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Full Length Research Paper

Are quelea birds really a menace? Innovative use of indigenous knowledge systems in the harvesting and utilisation of quelea, *Quelea quelea lathamii.* in Hwange District of Matabeleland North Province

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Quelea birds have been a threat to summer subsistence small grains and commercial winter cereal cropping in Zimbabwe. Control techniques using toxicant Fenthion through sprays has been developed in Zimbabwe. The harvesting and utilisation of quelea by the rural communities has always occurred using indigenous knowledge systems. To assess this, a survey was conducted in July 2012 to April 2013 in Hwange. The study sought to identify and assess the indigenous harvesting methods, consumption and impact of quelea harvesting on livelihoods, incomes and food security. Data was collected through focus group discussions, field observations and a questionnaire survey on forty harvesters. The study found that quelea birds are consumed and sold on the informal market for 20 birds per US$1.00. The locals use latex from *Euphorbia ingens, Euphorbia persistentifolia*, *Euphorbia fortissima* and wax from *Colophospermum mopane* through an ingenious environmentally friendly *Chembwe* trapping concept. *Euphorbia cooperi* latex *was* not used because it is poisonous. The study found that 600-1000 birds are caught per day from February to June. Harvesters get up to 350 kg of grain and USD500.00 per month from sales. The birds provide a cheap source of protein, employment and improved livelihoods. More information on preservation and processing is required.

Key words: Quelea harvesting, Quelea utilisation, Euphorbia, indigenous knowledge systems, Chembwe.

INTRODUCTION

The Red-billed quelea, (*Quelea quelea*) is the world's most abundant wild bird species, with an estimated adult breeding population of 1.5 billion pairs. Some estimates of the overall population have been as large as 10 billion. It is a small passerine bird of the weaver family Ploceidae, native to sub-Saharan Africa.

The southern race of quelea, *Ouelea quelea lathamii* breeds largely outside Zimbabwe, to the south, west and in the north where conditions are arid and ideally suited for breeding (Ward, 1971). Most of the border areas in Zimbabwe form part of National Parks and Wild Life Estates with the neighbouring countries. Hwange communal lands are adjacent to the north and western borders which experience quelea damage to summer subsistence small grain crops.

The food of the Red-billed quelea consists of annual grasses, seeds and small grain. As soon as the sun comes up, they come together in huge flocks and co-operate in finding a suitable feeding place. After a successful search, they settle rapidly and can cause serious damage to crops. In the middle part of the day they rest in shady areas near water bodies. Birds seem to prefer drinking at least twice a day. In the late afternoon they once again fly in search of food.

Although they prefer the seeds of wild grasses to those of cultivated crops, their huge numbers make them a constant

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threat to fields of sorghum, wheat, barley and pearl millet.

The average quelea bird eats around 10 grams of grain per day. This is roughly half its body weight and a flock of two million can devour as much as 20 tonnes of grain in a single day, (Elliot, 1989).

With an estimated adult breeding population of at least 1.5 billion, FAO estimates the agricultural losses attributable to the quelea in excess of US$50 million annually, (Elliot, 1989).

Damage

All small grain cereal grown in semi arid parts of Africa are a potential target and damage is especially likely when the birds' preferred wild food is unavailable. FAO (1981) estimates quelea damage in Kenya and Tanzania in 1978-79 to be worth US$5.4 million. The annual losses in Africa are estimated to be US$ 45 million, (Elliot, 1989).

Greater concentrations of quelea occur during the autumn and winter months when the birds congregate in large roosts often numbering several million adjacent to commercial irrigated wheat/barley crops and summer produced small grain crops. Unlike most other African countries, which do not have sophisticated irrigation facilities, damage is more noticeable in Zimbabwe at this time and tremendous effort and expenditure over the last 40 years has led to the development of effective aerial and ground methods resulting in greater than 90% kills regularly being achieved using the toxicant Fenthion, (La Grange 1978). Studies in Zimbabwe, based on work originally carried out in Botswana, (Jones 1975, 1976), has shown strong correlations between the level of depredation, presumably indicative of the birds' status and the previous season's rainfall. Where good rains are experienced over a long period, quelea appear capable of breeding several times with greater numbers threatening crops the following season. Consequently, since 1980 Zimbabwe has adopted an approach to control only the quelea, which is a direct threat to the standing crop.

