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PRELIMINARY SURVEY OF TERRESTRIAL VERTEBRATE FAUNA AND PEOPLE'S AWARENESS TOWARDS WILDLIFE IN THE NORTHERN GOVERNORATE OF THE GAZA STRIP

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Abstract

Many plant and animal species have disappeared in the Gaza Strip during the last 5-6 decades. No effort has been made to stop such disappearance and/or to conserve the biodiversity. This survey deals with the terrestrial vertebrate fauna in the Northern Governorate of the Gaza Strip. The ecological awareness of people (n=75) towards wildlife was investigated using a questionnaire specially designed for this purpose. A total number of 119 terrestrial, wild vertebrate species (13 mammals, 86 birds and 20 reptiles), in addition to many localy extinct mammalian species were recorded. Many wildlife species are on their way to extinction where anthropogenic factors, including overpopulation and urban expansion, lack of environmental awareness and education, destruction of habitats, over-grazing, poaching and hunting, over-use of pesticides, poor enforcement of environmental laws and legislations, and various military operations imposed by the Israeli occupation and settlements, were found to threaten wildlife resources in the area. Although population studies have not conducted in this survey, the populations of many species appear to have diminished. The hazards imposed by wildlife on both people's health and properties were also investigated. More than three-quarters of the interviewed sample 57 (76.0%) believed in the role of the wastewater treatment facility and its effluent pond in attracting biodiversity species. The majority of respondents (86.7%) stressed the importance of implementation of environmental laws and legislation to conserve nature and wildlife. Finally, the authors recommend improving cooperation of different parties to enhace the public awareness regarding the wildlife protection.

Key words: Terrestrial vertebrate fauna, biodiversity survey, environmental awareness, Gaza Strip.

Introduction

The Gaza Strip is a coastal area covering only 365 Km^2 of the Palestinian land next to the Mediterranean sea on the edge of the Egyptian Sinai desert. It ranges in

altitude from 0 to 100 m above sea level. Rainfall in the region varies from 200 to 400 mm annually (Applied Research Institute - Jerusalem, ARIJ, 1994, and Al-Agha, 1995). Despite its small and heavily populated area, the Gaza Strip supports considerable fauna and flora diversity.Its geographical location as a crossroad between Asia, Africa and Europe,its climate and topography contribute to its wealth of biodiversity (UNEP, 2003). The agrobiodiversity in the Gaza Strip further enhances animal abundance by providing suitable habitats, breeding sites, food and shelter particularly for birds. Faunistic biodiversity of Palestine includes approximately 500 birds, 100 mammals and 120 reptile and amphibian species, in addition to 400 fish and 5-10 thousand insect species (Shtayeh & Hamad, 1997, Palestinian Institute for Arid Land and Environmental Studies, PIALES, 1996 and Palestinian Central Bureau of Statistics – PCBS, 2000a). Qumsiyeh (1996) described most of the mammals living in the Holy Land. Although flora of Palestine has been frequently studied (Zohary, 1966; Shtayeh et al., 2000; Madi et al., 2002 and Said et al., 2002), studies on faunal biodiversity in the Gaza District are very rare, and are restricted to few unpublished reports (Abd Rabou, 1999 and 2000).

Awareness of the Palestinians public regarding wildlife values, ecology and conservation has never been investigated, although several nongovernmental organizations (NGOs) and institutions have conducted some environmental awareness campigns to particular sectors of the Palestinian community. The scarcity of wildlife expertise,as well as the current Israeli occupation impede fieldwork which is necessary for both wildlife assessment and public awareness evaluation. The current study is a preliminary survey aiming at 1) documenting the biological diversity in the Northern Governorate of the Gaza Strip, 2) introducing an ecological baseline for future ecological and conservation studies, 3) assessing the people's awareness towards wildlife values and 4) drawing the attention of the scientific community, public and decision makers to this hot and neglected ecological issue.

The Study area

The present study is carried out in the Northern Governorate of the Gaza Strip (Fig. 1). It occupies an area of 60.5 Km^2 and comprises three populated cities; Beit Lahia, Beit Hanoun and Jabalia. Its population is estimated to be 160,000 for the year 2004 (PCBS, 2000b). The annual total precipitation is the highest in the Gaza Strip (400 mm). Sand in the form of sand dunes (about 20-40 m above sea level) is the major characteristic feature of Beit Lahia and Jabalia while the clayey soil characterizes Beit Hanoun. Agriculture is the backbone of people’s economy in the

area. Citrus, olives, almonds in addition to other subtropical fruits in particular strawberry and vegetables are the main crops cultivated there (Yassin & Abd Rabou, 2002). In the Northern Governorate the Beit Lahia wastewater treatment facility is located. It is a pond system (basins) situated around 4 Km east of Mediterranean Sea. The facility is overloaded without outlet to the sea, and wastewater flows to the nearby sandy areas forming a large lagoon (Tubail et al., 2004). In the area, there is a dense wood of acacia trees, and many different shrubs and weeds growing on the roads between the basins and in the crevices on the sides of the basins (Al-Safadi, 1997). Although this new anthropogenic ecosystem enriches biological diversity especially for avian species, it imposes environmental and health problems to the nearby residential area. The presence of many habitats in the area such as the citrus, olive and plum orchards, vegetable fields, Al-Shouhada cemetry with its intense vegetation (in the southeasternmost of the Northern Governorate close to the political border) and many poultry and animal breeding husbandries further enrich the biodiversity value of the region in terms of species and number.

