			3				2																2					6													WV	VR
89	Isabelline Wheatear																			2																						?	VR
90	Northern Wheatear																		3	13	20	15	13							2										3	6	SV	U
91	Black-eared Wheatear															4				3																						1	SV	SV
92	Blackbird								5	3	3				7	15					10							12		1			3						10			R	U
93	Song Thrush													3		4																	2	3							2	SV	R
94	Graceful Warbler	15		7	3	22		20	20	10	13	12				1	20	24	17	16	20	11	13	10	10	10	13	12	10	4	2	12	5	2					3	5	3	R	C
95	European Reed Warbler	6		12		13		7			5			5		10		9	15	10	8	4	12	10	15	10			7	10	5	13	7	7	9				6	5	5	R	C
96	Olivaceous Warbler														6	2																							6			SV	VR
97	Olive-tree Warbler															2	2				11									3			3						4			SV	R
98	Blackcap										3			4	5		1		4												1	3	2									SV,WV	U

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No.	Common Name	2002						2003																				2004												Status	Abundance
		Oct		Nov		Dec		Jan		Feb		Mar	Apr		May	Jun	Jul	Aug		Sep		Oct		Nov		Dec	Jan		Feb	Mar	Apr		May	Jun		Jul		Aug		Sep			
		1	2	1	2	1	2	1	2	1	2		1	2				1	2	1	2	1	2	1	2		1	2			1	2						2	1	2		
99	Chiffchaff	3		7						2	3				5	10		22		7		7	7	7	9		7		3	3	1	3	8	3	4						2	R	U
100	Spotted Flycatcher																			1	2										4		3								SV	VR
101	Great tit											5	12		18		1												3	8	10		3				2			SV	R
102	Palestine Sunbird			7					2					5	7			3		2	7	9	2	5	9	4	12		7	20		9	12				8	4		R	C, Endemic
103	Lesser Grey Shrike															3	4															1		2						SV	VR
104	Great Grey Shrike															1					2										3	2								SV	VR
105	Woodchat Shrike												3	1			2												6					2							SV	R
106	Masked Shrike											1			4			5	1												1							3	5	3	SV	R
107	Hooded Crow	11	8	25	7	8	30	7	23	15	20	30	25		10	6	30	18	8	32	40	30	22	23	40	18	25	10	15	17	5	10	25	15	12			21	5	3	R	C
108	Starling			2				1	3																	2	1		4											WV	VR,R
109	House Sparrow	60	50	50	50	50	95	55	60	70	70	80	60	70	70	45	70	100	80	80	100	70	50	50	80	120	80	50	80	60	30	30	80	100	50			80	40	100	R	VC
110	Spanish Sparrow					10					10							2						13					8			12					15			R	U
111	Chaffinch																							9	1			7													WV	R
112	European Serin				1			3																																	WV	VR
113	Syrian Serin						4			2	1																2															WV	VR
114	Green Finch		4	7	7				5															3			4		1	2											WV	R
115	Goldfinch			1	2															3				3																	WV	VR
116	Siskin			6	5																			10			6														WV	VR
117	Linnet			4	2																			4			3														WV	VR
118	Desert Finch				2																						2														WV	VR

*Helmeted Guineafowl is an introduced domestic species and was found to be reared by the community in Wadi Gaza area and other localities in the Gaza Strip.
**The Pheasant (3 males and 1 female) was found preserved at the Biology Department, Al-Azhar University – Gaza Strip.
PM = Passage migrant; R = Resident; SV = Summer visitor; WV = Winter visitor; V = Vagrant; ? = Unknown
VR = Very rare; R = Rare; U = Uncommon; C = Common; VC = Very common; ? = Unknown

Great Cormorant *Phalacrocorax carbo*: As many as 18 individuals of this large bird were seen during the winter seasons of 2003 and 2004 in the wetland of Wadi Gaza and in the Gaza beach on the Mediterranean. In 23.01.2003, about 10,000 individuals were seen navigating 1-2 meters over the sea water at a distance of about 50-100 meters of the shore. The direction of navigation was from north to south towards Egypt.

Shag *Phalacrocorax aristotelis*: Only one individual of this species was observed for about two hours swimming in the wetland swamp of Wadi Gaza in 18.12.2003.

Great White Pelican *Pelecanus onocrotalus*: Two flocks of this species ranging between 150-200 individuals were seen in the autumn of 2003 flying in the sky of Wadi Gaza in their way northward.

Little Bittern *Ixobrychus minutus*: A total number of about 12 of the Little Bittern (Figure 6A) was recorded in winter months. It prefers the well-vegetated and reedy wetlands.

Night Heron *Nycticorax nycticorax*: A maximum number of about 20 adult and juvenile individuals was seen in 13.9.2003 resting in an area of dense reeds and bushes at the wetland edge. Additional records (N=11) of the species were reported in April and May months of 2004.

Striated Heron *Butorides striatus*: Two birds of the species were seen only once in June, 2004 resting among the reeds of the wetland of Wadi Gaza.

Squacco Heron *Ardeola ralloides*: About 12 individuals were seen as singles or in twos during the months of May to September of 2003 and 2004. The species prefers reeds and well-vegetated margins of the wetland ecosystem.

Cattle Egret *Bubulcus ibis*: Among other heron species, the Cattle Egret (Figure 6B) is the commonest in the wetland ecosystem of Wadi Gaza and the near agricultural fields or in dump places, landfills and other drier habitats of both sites of Wadi Gaza. A maximum number of about 70 individuals in addition to many significant numbers ($N \geq 30$) were seen many times throughout the year. Sometimes, the bird was seen flying in small groups ($N \geq 5$) in the sky of Gaza to and from roost sites.

Little White Egret *Egretta garzetta*: The Little Egret was found mostly among reedbeds of the shallow wetlands of Wadi Gaza and the nearby wastewater ponds and occasionally in agricultural fields and garbage places. The maximum numbers (N=20 and 23) of the species were recorded during winter months of 2002 and 2003.

Great White Egret *Egretta alba*: The occurrence of the species (N=3) in Wadi Gaza wetland was recorded as singles in two visits of summer months only.

Purple Heron *Ardea purpurea*: This species was recorded in winter months in numbers ranging from 1 to 4 with a total number of 14 throughout the study period. It is often flushed from the reeds and other dense vegetation such as *Tamarix sp*. of the edges of wetlands which it prefers.

White Stork *Ciconia ciconia*: The bird was seen twice in flocks of about 80 and 200 individuals in May and August, 2003, respectively flying over the vicinity of Wadi Gaza area.

Spoonbill *Platalea leucorodia*: It is a very rare species; only a single individual was recorded in April, 2003 in the shallow open water of the wetland of Wadi Gaza. The characteristic bill was the only key to distinguish the species.

Gadwall *Anas strepera*: The species was recorded twice; one individual in late September and 3 individuals in late November, 2003, swimming or resting on the dense wetland vegetation.

Mallard *Anas platyrhynchos*: The Mallard was seen in winter months in very few numbers (N=4) swimming or resting on the dense wetland vegetation. The characteristic plumage of males was a good feature to recognize the species.

Garganey *Anas querquedula*: This species seemed to be the most visible of the four dabbling ducks year round. A maximum number of 8 individuals was recorded in 8.8.2003, swimming in the open water of the wetland together with other aquatic birds.

