The Problems Faced by the Local Farmers in the Management of Francolin Raids in Crop-Farmlands in Muyuka Municipality, Southwest Region, Cameroon

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Abstract

The major human activities that have transformed the Earth include agriculture and urbanization. There has been an enormous deterioration in bird populations of late, consequently many farmland birds are listed as endangered species. Francolin birds are known in the destruction of crop, especially the tubers like cassava, yams, cocoyams, and yams in Cameroon, yet no serious study has been carried out to mitigate this crises. Hence, the objective of this survey is to assess the difficulties faced by the local farmers in handling the francolin-crop damage in Muyuka municipality. A total number of two hundred and fifty questionnaires were administered to a population sampled of local farmers in the study area. The results obtained reveal that profession associates significantly with the best method used prevent bushfowl damage in crop-farms (X^2 = 14.225 df=6, P<0.05). Inaddition, the survey has shown a very significant correlation link between the location areas of francolins and their crop-pest behaviour in farms (R^2 = 0.848, P<0.05). A significant correlation is also shown between gender and the best method used to prevent francolin birds from crop-farms (R^2 = 0.362, P<0.05). A respondent score of 82.04% recorded acknowledging that francolin birds are very serious crop-farmland pest in this community, necessitating its population control. The best method needed for the control of francolin population from damaging crop-farms recorded a respondent score of 46.53%, 27.76% and 25.71% for the use of traps, scarecrow and chemical spray respectively. This study requests the stakeholders in wildlife conservation and agriculture to jointly work in furnishing the local farmers with the best possible solutions to mitigate this crises in the community.

I. INTRODUCTION

The number of farmers affected by damage from large grazing birds has increased as also the costs for crop damage and preventative measures, for example, farmers have been compensated with 190,000 Euros (in total 2005–2008) in Lake Der-Chantecoq, France (Salvi, 2010) and 200.000 Euros (2012) in Sweden for damage caused by common cranes (Karlsson *et al*., 2013). These population changes, along with increasing crop damage are the result of international agreements banning hunting and promoting habitat conservation (wetland restorations). These include the Convention on the Conservation of Migratory Species of wild animals (CMS), and within Europe, the EU Council Directives on the conservation of wild birds and on the Conservation of natural habitats and of wild fauna and flora, as well as species-specific flyway manage- ment plans (Madsen and Williams, 2012). Additionally, these species have benefitted from the EU Common Agricultural Policy (CAP) that has promoted intensified agricultural practices with greater use of autumn-sown crops and larger field units (Jongman, 2002; Stoate *et al.*, 2001). As a consequence of non-overlapping objectives between conservation and agriculture, we are now in the situation that the number of large grazing birds continues to increase and fuelling for a potential conflict between those aiming to maximize agricultural production and those aiming to conserve biodiversity (MacMillan and Leader-Williams, 2008; Redpath *et al.*,2015, 2013).

Damage to agriculture is commonly severe in the vicinity of protected wetlands, because they provide attractive roost and staging sites for large grazing birds (Kleijn *et al.,* 2014; Vegvari and Tar, 2002), while the birds' resource needs are not often fulfilled within protected areas (Fox and Madsen, 1997; Woodroffe, 1998). Consequently, birds use agricultural land surrounding protected areas for foraging, causing crop damage (Alonso *et al.,* 1983; Amano *et al.,* 2007; MacMillan *et al.,* 2004; Nowald, 2010). Damage to crops leads to complex secondary effects, such as reluctance from certain stakeholders to react positively to the introduction of new protected areas or other conservation initiatives; potentially hindering the effective conservation of other bird species or important environments (Dickman, 2010). Management strategies can be developed following assessment of the probability of birds visiting different types of fields. Strategies should aim to reduce crop damage and its costs by steering birds to less damage-prone or less valuable fields, such as harvested or diversionary fields and to predict where high damage risk might occur (Jensen et al., 2008; Madsen *et al.,* 2014; Sherfy *et al.,* 2011).

The need for an evidence-based strategy is crucial, especially because issues regarding large grazing birds in many areas are changing focus from conservation to population regulation and crop protection (Amano, 2009; Pullin *et al.*,2004; Tombre *et al.,* 2013), including by culling wildlife (Hothorn and Muller 2010; Kuijper, 2011). However, for large grazing birds, culling is often prevented by international legislative protection as well as ethical or practical obstacles.Therefore, alternative measures need to be considered. Preventative measures currently used are scaring practices, such as propane cannons, flags and scarecrows, restricted lethal control aimed to scare birds from damage prone fields, and diversionary fields to which large grazing birds are attracted and left undisturbed to forage (Jensen *et al.,* 2008; Tømmervik *et al.*,2005; Vickery and Gill, 1999).

