Hunting and Illegal Killing of Birds

Along the Mediterranean Coast of Egypt

Socio Economic Study

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Report by Nature Conservation Egypt and BirdLife International

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Executive summary

Background

Twice yearly, millions of migratory birds fly between their breeding sites in temperate and Arctic zones in northern Europe and Asia, and winter in warmer regions like western and southern Europe, the Mediterranean, and Sub-Saharan Africa. The unsustainable hunting and illegal killing of birds along Africa's Mediterranean north coast might be contributing to declines in the populations of migratory species, and constitutes a considerable challenge for bird conservation efforts, as many local communities in these areas might depend on bird hunting during the migration seasons for part of their livelihoods. Over several decades, hunting of migratory birds has taken different forms along Egypt's coast culminating in recent years in the widespread use of hundreds of kilometres of mist nets along the coastline in the autumn, all the way from the eastern to the western border.

Efforts to address illegal and unsustainable legal bird trapping have to-date been impeded by a lack of reliable statistics regarding its scope and scale, as well as a limited understanding of the social, economic and cultural importance of trapping itself amongst local communities.

Nature Conservation Egypt (NCE), under the supervision of the BirdLife International Secretariat, was awarded a small grant by the Secretariat of the African-Eurasian Migratory Waterbird Agreement (UNEP/AEWA Secretariat) based on a financial contribution provided by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, to undertake a socio-economic survey on bird hunting along the Mediterranean coast of Egypt, to understand the socio-economic dimensions of bird hunting, and assess the resource dependency and social resilience and communities' ability to cope with any future changes in regulations and conservation strategies. Survey fieldwork was conducted during the autumn season of 2015, from 9-21 September. This report delivers on Result 1.2 of the Plan of Action to Address Bird Trapping along the Mediterranean Coasts of Egypt and Libya (Emile et al., 2014).

Methodology

The primary data source for the study was a field survey including quantitative and qualitative data, preceded by a review of relevant literature (see reference list). 73 bird hunters and traders from 25 local communities, towns and cities along the coast were interviewed following a comprehensive set of questions designed and tested prior to the survey. Group discussions were also held in communities where hunters agreed to participate.

Results

- Overall, bird hunting is of highly significant socioeconomic importance for communities along the coast.
- Although not systematically recorded in the context of the study, it was estimated that at least 75% of trapping observed was illegal.
- Social and economic dependency on bird hunting was found to be considerably high, while social resilience and ability to cope with conservation strategies is varied.
- Household size, occupation and income are significant variables which affect the prominence of bird hunting in local communities.
- Economic benefits received from bird hunting vary: from representing a major income supplement to covering basic subsistence.
- There are three main hunter profiles: commercial, subsistence and cultural/recreational hunters.

Recommendations

1. To acknowledge the cultural significance of bird hunting and its importance to local communities
2. To engage local communities in decision-making regarding policy changes.
3. To enforce hunting legislation to bring the hunting of birds under effective control – through:
    a) Implementation of the recommendations from the review of hunting legislation undertaken by NCE and EEAA
    b) Development of bird hunting management plan for the Mediterranean Coast and the rest of Egypt
    c) To prohibit the use of mist nets in key areas along the coast
    d) To set up a new system to increase fines for violations of hunting legislation
4. To develop a mechanism to control, track and follow up on the legality of bird hunting permits.
5. To secure high-level political support to ensure that measures to address illegal bird killing are given a high priority
6. To mainstream the socio-economic issues of bird hunting including through:
    a) Establishment of fish farms run by community members
    b) Provision of small loans to community members for them to set up small businesses
    c) Development of governmental incentive plans to cover part of the economic loss to hunters that may occur from new conservation strategies and hunting regulations

7. To increase awareness of bird conservation through:

    a) Working with local mosques' Imams, Islamic public figures and the media, to convey the bird conservation message to local people and raise awareness against illegal bird killing

    b) Development of a bird conservation awareness-raising strategy with a focus on the younger generation

8. To improve the knowledge of law-enforcement and local authorities regarding the birds, hunting and trading of birds –particularly regarding species in trade of high conservation concern such as birds of prey.

9. To control the export of wild birds (legal and illegal).

10. To undertake further studies including:

    a) A study to investigate the export market

    b) A study of non-hunters in the same areas to understand the socioeconomic situation of the population of these areas.

Contents

List of Figures

List of tables

1. Introduction

The term “hunting” can be defined as ‘chase or search for the purpose of catching or killing” (Ammer 2016), regardless the reason behind the catch or chase. Illegal killing refers to any form of deliberate action that results in the death/removal from the wild of an individual of a bird species that is prohibited under national or regional legislation. Illegal killing of birds includes hunting during the closed season, use of methods that are prohibited, killing of protected species, and hunting or trapping in protected areas in which such activities are forbidden.

For the purpose of this report, the term “hunting” is used in the generic sense, and a distinction between legal and illegal killing was not systematically recorded as part of the study.

1.1 Context

Many studies of migratory birds have suggested that numbers of birds are declining across Europe, due to the degradation of breeding and wintering habitats as well as changes in climatic conditions (BirdLife International, 2013; Vickery et al. 2014; Eason et al, 2015). The illegal killing of migratory birds in the countries of the Mediterranean region is contributing to this problem (BirdLife International, 2013; CABS 2014, Emile et al. 2014), which has been widely recognised by many national and international conservation organisations. It has been estimated that millions of migratory birds are illegally killed in the Mediterranean region every year for leisure, food and trade (Woldhek 1979; BirdLife International 2013; National Geographic 2013; Emile et al. 2014; CABS, 2014; Eason et al. 2015; BirdLife, 2015).

1.2 Hunting of birds in Egypt

Egypt is situated on internationally important migration routes for birds travelling between their breeding grounds in Eurasia and their wintering sites in Africa. While migrants make their journey across the Mediterranean during autumn and spring, millions of them are estimated to be caught in nets, traps and shot every year (Emile et al, 2014). During autumn, migrants are most vulnerable along the southern shores of the Mediterranean, after a long journey from Europe over the sea. They arrive exhausted, seeking rest in preparation for their next journey across the desert (Baha El Din & Salama, 1991).

For millennia, traditional bird hunting has been practiced by Egyptians for recreation, commercial sale and for subsistence. People have been trapping migratory birds at least since the Old Kingdom (2650-2150 BC (Magnin, 1991). Despite the fact that the hunting of birds had once been primarily for subsistence, it has now become a source of income for many hunters as a seasonal delicacy and luxury food; (Eason et al. 2015).

All species of passerines and near passerines are caught along the coast of Egypt; with Common Quails, House Sparrow, warblers and Golden Orioles comprising the majority. Other birds include Corncrakes,

nightjars, shrikes, kingfishers, Hoopoes, doves, wheatears, pipits, larks, flycatchers, red starts, and buntings. An average of 5.6 million individual birds was estimated to be illegally killed per year in Egypt (Brochet et al. 2015).

1.3 Laws and regulations

Egypt has laws in place that are by far the most important legal instrument protecting wildlife and related to the hunting of migratory birds (Baha E Din, 1998). The most important law regarding hunting management to date is Law 4/1994, which controls environmental degradation and includes provisions concerning international conventions, hunting management and species protection for the environment. Additionally, there are Ministerial Decrees, Governorate Decrees and regulations by National Committees, which also have provisions concerning the hunting of migratory birds (National Wildlife Status Report – EEAA, 2006).

Egypt is a Signatory to the international agreements on the protection of birds, including the Convention on Migratory Species (CMS) and the African-Eurasian Migratory Waterbird Agreement (AEWA). Egypt is also Signatory to the CMS Memorandum of Understanding on the Conservation of African-Eurasian Migratory Birds of Prey (Raptors MOU), committed to halting and reversing the declines in the populations of birds of prey.

Nature Conservation Egypt (NCE) and EEAA have recently undertaken a review of the national legislation on hunting to identify gaps and suggest recommendations for better enforcement and implementation (NCE, 2015).

1.4 Importance and objectives of the study

The hunting of migratory birds in Egypt is an ancient practice that has existed for centuries and has developed into a significant socio-economic activity, particularly in rural areas, in northern Egypt and along the Mediterranean coast. It involves hundreds of thousands of people supporting a variety of groups for subsistence and livelihoods (Baha El Din & Salama, 1991; Baha El Din, 2006; Emile et al.2014).

Over the past few years, several international media outlets have published articles documenting an increase in illegal and potentially unsustainable hunting practices along Egypt's Mediterranean coast (e.g The New Yorker, 2010; National Geographic 2013; Daily express 2014; The Guardian, 2015). Illegal bird killing constitutes a major threat to migratory birds in the Mediterranean region.

In response, Nature Conservation Egypt (NCE), the Birdlife Partner in Egypt, developed a Plan of Action to Address Bird Trapping along the Mediterranean Coasts of Egypt and Libya (Emile et al., 2014) initiated at a meeting convened and facilitated by the UNEP/AEWA Secretariat in November 2013 in Bonn, Germany on this issue. The approved Plan of Action included a study to assess the

socioeconomic aspects of hunting of birds along the Mediterranean coast of Egypt (Action 1.2.1 p 9), which this report provides and analyses.