Shoveler *Anas clypeata*: A maximum number of about 10 individuals was recorded in early January, 2003, swimming in the open water of the wetland. The species was recorded in very low numbers in winter and spring months.

Black Kite *Milvus migrans*: The Black Kite (Figure 6C) seems to be one of those raptors occurring year round. The surveyor recorded this bird in few numbers (N=24) during four visits conducted to site II of Wadi Gaza. The maximum number of Black Kites recoded in Wadi Gaza was 12. Two trap types named locally as "*Maltash*" and "*Shabak Galab*" (inverted net) were used in hunting of raptor species including the Black Kite. A captured Black Kite was sold in local currency which equals U.S. $ 35.

Marsh Harrier *Circus aeruginosus*: The Marsh Harrier (Figure 6D) species prefers swamps and marshes rich in reeds. A total number of 19 individuals was seen flying and searching preys over the reedbed of site I during winter months of 2002 and 2003. Two individuals were seen captured and kept by hunters.

Hen Harrier *Circus cyaneus*: Only one individual was found hunted by a bird hunter in 14.11.2002. This species has never been seen in the area after this date.

Common Buzzard *Buteo buteo*: Seven individuals of this species have been encountered throughout the study period in both sites of Wadi Gaza during winter months. A maximum number of three individuals was seen during January, 2003 in cultivated areas near the wetland of Wadi Gaza.

Long-legged Buzzard *Buteo rufinus*: The Long-legged Buzzard (Figure 6E) species was seen twice as singles in December, 2002 in an agricultural field in site II, and as hunted in 8.3.2003.

Imperial Eagle *Aquila heliaca*: This bird species seems to winter in Palestine. Nine individuals were recorded mainly in site II.

Golden Eagle *Aquila chrysaetos*: It is a huge raptor rarely seen in the open landscapes of the eastern parts of Wadi Gaza (site II and eastward). Only one and two individuals were recorded in October, 2003 and March, 2004, respectively.

Lesser Kestrel *Falco naumanni*: The Lesser Kestrel (Figure 6F) was recorded (N=34) in both sites in summer months of 2003 and 2004. The maximum recorded number was 22 in September 2003 in site II over an agricultural area rich in olive and citrus orchards.

Common Kestrel *Falco tinnunculus*: The Common Kestrel (Figure 6G) is probably a resident species in Wadi Gaza (N=21). The maximum number recorded was 4 in both January and February months of 2004. The bird occurs mostly in cultivated fields and meadows. Both the Lesser Kestrel and the Common Kestrel are highly hunted.

Eurasian Hobby *Falco subbuteo*: The Eurasian Hobby was rarely seen in summer months (N=5). The bird was recognized by its red vent.

Chukar *Alectoris chukar*: The Chukar (Figure 7A) occurs throughout the year in Wadi Gaza. Flocks of 7-14 individuals were recorded in various agricultural and natural habitats in both sites of Wadi Gaza (N>190). A maximum number of about 40 individuals was noticed in one visit to grapevine fields located on the sand dunes surrounding the wetland of Wadi Gaza. The bird is breeding and building the nest on the ground. Chukar is threatened by intensive hunting because of its delicious meat.

Quail *Coturnix coturnix*: Scattered flocks of Quails usually come to the Gaza Strip coast through the Mediterranean Sea during their migration path from Europe to Africa at the beginning of autumn season. Hundreds of Quails are captured along the Gaza Sea coast by illegal erection of scores of fine nets (Figure 7B). Hunters usually benefit from the captured birds as a source of food or money. A pair of the Quail costs U.S. $ 3-4. Quails

usually prefer low-growing crops and rough grasslands in Wadi Gaza area to live in.

Pheasant *Phasianus colchicus*: This bird species was not recorded during the field studies. Only three males and one female of the bird were found stuffed in the small museum of the Biology Department, Al-Azhar University, Gaza Strip.

Helmeted Guineafowl *Numida meleagris*: The bird seems to be not common locally in the wild. However, many Palestinians were found rearing the bird in their own agricultural fields in Wadi Gaza.

Spotted Crake *Porzana porzana*: The Spotted Crake is very secretive and shy. It was very rarely seen among reedbed on the margin of the wetland. During the study period, two individuals were encountered separately. The first was in October, 2003, and the second was seen captured one month later.

Moorhen *Gallinula chloropus*: Moorhens are familiar water birds in Wadi Gaza. Adults and juveniles were recorded among reedbeds, Tamarisk trees and even the close agricultural fields. A maximum number of about 63 individuals was recorded in January, 2004. Its presence may be known by its characteristic loud voice.

Purple Gallinule *Porphyrio porphyrio*: The occurrence of this species seemed to be very limited to 3-4 individuals in the whole wetland ecosystem in winter months of 2003 and 2004.

Coot *Fulica atra*: The Coot (Figure 7C) is one of the common birds in the wetland ecosystem of Wadi Gaza. A maximum number of 35 individuals (adults and juveniles) was recorded in January, 2004. The Coot was hunted using ground mist nets as a food source for many poor people or to feed captured raptors. At the beginning of the second half of the year 2004, a great destruction to their wetland habitats took place and as a result, a drastic decrease in its populations was noted.

Black-winged (necked) Stilt *Himantopus himantopus*: The bird is seen in the wetland ecosystem of Wadi Gaza throughout the year in numbers ranging between 7 and 14. The bird occurs mostly in coastal lagoons, shallow ponds and the Wadi Gaza mouth into the Mediterranean.

Avocet *Recurvirostra avosetta*: It is a very rare wetland bird preferring estuaries, flat shores and very shallow waters with low vegetation in Wadi Gaza. Only 3 individuals were seen once in November, 2003 in site I of Wadi Gaza.

Stone Curlew *Burhinus oedicnemus*: The Stone Curlew (Figure 7D) is uncommon, seen all year around. A maximum number of about 50 individuals was counted in 19.11.2002 resting in the grapevine fields near

Wadi Gaza. In 17.2.2003, about 15 individuals were seen in an area rich in shrubs adjacent to the wetland. The bird is local breeder and nests are built on ground, and each contains two eggs with stones usually around. As told by local people, the eggs and nests are usually destroyed by children and shepherds.

Ringed Plover *Charadrius hiaticula*: It is usually seen during winter months on the beach of the Mediterranean and the shallow shores of the wetland of Wadi Gaza. It is commonly seen in groups mixing with other waders ranging from 7 to 14 individuals.

Kentish Plover *Charadrius alexandrinus*: The habitat is somewhat similar to that of the Ringed Plover. A maximum number of 8 was recorded in January 2003.

Spur-winged Plover *Hoplopterus spinosus*: The Spur-winged Plover (Figure 7E) is one of the common bird species in Wadi Gaza. It occurs besides wetlands, marshes and even dry areas of low scrubby vegetation. Tens or sometimes hundreds of the bird were seen in nearly 95% of the visits. A maximum number of about 300 individuals was encountered in 23.1.2003 in the wetland area. Ground nests containing 4 eggs (Figure 7F) were sometimes found near the wetland of Wadi Gaza (N=6). These nests were commonly threatened by local people, children and shepherds. As a means of defending its breeding territory, the bird usually releases loud calls against intruders including man.