Materials and methods

The present survey was conducted in the Northern Governorate of the Gaza Strip over a four-year period between 1999 to 2003 considering the seasonal changes of the fauna. Frequent site visits and observations and discussions with local people were used to determine wildlife species and their ecological importance. A binocular (Vivitar 35X7-15) was used for species observations. Some photos were taken in the field by a Nikon N 90 camera equiped with a zoom lens for confirmatory purposes. During field investigation, the investigator has also identified some dead animals including some avian species, and a few small mammalian and reptilian species. Furthermore, many wildlife species including doves, passerines, raptors, and even some reptiles mainly snakes that have been captured and reared by some local people were also examined and identified. In addition, several animals brought to the Biology Department at the Islamic University of Gaza by students and local people were identified. Indirect evidence was used to identify certain speices such as bird sound, rodent sail excavation heaps,tracks and droppings (Merz, 1984 and Sargent & Morris, 1999). Several guide and reference books were employed for the taxonomic identification of amphibians and reptiles (Capula, 1989; Breen, 1994; Disi et al., 2001 and Disi, 2002), birds (Vere Benson, 1984; Richardson, 1992; Harrison & Greensmith, 1993; Porter et al., 1996; Shirihai, 1996; Abu Shammalah & Baha Ed-Din, 1999; Jonsson, 1999; Cottridge & Porter, 2000 and Sibley, 2001) and mammals (Boitani & Bartoli, 1983; Qumsiyeh, 1996 and Hoath, 2003).

To assess enviromental public awareness, seventy-five residents were randomly selected and interviewed individually and their responses were recorded in specially designed questionnaires. The draft questionnaire was reviewed by professionals in the fields of environmental and biological sciences. The questionnaire was piloted and modified as necessary. Most of the people interviewed were either native-born or had been living in the region for more than 20 years. All interviews were conducted face to face by one of the authors who holds M.Sc. in environmental sciences and familiar with the people and the area, and is currently engaged in a Ph.D. program concerning wildlife ecology and management and used to teach the courses of ecology, vertebrate and invertebrate zoology. This will support the study and minimize the error bias. The questionnaire included questions related to personal profile of the participants, identity of wildlife species inhabiting the area and their importance and threats, and the ecological awareness of the people towards conserving wildlife. Mix of yes/no and open-ended questions were included in the questionnaire (Backstrom & Hursh-Cesar, 1981). During the survey the investigator used to explain to the interviewed people any of the questions that were not clear to them.

Results

I. Terrestrial vertebrate fauna of the Northern Governorate

*1. Mammals***:** The survey reported 13 wild mammals, many of which are rarely found (Table 1). All the mentioned and encountered mammalian species are residents, except those of rare ones that appear to be transient in the area. It is worth mentioning that during the last three years three jackals and one wolf were captured by local people in the Gaza Strip using special metal traps used for hunting hares. These animals were examined by the authors. Two of these jackals kept by local people seen in the zoos were found losing one of their legs and after 1-2 months, they died due to the lesions and the poor care. Local people mentioned 5 mammalian species that have flourished in the past and have disappeared during the last 4-5 decades (Table 2).

*2. Birds***:** Table 3 showed a considerable number of avian species in the area. About 86 bird species were either observed or reported by others during the survey. Many bird species were found in private collections in the Gaza Strip. Although actual population studies were not carried out in the current study, there were marked seasonal changes in species and number of birds inhabiting the study area. The majority of birds recorded were migrant species.

*3. Reptiles***:** A total of 17 species of reptiles were reported in the area, some of them were observed by the authors either being free or captured by local people (Table 4). Most of these species have been preserved in the Department of Biology at the Islamic University of Gaza. It is worth mentioning that some of the existing reptiles are in a real threat as either stated by the people or observed by the surveyors, e.g. the Desert monitor *Varanus griseus*, Land turtle *Testudo graeca* and Palestine (common) viper *Vipera palaestinae.* However, no efforts have been made to protect these species.

*4. Amphibians***:** The reported amphibian species in the area were restricted to only three frog and toad species (Table 5). It is worth mentioning that all these species have been brought to the Department of Biology at the Islamic University of Gaza for dissection purposes to biology students.

II. Public awareness towards wildlife in the Northern Governorate

Table 6 gives the personal profiles of the participants (n=75) in the Northern Governorate of the Gaza Strip. Their average age was 34.0±1.5 years old; 46 (61.3%) aged 21-40 years. Analysis of the educational status of the participants showed that 25 (33.3%) had a university degree, 25 (33.3%) had finished secondary school, 8 (10.7%) had finished preparatory school, 11 (14.7%) had passed primary school and 6 (8.0%) were illiterate. The main occupation of the participants was farming 36 (48.0%). A total of 55 (73.3%) were married; 51 (92.7%) had children (5.8±0.5).

Perception of wildlife values among the interviewed people (n=75) in the Northern Governorate of the Gaza Strip is illustrated in Table 7.

*1. Wildlife and human health***:** When asked, 'Do wild animals present a risk to human health?' 44 (58.7%) agreed. They reported that wild animals cause some diseases such as rabies, plague and itching and also transmit parasitic and viral diseases. Physical injuries as a result of falling in burrows and trenches made by the populations of rats and moles were also mentioned. One farmer claimed that an aged diabetic woman bitten by a rat, while sleeping in her small parcel, developed a case of gas gangrene. Later she was admitted to the hospital, lost her leg and eventually died. Psychic problems such as fear mainly among children as a result of encountering snakes and rats were reported. Nuisance caused by some species like spur-winged plovers, hooded crows, geckos and frogs was also mentioned.