Social and economic factors influence the use of natural resources and can affect efforts to improve undertake biodiversity conservation or support development (Challendar, et al. 2015). The gap in socioeconomic knowledge represents a serious constraint to designing comprehensive measures that may reduce illegal and unsustainable hunting of birds. A socioeconomic assessment is a process of evaluating the social, cultural, economic and political circumstances of individuals, groups and institutions directly and indirectly associated with proposed conservation strategies (Bunce et al. 2000; Holmes, 2003b; Marshall, 2010).

Accordingly, an assessment of the socioeconomic dimensions of bird hunting helps increase understanding of the relationships between birds – as a natural resource, and hunters - as the resource users, through gaining knowledge of relevant issues to create a complete picture (Kelleher 1999; Holmes 2003b). This process enables the development of a better understanding of their resource dependency and can enable us to assess their ability to cope with changes in policies (social resilience) in favour of conservation. This will help planners and decision makers identify the potential impacts of conservation policies and strategies.

In this context, the objectives of the study are as follows:

1. To identify the spatial patterns and techniques of bird hunting along the Mediterranean coast of Egypt
2. To assess the socioeconomic drivers of bird hunting, dependency and social resilience
3. To evaluate the communities' understanding of bird conservation policies, and consequently
4. To determine whether the communities would consider bird conservation strategies

This study is believed to be the first extensive field effort to collect information about the socioeconomic dimensions of bird hunting in Egypt, to help improve the effectiveness and outcomes of policies, programmes and projects aimed at addressing the issues of bird hunting and illegal killing.

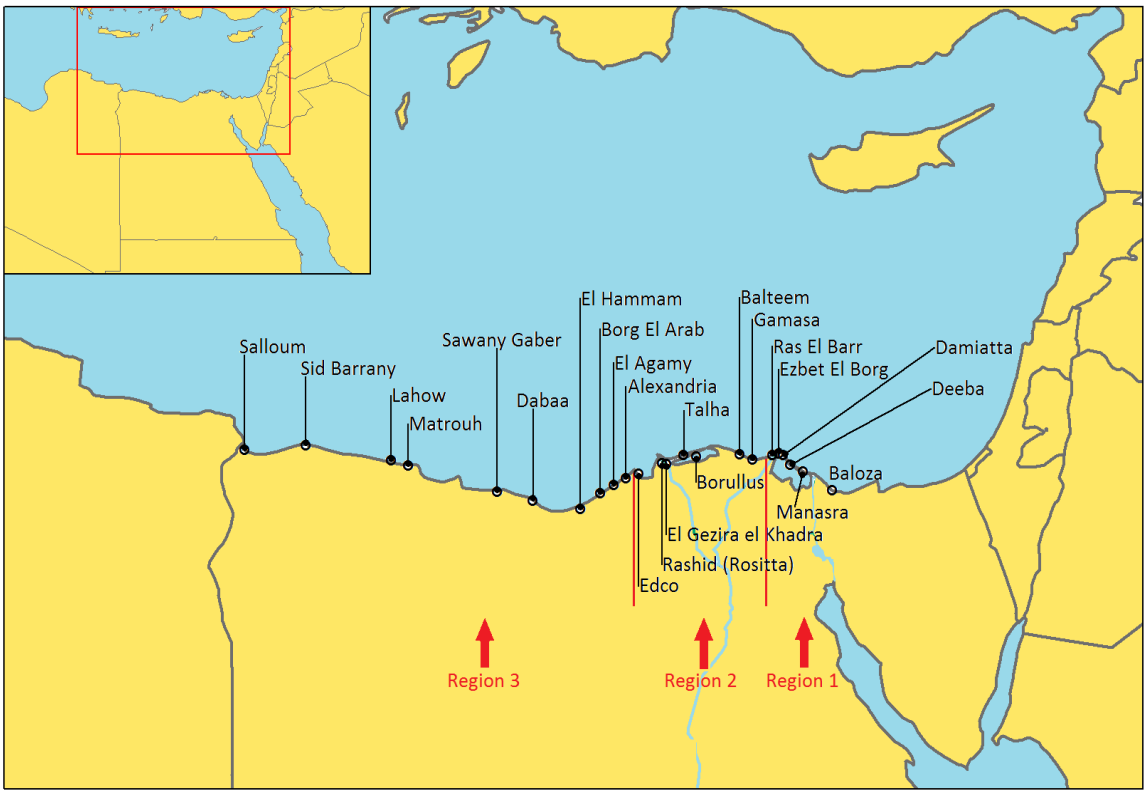
2. Methodology

2.1 Study area

The study was conducted along almost 800 km of the Mediterranean coast of Egypt where bird hunting takes place. The study area covered 25 communities and sites known as bird hunting sites along the coast. From east to west respectively these include: Baloza (North Sinai), Port Said, Ashtoum El Gamil, Deeba, Damietta, Ezbet El Borg, Ras El Barr, Gamasa, Balteem, Borullus, Talha, El Gezira el Khadra, Rashid, Edco, Alexandria, Agamy, Borg El Arab, Hammam, Dabaa, Sawany Gaber, Matrouh, Lahow, Mathany, Sidi Barrany and Salloum; as shown in (fig 1).

To provide comparative data on hunting techniques and targeted species, the coast was divided into three regions. Region 1 included Baloza to Ras El Bar; Region 2 included Gamasa to Edco; and finally the Region 3 covered from Alexandria to Salloum. Lake Manzala was included in Region 1 and Lake Borullus was included in Region 2.

Figure 1 Communities surveyed



2.2 Field survey design

2.2.1 Training interviewers

As agreed between NCE and the Nature Conservation Sector of the Egyptian Environmental Affairs Agency (EEAA), six park rangers from Zaranik, Borullus and Omeid Protected Areas located on the Mediterranean coast were selected by the EEAA officials to be part of the survey team and to receive training in how to collect socioeconomic data as part of capacity building for the Park rangers. Therefore, six park rangers and two NCE volunteers received training in social survey methodology. Training was undertaken by the author within a classroom, and in the field. The classroom-based training took place on 8th September 2015.

The training comprised an overall review of social science survey methods and techniques, including themes on designing questionnaires, open-ended questions, observations and writing field notes.

Photo 1.Interviewers training (classroom)

Photo 2 .Interviewers training (on-the-job)

Other methodological considerations were discussed such as ethics and positionality (conducting research connected to an organization that they work for) and how they could affect the relevance and reliability of the data collected. The trainees practiced conducting interviews where their answers were reviewed and discussed in the scope of the mentioned themes. Data processing, management and analysis were also discussed and they practiced data entry.

2.2.2 Survey techniques

Data were collected through an extensive survey during the period from 9th to 21st September 2015. A team, led by the author and two research assistants from NCE, undertook this field based survey. The park rangers conducted interviews along the coast where their parks were situated.

Interviewees were approached using standard socio-anthropological methods including questionnaires, focus group discussions, observations, visits to markets and places of social

gatherings, where most hunters were interviewed. Other interviews were conducted at the hunting sites. The survey was pilot–tested during the spring season.

The questionnaires consisted of four parts: a) socio-economic aspects related to bird hunting activities b) attitudes, circumstances and experiences related to bird hunting; c) indigenous knowledge about birds and d) personal perspectives of the protection of birds. Many questions were posed as a statement and interviewees were asked to agree or disagree with each statement on a 4-point Likert scale. Some closed-ended questions (such as: do you use mist nets, do you use call devices to attract birds) were asked. We also used open-ended questions to enable more detailed responses.

Since the bird hunters use local names for different species of birds, we used field guides with pictures of birds to have the hunters identify the targeted birds and those species mostly caught during the migratory season; as well as identifying the birds that they thought were declining in numbers.

Focus group discussions were conducted across a few villages where it was practical to do so, based on the acceptance of a number of hunters to participate in the discussion group. The discussions covered bird hunting techniques and illegal and unsustainable practices, and sustainability and protection of birds. Most of the discussions took place at the hunting sites and gathering places such as village coffee shops. The participants were local bird hunters and traders.

Observation was an effective tool to collect more information particularly on hunting techniques and the types and numbers of birds that are most likely caught. Visits to markets were conducted to collect information on prices and trading processes.

The survey mainly targeted seasonal hunters. Two non-probability sampling techniques were used due to the difficulty of using random techniques. A convenient sample was approached randomly by visiting the hunting sites. In other areas, some of the hunters encountered refused to be interviewed (see challenges section below). Many of them, however, directed us to other hunters who accepted to be interviewed. Therefore, a 'snowball' sampling technique was also used to enable the team to identify and recruit respondents from the acquaintances (Morgan, 2008; Kurant et al. 2011) of those hunters initially encountered in each village or town. Thus the sample group appears to grow like a rolling snowball. The total number of respondents who agreed to be interviewed was 73, of which 7 were traders (including middlemen). Other hunters attended the focus group discussions without being interviewed.