Research findings indicate that grass seed is preferred except possibly pearl millet and white varieties of sorghum. It is admitted, though, that damage is more serious to barley and can be devastating to sorghum and millet during the summer months.

Harvesting of Quelea

Africa experiences an acute shortage of protein food and any source of protein must therefore be exploited. The nutritional content of quelea is high, with a greater calorific value than dried mammalian meat and around five times the protein found in staple cereals, (Jaeger, 1977). The most widespread and easiest method of harvesting quelea is the collection of nestlings from breeding colonies, which is most productive just before they fledge (Jarvis and Vernon, 1989). Some 3.5 tons of quelea chicks were harvested from a large colony in a wildlife conservancy by some 500 rural people, a control method that can be cost effective locally as it is no burden on the exchequer and provides an important food supplement in drought areas.

Quelea have always been harvested by various means in Zimbabwe such as using sticks to beat roosts after sunset, use of elastic strips from inner car tubes to smash through massing birds and trapping. Breeding colonies close to human settlements are raided just prior to the fledgling stage primarily for their food value.

The use of mist nets is a method which is able to cope with large numbers though removing the birds after dark in the roost is both tedious and damaging to the nets. In breeding colonies where collection can be carried out during daylight hours, this problem is alleviated to a large extent and catches of up to 1000 birds per day have been achieved in Zimbabwe (La Grande, 1988).

An enterprising farmer in the Banket/Trelawny area of the Zimbabwe found that he could successfully trap quelea by building several walk-in traps which he loaned out at no cost to his employees who used them around his wheat lands. These people in return were allowed to keep or sell the quelea they caught. In this way he was able to trap up to 475 quelea birds a day, with an average of 150 birds from each of his 12 traps, (La Grande, 1988). Although this method proved popular, it had little apparent impact on damage inflicted to the crop nor were they attractive for large scale collection. It is believed there is room for improvement based upon the Australian crow-trap principle.

Clearly a more efficient method was necessary capable of collecting several thousands quelea at a time. Considerable research has been carried out on quelea throughout Africa although little information is on hand regarding roosting behaviour in both over night roosts or daily resting places where they congregate in large numbers. Behavioural studies to determine where mass capture could be best directed was carried out in 1978 (La Grange, 1978). Two methods have been tried in the U.S.A. and Canada particularly against blackbirds and starlings to capture or destroy them in large numbers without toxicants. These included the use of surfactants Stickley (1986) and flood lit traps (Mitchell 1963), both of which appear to have been fairly successful.

Although rural people traditionally collect and eat quelea throughout Africa, even after spraying operations, commercial markets are only well developed in Cameroon and Chad where flying birds are intensively trapped by teams with hand held, cast and large stationary nets. Trapping and selling quelea for food is an important economic activity in rural Chad and it was estimated that in one area around N"Djamena the income from some 7 million quelea sold per year comes to within