*2. Wildlife and human properties***:** When asked, 'Do wild animals have a damaging effect on human properties?' 60 (80%) agreed. They stated that rodents like rats, mole-rats and gerbils and some birds like sparrows, bulbuls and crows attack both their cultivated and stored crops. They also mentioned that rodents, hares and crows along with dogs, cats and other domesticated animals destroy plastic tunnels and green houses and sometimes farmers' clothes. In addition, the heavy populations of rats were mentioned to damage peoples' furniture and house floor by making deep holes and burrows underneath the pavement. Chicken, ducks, pigeons and rabbits in the farm were frequently attacked by crows, barn owls, rats, mongooses and snakes and occasionally by vagrant species such as foxes and jackals as claimed by people.

*3. Dangers threatening wildlife***:** When asked, 'Do you remember any wild animals disappearing from the area?' 59 (78.7%) of the answers were yes. They mentioned examples such as Jackals, Red Foxes, Porcupines, Hyenas, Wolfs and Gazelles. The majority of the interviewed people 62 (82.7%) reported many dangers threatening wildlife and probably contributing to their disappearance. These include 1) rapid growth of human population and expansion of housing 2) over-cutting of trees and shrubs 3) Israeli deliberate demolishing of huge areas of agricultural land and orchards 4) extensive and intensive use of pesticides 5) hunting/over-hunting and deliberate killing of wildlife animals 6) depletion of sand dunes due to sand quarrying 7) fences between Israel and Gaza Strip as well as those around settlements within the strip which effectively block movement of terrestrial fauna and cut natural ecological corridors 8) different types of factories scattered in the eastern part of the Northern Governorate such as pavement, asphalt and concrete factories 9) developmental and infrastructure projects in the area and 10) disturbance due to frequent Israeli military operations in the area.

*4. Wastewater treatment facility and its impact on wildlife***:** The majority of the interviewed people 57 (76.0%) believed that wastewater treatment facility in the area do have impacts on wildlife. They mentioned that the facility and its huge effluent pond attract many animal species particularly aquatic birds. On the other hand, 18 (24.0%) of the interviewed reported some problems not related to wildlife. They mentioned mosquito problems and offensive odors caused by the effluent pond of the wastewater facility.

*5. Wildlife protection***:** Most of the participants 65 (86.7%) see that it is necessary to impose effective laws to protect wildlife. They usually compare the weak and ineffective Palestinian environmental laws with that of the Israelis.

Discussion

The study area is classified as a coastal ecosystem in a semi-arid zone. The main ecological features of the study region comprise sand dunes, relatively large orchards of citrus, olive and almond, residual jungles, acacia trees and many different shrubs. The anthropogenic features include the Northern wastewater treatment facility and Al-Shouhada cemetery with its relatively dense and varied vegetation. All provide habitats for many wild vertebrates particularly birds; the most abundant faunistic group covered in the current survey. The geographical location of Palestine in general , and the Gaza Strip in particular, as a key crossroad linking Africa, Asia and Europe further enhances the diversity of faunistic and floristic elements (UNEP, 2003). Accordingly, many of the Gaza Strip vertebrate fauna have strong affinities to vertebrates of North Africa and Afrotropical or Ethiopian zoogeographical region, they include the Egyptian Mongoose *Herpestes ichneumon*, Egyptian Fruit Bat *Rousettus aegyptiacus*, Ethiopian Hedgehog *Hemiechinus aethiopicus*, Desert Monitor *Varanus griseus* and Egyptian Cobra *Naja haje* (Qumsiyeh, 1996 and Hoath, 2003). Other species may be representative of Asiatic as well as European faunal regions. In this regard, Qumsiyeh (1996) indicated that most mammals in the Holy Land (Palestine and Jordan) have Palearctic (Europe, North Africa and North Asia) affinities, and a few have affinities to the Ethiopian (Africa south of the Sahara and southwestern Arabia) and Oriental (India and Southeast Asia) regions.

Terrestrial vertebrate fauna

The fast growing population and expansion of residential areas, the establishment of 21 enclosed Israeli settlements with wire net fence, over-hunting, destruction of the existing forested areas and sand dunes, as well as extensive depletion of natural resources contribute to the dramatic decline or the local extinction of some wild mammals over the past five decades in the Gaza Strip. Body size of mammals is an indicator of their vulnerability to human caused destruction to their natural habitats (D'Andrea et al., 1999). Therefore, the mammalian species recorded here are few and of the small size class. Most of the present species are

rodents, which are considered as pests destroying the cultivated and stored crops as well as other people's properties.

Environmental diversity of the Gaza Strip particularly in the North part provides the study area with a variety of terrestrial and aquatic birds attracted to the wastewater treatment plant and its large effluent pond in the area. Also, many coastal and marine birds such as gulls and terns are attracted to this coastal area. Birds find in orchards, crop fields and sand dunes excellent sites for their food, shelter, nesting and breeding. Birds are one of the most conspicuous groups in any fauna, and they are relatively easier to count and survey than most other wildlife (Bibby et al., 1998). They are sensitive environmental indicators, and bird surveys and counts can provide an early-warning system, allowing the health of an ecosystem to be assessed (Pomeroy, 1992). This is a vital reason standing behind several studies in different habitats and localities worldwide, e.g. national parks and agricultural areas (Hamed & Evans, 1980 and Hamed, 1998). The current survey showed many resident bird species in the Northern Governorate of the Gaza Strip of which only two birds (Chukar *Alectoris chukar* and Spur-winged plover *Hoplopterus spinosus*) have been studied in term of their breeding and behavior aspects (Al-Safadi, 1997 and 1999). During our survey, the authors observed different types of bird nests in sand dunes (e.g. Spur-winged plover *Hoplopterus spinosus*) and on trees (e.g. Laughing or Palm dove *Streptopelia senegalensis*). Although, the sky of Gaza Strip was overflowing with migratory bird species in the past, only tens of them have been observed and recorded in the present study. Urban expansion in Gaza may be the cause of the decline in number of species. Some species mainly passerines were not included here, since were not mentioned by the interviewed people in the area.