Photo 3. Interviewing (Deeba)

Photo 4 Group discussion (Sawany Gaber)

2.2.3 Data Analysis

The data set consists of frequencies of responses, which are summarised descriptively in tables, figures and graphs where appropriate. Logistic regression analysis was employed to analyse the socio-economic factors that influence bird hunting. The model specification used hunting of birds as the dependant variable and gender, marital status, age, education, household size, proportion of income derived from bird hunting and occupation.

2.3 Challenges

Due to the political situation in North Sinai, the team was unable to survey the whole area, but the nearest site to Port Said in North Sinai was surveyed. Moreover, a recent study was published on 'Hunting of Migratory Birds in North Sinai' by Eason, et al, (2015), providing information on quail hunting techniques and the numbers of birds caught in trammel nets, along with other by-catch.

Many of the hunters/middle men and traders encountered refused to be interviewed. This could have been due to their fear of being questioned by authorities, particularly as they are aware of the conservation efforts being implemented the authorities (e.g. the ban on bird hunting in Protected Areas and the use of the bird 'calling devices'). Furthermore, many do not want to disclose private information (e.g number of children, number of people in the household, income from hunting, etc.).

3. Results and discussion

3.1 Hunting Techniques

The hunting of migrants along the Mediterranean coast of Egypt is widespread and involves use of many different techniques and methods. The main hunting techniques observed during the study were as follows (in line with Baha El Din, 2006):

3.1.1 Trammel Nets

Trammel or mist nets, were introduced in the 1990s (focus group discussions). Nets are strung along the coast, with wall-to -wall nets lining the shore. Birds are usually netted at dawn after flying across the Mediterranean Sea. Once birds hit the net, they are immediately collected and stored alive. This is one of the main techniques employed to trap quail, however, the use of nets leads to indiscriminate catching of bird species and even bats.

Photo 5: Illegal trammel nets (Baloza)

While there are laws specifying where to build the net (500 m from the shoreline), the size of the space in-between nets (20m) and the height of the nets of maximum 3m, these laws are not enforced owing to limited capacity and lack of coordination between enforcement agencies. In some areas in Region 1 and 2, another higher line of trammel nets was built further inland. Usually there are no, or very small, gaps in between the nets. In some areas nets were rolled up about half a metre during the day to allow passing gaps; while they are left rolled up in other areas all the time.

The continuous stretch of trammel nets has been called 'Mansaab' by local communities, which is different from the mansaab described below. Although there is no official ownership, the land where trammel mansaab is built usually belongs to a specific family for seasonal hunting use. Other people cannot claim the right to use the same piece of land, which is regulated by traditional community laws or' word of mouth' from one generation to another. Each family has held its allocated land for generations. The mansaab allocated land varies in length between 150m to 500m per family along the coast (interviews).

3.1.2 Mansaab

Photo 6 : Mansaab (Delta)

Mansaab is one of the old techniques to catch Quail (Baha El Din & Salama, 1990). This is a bird trap composed of grass or sticks and arranged in a tent-like structure with the entrance facing south and a piece of fishing net closing off the seaward opening (see photo below). Tens of dozens of these traps are placed along lateral beaches and sand dunes. Ground dwelling and roosting species such as Quail and Corncrake seeking shelter enter the traps and are caught in the interior nets.

3.1.3 Eb

Photo 7: Eb (El Mathany)

Large mist nets are placed over trees or shrubs and are used to catch perching species, such as songbirds. In areas devoid of vegetation, artificial vegetation is used to attract birds. These nets are highly effective and indiscriminate, catching almost every bird that seeks shelter in the vegetation. Eb is widely used at a larger scale in Region 3.

3.1.4 Lime sticks

Photo 8: Songbird stuck on Lime

The use of lime sticks is an uncommon, localized method, but highly effective to catch songbirds and other perching birds. Lime is produced from the seeds of a special plant grown for this purpose (See photo 9). The sticky substance is then spread on the stick. The birds land on the stick and become stuck. Each stick can trap up to 15 birds at a time.

Photo 9: Plant produces glue

This technique is also used to catch birds of prey, which prey on songbirds that are already caught and become trapped in turn. An incidence of this was witnessed during the field survey.

3.1.5 Air Rifle and shot Gun

Photo 10: Killed White storck (El Mathany)

There is increased use of air rifles for bird hunting along the Mediterranean coast. Children and young men are the main people using air rifles and shooting migratory birds for hunting and recreation. Perching birds are mostly hunted, but shooting is indiscriminate. Many hunters hunt with shot guns in Region 3. Shot guns are mainly used for hunting larger migratory birds such as storks, flamingos, ducks, as well as quail, doves and waterbirds.

A license is required for the use shot guns for bird hunting. Over the past 4 years, due to the current security situation, the issuing of licenses have been suspended. However, despite this, many hunters have been able to obtain shot guns and use them for hunting, due to the lack of law enforcement.

3.1.6 Call devices

This use of this technique has emerged over the past two years. It consists of an MP4 player, playing bird songs and calls, that is connected to a battery and speakers to attract flying birds to land where the speakers are hidden (usually an Eb or mansaab). A decoy bird is visibly fixed to deceive other birds.

Photo 11: Call device (Dabaa)

Most hunters are fully aware that using this device is against the law and that they will be fined if caught. However, the device is easy to purchase and usually well-hidden. Hunters believe that using call devices has increased the numbers of birds caught. This forms a significant threat to certain species where populations are declining. (e.g. European Turtle doves).

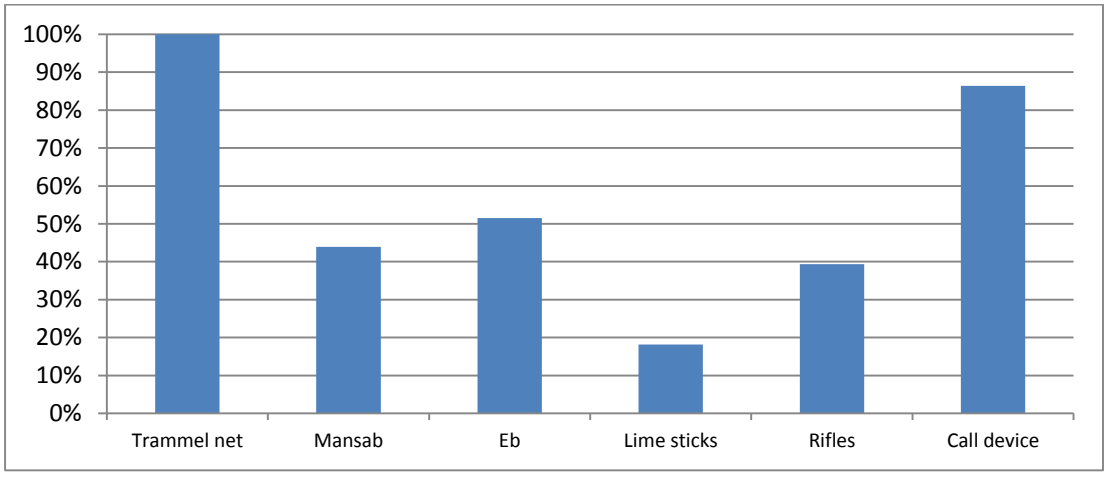


Figure 2 Hunting techniques used by the survey respondents

As shown in Fig 2. all respondents use trammel nets, mostly alongside other hunting techniques. The main purpose of using nets is to catch quails and songbirds. Nets, however, are a great threat to non-target species (Rouphael et al, 2015), which are also trapped. 83% of the respondents said they use call devices with all techniques including trammel nets, to increase the number of caught birds.

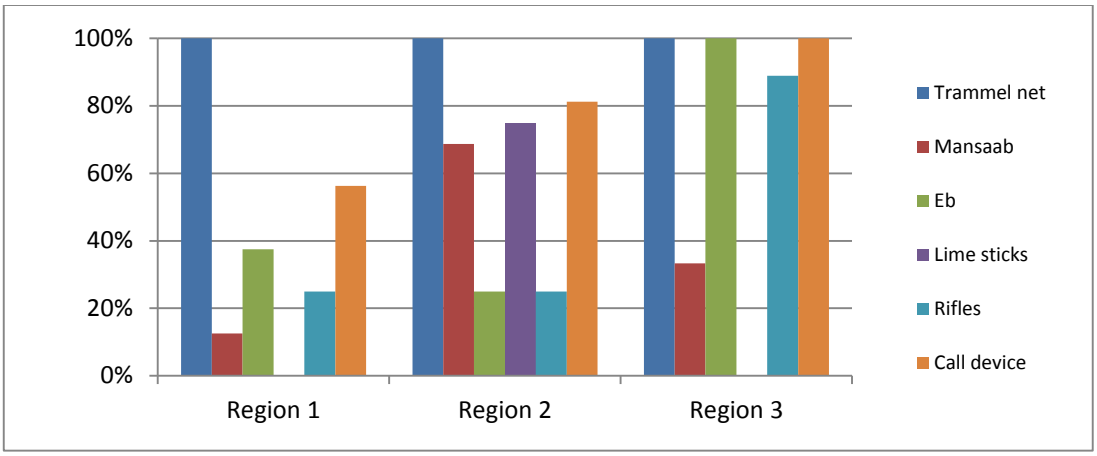


Figure 3 Hunting techniques used by respondents in each region

While trammel nets are commonly used in all study regions, other techniques are found to be exclusively used in certain regions. As shown in Fig 3, Lime sticks are used only in Region 2, which has the necessary materials available in the environment.