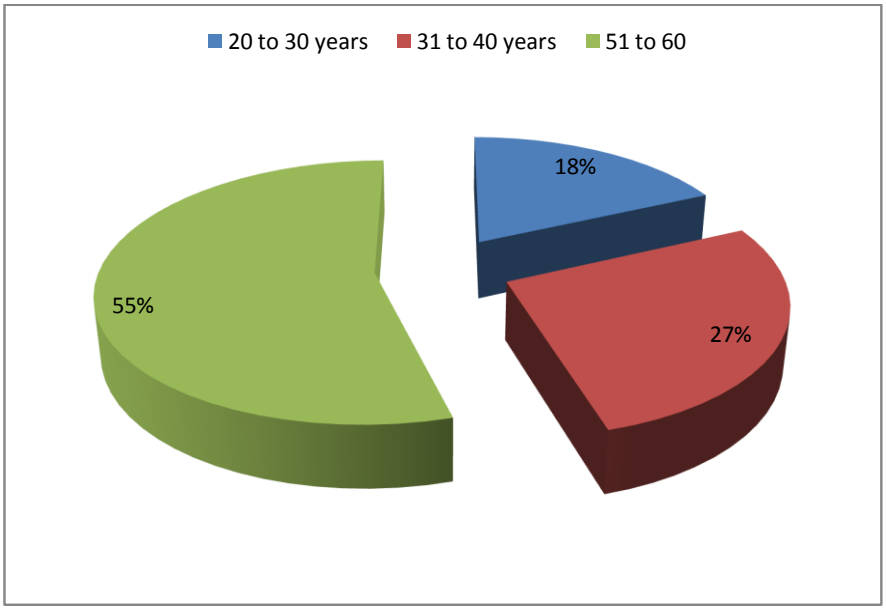

Figure 1: Age of quelea harvesters

40% of the maximum capitalised crop loss experienced by farmers (Mullié, 2000).

Zimbabwe, like most developing countries, faces protein shortage. The harvesting and utilisation of quelea by the rural population has always occurred for decades. Traditionally, quelea birds have been consumed and have recently been sold on the informal market. The recognition of quelea as a potentially economic renewable resource has been recognised by the rural communities.

The Objectives of the Study were

- To find out and document the indigenous knowledge systems and approaches of harvesting quelea birds in Hwange District.
- To assess the socio economic impact of quelea harvesting on the livelihoods of the rural communities in Hwange District.

METHODOLOGY

Site Description

The study was carried out in Nekatambe and Nekabandama Wards of Hwange District in Matabeleland North Province. The district lies predominantly in Agro-ecological Region IV, which is characterised by very low and erratic rainfall of less than 500 mm per annum. Despite the low rainfall, farmers in the region still practise dry land small grain cropping, where they realise relatively low yields in certain favourable localities. The major challenge in the production of small grains is the low and erratic rainfall, destruction of grain due to quelea and armoured ground crickets.

Sampling Framework

A survey was conducted to assess how the local communities have been harvesting and utilising quelea. A total of 40 respondents were randomly selected along the major rivers and water bodies in the wards. A questionnaire was developed and administered to 40 respondents.

Three case studies were conducted in two locations in the two wards. The harvesters were asked to outline the methods they use in harvesting quelea and how this has impacted on their livelihoods.

Consent was sought and granted by the respondents before the interviews and case studies were conducted. The data was analysed using SPSS Version 16 and Ms Excel.

RESULTS

Population Demographics

All the respondents were male since quelea harvesting is a male domain. The age range of those involved in quelea harvesting was from 24-58 years. The 51- 60 years age group had most respondents (55%), whilst the 31-40 years and 20-30 years had 27% and 18% respectively (Figure 1).

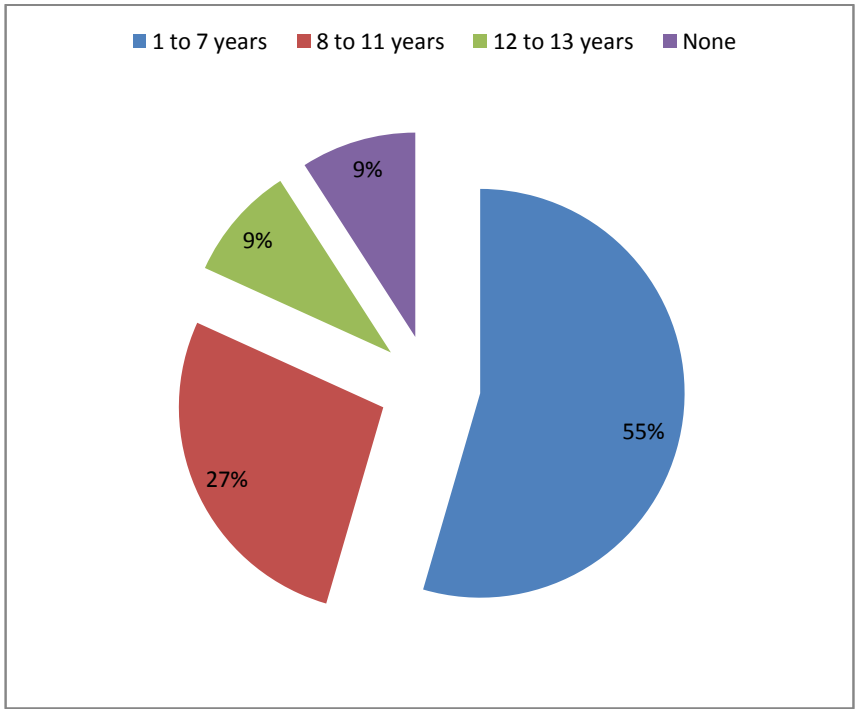

Figure 2: Level of education.