The arid to semi-arid climate and the topographic features characterizing the Northern Governorate and the Gaza Strip as, a whole make it a suitable habitat for reptiles. Although snakes play an important role in killing pests (Kochva, 1998), people in the area consider them as a source of danger without discriminating between poisonous and non-poisonous snakes and deliberately kill them. In this context, the Palestine common viper, which is endemic to this area is particularly threatened (Euroconsult & IWACO, 1994). Furthermore, Desert monitor is rarely seen and is now facing the danger of extinction. Although the Caspian freshwater turtle is present in other parts of the Gaza Strip, e.g. Wadi Gaza, it has not been recorded in our survey area. Further research is still needed to study reptiles and other wildlife populations in terms of their distribution, habitat and behavior.

The dryness of most surface water bodies in the Gaza Strip including most of Wadi Gaza wetland ecosystem threaten the amphibian populations. Only three frog and toad species were recorded in the area. Storm water collection ponds and humid areas constitute a major habitat for such species. Gabbay (1998) reported that the partial drainage of the Hula wetland in the north east of Palestine for agricultural purposes leads to habitat changes and as a result to the disappearance of the frog *Discoglossus rigriventer* along with other endemic species. However, the intensive application of agrochemicals including pesticides on wetland cultivation areas threatens more and more the ecology and species composition of these ecosystems (Donald et al., 1999).

People's awareness towards wildlife

The role of the local community in preserving wildlife is highly appreciated during the course of this work. The participatory appraisal is a means of learning from and with the local people, and this helps us in conducting this study. People in the Northern Governorate showed good intention to participate in the questionnaire interview. The low level of illiteracy recorded among the participants reflects a well educated community. This will help in enhancing the level of awareness towards wildlife and nature conservation and in launching educational environmental programs in the future. Many of the participants are farmers who are in frequent contact with wildlife.

Some wildlife contribute to transmitting various diseases to humans including West Nile fever transmitted by migratory avifauna (Rappole et al., 2000), rabies tranmitted by dogs, bats, foxes, …etc. (Meltzer & Rupprecht, 1998), plague transmitted by rodents and many other diseases and parasitic infections (Ghazi, 1990). No data on such diseases are available in Gaza Strip. People in the area usually speak about their fear of snakes, especially children. The case of aged diabetic woman death recorded in our survey is another example of wildlife threat on humans. A study conducted in Switzerland, showed an annual bite and scratch incidence rate of 325 per 100,000 population, of which only 2.4% was caused by wild animals and the rest by other vertebrate pets including dogs and cats (Matter & the Sentinella Arbeitsgemeinschaft, 1998). Activities practiced by people in the Northern Governorate such as wood and timber collection in dumps, establishment of agricultural stores as well as husbandries for livestock making them vulnerable to frequent wildlife danger. This danger seems to be great in countries rich in wildlife

resources. Treves & Naughton-Treves (1998) reported that government authorities in Uganda recorded 636 human causalities (injuries plus fatalities) caused by wildlife between 1923 and 1994, though mild injuries are more likely not to be reported.

The danger of wildlife on human properties seems to be well known to the people in the area. Rodents invade and destroy cultivated and stored crops, green houses and even home furniture resulting in severe economic damage and losses. This forced people to use various toxic materials including rodenticides causing serious morbidity and mortality among the non-target species. There is a mis-documentation in the magnitude of crop losses due to vertebrate pests in developing countries, and hence the Gaza strip. Records of frugivory from over 75 countries showed that in addition to a small number of reptiles and fishes, 1272 bird and mammalian species are known to eat figs and cause production losses (Shanahan et al., 2001). In the study area, many bird and mammalian species (doves, passerines and fruit bats) were seen to attack various fruit trees including figs, plums, dates, apples, citrus … etc.

The environment in the Gaza Strip has been severely degraded since the occupation by Israel in the 1967. Soon after the authority was handed over to the Palestinians according to Oslo agreement in 1994, intense infrastructure projects, roads and buildings constructions started on the expense of wildlife and its habitats. Absence of effective legislation for wildlife protection in the Gaza Strip further exacerbates the situation in terms of chasing, poaching and illegal hunting of wild species (Euroconsult & IWACO, 1994), over-cutting of trees and over-use of pesticides (Abd Rabou et al., 2002 and Yassin et al., 2002). Although Israel has an effective environmental law concerning wildlife protection, its guest Thai workers have engaged in illegal hunting and gathering for feeding purposes. More than 60 wild species have been found in different types of traps laid by those workers. These activities have a serious deleterious effect on the wildlife in Israel (Yom-Tov, 2003). The existing political fence around the Gaza Strip and the well-fenced Israeli settlements in the area already prevent the free movement of large mammals and wildlife in general (UNEP, 2003) and hence their disappearance from the area. Since Al-Aqsa Intifada in the year 2000 till now, Israel has demolished vast areas of wooded lands and forests including wild trees, citrus, olive and almond orchards (Palestinian Environmental NGOs Network – PENGON, 2003 and UNEP, 2003). In

this context, the impacts on the Palestinian natural systems and wildlife may appear to be of low priority when compared to the parallel human suffering caused by the current escalating conflict (UNEP, 2003). All the mentioned actions destroyed habitats and niches of wild species.