3.2 Catching birds of prey using Sharak (Noose harnesses)

Some hunters target birds of prey only, particularly falcons, which are most sought after in Arabian Gulf markets. Although there are many methods and techniques used to catch birds of prey, 'Sharak' is the most common technique used to catch falcons in Egypt, as seen in many bird markets along the coast. Baha El Din & Salama (1991) referred to this technique as the most effective method for catching falcons. Sharaks are made of thick cotton thread designed to fit on a pigeon as bait for falcons. When a bird of prey tries to catch the pigeon, its talons are caught in the noose.

Photo 12: Sharak to cach birds of prey (Gamasa)

The trapped birds of prey are often inhumanely treated. Some falcons that are used as bait have their eyes stitched closed and many of them die in captivity. In the past, falcons would be released at the end of the season (Baha El Din, 2006) but these days, due to their high value, most falcons are sold.

This technique is used by hunters specialised in hunting bird of prey in all regions. Sharaks are extensively sold in bird markets along the coast, particularly in region 3 (see Fig 1).

3.3 Hunting regulations

Article 24 of law 4/1994, addresses the issuing of hunting permits, stating that hunting of birds and/or wildlife requires a valid permit, highlighting the purpose for which they would be hunting, the method used and hunting period (LAW 4/1994). It also describes the process for obtaining permits through submitting an application to the Minister of Internal Affairs, who would refer the application to the EEAA for a final decision.

However, permits for hunting along the coast can be issued by both the governorate and Coast Guard. The permits are renewable on a yearly basis for a small fee payable by the hunter. The Coast Guard can only renew permits at the nearest Coast Guard office to the Mansaab (interviews). The permit acquisition process is easy for hunters; they simply need to submit their ID and any previous or expired permits. No instructions or information on regulations are given to hunters with the permits. Furthermore, no permits are required for trade and possession of wildlife or birds in Egypt, nor is there any quota system in place.

Technically, permits are not to regulate hunting per se, but to regulate the presence of individuals on the coast to hunt. (Dr Baha El Din pers. comm.)

It is difficult to know how many permits are issued, due to the locality of processing permits and the absence of a central system to compile such information. The fees for the permits are generally low and the funds are not recycled for the management of the system.

3.4 Hunting seasons

According to respondents, autumn is the major bird hunting season on the coast. However, some hunting activities were recorded in spring too, particularly during the return of Quail. Some of the respondents hunt in other locations in Egypt (e.g Nasser Lake in Aswan southern Egypt), targeting different species, such as the Egyptian goose, mainly for consumption.

Table 1 Hunting months and targeted species

Species	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Quails	x	x	x					x	X			
Ducks		x	x	x	x							
Dove		x	x					x	X			
Songbirds	x	x	x					x	X			
Golden Oriole		x	x									
Birds of prey		x	x	x				x				
Water birds		x	x	x				x	X			
Others		x	x	x				x	X			

Based on the respondents' answers to the question 'During which months of the year do you hunt?', the hunting season for Quail and songbirds starts in mid-August. September and October are considered peak months for hunting all species. The hunting of ducks and other birds of prey continues into November. The hunting of ducks and waterbirds, such as coots and moorhens, and other species, such as storks and cranes, continues until the beginning of November.

3.5 Target species

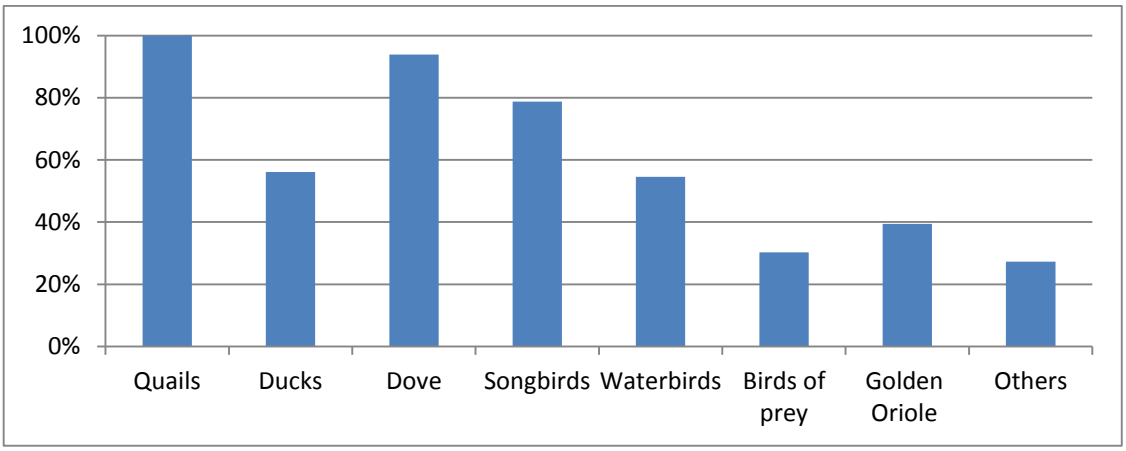


Figure 4 Species targeted by hunters

As Fig. 4 indicates, the priority target for all respondents is Quail, followed by doves at 96%, followed by songbirds. These species of high economic value (see section 3.6) are easily caught by trammel nets or Eb. 79% and 77% prioritised ducks and waterbirds respectively (mainly in areas where lakes are found). All duck species and waterbirds have a great economic value. Golden Oriole is also targeted by hunters in the three regions. It is the most targeted species in region 3, with the majority of this species caught there (observation and interviews – see fig 5.).

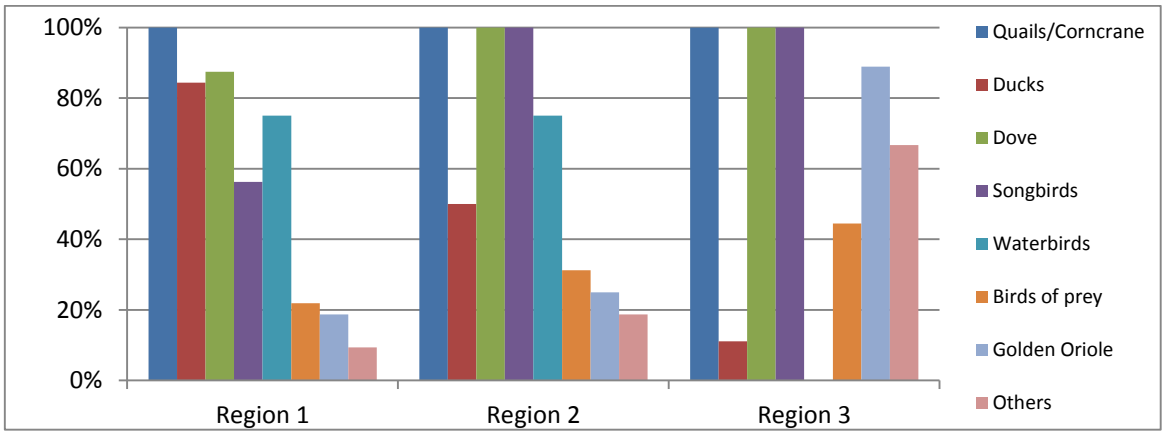


Figure 5 Targeted species by region

3.6 Economics of bird hunting

3.6.1 Cost and benefit

In some of the poorer communities along the coast, hunting migratory birds is considered a free source of meat to supplement diets. Respondents from such areas referred to the high cost of purchasing meat which they said they could only afford to consume once a week.

The subsistence costs for bird hunters in Egypt seem to be quite low, especially as many bird hunters make their own hunting tools, from trammel nets to Falcon's traps (Sharaks). The material for making trammel nets is available in hardware stores. Readymade trammel nets are also available at LE 3[1] per Kg, and a mansaab of 100m costs LE75 - LE100. Nets are manufactured in the Damietta factory, which supplies most of the country's fishing nets.

Most of the shot guns and ammunition sold in Egypt are imported (or smuggled) from abroad. There is one manufacturer of guns and ammunition in Egypt but they produce guns mostly for security purposes. There is a factory in Alexandria which manufactures lead shot and cartridges, which is controlled by the Shooting Sports Club and the newly emerged hunting federation, to distribute to members according to certain procedures (pers. comm. President of hunting federation). Air rifles can be bought from a small number of stores in large cities. Buying a shot gun requires a security permit and a valid license. Air rifles cost LE 500 – 3000 and shot guns cost around LE 20,000 'if legally bought', while a box of 50 cartridges costs LE 40-60. This means that this hunting technique is unaffordable for most of the hunters along the coast.