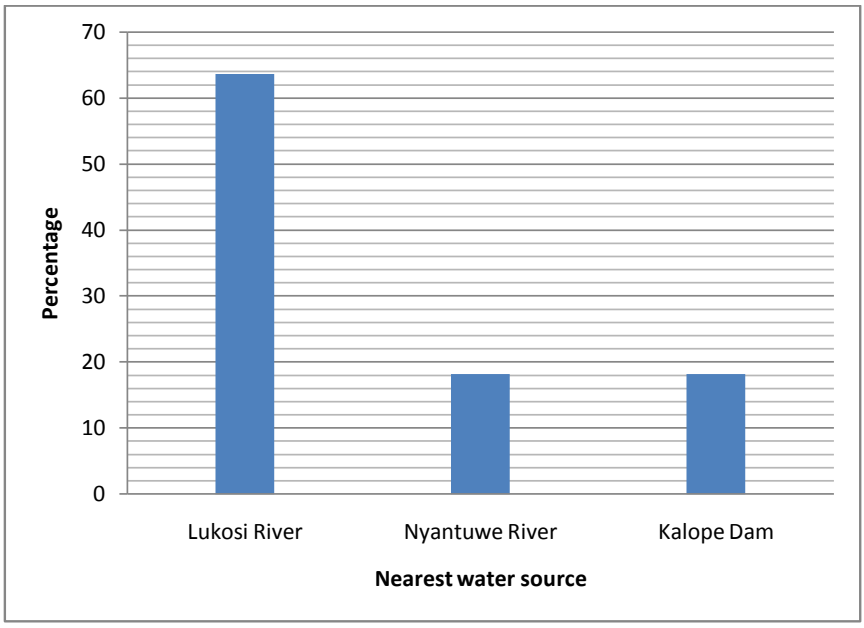

Figure 3: River where harvesting takes place.

Married men comprised 73% of respondents, whilst 18% and 9% were divorced and separated respectively.

The family sizes range from 4-16 people per household, with 54% of respondents having more than 10 people in their households.

Education Qualifications

Fifty five per cent of respondents had some primary education, 27% had secondary education and 9% having not gone to school, Figure 2.

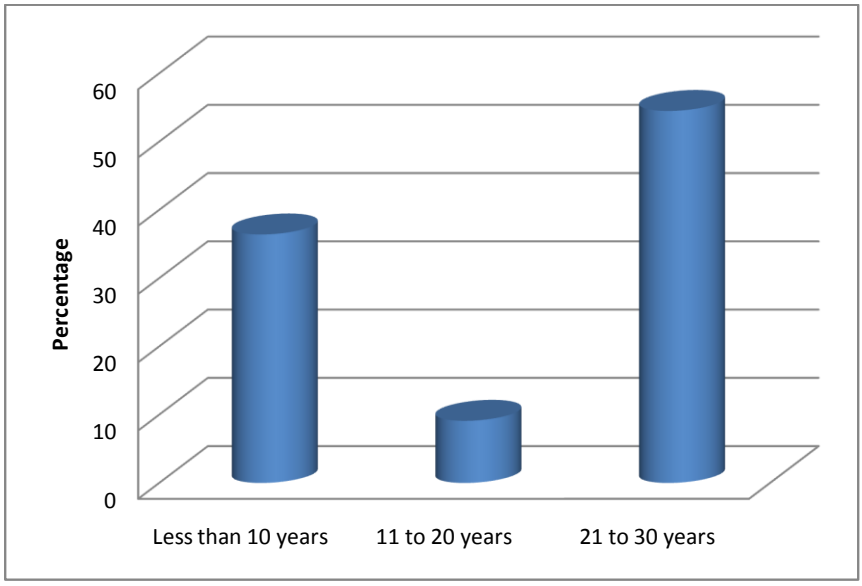

Figure 4: Years in quelea harvesting.