Lapwing *Vanellus vanellus*: This beautiful bird is unique among waders with its long wispy crest and green back. Only two individuals were seen in 5.11.2003 in a shallow wastewater pond in Wadi Gaza.

Little Stint *Calidris minuta*: It is a very scarce bird, with only one individual seen captured in 13.9.2003 by a child in the area of Wadi Gaza wetland.

Common Snipe *Gallinago gallinago*: The Common Snipe was easily distinguished in winter months by its long bill pronounced head markings. The bird prefers muddy areas of wetlands and wastewater lagoons with low grasses and vegetation. It was commonly observed as singles or in small groups (N≤5) in Wadi Gaza wetland.

Ruff *Philomachus pugnax*: This wader occurs in groups each of about 20 individuals in damp and stony areas with scarce and low vegetation beside the wetland of Wadi Gaza in winter months.

Spotted Redshank *Tringa erythropus*: The bird was seen in only two visits to the wetland region of Wadi Gaza in October and November, 2003.

Redshank *Tringa tetanus*: This wader is characterized by its orange-red legs. It occurs in winter months in the area of the open wetland and shallow

shores. It was uncommonly seen and a maximum number of 10 individuals was observed in February 2004.

Marsh Sandpiper *Tringa stagnatilis*: This bird is a winter and summer visitor or probably resident. It was seen in the shore of wetlands and wastewater pools in Wadi Gaza. A maximum number of 20 individuals was seen in September, 2003.

Green Sandpiper *Tringa ochropus*: About 40 individuals were seen in one group in March, 2003 in the wetland margins with muddy substrates.

Common Sandpiper *Actitis hypoleucos*: The bird was seen in groups ranging from 3 to 14 individuals wading in the vegetated muddy shores of the wetland ecosystem of Wadi Gaza. The species was encountered in summer and early autumn months.

Mediterranean Gull *Larus melanocephalus*: All gull species encountered in the Gaza Strip are coastal birds with some that may occur in inland sewage and wetland waters. The Mediterranean Gull was encountered scarcely in very low populations in the wetland ecosystem of Wadi Gaza.

Black-headed Gull *Larus ridibundus*: This is the most commonly gull species seen in Wadi Gaza wetland particularly in winter. The most encountered number was 200 individuals in 29.10.2003, which was a windy day with scattered clouds. They were seen flying forth and back between the Mediterranean and the wetland of Wadi Gaza. However, many individuals were seen swimming for short time or roosting in the wetland of Wadi Gaza.

Lesser Black-backed Gull *Larus fuscus*: This bird was seen scarcely in very low populations during some winter months. The maximum number encountered was 12 individuals in 18.9.2003 in the wetland, sewage lagoons and the seacoast.

Herring Gull *Larus argentatus*: Only two and three individuals of the bird were seen in January and February of 2004, in the Mediterranean coast and Wadi Gaza wetland respectively.

Yellow-legged Gull *Larus cachinnans*: Only two individuals of this species were seen in two separate visits to the wetland of Wadi Gaza in winter months.

Great Black-backed Gull *Larus marinus*: Very few individuals (2-4) were seen during winter months of 2004 on the seacoast of the Mediterranean.

Gull-billed Tern *Gelochelidon nilotica*: It is seen in low numbers (4 or less) in winter of 2002 and 2003 near the coast or flying over of the wetland of Wadi Gaza.

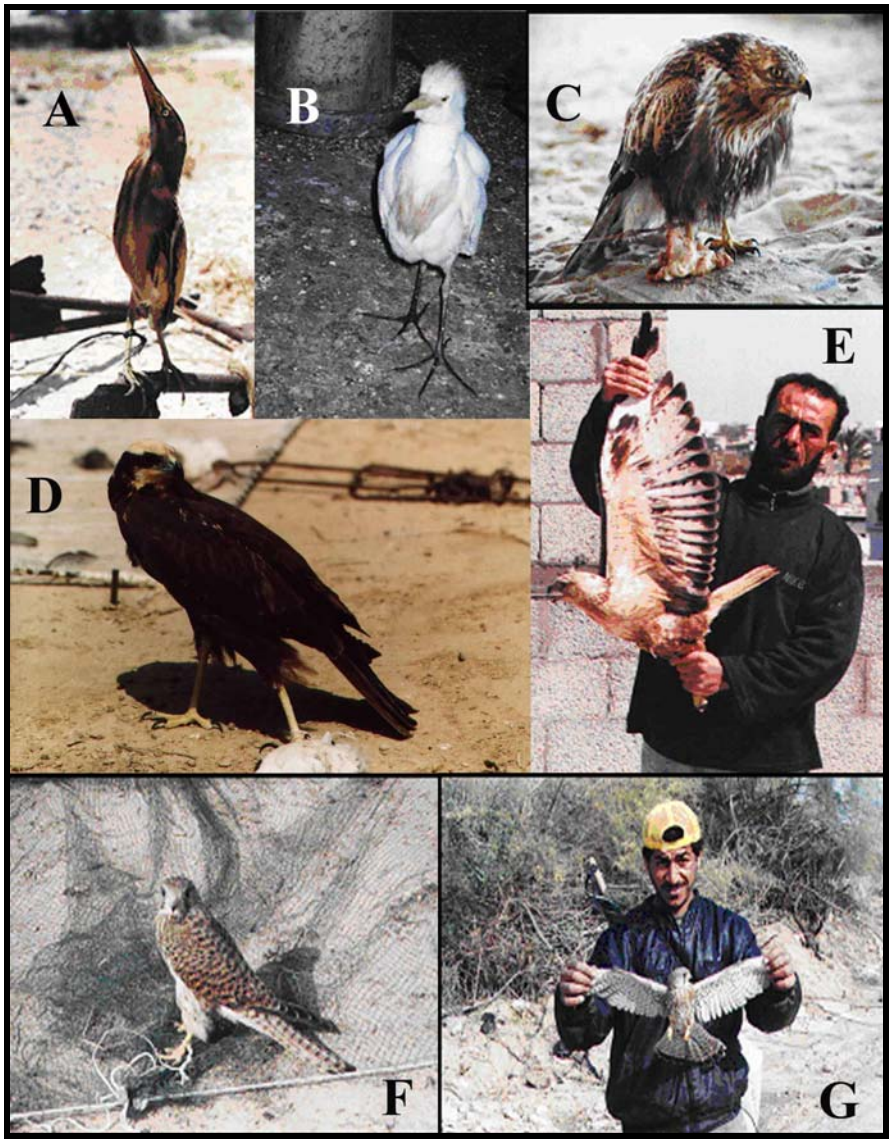

Figure 6: Birds of Wadi Gaza: (A) Little Bittern *Ixobrychus minutus;* (B) Cattle Egret *Bubulcus ibis*; (C) Black Kite *Milvus migrans*; (D) Marsh Harrier *Circus aeruginosus*; (E) Long-legged Buzzard *Buteo rufinus*; (F) Lesser Kestrel *Falco naummani* and (G) Common Kestrel *Falco tinnunculus*