The hunting of migratory birds is considered a source of employment and supplementary income as well as a source of protein to thousands of individuals in Egypt. A high percentage of hunters are from poor and marginalized communities, of which a small number exclusively depend on income from migratory bird hunting for their livelihoods. Over 75% practice hunting as a secondary activity to supplement their incomes.

3.6.2 Economic value of birds

Photo 13: Birds market (Dabaa)

Traders profit the most from bird hunting in Egypt. Birds are usually collected every morning by either a trader or a middle man, who at the same time provides the hunters with other supplies that they need for camping. Collected birds are taken to local and larger markets. Some other birds are sold directly on the main roads by hunters.

[1] LE: Livre Egyptian (Egyptian Pound). LE1 = $0.13

The extent of coastal harvesting is not known, as it is not a prominent, officially measured economic activity, nor is it subject to regulation or represented by a formal organisation. However, several attempts to estimate the total number of birds were made in previous studies, based on counting birds caught in trammel nets (e.g. Eason, et al. 2015).

In this study, to estimate the economic value of bird hunting, it was important to estimate the total numbers of the hunted birds, based on the actual data collected in this study and what was seen on the ground during the field survey. Some individual hunters allowed the team to count their harvest of one day, which was an average of 85 birds, mostly quails, songbirds, corncrake, wryneck, and golden oriole. The estimated total number of hunted birds (excluding birds of prey) was calculated as follows:

Photo 14: Counting killed songbird (Dabaa)

- Taking out around 150 km of 800 km total length of the surveyed area leaves 650 km trammel nets widespread along the coast.
- Family allocated land for trammel nets was 150 m to 500 m (see section 3.1.1), with an average of 325 m per family (represented by a hunter).
- Estimated total hunters along the survey area are 650 km/325 m = 2000 hunters.
- Average of birds caught in the autumn season is: 85 birds x 70 days = 5900 birds per hunter per season, taking into consideration that the numbers of birds varies from one day to another during the same season. Thus the total estimated birds caught in the whole study area can be established by multiplying the average number of birds per hunter times the estimated number of hunters: 5900 birds x 2000 hunters = **11,800,000 birds.** This should be regarded as a provisional figure, subject to further verification and review against the results of the 'Illegal Hunting Monitoring Programme', which is simultaneously being conducted by NCE.

3.6.3 Markets

Bird hunting along the coast is usually dominated by local communities in their local areas, where most of the hunting takes place. Most villages and towns have small bird markets that serve local people, while the larger bird markets are typically found in the surrounding cities that serve the non-locals. Six major markets were visited in Port Said, Damietta, Rashid, Alexandria, El Hammam and Dabaa. Other small markets within the rest of the survey communities were also visited to collect information on prices and species of high demand.

The amount of money received from the sale of migratory birds varies from one species to another, ranging from hundreds of thousands of Egyptian pounds for falcons to LE 1 for small songbirds. Birds of prey are the most valuable species: a Peregrine falcon was sold for LE 220,000 in Gamasa. Birds of

prey are usually sold for export to customers from Arabian Gulf countries. Quail and corncrake are sold for LE 25 per pair, duck species are sold for between LE80 for Shoveler to LE 125 for pintail (per bird), which usually sold in 'Tora' (four ducks at a time); and the Golden Oriole is sold for LE 22 per pair. Doves, particularly turtle doves, are primary quarries. Dove hunting takes place along region 3 (see Fig 5), mostly in private farms close to the coast, using the Eb technique, and sometimes shot guns, along with a call device. Doves are sold for LE 70 per pair, while other birds like storks, crane and herons are sold ranging from LE 50 – LE 150 depends on the size of the bird. Water birds like coot, moorhen and purple gallinule are sold for LE 50 in Damietta market. Ducks and quails are considered a delicacy, while other birds are purchased as inexpensive food items by poorer communities in all regions.

Photo 15: Frozen birds for sale (Rasheed)

The primary quarry species are quail and songbirds, despite their relatively low prices. They are more abundant and hence hunters can make more profit from the quantity they can catch (see table 2). They are mainly sold via markets to restaurants across Egypt.

A new market for migratory birds, both live and dead, has recently opened. Hundreds of thousands of birds have been sold to middle men, who collect birds from markets to export to Arab Gulf countries. This has significantly raised the prices and encouraged more individuals to engage in bird hunting activities.

Birds are kept alive for a few days in the markets for local people, who prefer to see the birds alive first to ensure that they are healthy and freshly killed. Unsold birds are eventually killed, packed and frozen.

The number of live birds counted during a visit to one of the traders was 850 birds (mostly doves, Quail, Golden Oriole), while the same trader claimed to have over 30,000 birds killed and frozen in his store, which were the accumulation of three days' hunting.

The economic incentive for bird hunting appears to be a stronger driver than both that for food subsistence and that of leisure. It is seen as strong motivation for the current levels of demand for birds, particularly exporting to the recently opened market in the Arabian Gulf areas.

Table 2 Prices of target species

Species	Average price / bird (LE)
Quails/Corncrake	11
Ducks	90
Dove	35
Songbirds	1
Golden Oriole	11
Water birds	40
Others (stork, crane, heron)	40
Average price per bird	**33**

To calculate the total monetary value of birds, an average price has been calculated, based on the average prices of the seven target species (see above), which is estimated at LE 33. Thus, the total monetary value of birds during autumn of 2015 in the surveyed area is: 11,800,000 birds x LE 33 = **LE 389,400,000**, which is $ **50,622,000**[2] per season.

Many of the hunters interviewed for the study believe that the rising prices for these birds is driven largely by a high demand for birds for export, in response to the profitable market opportunities in the Gulf countries. This is a potentially major factor in encouraging increased participation in bird hunting.

3.7 Socioeconomic dimensions of bird hunting

3.7.1 Cultural

Since the time of the Pharaohs, birds have has an important place in Egyptian culture. Some ancient Egyptian gods were featured as birds. The God of the moon, Thoth, was portrayed as an ibis with his crescent shaped beak. Horus, the God of the sky and the son of God Osiris, was portrayed as a falcon.

Photo 16: Children collect birds

The hunting of birds was an important source of food in Ancient Egyptian times as well as a popular sport (Baha El Din, 1998, Baha El Din, 2006). Autumn bird catching

[2] LE 1 = $ 0.13

provided a vital source of protein for desert communities. It is mentioned in the Qura'an that God sent Quails and Alpine Swifts, 'Manna and Salwa', as a source of food to the prophet Moses and his people in Sinai while they were escaping from Egypt. At the beginning of the last century, Quail hunting was a profitable business. Between 1906 and 1913 one to two million Quail were exported from Egypt to European markets (Baha El Din & Salama, 1991; Baha El Din, 2006).

Children learn to hunt birds at a very young age by helping adult hunters harvest birds from nets. In most of the local communities surveyed, parents encouraged children to hunt on their own by giving them toy air rifles and, sometimes, those children would go hunting with their parents.

The hunting of birds during the autumn is considered a recreational and social activity involving many families and their friends. In some areas, parents take their children for camping on the coast to enjoy the sea whilst hunting birds. Children enjoy collecting birds from the nets, through which they learn about, and can easily distinguish, birds by their given local names. Friends also gather and go for hunting trips for longer periods, particularly those who hunt birds of prey, not only on the coast, but further south in the desert areas. Some hunters, who have other occupations, take time off from their regular work to go hunting. To many of them, this is considered to be time off for recreation, while supplementing their income.

Culturally, Egyptians tend to have a very exploitative and consumptive view toward nature (Baha El Dine, 2006). Birds in particular are viewed as a resource to be consumed. However, some coastal communities still have some traditional conservation attitudes founded on sustaining supply of the resource; such as restricting hunting during spring to allow birds to return to Europe and come back 'with their children' in the next autumn (group discussions).

Unlike in many other countries, where conservation has been embraced by hunters as a means to preserve their sport, there are relatively few Egyptian hunters who are conservation-oriented. Hunters in Egypt tend to oppose any restriction that prevents or limits their hunting. Although low in numbers, the hunters represent a strong lobbying force.

3.7.2 Bird hunting dependency

A number of socioeconomic variables can be used to assess the relationship between people and bird hunting, including gender, age, marital status, education, size of household, occupation and proportion of income that comes from hunting. These characteristics vary among resource users and communities and help explain why some people are more dependent on bird hunting than others.

Gender, age, marital status, education, occupation, size of the household and household income are primary factors that influence people's behaviour (Bennet, 1995; Humphry, 2001; McGuill, 2014). This section presents and explores these factors as drivers behind hunting of birds, based on the survey sample.

3.7.2.1 Descriptive socioeconomic data

1) Distribution of the respondents by gender

Table 3 shows that 96% of the respondents were male while only 4% were female. These particular respondents are housewives, who were sharing responsibility at the hunting sites due to their husbands' other job commitments. This indicates that bird hunting is dominated by men for cultural reasons. However, women can assist as long as there is a man of her immediate family at the hunting site.