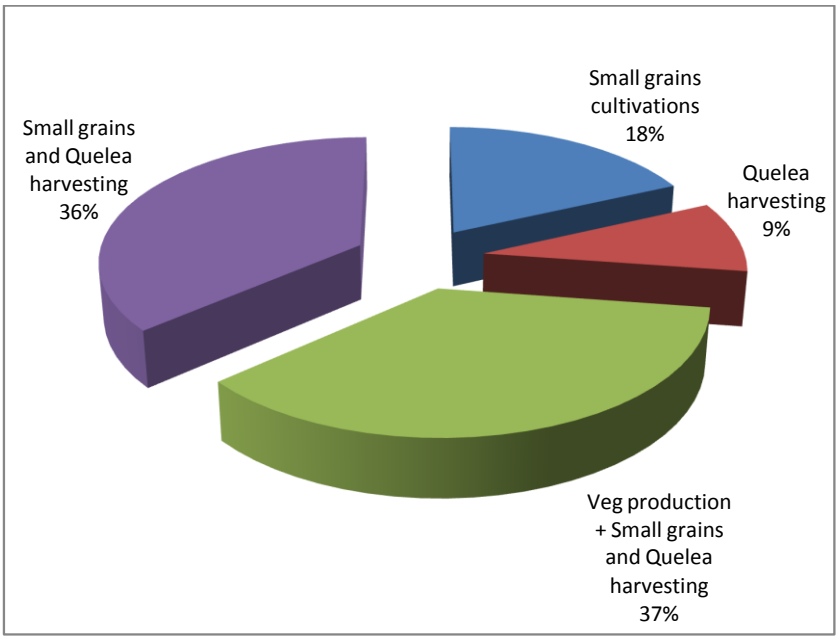

Figure 5: Livelihood activities carried by men.

Involvement in Quelea Harvesting

The study found out that 91% of the respondents have been involved in quelea harvesting in the past year. Figure 3 shows that 64% of the harvesters being along the Lukosi River, whilst those harvesting along the Nyantuwe River and Kalope Dam were reported at 18% each.

The study revealed that 54% of respondents have been involved in quelea harvesting for more than 21 years, whilst 9% and 36% reported 11 to 20 years and less than 10 years respectively Figure 4.

Figure 5 above shows that the other activities carried out by the quelea harvesters are small grains cultivation, winter vegetable cultivation or a combination of these activities.

Indigenous quelea harvesting method

Harvesters selected a site between the water points and the

Plate 1

Plate 2

Plate 3

Plates 1 to 3: Hides made of *Acacia karroo* brushwood.

quelea's feeding grounds or small grains fields. A hide or **Chembwe** is constructed. Plates 1-3 above show the hides.

The hides are made on live *Acacia* trees and cut *Acacia* brushwood. The hides are 3 to 4 metres in diameter and 1.9 to 2.2 metres high. There is enough room for five people to operate from and a platform for a circular cage or two. The roof of the hide is constructed in such a way that the person inside the hide is not visible but is able to see what is happening on top of the hide. Forty to fifty quelea birds are caught, killed, placed on forked stick and put on the top of the hide to act as dummies *or mankonga.*

A circular cage (Plate 4), of 1.0 to 1.2 metre diameter, made of tender twigs of *Grewia flavescens* is used to keep up to 200 captive live quelea birds. The cage is placed on a one metre high platform. These birds are caught at the beginning of the quelea harvesting season in February and kept in the cage until the end of the harvesting season in June and are released into the wild at the end of the harvesting season. It was found out that the red billed male quelea are caught and caged.

When the birds in the cage are being fed, they make a chirping noise, which attracts the birds that will be flying past the hide. The male quelea birds make the most chirping noise and this attracts the flocking females

Plate 4: Circular cage (Idendele) on a wooden platform.

Table 1: Species used for making trapping lime.

Scientific Name	Common Name	Local Name (Nambya)
Euphorbia ingens	Candelabra	Izama
Euphorbia persistentifolia	Euphorbia	Kagumampembele
Euphorbia fortissima	Euphorbia	Izama
Colophospermum mopane	Mopane	Umpani

and other birds to come and perch at the top of the hide. The combination of the dummies and chirping captive birds attract the flocking quelea to perch on the hide which will be having some baited perches. The hides are sited near the small grains fields. This was reported by 73% of the respondents, whilst 27% sited them near the water sources or along the river banks.