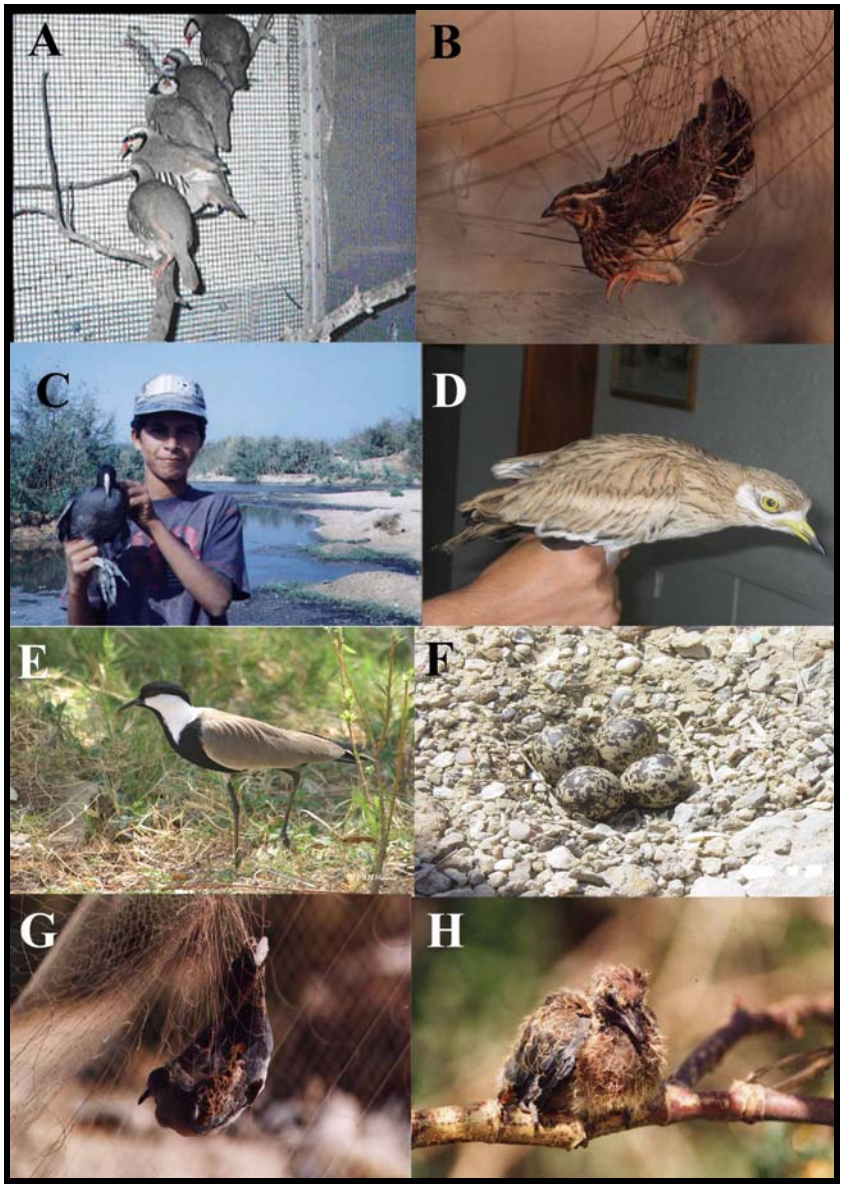

Figure 7: Birds of Wadi Gaza: (A) Chukar *Alectoris Chukar*; (B) Common Quail *Coturnix coturnix*; (C) Coot *Fulica atra*; (D) Stone Curlew *Burhinus oedicnemus*; (E-F) Spur-winged Plover *Hoplopterus spinosus* and its ground nest; (G) Turtle Dove *Streptopelia turtur* and (H) Laughing Dove *Streptopelia senegalensis* – juvenile

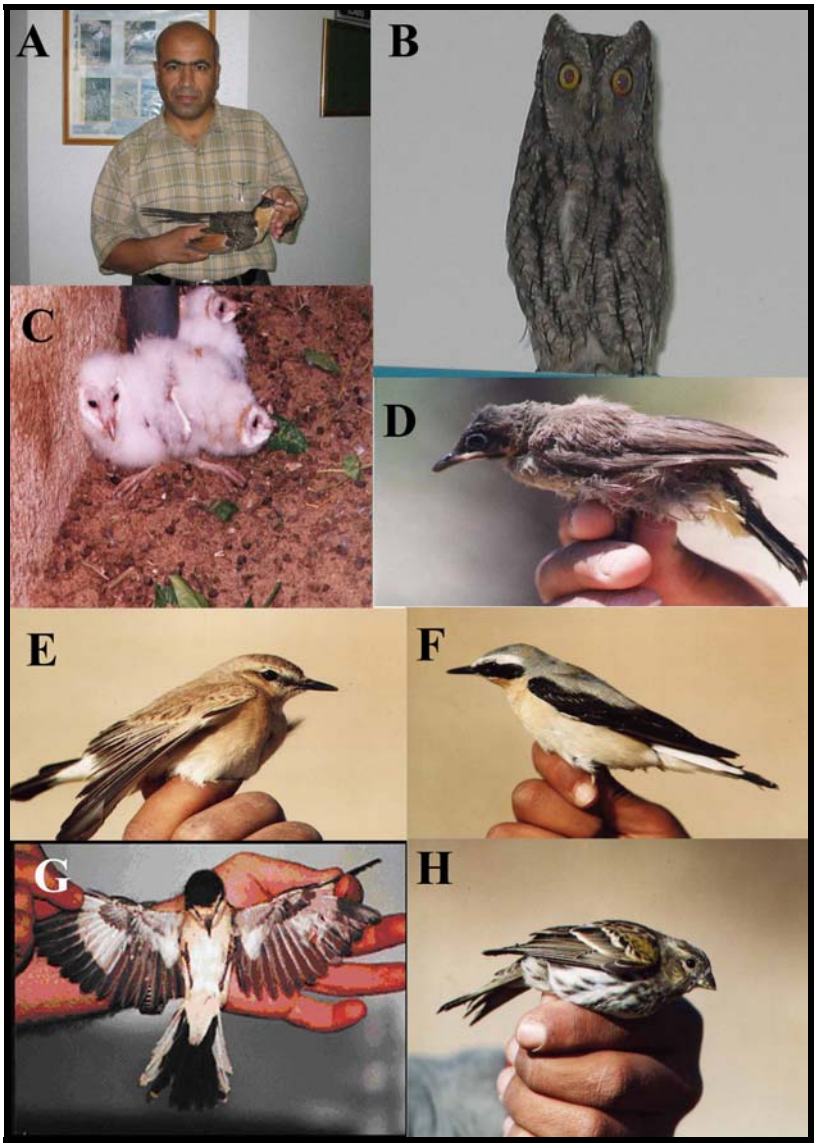

Figure 8: Birds of Wadi Gaza: (A) Great Spotted Cuckoo *Clamator glandarius*; (B) European Scops Owl *Otus scops*; (C) Barn Owl *Tyto alba* – juveniles; (D) Yellow-vented Bulbul *Pycnonotus xanthopygos*; (E-F) The female and male of Northern Wheatear *Oenanthe oenanthe*; (G) Masked Shrike *Lanius nubicus* and (H) European Serin *Serinus serinus*

Common Tern *Sterna hirundo*: This species was rarely seen in three visits to the wetland and near Mediterranean coast during summer months (April-June, 2003).