Table 3 Distribution of the respondents by Gender

	Male	**Female**	**Total**
Number of respondents	70	3	73
Percentage	96%	4%	100%

2) Distribution of the respondents by age range

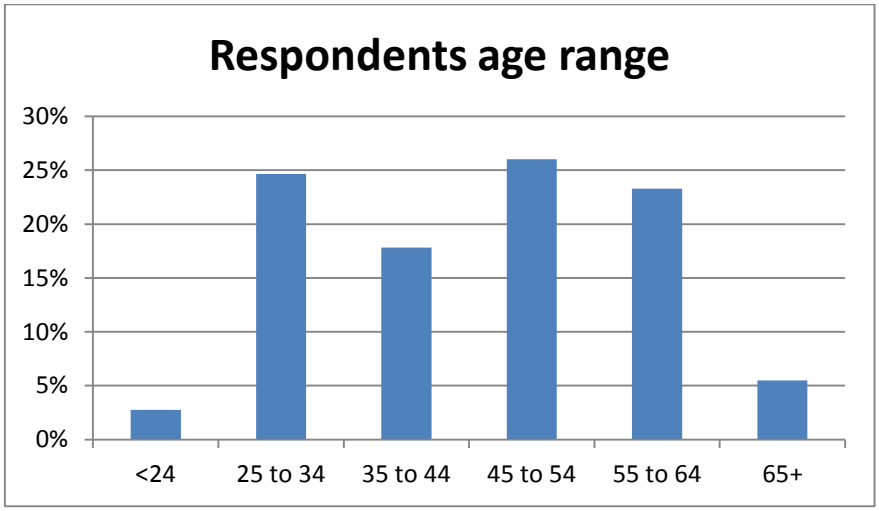


Figure 6 Distribution of the respondents by age range

Fig. 6 shows the variation of age range of individuals involved in bird hunting activities, which suggests that bird hunting is practiced by all generations at the same time. Noticeably, the spread of respondents between 25 to 55 years old (i.e. within 'working age'), indicates that hunting is considered an additional source of income as likely to be supporting families.

3) Marital Status

Table 4 Distribution of the respondents by Marital status

	Married	unmarried	Total
Number of respondents	58	15	73
Percentage	79%	21%	100%

4) Education

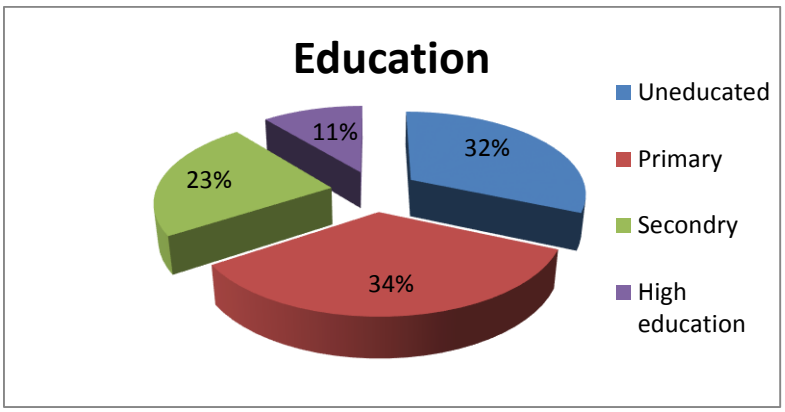


Figure 7 Distribution of the respondents by level of education

The respondents' level of education varied, as 32% of the respondents were uneducated, while 34% had primary education. The total of these two categories is 66% which is >50% of the total sample. 23% were educated up to secondary school, while 11% have continued to higher education. 2/3s of the respondents had only received education up to primary level or less, with 1/3 having no education at all. This is significant in terms of both their income-generation potential and in tackling the issue of understanding the impact of hunting through education.

5) Size of the household

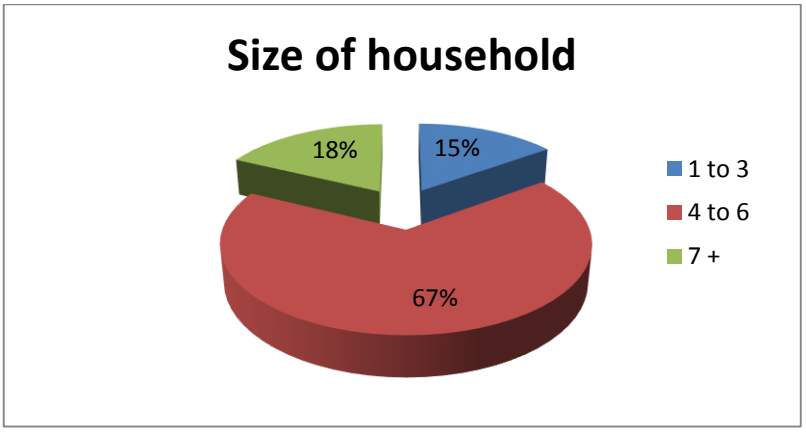


Figure 8 Distribution of the respondents by Size of the household

Household size is a clear factor influencing the level of participation in supplementary economic activities (Elhalawani, 2013). In poorer communities, the more members in the household, the higher

probability that the head of the household, and other household members will need to participate in economic activities to supplement their income. In the current study, 18% percent of the respondents support 7 children, while 67% support from 4 to 6 children, which is in line with the national average of 5 children per household. This puts pressure on hunters to continue hunting to meet household needs.

6) Proportion of household's annual income that comes from bird hunting

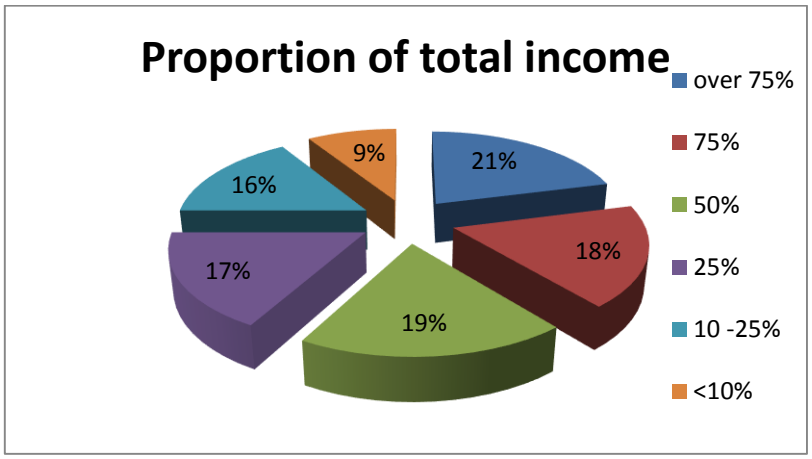


Figure 9 Distribution of the respondents according to the proportion of income coming from bird hunting

Fig 9 indicates that for one fifth of the respondents, income from bird hunting represents more than 75% of their household income, while bird hunting represents 75% of the total income for 18% of respondents. Half of the total income for 19% of the respondents comes from bird hunting, while 17% of the respondents earn 25% of their total income from bird hunting. Less than 10% hunt birds for food and presents for family members and friends.

Therefore, nearly 60% of those questioned, reported that at least half of their income is derived from bird hunting, demonstrating the importance of bird hunting to the livelihoods of these coastal communities.

7) Occupation

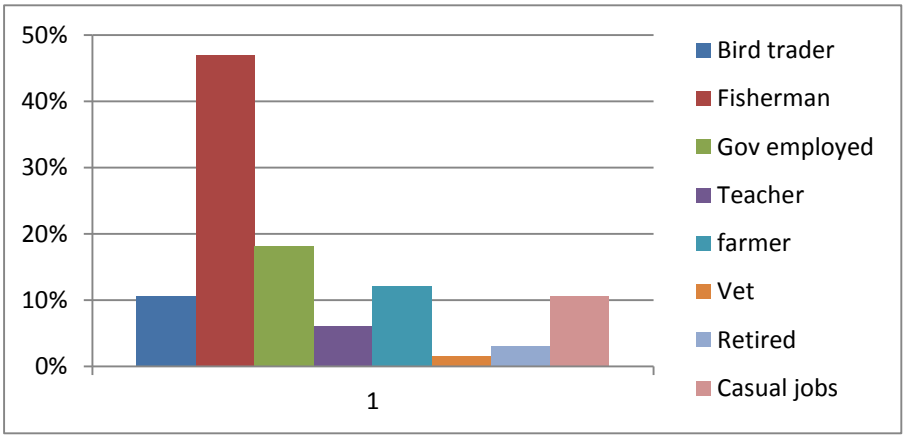


Figure 10 Distribution of the respondents by occupation

The local communities on the Mediterranean coast of Egypt are mostly involved in farming, fishing and running small businesses (Marshall et al., 2007; Shokry, 2012). Occupation is one of the social factors that influences individuals' relationships with natural resources (Elhalawani, 2008; Elhalawani, 2013). This sample includes hunters with a wide range of primary occupations, by far the largest proportion being fishermen, who, because of the nature of their occupation and the accessibility it provides to the coast, have become seasonal bird hunters. The 10% accounted for by those in casual employment (mostly handymen) and the 12% who are farmers, are expected to be from poorer communities. This occupation variety stresses that bird hunting is part of the culture that needs to be acknowledged. None of the respondents were solely dependent on bird hunting for their livelihood.