Euphorbia species used.

The harvesters use latex from *Euphorbia ingens, Euphorbia persistentifolia* and *Euphorbia fortissima* and wax from *Colophospermum mopane.* In order to collect the latex, an incision is made on the Euphorbia plant using a small axe. The oozing latex is collected and stored in containers of up to five litres and this solidified latex is usable for up to two years after collection. Wax is collected from the mopane trees. The mopane bark is injured and this induces the exudation of some wax.

Euphorbia cooperi var calidicola is not used because the latex from this species is toxic and the fumes produced during the preparation of the trapping lime are an eye irritant.

The harvesters tap latex from three *Euphorbia spp* in Table 1. The latex is mixed with wax (Indunda/Igcino) from the *C. mopane* tree. The mixture is heated and stirred to make a stiky coagulant or lime called *bulimbo* (Nambya/Tonga) or *inofi* (Ndebele). After the trapping lime has been made, all the bark that had the wax from the *C. mopane* is removed. This sticky lime can be used for up to seven days before it is replaced by a fresh preparation.

The study found out that 82% of the harversters reported getting the latex from up to 20 kilometres away and 18% reported getting the latex from more than 21km

Plates 5 to 8 show the *Euphorbia spp* used and the injury on the *C. mopane* for the exudation of the wax.

Plate 5: *Euphorbia fortissima*

Plate 6: *Euphorbia persistentifolia & Euphorbia cooperi var calidicola (*Bushveld candelabra Euphobia) with brown flowers not used for trapping.

Plate 7 and 8: Injury on Mopane bark to induce wax formation.

away.

Three respondents have planted some of these *Euphorbia spp* at their homesteads, Plate 5.

Once the fresh batch of sticky lime has been prepared, it is boiled in water, picked whilst still hot and rolled onto thin twig/sticks of 50 to 70 centimetres of *Grewia monticola* or *Grewia flavescens.* These twigs are attached to a 1.5 metre long stick or handle. There is a hook where the stick with the trapping lime and handle meet. These hooks are used to attach the baited perches to the top of the hide. The baited, sticky twigs are put through the roof of the hide. Fifteen to twenty baited twigs or *misumusuma* are put on the hide and when the birds in the circular cages are fed, they make a lot of chirping noise. The noise made by the captive birds and the dummies on top of the hide attracts the flocking quelea birds to come and perch on the hide. As the flocking quelea perch on the hide, some will perch on the twigs with the trapping lime or *bulimbo* and stick to the twigs. Since the harvesters inside the hide can see the stuck or caught birds, they remove the baited twigs so as to remove the caught birds and kill them. The baited twigs are put back on top of the hide and depending on the weather conditions the lime loses its stickiness when it is cool and cloudy. The trapping lime is removed, boiled and rolled onto the twigs again.

Plates 9 below show a quelea harvester and one of the authors setting up the baited twigs on top of the hide and removing the trapped quelea bird.

The study found out that each harvester caught 600 to 1000 birds per day. Most of the birds are caught during the cooler parts of the day, (0600-1100 hours and 1500-1800 hours) and it was reported that catches were less during the hotter parts of the day. It was observed that the quelea flocking was less during the hotter parts of the day than during the cooler parts of the day.