However, to make informed decisions and to implement effective measures, it is of fundamental importance to understand the probability of finding birds at field under given conditions (Jensen *et al.,* 2008; Pullin *et al.,* 2004). Probability of finding birds at fields is influenced by crop type and crop stage as well as food abundance and quality (Amano *et al.*,2004; Anteau *et al.,* 2011; Leito *et al.,* 2008). Food abundance is strongly linked to harvest practices as waste grain becomes available at stubble fields and depletes over time due to consumption, decomposition or germination of grains (Lovvorn and Kirkpatrick, 1982). Moreover, distance from roost sites affects the probability of finding large grazing birds at a field as they trade energy gain against travel costs (Bautista *et al.,* 1995; Jensen *et al.,* 2008) with a clear daily pattern where birds feed on fields during the daytime and rest over night at roosting places (Bautista and Alonso, 2013).

The main aim of this study is to assess the difficulties faced by the local farmers in handling their crop damage crises by francolin birds in their community. The relationship that exists between bird pests and crop-farmers has seriously affected harvest in most parts of Cameroon. This conflict is believed to be the main cause of bird destruction, consequently, the used of unconventional methods like chemical pesticides by the local farmers to destroy these birds in the crop-lands is feared to have contributed to create ecological problems in many parts of the country. The global human population increase is consequently increasing pressure on human survival causing developing nations to depend ultimately on agriculture. This agricultural dependence has been the main cause of rainforest degradation and the wildlife population decline.

II. MATERIALS AND METHODS

Muyuka municipality is situated on the coast of southwest Cameroon, between 3°57'- 4°27' N and 8°58'-9°24'E, where its slopes rise from the Gulf of Guinea, and includes two major biomes (Guineo-Congolian forest and afro-montane forest). The montane forest that is recognized as home for endemic and threatened species has higher death of trees than other vegetation types (Forboseh *et al.,* 2011). The regular burning of the grassland around the montane forest further exacerbates the problem because it leads to the destruction of the habitat, nests, eggs and juveniles of ground nesting birds such as the Grey-necked Picathartes and mount cameroon francolin (Horak, 2014).

The average monthly temperatures are like any other part of Fako division, with the hottest month recording a monthly temperature of 33°c (February and March) and the coldest months recording as low as 23°c (June–October). Two major seasons exist in this area, the rainy and the dry seasons. This area is also known to be rich in francolins and many other wildlife species like chimpanzees, duikers, guenon monkeys and the rodents. Muyuka area has a forest at the slop of mount Cameroon. The environment is constantly under pressure from mankind. The search of farmlands and settlements space keeps increasing as time increases. Most farming systems are not eco-friendly, leading to land degradation. Like any other part of Mount Cameroon region, Muyuka municipality is rich in andosols even though water remains one of the vital natural resources appealing to the local inhabitants of the eastern slope. Traces of clay soils can also be found in certain areas. Generally, the area is rich in sandy soil, black volcanic soil with high humus content (Horak, 2014).

Fig. 1: Map of Muyuka municipality (Source; Forboseh *et al.*, 2011)

III. DATA COLLECTION AND ANALYSIS

The primary research data was collected from related literature material in the course of preparing the questionnaire. Immediately after a brief pilot study was done, the secondary data collection process was launched in the study area and this witnessed the administration of two and fifty questionnaires to a randomly selected population sample. All the questionnaires given out were returned just within a few days. The quantitative demographic data like profession and gender was tested against qualitative variables like the best methods used by the local farmers to prevent crop damage. The research data was analyzed by using SPSS version 20, and both chi-square and correlation statistical tools were used.

IV. RESULTS

The survey showed that profession associates significantly with the best method of preventing bushfowl damage to the crop-farms (X^2 = 14.225 df=6, $P<0.05$) fig. 1. Francolins in Cameroon and some other areas in the South of Sahara are considered to be very serious crop-pest. This is a nightmare to most crop-farmers in Muyuka where its control from farms is a preoccupation, using all affordable methods to fight the crises.