Although some participants speaking about the environmental problems imposed by wastewater treatment facility and its effluent pond on the residents, more than three-quarter of them believed in its importance for wildlife. This sewage lagoon is an important artificial aquatic habitat for water birds. It provides a good place for feeding, resting, roosting and breeding for many of waterfowls and for some amphibians, reptiles, terrestrial birds and mammals. Changes in animal populations can also occur, with an increase in pest species and scavengers at exposed untreated sewage outflows, and an increase in invertebrate disease vectors (UNEP, 2003). The build-up of toxins and pesticides in food chains in such sewage systems also threatens biodiversity. In this regard, a recent study concerning public awareness of people towards biodiversity in Wadi Gaza wetland revealed that wastewater was ranked by people to be the main cause threatening fauna and flora in this ecosystem (Abu Shaban, 2002). Further studies are needed to address the actual impacts of pollution by sewage on biota.

The poor and weak environmental situation in the Gaza Strip necessitates urgent implementation of the environmental laws and legislation for wildlife protection and nature conservation that already existed throughout the successive periods of British mandate, Egyptian governance and Israeli occupation, but actually it was not put into action in the Gaza Strip (Euroconsult & IWACO, 1994). The law should be enforced along the Gaza coastline where scores of fine nets are erected illegally to capture various birds species; mainly the quail *Coturnix coturnix* (UNEP, 2003). This urgent desire was obvious when the majority of the interviewed people agreed to impose effective laws by the Palestinian authority to safeguard the wildlife and their ecological habitats.

Conclusion and Recommendations

The current study represents a preliminary survey of wildlife resources and people's awareness towards these resources in the Northern Governorate of the Gaza Strip. The following could be concluded:

Despite its small area, the Northern Governorate seems to have a relatively high occurrence of wild vertebrate species. The diversity of ecological habitats, the geographical situation and the climatec enhance such an occurrence.

1. Regardless to its health impacts, the wastewater treatment facility in the area seems to attract more biodiversity elements specially water birds.

2. Many anthropogenic factors were found to threaten the ecological integrity of the area in terms of species population loss and even disappearance as documented for many mammalian species.

3. Mis-documentation of wildlife hazards to both humans and their properties was clear.

4. Lack of wildlife specialists, school and university education programs, and environmental laws and legislations impede such progresses in wildlife subject.

5. The people's attitude and awareness towards wildlife in the area plays a variable role in protecting some visible species.

In the light of these conclusions, we recommend the following:

1. Comprehensive ecological studies should be applied in the whole country to address both faunistic and floristic biodiversity and the hazards facing it.

2. Wildlife and biodiversity conservation in addition to other environmental aspects should be taken into consideration during the implementation of infrastructure and developmental projects. Thus, the Environmental Impact Assessment (EIA) techniques should be a part and obligatory step for approving any developmental project by the authorities in charge. Moreover, local people should be a main axis of development when applying such projects.

3. The establishment of nature reserves as the case of Wadi Gaza, sanctuaries and public zoos is highly recommended, where their role in raising ecological awareness can not be ignored or neglected.

4. The role of universities, schools, authorities, governmental and nongovernmental organizations and the cooperation of various local, regional and international parties should be highlighted through capacity building, information exchange,

awareness programs, specific educational courses and projects, field work, implementation of environmental laws and legislations. In this regard, the official and non-official media should be involved.

Table 1. Wild mammalian species reported and/or encountered in the Northern Governorate, Gaza Strip.

Family	Common Name	Scientific Name	Status*	Arabic or Local Name
Leporidae	Cape hare	*Lepus capensis*	R	أرنب بري
Erinaceidae	Long-eared hedgehog	*Hemiechinus auritus*	R	قنفذ طويل الأذن
	Ethiopian hedgehog	*Hemiechinus aethiopicus*	R	القنفذ الأثيوبي
Pteropoidae	Egyptian fruit bat**	*Rousettus aegyptiacus*	R	خفاش الثمار المصري
Muridae	House mouse	*Mus musculus*	R	فأر منزلي
	House (black – ship) rat	*Rattus rattus*	R	فأر البيوت (الأسود – المراحيض)
	Norway (brown) rat	*Rattus norvegicus*	R	فأر (بني) نرويجي
Dipodidae	Lesser Egyptian jerboa	*Jaculus jaculus*	R	اليربوع المصري الصغير (الفأر الأبيض)
Spalacidae	Palestine mole-rat	*Spalax leucodon ehrenbergi*	R	الخلد الفلسطيني – أبو عماية
Herpestidae	Egyptian mongoose	*Herpestes ichneumon*	R	نمس مصري – نسناس
Canidae	Wolf***	*Canis lupus*	-	ذئب
	Golden jackal***	*Canis aureus*	-	ابن آوى
Felidae	Wild cat***	*Felis silvestris*	-	قط (سنور) بري

* Status: R = Resident

** Although this fruit bat was recorded in the area, further studies are needed to know more about the occurrence of other existing nocturnal bat species.

*** Rare mammals: They are either reported to be seen by peoples or seen by the authors with people who are hunting them.

Table 2. Locally extinct wild mammals in the Northern Governorate, Gaza Strip.

Family	Common Name	Scientific Name	Arabic or Local Name
Canidae	Red fox	*Vulpes vulpes*	الثعلب
Hyaenidae	Striped hyena	*Hyaena hyaena*	الضبع
Hystricidae	Indian crested porcupine	*Hystrix indica*	النيص – الشيهم
Bovidae	Dorcas gazelle	*Gazella dorcas*	غزال الدوركاس
	Mountain gazelle	*Gazella gazella*	الغزال العربي

Table 3. Avifauna reported and/or observed in the Northern Governorate, Gaza Strip.