Little Tern *Sterna albifrons*: This species is a summer visitor where a maximum number of 7 birds was seen in late April, 2003 in the wetland of Wadi Gaza and the near coastal areas.
Whiskered Tern *Chlidonias hybridus*: Only two individuals of this species were seen in 13.9.2003, swimming in the wetland of Wadi Gaza.
White-winged Black Tern *Chlidonias leucopterus*: Very few numbers (4-6) of this species was seen in three separate visits during July to September, 2003 in the wetland of Wadi Gaza and the near coastal area.
Common Swift *Apus apus*: A maximum number of 12 individuals was seen in site I of Wadi Gaza in May, 2004.
Rock Dove (Pigeon) *Columba livia*: This species is one of the commonly seen birds throughout the year in Wadi Gaza mainly in flocks. The numbers usually seen ranged between 8 and 40. The habitats included agricultural fields, public buildings and places, near places of stored crops and in rocky mountainous and terrains.
Collared Dove *Streptopelia decaocto*: Only two individuals of this species were seen in 25.3.2004 near the wetland of Wadi Gaza.
Turtle Dove *Streptopelia turtur*: The Turtle Dove is commonly seen in low numbers throughout the year in Wadi Gaza two sites. A maximum number of about 30 individuals was seen in 22.4.2004. The species is common in cultivated fields with open woods, clumps of trees and gardens. In 19.9.2004, an individual was seen captured using the same mist nets used to catch Quails *Coturnix coturnix* (Figure 7G).
Laughing (Palm or Senegal) Dove *Streptopelia senegalensis*: The Laughing Dove (Figure 7H) is commonly seen year round with an average number of about 25 birds per visit. This species occurs in cultivations, villages and buildings, rocky and flat areas in the vicinity of Wadi Gaza. The nests are built on Tamarisk, citrus and olive trees and usually containing two eggs. Similar to the Turtle Dove, the eggs, fledgling and the adults of this species are really under threat due to egg collection, nest destruction and over-hunting of adults for meat.
Great Spotted Cuckoo *Clamator glandarius*: Only two individuals of the Great Spotted Cuckoo were seen as singles in April and May, 2004 in agricultural orchards lying in site II of Wadi Gaza. Recently, one juvenile individual was hunted in site I and brought to the Biology Department, Islamic university of Gaza in 28.5.2005 (Figure 8A).
European Scops Owl *Otus scops*: The European Scops Owl (Figure 8B) was not seen in the field, but single individuals were brought by Wadi Gaza resident to the Biology Department, Islamic University of Gaza in April and May, 2004 and in April, 2005.

Little Owl *Athene noctua*: In spite of the fact that single individuals (N=4) of the species were rarely seen by the surveyor in scattered months, the bird seems to be found throughout the year as mentioned by residents in Wadi Gaza area. The bird inhabits holes found in trees or even the cliffs on either banks of Wadi Gaza, mainly in site II. In a very recent visit conducted in 7.6.2005, a Little Owl was found standing at the gate of a hole in the eastern cliffs of Wadi Gaza.

Barn Owl *Tyto alba*: This nocturnal Barn Owl seems to be the commonest owl species in Wadi Gaza, although it is usually seen in very low numbers. The presence of the species may be identified by the male's distinctive call at night. A yearly average number of 7 individuals were brought by students and local people to the Biology Department, Islamic University of Gaza. The nests are built in cavities of tree holes, barns and old buildings. In 1.5.2005, a newly discovered nest was identified by the surveyor with the help of the building's owner in an un-used downstairs in Wadi Gaza (Figure 8C).

White-breasted Kingfisher *Halcyon smyrnensis*: The White-breasted Kingfisher could be detected in an area by hearing its loud and distinctive calls.It was recorded throughout the year as it was uncommon in agricultural fields, wetlands and other water bodies and streams. A maximum number of 8 individuals was seen during two visits to Wadi Gaza conducted in May and September, 2003. Two birds were seen dead in Wadi Gaza as well. It nests in holes made in earth cliffs near the wetland and in the eastern parts of Wadi Gaza.

Common Kingfisher *Alcedo atthis*: The bird is uncommonly found year round. In most positive visits for this species, a number of 2-6 individuals were mostly recorded in sewage channels in Wadi Gaza. In one visit carried out in 5.9.2004, the surveyor was able to count about 25 individuals. The bird was seen sitting for long periods on branches hanging out over the water. It occurs mostly in flowing streams, ponds, wetlands and small ditches.

Pied Kingfisher *Ceryle rudis*: This resident and uncommon species was seen in very low numbers ranging from one to three per positive visit. The species was known for its white and black plumage when perching on a solid object or a shrub in open waters or the vegetated shores of the Wadi Gaza wetland.

European Bee-eater *Merops apiaster*: This beautiful bird species was recorded in both Wadi Gaza sites in small numbers in winter and summer months throughout the year, with highest count of 25 individuals on 1.10.2003. The nests are built in excavated holes in earth banks, hillsides

and steep eroded faces. The bird occurs in agricultural fields and shrubby wetland of Wadi Gaza.

European Rollar *Coracius garrulous*: Only 5-7 birds were seen throughout the study period, moving between different perches including trees of citrus orchards and telephone and power lines.

Hoopoe *Upupa epops*: This beautiful bird was found nearly in all months and in both sites of Wadi Gaza. It is a rare bird, common in cultivated areas with a mixture of open woods, parks, gardens, pastures and olive plantations which are very common in the Gaza Strip. The bird was usually found as singles, with a maximum number of about 10 individuals was counted twice on 8.8.2003 and 4.9.2003.

Syrian Wood-pecker *Dendrocopos syriacus*: This bird was observed five times throughout the study period as singles in gardens, parks and around clumps of trees. It nests in holes made inside tree trunks and dry stems.

Crested Lark *Galerida cristata*: This is a common bird species found in Wadi Gaza both sites throughout the year; mainly in open and dry landscapes, farmlands and newly cultivated areas. The Crested Lark is hardly seen due to its camouflaging plumage with the background or the soil color it stands on, but it is easily identified by its loud and musical calls. The bird was usually seen in pairs or small parties; with a maximum number seen was 30 in January, 2003.

Skylark *Alauda arvensis*: This species was seen in numbers ranging between 3 and 4 in winter months of 2003, though a single bird was seen in May, 2004.

Barn Swallow *Hirundo rustica*: This is a common species in Wadi Gaza and other rural and urban areas of the Gaza Strip. The bird was commonly seen flying or roosting on reeds or Tamarisk plantations or on telephone wires in groups near the wetland of Wadi Gaza. Maximum records of the bird ranged between 50 and 70 in various months throughout the year.

Yellow Wagtail *Motacilla flava*: The Yellow Wagtail reaches the area at the beginning of spring and may extend to autumn months. It is commonly found in the Wadi bed, pastureland, shrubby areas and agricultural fields adjacent to Wadi Gaza. A maximum number of about 80 individuals was counted in September, 2003. Like other wagtail species, the bird was usually seen feeding actively on the ground.

Citrine Wagtail *Motacilla citreole*: The Citrine Wagtail is a summer visitor, though uncommon, inhabiting the wetland, the Wadi bed and agricultural areas. A maximum number counted was 20 in March, 2004.