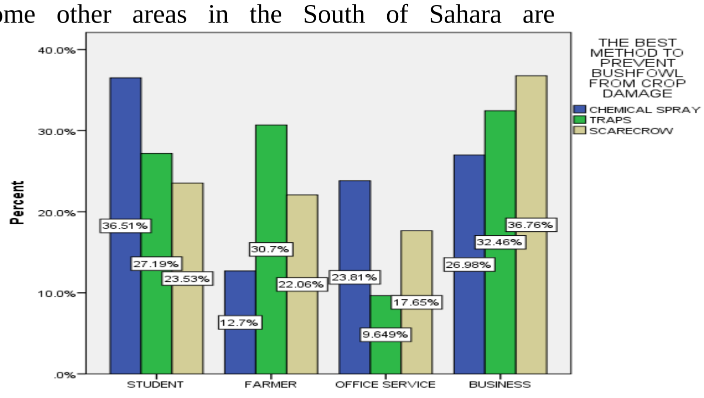

Fig.1: Profession and The best method to prevent Francolin birds from farms

The survey showed a very significant correlation link between the location areas of francolins and their crop-pest behaviour in farms (R^2 = 0.848, P<0.05) fig.2. Francolins general are most often located around farmlands where they feed on crops. For this reason they are known to be an environmental indicator, indicating crop-farmlands and areas that have once been farmed and are having crop remnants to feed these bird species. Francolins have rarely been found deep into the rainforest of Cameroon. In some places they are rather called farm-birds due to their strong association with crop-farmlands.

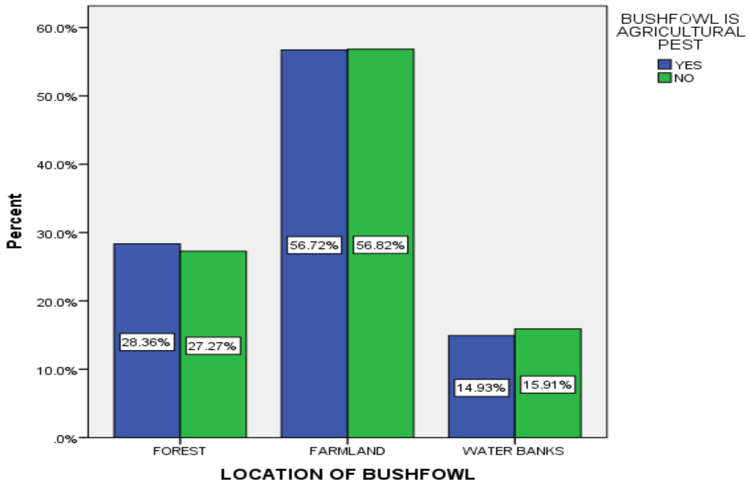

Fig. 2: The location of francolins and their agricultural pest behaviour

A significant correlation is shown in fig.3 between gender and the best method used to prevent francolin birds from crop-farms (R^2 = 0.362, P<0.05). The population of Muyuka sub Division is dominated by local crop-farms. The high production capacity of crops like plantain, cassava, yams, and cocoyams has gained this sub Division a prominent position in food supply to bigger cities like Douala. Crop-farming is the main occupation and income generating source of both women and men in this area. Hence, crop-farm protection from the francolins and other bird species that destroy crops is paramount.