Family	Common Name	Scientific Name	Status*	Arabic or Local Name
Anatidae	Garganey	*Anas querquedula*	M	بط – حذف صيفي
	Shoveler	*Anas clypeata*	M	كيش – بط شرشير
Rallidae	Moorhen	*Gallinula chloropus*	R	دجاجة الماء
	Coot	*Fulica atra*	R	غرة
Phalacrocoracidae	Cormorant	*Phalacrocorax carbo*	M	غاق الماء – غراب البحر
Laridae	Yellow-legged gull	*Larus cachinnas*	M	نورس أصفر القدم – فضي
	Mediterranean gull	*Larus melanocephalus*	M	نورس البحر المتوسط
	Black-headed gull	*Larus ridibundus*	M	نورس أسود الرأس
	Lesser black-backed gull	*Larus fuscus*	M	نورس أسود الظهر الصغي
	Little tern	*Sterna albifrons*	M	خطاف صغير
Charadriidae	Spur-winged plover	*Hoplopterus spinosus*	R	زقزاق شامي– قطا
	Ringed plover	*Charadrius hiaticula*	M	أبو الرؤوس المطوق
	Kentish plover	*Charadrius alexandrius*	M	أبو الرؤوس الإسكندراني
Recurvirostridae	Black-winged stilt	*Himantopus himantopus*	R	أبو المغازل – كرسوع
Scolopacidae	Redshank	*Tringa totanus*	M	طيطوي أحمر الساق
	Marsh sandpiper	*Tringa stagnatilis*	M	زمار الرمل الخواض
	Ruff	*Philomachus pugnax*	M	حجوالة – الشقي
	Common snipe	*Gallinago gallinago*	M	جهلول عادي – شنقب
	Stone curlew	*Burhinus oedicnemus*	R	كروان صحراوي
Ardeidae	Cattle egret	*Bubulcus ibis*	R	أبو قردان
	Little egret	*Egretta garzetta*	R	بلشون أبيض (بيضوي) صغير
	Purple heron	*Ardea purpurea*	M	مالك حزين أرجواني
	Night heron	*Nycticorax nycticorax*	R	غراب الليل
	Little bittern	*Ixobrychus minutus*	M	الواق الصغير
Thresliornithidae	Spoonbill	*Platalea leucorodia*	M	أبو ملعقة
Ciconiidae	White stork	*Ciconia ciconia*	M	لقلق أبيض
Alcedinidae	Pied kingfisher	*Ceryle rudis*	M	السماك الأبقع / الأرقط
	White-breasted kingfisher	*Halycon smyrnensis*	R	السماك أبيض الصدر – القاوند
	Common kingfisher	*Alcedo atthis*	M	السماك الشائع – رفراف

Meropidae	European bee-eater	*Merops apiaster*	M	الورور الأوروبي
Tytonidae	Barn owl	*Tyto alba*	R	بومة الجرن – بومة بيضاء
Strigidae	Little owl	*Athene noctua*	R	أم قويق – بومة صغيرة
Falconidae	Kestrel	*Falco tinnunculus*	R	عوسق – صقر الجراد
	Lesser kestrel	*Falco naummani*	M	عويسق
	Peregrine falcon	*Falco peregrinus*	M	الشاهين
Accipitridae	Common buzzard	*Buteo buteo*	M	صقر حوام
	Imperial eagle	*Aquila heliaca*	M	ملك العقبان
	Steppe eagle	*Aquila nipalensis*	M	عقاب السهول
	Black kite	*Milvus migrans*	R	الحدأة السوداء
	Marsh harrier	*Circus aeruginosus*	R	مرزة البطائح
	Hen harrier	*Circus cyaneus*	M	مرزة الدجاج
Phasianidae	Quail	*Coturnix coturnix*	M	فر – سمان – سلوى
	Chukar	*Alectoris chukar*	R	شنار – حجل
	Helmeted guineafowl	*Numida meleagris*	D**	دجاج فرعون
Columbidae	Rock dove	*Columba livia*	R	حمام بري
	Palm (laughing) dove	*Streptopelia senegalensis*	R	يمامة ضاحكة (حمام) – حمرية
	Turtule dove	*Streptopelia turtur*	R	يمامة قمرية – حمام رقطي
	Collared dove	*Streptopelia decaocto*	R	يمامة مطوقة
Hirundinidae	Barn swallow	*Hirundu rustica*	R	سنونو – عصفور الجنة
Upupidae	Hoopoe	*Upupa epops*	R	هدهد
Picidae	Syrian woodpecker	*Dendrocopos syriacus*	R	نقار الخشب السوري
Pycnonotidae	Yellow-vented bulbul	*Pycnonotus xanthopygos*	R	بلبل أصفر العجز
Alaudidae	Skylark	*Alauda arvensis*	M	قنبرة الحقول
	Crested lark	*Galerida cristata*	R	قبرة متوجة
Motacillidae	White wagtail	*Motacilla alba*	M	ذعرة بيضاء – كركز
	Citrine wagtail	*Motacilla citreola*	M	ذعرة صفراء – سفرية
	Yellow wagtail	*Motacilla flava*	M	ذعرة صفراء – سفرية
Sylviidae	Graceful prinia (warbler)	*Prinia gracilis*	R	فسية – فسيوة
	Olivaceous warbler	*Hippolais pallida*	M	الخنشع الزيتوني الباهت