White (Pied) Wagtail *Motacilla alba*: The White Wagtail is the most commonly seen Wagtail species in Wadi Gaza ecosystem in terms of

numbers. It is a winter visitor inhabiting most habitats such as wetlands, open areas, agricultural areas, pastureland and the Wadi Gaza banks. The maximum counted number was 70 during December, 2002. This species is usually hunted by children in the Gaza Strip.

Yellow-vented Bulbul *Pycnonotus xanthopygos*: The Yellow-vented Bulbul (Figure 8D) is a common bird species in Wadi Gaza throughout the year. With its songs, it is a characteristic bird of gardens, orchards and shrubby wetlands in the Gaza Strip. Three nests, each containing 3 purple-colored eggs were found in an olive orchard in Wadi Gaza. The bird is considered as a pest by local farmers due to its habit of feeding on fruits. A maximum number of about 100 individuals was counted in February, 2003. Many of these birds were found hunted or dead with their heads cut.

European Robin *Erithacus rubecula*: The bird is a winter visitor usually seen hopping on the ground. A maximum number of 15 was seen on 18.12.2003, while other numbers ranging between 1-10 were seen in other winter months. The bird inhabits grassy lands, shrubby wetlands and agricultural fields of Wadi Gaza.

Bluethroat *Luscinia svecica*: The bird was more obvious in reedbeds and dense vegetation bordering wetlands of Wadi Gaza. Maximum counted numbers ranging between 30 and 35 birds were encountered during November, 2003. Many Bluethroats were seen either hunted by children or dead with their heads cut.

Common Redstart *Phoenicurus phoenicurus*: This bird was seen in Wadi Gaza among *Tamarix* bushes and shrubs and the low vegetation bordering the wetland and in agricultural fields. The bird is a winter visitor with highest counts of 5 individuals in two occasions during October and November, 2003.

Stonechat *Saxicola rubetra*: This bird was seen in four visits to Wadi Gaza among bushes and the low vegetation bordering the wetland and in agricultural fields. A highest count of six individuals was recorded in 15.2.2004.

Isabelline Wheatear *Oenanthe isabellina*: Only two individuals of this species were identified during an early morning visit to the seacoast of the Mediterranean near Wadi Gaza in September 2003, where hunters trapped them together with Quails using mist-nets.

Northern Wheatear *Oenanthe oenanthe*: The Northern Wheatear (Figure 8E and F) was seen inhabiting pastures, agricultural fields, heaths and Wadi beds. The bird was recorded in autumn and winter months, with highest count of 20 on September 2003.

Black-eared Wheatear *Oenanthe hispanica*: It is rarely seen in the field with a maximum count of 4 was recorded in June 2003. Other counts of 3 and 1 were recorded in September 2003 and 2004, respectively.
Blackbird *Turdus merula*: The bird seems to be familiar to most inhabitants of Wadi Gaza. It is found year round, inhabiting gardens, parks, dense agricultural fields and citrus orchards and sedges. It breeds in all types of woodland with rich undergrowth, with the nest containing 4 blue-colored eggs as seen many times by the surveyor. A maximum count of 15 was seen in June 2003.
Song Thrush *Turdus philomelos*: This species has nearly the same size, feeding habits and habitats of the Blackbird, but the difference is its summer distribution. The maximum counted numbers of the species were 4 in both May 2003 and April 2004.
Graceful Prinia (Warbler) *Prinia gracilis*: In spite of its small size, the Graceful Warbler is well known to Wadi Gaza inhabitants year round. In both sites of Wadi Gaza, the species was found as singles or in small groups ($N \leq 6$), inhabiting areas with scrubby ground vegetation and often at marsh edges with rushes and tamarisks. The maximum counted number of the species was 24 in August 2003.
European Reed Warbler *Acrocephalus scirpaceus*: This species was seen in most months year round in Wadi Gaza, mainly at the marsh reedy edges and the tamarisk bushes. Usual counts of the species ranged between 5 and 13, with maximum counts of 15 individuals were recorded in August and November, 2003.
Olivaceous Warbler *Hippolais pallida*: This rare Warbler species was seen in Tamarisk bushes and agricultural orchards with olive plantations in Wadi Gaza. The highest counts of the bird were 6 in May, 2003 and August, 2004.
Olive-tree Warbler *Hippolais olivetorum*: It is similar to the Olivaceous Warbler in terms of habitat, status and rarity. A maximum count of 11 individuals was recorded in September, 2003.
Blackcap *Sylvia atricapilla*: The highest count of this species was 5 individuals in May, 2003, although other counts ranging between 1 to 4 were recorded in other months extending from February to August. The bird occurs and conceals in agricultural lands and wild shrubby habitats of Tamarisks in both Wadi Gaza sites.
Chiffchaff *Phylloscopus collybitta*: This common species was recorded in numbers ranging from 2 to 10, nearly in most months in Wadi Gaza, with maximum count of 22 in 8.8.2003. The bird inhabits mixed tree and shrub species at the marsh edges.

Spotted Flycatcher *Muscicapa striata*: This species was seen as singles in Wadi Gaza during summer, with highest count of 4 individuals in April, 2004. Only 10 individuals were recorded throughout the study period. The bird occurs on different trees, shrubs and vegetated areas in Wadi Gaza.

Great Tit *Parus major*: This species is a summer visitor, occurring and breeding in agricultural fields and citrus, almond, and fruit orchards in Wadi Gaza. In 1.5.2005, a nest containing about 8 juveniles was noticed built inside a carpet left coiled on a citrus tree. The maximum counted number of the species was 18 on 16.5.2003.

Palestine Sunbird *Nectarinia osea*: The Palestine Sunbird is the only endemic bird species in the Gaza Strip. It takes nectar from flowering trees and shrubs; mainly the Tree Tobacco *Nicotiana glauca*, which is very common in Wadi Gaza. The nest (N=7) of this species containing three white small eggs was found hanging among the small leaves of an olive tree in orchards bordering Wadi Gaza. The bird was usually seen in pairs throughout the year. The maximum counted number was 20 individuals in March 2004. Some children were found to catch some of these birds for fun.

Lesser Grey Shrike *Lanius minor*: This species was rarely seen in Wadi Gaza both sites during summer months. It was found in cultivated areas with trees and shrubs. The maximum recorded number of the species was 4 in July 2003.

Great Grey Shrike *Lanius excubitor*: It resembles the Lesser Grey Shrike in occurrence, habitat and rarity where the highest count was 3 in April 2004.

Woodchat Shrike *Lanius senator*: This species was rarely seen in Wadi Gaza in summer and spring months, mainly in the dry shrubby areas of eastern Wadi Gaza, cultivated areas, olive orchards and near the wetland. The maximum counted number was 6 in 11.3.2004.

Masked Shrike *Lanius nubicus*: The highest number counted was 5 in August 2003 and September 2004. The bird was found in agricultural fields, dry open and shrubby areas and wetland region of Wadi Gaza. Two specimens of the bird were captured in Wadi Gaza in 7.9.2004 and 16.9. 2004 and transferred to the Biology Department, Islamic University of Gaza, where they were photographed (Figure 8G).

Hooded (Carrion) Crow *Corvus corone*: The highest number of the Hooded Crow recorded in both sites of Wadi Gaza was 40 in September and November, 2003. More than 10 birds were usually seen in the wetland area fighting with the Spur-winged Plover *Vanellus spinosus* while the latter was

trying to protect its nesting and breeding sites. The bird was commonly seen in great numbers foraging in mixed flocks with the Cattle Egret in shallow wastewater ponds lying in the Wadi bed. The bird usually occupies the highest canopy of trees and shrubs.