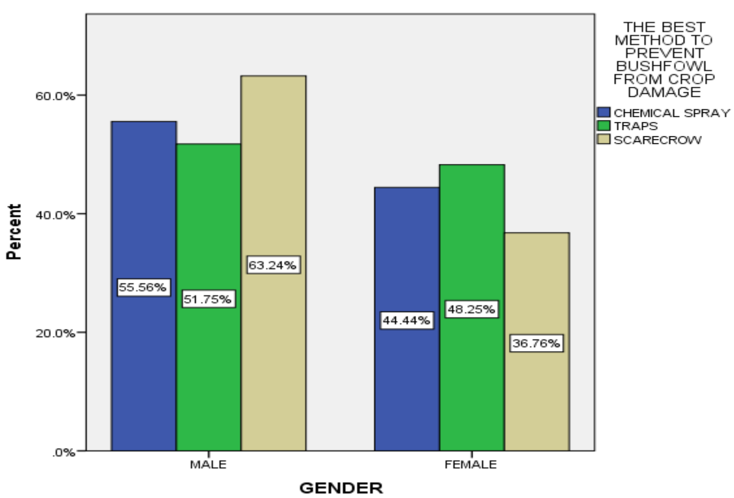

Fig. 3: Gender and The best method to prevent francolins from farmlands

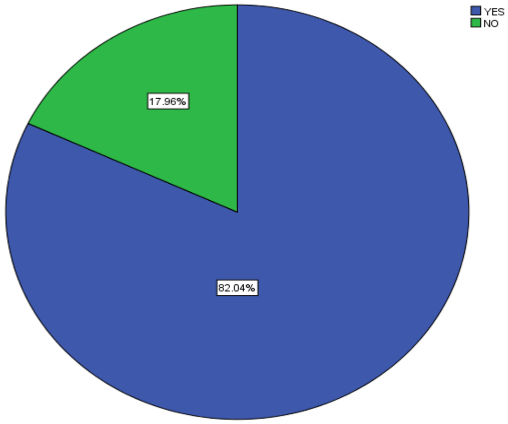

Fig. 4: Bushfowl is an agricultural pest

A respondent score of 82.04% is recorded on francolin birds as very serious crop-farmland pest in the community, necessitating their population control (fig.4). It is also important to know that crop-farm pest generate conflicts between wildlife and humans in many places in Cameroon, resulting to the indiscriminate killing of the population of this birds. It is the responsibility of the stakeholders to educate the local people on what direction the relationship should take. Our desperate need of crops to survive households economically and the wildlife population for conservation, tourism and domestication invites competence in research in order to strike a co-existence balance. A respondent score of 17.95% recorded on francolin birds non destructive to crop-farms might be from non tubers farmers. This group of farmers might not have had any serious crop-destruction problems from these birds.

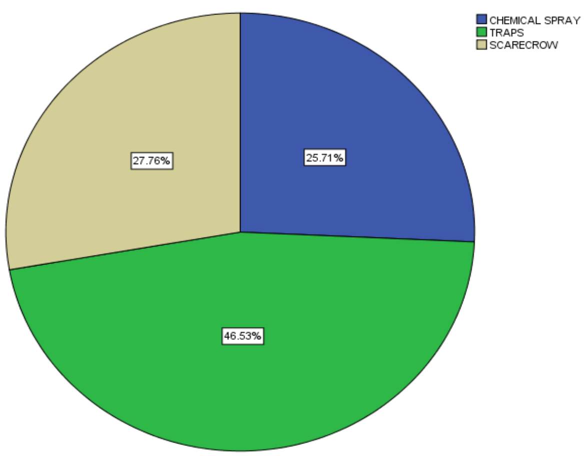

Fig.5: The best method used to prevent bushfowl from crop damage

The best method needed for the control of francolin population from damaging crop-farms recorded a respondent score of 46.53%, 27.76% and 25.71% for the trap, scarecrow and chemical spray respectively (fig.5). The protection of crop-lands by the local farmers in this community has to be given a research consideration. The trapping method usefulness as shown in this survey seems to help these farmers in fighting to control the population of the pest birds. This trapping does not only reduce the bird population but also helps to guarantee sustainable protein availability for these farmers. The scarecrow pest-fighting method is targeted to chase these birds away from the crops, but this method is believed to rather divert these birds to other neighboring crop-farms for feeding, and some even return to the original farms when they must have adapted themselves with this method. Some farmers have acknowledged that most of these birds no longer fear the scarecrows, especially birds that have been very frequent to these farms. The chemical spray has proven to be more useful and efficacious to the population of weavers and insect pest in farmlands than the francolins which are bigger in size comparatively. Secondly the application of chemicals like pesticides to control the pest population invites other environmental problems like the destruction of ecological food chains.

V. DISCUSSION

The world population continues to grow, accompanied by rapid urbanization and industrialization. In 2009, more than 50% of the world's population was living in cities (UN, 2011), with the most rapid urban growth in low-income regions. In Africa the urban population is likely to triple, and in Asia it will be more than double in a few decades (UN, 2011). Loss of biodiversity is a worldwide phenomenon (Butchart *et al*., 2010). Even though cities only occupy 2.7% of the world's drylands, urbanization leads to several environmental problems including damage to biodiversity (Kareiva *et al*. 2007, Grimm *et al*. 2008). Birds are globally seen as a flagship group for conservation, for ecological, evolutionary reasons, and they occupy a significant place in people's perception of nature. Birds are highly sensitive as well as mobile, and thus eminently suitable to study the impact of anthropogenic disturbance on biodiversity (Chazdon *et al*., 2009; Gibson *et al*., 2011). India's bird diversity contains 13% of the world species richness, approximately 1300 species (Grimmett *et al*. 1998), and contains several Endemic Bird Areas (Birdlife International 2012). India has three of the 34 global biodiversity hotspots. Studies of the effect of urbanisation are not common on the Indian Peninsula, and studies of human impact on bird diversity are even rarer. Some early reports (e.g. Galushin 1971) were impressed by the high number of birds in Indian cities, and suggested that this can be explained by the amount of food available, the number of trees that can provide breeding sites, and the "traditional goodwill of Indians to all living beings" (Galushin 1971). The activity pattern of birds in croplands is influenced by a number of factors such as crop type, non-crop physical structural arrangement and the agricultural practices (Rodenhouse *et al.*, 1995).