	European reed warbler	*Acrocephalus scirpaceus*	M	هازجة القصب
	Icterine warbler	*Hippolais icternia*	M	الخنشع الليموني
	Green warbler	*Phylloscopus nitidus*	M	هازجة خضراء
	Chiffchaff	*Phylloscopus collybita*	M	نقشرة ذهبية – نقشارة
Muscicapidae	Spotted flycatcher	*Muscicapa striata*	R	خاطف الذباب المنقط
Emberizidae	Yellow-throated sparrow	*Petronia xanthocollis*	M	عصفور أصفر الزور
Passeridae	House sparrow	*Passer domesticus*	R	عصفور منزلي – دوري
	Spanish sparrow	*Passer hispaniolensis*	R	عصفور أسباني – دوري أسباني
Turdidae	Black bird	*Turdus merula*	R	شحرور – دج
	Bluethroat	*Luscinia svecica*	M	مسهر – دحل
	Robin	*Erithacus rubecula*	M	أبو الحناء – أبو الحن – حمرية
	Stonechat	*Saxicola torquata*	M	أبلق الرعيان
	Isabeline wheatear	*Oenanthe isabellina*	M	الأبلق الأشهب
	Northern wheatear	*Oenanthe oenanthe*	M	الأبلق الاعتيادي
	Black-eared wheatear	*Oenanthe hispanica*	M	الأبلق أسود الأذن
Laniidae	Woodchat shrike	*Lanius senator*	M	دقناش شامي – صرد
	Masked shrike	*Lanius nubicus*	M	صرد
Necrariniidae	Palestine sunbird	*Nectarinia osea*	R	عصفور الشمس الفلسطيني
Corvidae	Hooded crow	*Corvus corone*	R	غراب بلدي رمادي
Fringillidae	Green finch	*Carduelis chloris*	R	خضر – خضيري
	Goldfinch	*Carduelis carduelis*	R	حسون ذهبي
	Linnet	*Carduelis cannabina*	M	عصفور تفاحي
	Chaffinch	*Fringilla coelebs*	M	الصغنج – عصفور ظالم – زرعي
	Siskin	*Carduelis spinus*	M	طزليك
	European serin	*Serinus serinus*	M	نعار أوروبي – بسبوس
	Syrian serin	*Serinus syriacus*	M	نعار سوري
	Desert finch	*Rhodospiza obsoleta*	M	حسون صحراوي – هرد

* Status: R = Resident, M = Migrant, D = Domesticated

****** Helmeted Guineafowl (*Numida meleagris*) was found domesticated and reared by some people in the area

Table 4. Reptile species reported and/or observed in the Northern Governorate, Gaza Strip.

Family	Common Name	Scientific Name	Status*	Arabic or Local Name
Testudinidae	Land turtle	*Testudo graeca*	R	السلحفاة الأرضية
Varanidae	Desert monitor	*Varanus griseus*	R	الورل الصحراوي
Agamidae	Agama	*Agama stellio*	R	الحردون
Scincidae	Sand skink (fish)	*Scincus scincus*	R	سقنقور الرمل
	Ocellated skink	*Chalcides ocellatus*	R	الدفان
Chamaeleon-idae	Mediterran-ean chameleon	*Chameleo chameleon*	R	الحرباء
Geckonidae	House (turkish) gecko	*Hemidactylus turcicus*	R	أم بريص
	House gecko	*Ptyodactylus hasselquistii*	R	أم بريص
Lacertidae	Bosc's lizard	*Acanthodactylus boskianus*	R	سحلية
	Fringe-toed sand lizard	*Acanthodactylus shreiberi*	R	سحلية
	Lizard	*Lacerta laevis*	R	سحلية
Typhlopidae	Blind snake	*Ramphotyphlops braminus*	R	الثعبان الأعمى
Elapidae	Egyptian cobra	*Naja haje*	R	الكوبرا المصرية
	Desert black snake (cobra)	*Walterinnesia aegyptica*	R	الثعبان الأسود الصحراوي
Boidae	Sand boa	*Eryx jaculus*	R	البوا الرملية
Viperidae	Palestine (common) viper	*Vipera palaestina*	R	الحية الزعرة الفلسطينية
	Carpet viper	*Echis coloratus*	R	حية السجادة

* Status: R = Resident

Table 5. Amphibian species reported and/or observed in the Northern Governorate, Gaza Strip.

Family	Common Name	Scientific Name	Status*	Arabic or Local Name
Bufonidae	Common toad	*Bufo viridis*	R	عجلوم شائع
Hylidae	Tree frog	*Hyla arborea*	R	ضفدع شجري
Ranidae	True frog	*Rana sp.*	R	ضفدع

* Status: R = Resident

Table 6. Personal profile for the participants (n=75) in the Northern Governorate, Gaza Strip.

Personal profile	Participants	
	No.	%
Age (mean=34.0±1.5 year)		
≤20	11	14.7
21-30	24	32.0
31-40	22	29.3
41-50	8	10.7
>50	10	13.3
Education		
University degree	25	33.3
Secondary school	25	33.3
Preparatory school	8	10.7
Primary school	11	14.7
Illiterate	6	8.0
Profession		
Farmers	36	48.0
Employees	11	14.7
Workers	11	14.7
Students	13	17.3
Others*	4	5.3
Marital status**		
Single	20	26.7
Married	55	73.3
With children (mean=5.8±0.5)	51	92.7
Without children	4	7.3

* Others include shepherds, traders and drivers.
** No widowed or divorced people were encountered.

Table 7. Perception of wildlife values among the interviewed people (n=75) in the Northern Governorate, Gaza Strip.