Starling *Sturnus vulgaris*: The Starling was rarely seen in numbers of less than 3 individuals in the cultivated fields surrounding Wadi Gaza during winter months. The total recorded individuals throughout the study period were 13; with a maximum number recorded was 4 in February 2004.

House Sparrow *Passer domesticus*: The House Sparrow was the most abundant and most commonly seen bird species in Wadi Gaza. The bird lives in or near human habitations and is very active, searching the ground for grains and insects. The bird in named locally as "*Dwiri*" and it is the most common hunted bird in the Gaza Strip for meat. In all visits to Wadi Gaza, the bird was counted in tens and sometimes in hundreds. The nests of the House Sparrow are usually built in holes and crevices in buildings and sometimes on trees and bushes. The nest often harbors 5-6 eggs (N>20).

Spanish Sparrow *Passer hispaniolensis*: This bird species has nearly the same habitats of the House Sparrow. It was rarely recorded in Wadi Gaza. It seems to occur nearly in all months, with the highest number recorded (N=15) was in August 2004.

Chaffinch *Fringilla coelebs*: All Finches and Serins are small-sized birds and accordingly they were rarely seen in the field by the surveyor. Chaffinch was very scarcely seen during the winter months of 2003/2004. Only 17 individuals were recorded throughout the study periods inhabiting shrubby wetlands, parks, gardens and solitary trees inside cultivated areas in Wadi Gaza. The maximum number seen was 9 in November 2003.

European Serin *Serinus serinus*: The European Serin (Figure 8H) was seen hunted only twice in winter months in 5.11.2002 as a single bird and in 1.1.2003 as 3 birds.

Syrian Serin *Serinus syriacus*: The maximum recorded number of the species was 4 in November 2003. All recorded birds were found hunted in winter seasons (N=9).

Greenfinch *Carduelis chloris*: The Greenfinch is a winter visitor and it was seen eight times as either free on bushes or hunted in Wadi Gaza area. The maximum counted number of the species was 7 during November 2002.

Goldfinch *Carduelis caduelis*: During the last 3-4 decades, the Goldfinch was common as reported by Wadi Gaza inhabitants. Nowadays, it is very rare due to its intensive hunting and habitat destruction. The species was

rarely seen by the surveyor in the wild (N=2), in stead it was seen captured by locals (N=7). A single Goldfinch may cost U.S. $30-40. It was usually purchased and caged by Palestinians due to its very nice and distinctive songs. The species occurs naturally in shrubby areas, gardens, parks, and fruit orchards. The maximum number seen in one day was 3 in September and November 2003.

Linnet *Carduelis cannabina*: The Linnet was seen in cultivated areas and scattered bushes (N=13), with the maximum observed number was 4 in November 2002 and 2003. Many birds were seen captured and caged by hunters in Wadi Gaza area.

Siskin *Carduelis spinus*: Few numbers of the bird were seen in cultivated areas and scattered bushes in Wadi Gaza. The maximum number observed was 10 in November 2003. Most of these birds were seen captured and caged by hunters.

Desert Finch *Rhodospiza obsolete*: The four birds recorded throughout the study period were captured by hunters near the wetland ecosystem of Wadi Gaza.

Discussion

The location of Palestine at the terrestrial meeting point between Asia, Europe and Africa and the diversity of the country's climatic zones facilitate the interaction and spread of plants and animals of the three continents. This diversity is nurtured also by the abruptness with which climatic zones; desert, steppe, Mediterranean woodland and even oasis adjoin one another in this compact geographical area (Isaac & Gasteyer, 1995). The Gaza Strip which is located at the southern portion of the Palestine coast along the Mediterranean Sea harbors a variety of wildlife including terrestrial and aquatic forms. Wadi Gaza provides habitats and multi-purpose niches for a variety of flora and fauna as indicated by Abd Rabou (2005). Wadi Gaza Wetland is an important site for migratory birds along the Middle East flyway. Dense concentration of migratory birds occurs over the Gaza Strip during spring and autumn migration seasons (Euroconsult/IWACO, 1994). Many species use the coastal and wetland habitats of Gaza as a stopover point before continuing their annual migration (MedWetCoast, 2003).

The relatively large number of bird fauna in Wadi Gaza and its wetland could be attributed to ecosystem diversity where Wadi Gaza is neighboring to various ecosystems and landscapes such as the sea coast, sand dunes, natural vegetation and agricultural orchards. These ecosystems provide birds with all needs; shelter, fuel, food, nesting and resting sites. The location of the study area supports such an occurrence of birds as well. The results

reinforce the necessity of long-term inventories in order to understand the dynamics of bird communities in the study area. It is expected that the population over-crowding in a very limited area and the intensive and extensive application of infrastructural and developmental projects are major factors contributing to the gradual decline of all levels of biodiversity (landscape, ecosystem, species and genetic) in the area. Since the Palestinian Uprising in September 2000, the uprooting of vast areas whether natural or cultivated for claimed Israeli security reasons had its major impact on wildlife ecology in the area. The expansion of the Israeli settlements at the expense of natural and agricultural lands and the continuous Israeli military operations make the life of the wild animals risky.

The decline of many bird species indicated by most of Wadi Gaza inhabitants could be attributed to anthropogenic factors including overpopulation and residential expansion at the expense of natural ecosystems, lack of awareness and environmental education, destruction and transference of ecological habitats into cultivated ones, wastewater, over-use of pesticides, over-hunting and poor implementation of environmental laws and legislations. According to D'Andrea *et al*. (1999), the replacement of natural habitats by cultivated areas has been changing the structure of animals and plant communities, chiefly in relation to the composition and abundance of species. Moreover, wastewater is an actual problem both to humans and wildlife and the environment as well (Abu Shaban, 2002). This could be attributed to the pathogens found in the wastewater and the build-up of toxins through food chains and webs in aquatic habitats where wastewater is drained (Donald *et al.,* 1999 and Gopal, 1999). A study of bird species numbers, in the Houghton Lake Wetland, USA, has showed that discharging of wastewater into the lake was affecting adversely bird species and numbers (Hanowski & Niemi, 1993).

Poaching and hunting of wildlife are common practices in Wadi Gaza and the Gaza Strip. In most visits, people were seen to use different means to hunt and capture wild birds. Due to their faunal richness, wetlands seem to be more exploited in terms of hunting than other ecosystems (Skinner & Zalewski, 1995). Although raptors are threatened in Palestine (Brett, 1988), their hunting was found to be a sort of sport and commerce in Wadi Gaza area. Also, the hunting activities of the Common Quail *Coturnix coturnix* were intensive in the area, and according to Euroconsult/IWACO (1994) and UNEP (2003), this hunting is the most visible of such activities in Wadi Gaza and along the Mediterranean coast of the Gaza Strip. In South Africa, Quail hunting is also a common practice and large numbers of the bird are

hunted annually (Kerley *et al.,* 2000). Such illegal hunting or over-hunting in developing countries has resulted in that many wildlife species are threatened (Yom-Tov, 2003). In contrast, wildlife in Israel has legal protection and hunting is allowed only for animals that are either classified as agricultural pests or are common (Mendelessohn & Yom-Tov, 1988). Despite that, the poaching and hunting practices by Thai workers in Israel imposed negative impacts on wildlife and biodiversity resources (Yom-Tov, 2003). In the light of these findings, it is the responsibility of the Palestinian authorities to regulate hunting activities through posing environmental laws and legislations in order to protect wildlife resources in Palestine.