Proportion of the hunted birds kept for personal consumption

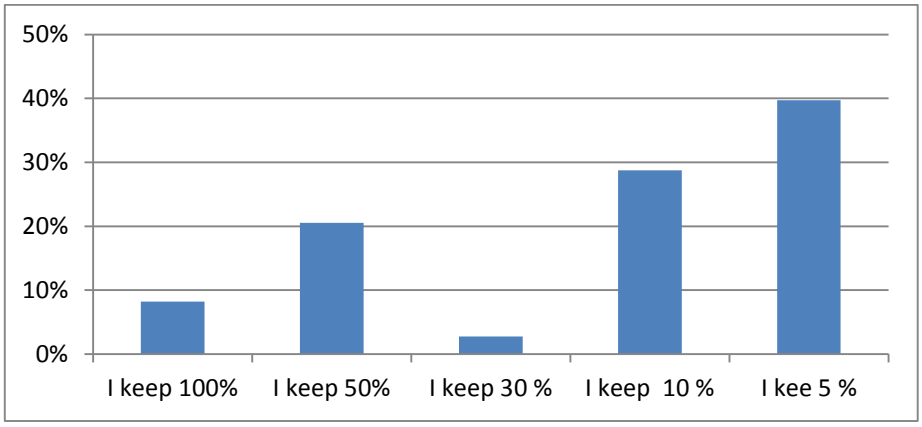


Figure 11Proportion of the hunted birds kept for personal consumption

It was found that only 7% of the respondents hunt birds for personal consumption and to give as presents to friends. This is a cultural activity for those who hunt for recreation only. Twenty percent keep half of the hunted birds for household consumption and to ensure they have a decent amount of protein. Over two thirds of the respondents keep only ten percent or less for themselves, suggesting that selling the harvest for its economic benefits outweighs the nutritional value for the majority of respondents.

3.7.2.2 Association between socioeconomic factors and bird hunting

A logistic regression was used to predict the association of the socioeconomic factors and bird hunting – using bird hunting as an independent variable. The logistic regression predicts not only whether there is an association between factors but also the direction of this association (direct proportional or inversely proportional relationship). Respondents were asked whether they 'have to hunt birds'. The answers were binary at 1 for 'yes' and 0 for 'no'.

Table 5 Results of a logistic regression to determine which socioeconomic factors influence hunting birds

Factor	Odds ratio	SE	df	P value
Gender	0.851	0.104	1	0.189
Age	1.144	0.225	3	0.494
Marital status	0.843	0.167	1	0.392
Education	1.144	0.225	3	0.494
Proportion of income	0.874	0.04	5	0.003*
Size of household	0.843	0.107	2	0.022*
Occupation	0,116	0.105	2	0.018*

* $P \leq 0.05$

It was expected that socioeconomic factors represented in the variables would be the driver for bird hunting. As shown in Table 5, there is no correlation between bird hunting and age, marital status and education. There is, however, significant correlation between bird hunting and proportion of income, size of household and occupation, as P value is <0.05.

The proportion of income and size of household were found to positively influence individuals' engagements in bird hunting, substantiating the hypothesis that reducing the prevalence in bird hunting would only be feasible if other supplementary income sources were available to local people in the area.

3.7.3 Bird hunting and social resilience

The term social resilience refers to individual resilience and the flexibility with which resource-users can adapt to changes in resource-use policy (Marshall & Marshall, 2007; Marshall et al, 2010). Social resilience, within the context of this study, refers to the bird hunters', as resource-users, ability to understand and cope with changes to the existing hunting policy and potential conservation measures. Resource users' perception of the ability to understand, and cope with new strategies and regulations are likely to be extremely relevant for assessing their social resilience and also relevant to how difficult it might be to implement strategies to reduce hunting pressure (Dr Rouphael pers. comm., 2015). Table 6 presents the frequencies of responses to questions to assess their social resilience.

Table 6 Responses to questions that assess their resilience

Question	Yes %	No %
Would you consider altering hunting /selling wild birds?	8%	92%
Would you agree on having new hunting laws and regulations for sustainable bird hunting?	67%	33%

The majority of respondents (92%) were confident that they would never give up hunting of birds. Only 8% would consider an alternative. This indicates that hunters do not believe in their ability to find an

alternative source of income or protein. Having been in the hunting business for generations, these people are not confident in their ability to change.

While 33% would not like to see more laws or regulations, 67% agreed with the need for new hunting regulations in order to sustain bird hunting. The latter percentage includes those individuals who can positively adapt to and cope with policy changes or new strategies.

3.7.4 Perception and attitude towards conservation

Bird hunters have accumulated knowledge of bird species and migration flyways over generations. Almost all respondents acknowledged the decline in bird numbers, particularly over the past few years. They believe that development along the coast, the increase in numbers of hunters and illegal/unsustainable hunting are behind this decline.

Respondents were asked, as a final comment within the questionnaire, to describe what they thought might be important in protecting bird resources for future generations, which were also discussed during the group discussions. Their responses are provided in Table 7. A total of 18 people made ten main comments. Interestingly, few comments were made relating specifically to better law enforcement and the prevention or reduction in hunting for a few years, whilst one hunter suggested that authorities "hire local guards to report hunting violations".

Table 7 Attitude of bird hunters towards bird conservation

Issues raised by respondents	**Frequency**
"Development and industrial estates along the coast "	12
"The number of hunters has increased"	4
"Lack of law enforcement"	9
"I strongly agree with conservation for next generations"	4
"Future is in the hands of God (either to decrease or increase the number of birds)"	19
"People will harvest and eat everything no matter what"	12
"Stop hunting for few years to increase the numbers of birds"	4
"I do not know what birds I should not catch"	3
"hire local guards to report hunting violations"	1
"We stopped eating birds that are respected in Qura'an"	5
Total	**73**

While many bird hunters did indicate an interest in some level of regulation of bird hunting activities in order to help sustain birds for future generations, others were not concerned about the future, with a strong belief that God is responsible for the future and will protect and secure birds for the coming generations.

It was noticed that the majority of hunters encountered had strong religious beliefs, with Islamic backgrounds. Many of them respect certain species that were mentioned in Qur'an such as the Hoopoe, which they have ceased eating, and therefore hunting, as requested by Imams in the local mosque. This suggests that religious beliefs could be used to motivate individuals' behaviour change and could play an important role in future conservation action.

3.7.5 Types of hunters

The main characteristic shared by most hunters within the survey regions is that they came from families that have practiced hunting for generations. Their motivations, however, have varied and changed over time from hunting for food or for recreation to hunting for economic benefits. In the light of the study analysis, hunters can be defined in three groups:

a) **Commercial hunters**, who are typically motivated by the economic value of birds and the significant proportion of their income that comes from hunting (see Fig. 9, which indicates that 58% of respondents derived a significant proportion of their income from hunting; and Fig. 11, which shows their preference to sell birds).
b) **Subsistence hunters**, who hunt for securing source of protein, while selling a small proportion of birds for income supplement.
c) **Recreational/cultural hunters**, who consider hunting as part of their traditional practices and seasonal recreation activity that cannot be altered.

The following case-studies were selected from each group as illustrative examples of different respondents' hunting perspectives.

A commercial hunter

A primary-level educated, land owner farmer from the Nile delta area (region 2), who is the head of a household consisting of 7 people, 5 of which are children at different stages of education. When the season begins in mid-August, he moves to the 200 meter strip of land by the coast that he used to hunt in with his father, starting when he was 7 years old. He is usually accompanied by his brother, who helps him to build a shelter to sleep in and to put up the trammel nets on the wooden stands that are always left up on the site. He also uses lime sticks to catch songbirds.

He can hardly wait for the autumn hunting season every year, seeing the profit that comes from hunting as essential to securing funds for life's necessities and to support changes in their lifestyle.

Despite his awareness of the environmental laws and regulations of bird hunting, he thinks that if he abides by these regulations, such as leaving a space between the trammel nets, the other hunters will not. He believes that numbers of birds are declining due to development along the coast. He also believes that God will bring more birds every year.

---------- **ooo000ooo** ----------

A subsistence hunter

A secondary school educated governmental employee from the Nile delta area (region 2), who is the head of a household consisting of 6 people, including his parents and two children. His father used to hunt, but now he is responsible for hunting along with his other brother, as his father becomes more elderly. The hunting season is mainly the time when he can provide his family with a generous proportion of protein that he cannot usually afford out of his income.

On top of securing protein, he can sell some of his harvest to supplement his income. He uses an air rifle to catch birds such as white stork or heron, that do not fall into the nets. Catching a big bird is considered a prize for him.

He is familiar with hunting laws and regulations and interested in conservation as long as conservation plans do not completely ban hunting. Although he has a strong belief that numbers of birds are in the hands of God, he thinks that trammel nets might be one of the reasons behind the declining number of birds. Therefore, he does not mind banning using trammel nets as a hunting technique.