Shift in cultivation timing also significantly affects the activity pattern of cropland birds, which causes further reduction of the population of farmland birds (Best, 1986; Jobin *et al*., 1996). An annual shift in the cultivation timing in India is dependent on the onset of the monsoon. The rainfall period affects bird breeding activities, habitat formation and food availability. In spite of the natural and atmospheric conditions, the increase in land use by humans for purposes other than agriculture influences bird habitat degradation rate, as these birds are sensitive to the changing pattern of agricultural practices (Lohr *et al.*,2002). Cropland birds have significantly adapted to the dynamic nature due to their unique metabolism and non-selective food habit (Järvinen, 1979). There has been an enormous deterioration in bird populations in the last 30 years and consequently many farmland birds are listed as endangered species (Donald *et al.*,2006). Considerable measures are required to protect bird biodiversity (Ranganathan *et al.*, 2012). The trend of reduction in cropland area, agricultural intensity and bird biodiversity is not only common in Asia (Semwal *et al.*, 2004), but research in other parts of the world such as North America (Brennan & Kuvlesky, 2005), Europe (Clay, 2004) and Africa (Söderström *et al.*, 2003) also show an identical scenario.

The extensive use of pesticides in agriculture influences bird health causing endocrine disruption and weakening of the immune mechanism of bird species dwelling in the croplands, and hence it has destructive biological effect on the birds (Lundholm, 1987; Fairbrother *et al.*,2004). Pesticide residues have been reported in eggs of many bird species in different parts of the world (Tannock *et al.*, 1983; Medvedev, 1995). Recent study in Iran indicates that organochlorine pesticide and olychlorinated biphenyl (PCB) residues are found in bird's feathers (Dahmardeh et al., 2009) and there are many pesticides which are noted to be more harmful to birds than to mammals (Walker, 1983). Inaddition, pesticide coated seeds create risk of toxicity and pesticide poisoning (Hart, 1990; Fletcher *et al.*, 1995; Pascual *et al*., 1999). A wide variety of arable crops attract granivorous birds that cause significant damage to crop yields globally (Coleman & Spurr, 2001; Ormerod *et al.*, 2003). Birds can inflict damage to the crops and a loss to the farmers in all the stages of crops right from sowing, planting until harvesting. However, there are few studies of the problem among the farmers and the magnitude of crop damage caused by birds in India (Dhindsa & Saini, 1994).

The class Aves includes all species of birds. It comprises of about 10,000 recognised species, which descended from one another through the process of adaptation by natural selection. Some birds are generally believed by local people to be both indicators of season and time, and to some extent certain bird species can be used to predict the period of the day and night like the francolin. Bird farming enables some people to be economically self reliant and has reduced the number of the unemployed human population in some society. They are also used as national symbols, e.g in the Roman Empire, the symbolic eagle in Europe was the Golden Eagle, while the Eagle is also used in the Nigeria's coat of arms to represent strength. Birds are regarded as divine messengers in primitive culture, thus to understand them is to understand divine revelations. Despite the fact that bird populations are for the most part beneficial, there are occasions when individuals of certain species can seriously compete with human interest 4. Some of these creatures create serious pest problems where they occur singly or in small group but especially when in large aggregation.

VI. CONCLUSION

The attractive smooth plumage morphology of many bird species and their beautiful songs during feed programmes wins them human love in the tourism industry. Their ability to settle in areas other wildlife species cannot due to their flying behavioral ability guarantee their survival as well as population increase. However, many bird species like francolins have had an uncompromising associated, especially on crop-farmlands where these birds are adapted to crop-destruction for their feeding. This crop-farmland conflict has posed a generational research challenge to agronomists, wildlife biologists, and wildlife conservationists looking for a solution of have the birds and the crops in a reduced conflict relationship. In Muyuka, crop-farmers have employed different tactics to protect their crops from damage by reducing the bird population but lack enough financial encouragement for feasibility. The preferable application of toxic chemical pesticides in these farmers in fighting the francolins would further destroy ecological food chains in the area and in neighboring water bodies. Hence, the State government should allocate enough research budget and expertise to handle the crop-farm-pest conflict in Muyuka and other parts of Cameroon.

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