The number of 118 bird species encountered in Wadi Gaza Nature Reserve exceeds in about three times (76.6%) the number of all other terrestrial vertebrate fauna (15 mammals, 18 reptiles and 3 amphibians) recorded in the area (Abd Rabou, 2005). This implies that Wadi Gaza Nature Reserve played a vital role in harboring bird fauna due to its geographical position as a bottleneck for migratory birds coming from Eurasia to Africa and vice versa. Bird faunas are an important component of many ecosystems as they are one of the most conspicuous groups in any fauna (Pomeroy, 1992). They can be a practical choice as bioindicators, given the ease of observing species, most of which are diurnal and vocal (Francl and Schnell, 2002). More or less figures were encountered in many studies carried out in different nature reserves and national parks in different Middle East, African and Asian countries (Hamad, 1998; Wang *et al.,* 2000; Sert and Erdogan, 2004; Evans *et al.,* 2005). These studies revealed the importance of reserves and parks in harboring and conserving bird fauna including endangered species of which many facing possible extinction.

The current survey recorded the presence of 49 (41.5%) aquatic bird species belonging to the orders; Pelecaniformes, Ciconiiformes, Anseriformes, Cruiformes, Charadriiformes and Coraciiformes. This considerable number is attributed to the hydric nature of the western part of Wadi Gaza where the wetland is located and to the wide range of shallow and deep water bodies exploited by a variety of waders, marine and coastal birds (Harrison and Greensmith, 1993 and Jonsson, 1999). The location of Wadi Gaza near the Mediterranean Sea is also a promoting factor for sea and coastal bird occurrence. The newly created Agmon wetland in the Hula Valley, northern Palestine, has succeeded in attracting a large variety of water birds as it provides foraging, nesting and roosting habitats to 180 bird species (Ashkenazi and Dimentman, 1998 and Shy, 1998). Many studies were carried out in ponds, dams and other wetland systems in Turkey revealed significant and considerable numbers of bird fauna (Erdogdu, 2001; Aslan

and Kiziroglu, 2003; Karakas and Kilic, 2004 and Perktas and Ayas, 2005).
The Spur-winged Plover *Hoplopterus spinosus* is an actual breeder in different localities of the Gaza Strip including Wadi Gaza and its near wetlands, sewage lagoons and agricultural fields. The breeding habits of the Spur-winged Plover were studied in similar ecosystems in the Gaza Strip (Al-Safadi, 1997) and Sudan (Hassan, 2001). The ground nests made by the species around the wetland ecosystem of Wadi Gaza and inside the agricultural fields are usually destroyed by people and herds of sheep.
The recorded 41 passerine species constitutes 34.7% of all birds encountered in Wadi Gaza. The usual small size of passerine species and the diversity of environments and habitats they occupy sometimes make them hidden and as a result unseen by the surveyor and thus not recorded. It is worth mentioning that as many as 12 small bird species were seen but could not be identified by the surveyor during the study period because of their small sizes and high mobility. This necessitates the importance of conducting more studies and surveys. Of the passerines, the Palestine Sunbird *Nectarinia osea* is the only endemic species in Palestine as it inhabits different environments rich in flowering plants (Porter *et al*., 1996 and Shirihai, 1996) such as the Tree Tobacco *Nicotiana glauca* which constitutes a major food source for the species in the east Mediterranean (Tadmor-Melamed, 2004). The House sparrow *Passer domesticus* had the highest abundance in the area, compared to other bird species, because of its feeding habits and high reproduction affinity. The bird exploits a wide range of food materials and nesting places in different habitats including the urbanized localities (Jonsson, 1999).
Chukars *Alectoris chukar* are common residents in the Gaza Strip exploiting various habitats; particularly agricultural fields, shrubby sand dunes and Wadi beds. In spite of that, Alkon (1983) pointed out that nesting of Chukars was largely restricted to natural vegetation in Israel though many nests were found by the surveyor built on the ground of grapevine fields near Wadi Gaza. This could be attributed to the scarcity of naturally-vegetated areas in the Gaza Strip. No regulations of wildlife hunting were applied in the Gaza Strip (Euroconsult/IWACO, 1994) and accordingly the populations of many birds including Chukars seem to decrease. This situation is similar in the villages around Termessos National Park (Turkey), where the populations of both Chukars and Quails have shown a large decrease in the last ten years due to widespread illegal hunting (Sert and Erdogan, 2004). Doves, particularly the Rock Dove *Columba livia*, the Laughing Dove *Streptopelia senegalensis* and the Turtle Dove *Streptopelia turtur* are commonly hunted for their meat. The availability of nesting and

breeding sites and feeding habits of the doves promotes their occurrence in large populations. The easy hunting of doves could be attributed to the fact that they feed primarily at man-made sites and infrequently at natural sites.

Most raptor species were found either captured or reared at homes and this promoted the decline in raptor populations in the area. Pesticides could be another threat to raptor populations in Wadi Gaza due to their extensive and intensive application in the Gaza Strip (Abd Rabou *et al*., 2002 and Yassin *et al.,* 2002). Brett (1988) pointed out that raptor populations in Palestine were seriously affected by the extensive use of pesticides including persistent organochlorines. Similar results concerning the negative impacts of pesticides on raptors and other wildlife species were reported in Israel (Liven-Schulman *et al.,* 2004), African countries (Wiktelius and Edwards, 1997) and Canada (Mineau, 1993; Mineau and Keith, 1993 and Noble *et al.,* 1993).

The monthly average bird counts showed slightly irregular oscillating curve starting from October, 2002 and ending at September, 2004. This pattern could be attributed to climatic conditions in terms of rainy or windy days and the local movements of some species. However, the curve showed an increase in bird species counted during and after migration seasons (autumn and spring). The highest peaks were found during March and May 2004, i.e. the months following the spring migration. Similar results were pointed out by Aslan and Kiziroglu (2003) who found that quite a rich bird fauna was seen during the spring migration (between March and May) in a pond system situated on one of the migration routes of birds in Turkey. If the curve was extended to later months after the study period, a decline in the numbers and populations of species would be noticed. This was because of the massive deterioration took place to the wetland of Wadi Gaza and its surrounding vegetation.

Internationally, the importance of wetlands to biodiversity issue has lead to a process known as wetland mitigation which means wetland creation and restoration to replace wetlands lost or destroyed (Mitsch *et al.,* 1998 and Shuwen *et al.,* 2001). This could be considered as a sign to the Palestinian government and the Palestinian environmental bodies to pay more attentions to the rehabilitation and conservation of their ecosystems; particularly Wadi Gaza in order to improve the life of Palestinians through nature conservation in times all parties saying that nature is a scarce resource in Gaza Strip. Finally, the authors recommend carrying out more research on wildlife and improving cooperation of different parties to enhance the public awareness and to implement environmental laws and legislation to conserve nature and to protect wildlife.

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