---------- **ooo000ooo** ----------

A Recreational/cultural hunter

A secondary-school educated trader from the northern coast (region 3), who is a member of a household consisting of 7 people. Bird hunting represents an essential part of his life. He enjoys hunting along the coast as well as inland, using his shot gun. His father and grandfather are still hunting. He believes that he cannot stop hunting. As the hunting season represents quality time spent with friends. He shares the harvest with friends and relatives.

He thinks that laws and regulations will be more effective if well-enforced. He also believes that conservation is important as long as it does not affect their cultural heritage.

These examples give an idea of the variation in hunters' motivations, but highlight the common cultural value given to bird hunting. It also reflects the significance of religious belief, which could be a key element to be taken into account in the development and implementation of future conservation programmes.

Relevant conservation approaches for each of these groups should be taken into consideration. For example, law enforcement might be effective with commercial hunters, but less so for subsistence hunters unless alternative income sources are available; while the approach with recreational/ cultural hunters could focus on raising awareness. A common approach that may be applicable across the three types is stressing Islamic conservation principles – in line with religious beliefs in the region.

4. Conclusions

This study was undertaken in response to concerns that, despite the efforts of governments, intergovernmental organisations, NGOs and others, the illegal and unsustainable hunting of birds continues to be a major problem driving declines in the populations of many migratory birds. This is a threat to the species and health of the ecosystems. Furthermore, it reduces the availability of birds as a natural resource to people who depend on them for food and/or income.

The key objective of this study was to help inform efforts to reduce illegal and unsustainable bird hunting, based on a better understanding of the relationship between resource users and birds as a natural resource (resource dependency); and therefore predict the consequences of policy changes and whether the resource users (hunters) can cope with change and adapt to new conservation strategies (resilience). This socioeconomic information will assist in the design and implementation of the NCE Plan of Action along the Mediterranean coast of Egypt.

The study did not systematically differentiate between 'Legal hunting' and 'Illegal killing' and a mixture of both legal and illegal hunting methods were used by hunters. However, it was estimated that at least 75 % of the hunting was illegal.

The study has achieved the following objectives:

1. **To identify spatial patterns and techniques used for bird hunting along the Mediterranean coast of Egypt**

Bird hunting takes place by the shoreline in most areas along the Mediterranean coast, using a variety of different techniques. Widespread trammel nets are used in two, and sometimes three, layers illegally, specifically in North Sinai and the Delta regions. Not only is it a major threat to birds, but to other wild species that can be accidentally netted. Illegal call devices were also used along the coast in all regions.

Despite the commitment to the international agreements at the national level, and despite the existence of the national laws, violations continue and enforcement of laws has become an increasingly difficult task due to lack of capacity and awareness of the potential impacts.

2. **To assess the socioeconomic drivers of bird hunting, dependency and social resilience**

Bird hunting is thought to contribute little to Egypt's national economy (Baha El Din. 2006; Wildlife National Report - EEAA, 2010). It, however, represents an important source of revenue and the livelihood for some coastal communities and individuals. The profit motive seems to be one of the key incentives behind the continuation of bird hunting in Egypt (Baha El Din, 1998; Baha El Din, 2006).

The socio-economic characteristics of the bird hunters indicate high level of dependency on the resource, suggesting that major changes in policies in favour of conservation has the potential to cause substantial impacts to individuals and families.

3. To evaluate the communities' understanding of bird conservation policies

Despite the fact that most Egyptians tend to have a very exploitative and consumptive view toward nature, some coastal communities do have traditional conservation attitudes based on sustaining supply of the resource; such as restricting hunting during spring to allow birds to return to Europe and come back 'with their children' in the next autumn (group discussions).

4. To determine if the communities would consider further bird conservation strategies

Bird-hunting is a long-established cultural activity and hunters have acquired knowledge of migratory birds over many years. This suggests that hunting of birds may be critical to the cultural identity of certain communities and any changes to this activity could have more serious cultural impacts.

The ability of resource users to adapt to changes in the rules that restrict accessing natural resources will determine their willingness and capacity to comply and the social and economic impacts that they are likely to experience (Marshall 2010). Results from this study suggest that more affluent hunters in many communities are resilient to change, with considerable ability to cope with potential hunting regulations and conservation strategies. However, poorer communities are vulnerable to change due to their dependency on bird hunting as an income supplement and source of protein.

A focal concern for bird hunters was not to entirely restrict or ban hunting activities on the shoreline. However, they deemed the regulation of hunting acceptable.

5. Recommendations

Understanding the significant cultural and socioeconomic aspects of bird hunting in Egypt underpins effective conservation programmes. The following recommendations have been drawn from the findings of this survey:

1. **To acknowledge the cultural roots of bird hunting and its importance to the individuals involved in this activity.** Bird hunters have practiced this activity for generations. Hunting remains a deeply entrenched traditional activity in a number of Egyptian communities, suggesting a culturally sensitive, participatory approach should be adopted to enact change. Therefore, acknowledging their rights, by the authorities, to practice hunting will establish a link of trust between hunters and governmental authorities, which will allow for mutual understanding of each party's concerns.

2. **To engage the local community in decision making regarding policy changes.** Effective community engagement results in less conflict, better compliance, fewer delays to implementation and less complicated regulations and protection criteria (Marshall et al. 2010; Rouphael et al, 2015). Involvement of the community also reduces uncertainty about the implications of a policy change, and increases the likelihood of desirable social and conservation outcomes.

3. **To enforce hunting legislation to bring the hunting of birds under effective control – through:**

    a) Implementation of the recommendations from the legal review undertaken by NCE and EEAA
    b) Development of a bird hunting management plan to cover not only the Mediterranean coast but the entire country.
    c) Prohibition of the use or mist nets in certain areas along the coast; such as the sand marshes areas in the Delta, as well as coastal protected areas and their buffer zones.
    d) Establishment of a new system to increase the levels of fines for hunting violations, including using illegal hunting techniques such as call devices.

4. **To develop a mechanism to control, track and follow up on bird hunting permits.** This can be done through collaborative work among official stakeholders. This will provide documented and reliable statistical information on numbers of individuals practicing hunting along the coast and allow for effective monitoring and follow up and thus, improved control.

5. **To securing high-level political support to ensure that measures to address the impact of bird hunting are given a high priority in the conservation sector.** This includes ensuring the availability of capacity allocated to implement these actions.

6. **To mainstream the socioeconomic aspects of bird hunting** not only within conservation policies, programmes and budgets, but also within the policies and programmes targeted towards meeting the overall socioeconomic development and poverty reduction goals. Findings of this study should be discussed with the administrative officials and decision makers within the relevant governorate, as well as the Minister of Development in order to develop alternative activities that provide economic support to the local communities including:
    a) Establishment of fish farms to be run by community members
    b) Provision of small loans with low interest rates for community members to start up small businesses
    c) Development of governmental incentive plan to cover part of the loss to local communities that may result from new conservation strategies and hunting regulations

7. **To increase awareness of the impact of hunting on bird numbers and sustainable conservation.** Awareness-raising campaigns were believed to be effective in changing behaviour in approximately half the cases where they were targeted (TRAFFIC International, 2008). Awareness-raising efforts to reduce illegal and unsustainable bird hunting need to reflect the different groups outlined in the findings above, and targeted to relevant audiences, such as:
    a) Local mosques' Imams and Islamic public figures in media, to convey the conservation message to local people, supporting a shift in their behaviour away from illegal and/or unsustainable activities. These influential figures may be the most appropriate and effective in communicating with local communities; emphasising the religious ethics of hunting and underpinning conservation ethics. Greater understanding and more information is required in this regard, as there is no information available in the literature on the effectiveness of such a campaign.
    b) The younger generation, particularly school age children. A bird conservation awareness strategy should be developed to target young people. Awareness-raising campaigns should be developed in a way that will enable their impact to be assessed and subsequent campaigns to be modified in order to strengthen their impact further.

8. **To improve the knowledge base of official stakeholders towards the hunting and trading of birds.** Particular attention should be given to those traded species that are of high conservation concern, such as birds of prey.

9. **To control the export of wild birds.** There is no doubt that the export market demand has led to a significant increase in bird hunting. Controlling, if not banning, the export of wild birds can reduce this pressure and discourage illegal hunting. Currently, no information is available on the size of the Arabian Gulf market that has recently opened up, the procedures of the exporting process or the numbers of exported birds. This critical issue needs more investigation and attention from officials.

10. **To undertake further fieldwork and studies to complete the socio-economic picture along the coast. In particular:**

    a) To conduct a follow-up comparative study of non-hunters in the same geographical areas to understand any variance in the socioeconomic characteristics between hunter and non-hunter households. This will help to refine the recommendations and suggested conservation actions.
    b) To conduct a study to investigate the scale and structure of the export market, as it is believed that this market has stimulated an increase in bird hunting to meet the demand, and, consequently, more illegal hunting activities.

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