Question	Yes		No	
	No.	%	No.	%
Do wildlife animals have a damage effect on human health?	44	58.7	31	41.3
Do wildlife animals have a damage effect on human properties?	60	80.0	15	20.0
Are there dangers threatening wildlife animals?	62	82.7	13	17.3
Do you remember any wildlife animals disappeared from the area?	59	78.7	16	21.3
Do you think that the wastewater treatment plant in the area and its effluent pond having impacts on wildlife?	57	76.0	18	24.0
Do you think it is necessary to impose effective laws to protect wildlife?	65	86.7	10	13.3

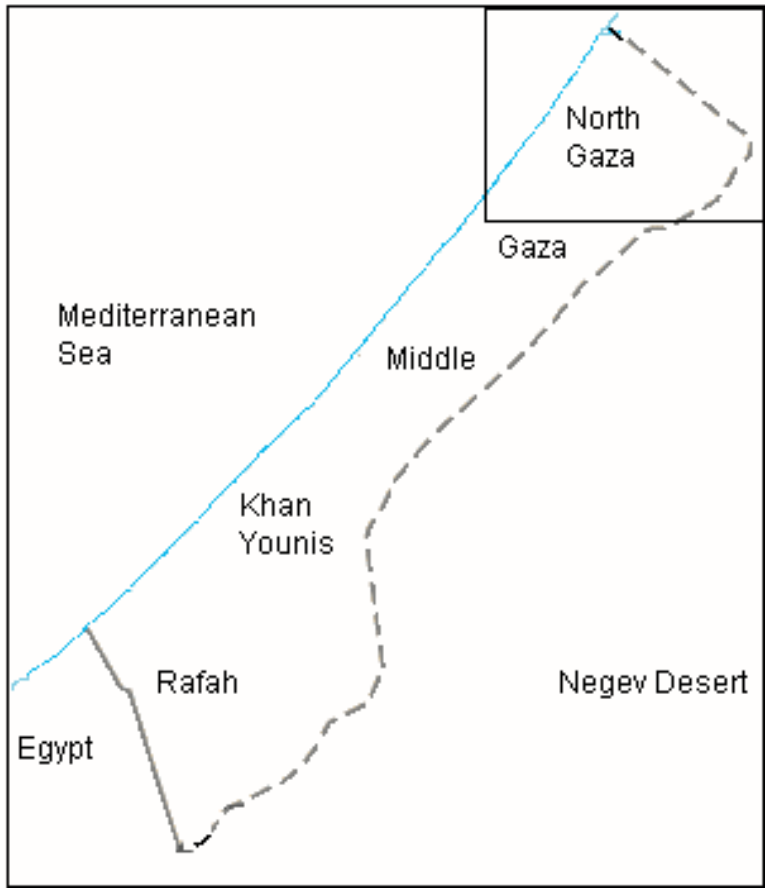

Fig. 1. The base map of the Gaza Strip showing the Northern Governorate

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m/z 301
(2.7%)

m/z 249

الملخص العربي

مسح أولي للحيوانات الفقارية البرية اليابسية و وعي الناس تجاه الحياة البرية في محافظة شمال قطاع غزة

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اختفت عدة أنواع نباتية و حيوانية في قطاع غزة خلال ال 5 – 6 عقود الماضية، و لم يبذل أي جهد يذكر لوقف هذا الاختفاء أو لصون التنوع الحيوي. يهتم هذا المسح بالحيوانات الفقارية البرية اليابسية في محافظة شمال قطاع غزة، حيث بحث الوعي البيئي للناس (n=75) تجاه الحياة البرية باستخدام استبانة صممت خصيصا لهذا الغرض. سجل ما مجموعه 119 نوعا من الحيوانات الفقارية البرية اليابسية (13 حيوانا ثدييا، 86 طيرا، 20 حيوانا زاحفا و برمائيا) بالإضافة إلى عدة أنواع ثديية مختفية كما أن عدة أنواع من الحياة البرية ستجد طريقها للإنقراض نتيجة مجموعة من العوامل البشرية التي تهدد موارد الحياة البرية في المنطقة. تشمل هذه العوامل الزيادة السكانية و الزحف العمراني، انعدام الوعي و التعليم البيئي، تدمير المواطن البيئية، الرعي الجائر، المطاردة والصيد، الإستخدام المفرط للمبيدات، ضعف تنفيذ القوانين و التشريعات البيئية، بالإضافة إلى العمليات العسكرية التي يقوم بها الإحتلال و المستوطنات الإسرائيلية في المنطقة. برغم أن الدراسات العشائرية لم تجر في هذا المسح إلا أن عشائر العديد من الأنواع انخفضت. بحثت الدراسة المخاطر التي تفرضها الحيوانات البرية على صحة الإنسان و ممتلكاته. أبدى أكثر من ثلاثة أرباع عينة الدراسة 57 (76.0%) اعتقادهم بدور محطة معالجة مياه الصرف الصحي و البرك الملحقة بها في اجتذاب العديد من أنواع الحياة البرية للمنطقة، كما أكدت غالبية عينة الدراسة 65 (86.7%) على أهمية تنفيذ القوانين و التشريعات البيئية بما يكفل صون الطبيعة و من ثم الحياة البرية. ختاما، يوصي الباحثون بتحسين التعاون بين المحافل المختلفة برفع مستوى التوعية البيئية للمواطنين بغرض حماية الحياة البرية.

الكلمات المفتاحية: الحيوانات الفقارية البرية اليابسية – مسح التنوع الحيوي – الوعي البيئي – قطاع غزة.