Plate 9: Removing a trapped bird from a *Grewia flavescens* twig

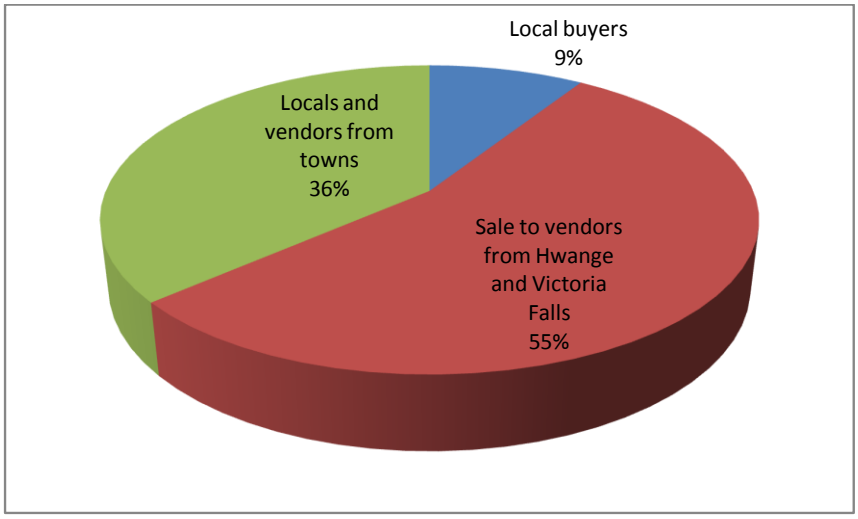

Figure 6: Marketing of quelea birds

It was also found out that the number of birds caught per day depended on weather conditions during the day. Catches are higher during warmer and wind less days. Catches were reported to be lower during windy and cool days.

Processing and Marketing of Quelea

People bought the birds and pluck out the feathers. For easier handling, the harvesters reported that the birds are soaked in water and the feathers plucked manually. The beaks and legs are cut off so as to remove any sticky trapping material on the beaks or legs. Cooking the birds with the sticky material will lead to the birds becoming bitter and unpleasant. The bird's crop and bowels are removed and the birds are boiled in salted water.

Marketing of the quelea is informal with 9% of respondents reporting local purchases from the local communities, whilst locals and vendors were reported by 36% of the respondents. Purchases by vendors from Hwange and Victoria Falls were reported by 55% of respondents Figure 6. The majority of the vendors are women.

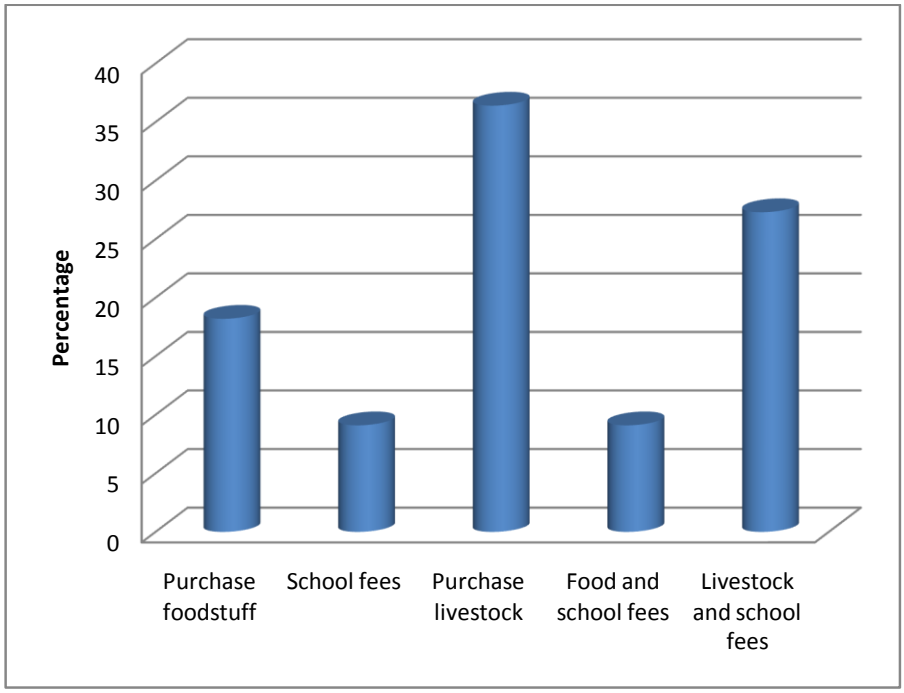

Figure 7: Utilisation of quelea income.

The quelea birds are sold at US$1 for 20 unprocessed birds. The vendors process and sell the birds at US$1 for 10 birds. These are mainly sold at the informal markets, beer halls and bus termini in Hwange, Victoria Falls and Dete towns.

Barter Trade

The quelea harvesters reported selling the quelea by exchanging with grain (pearl millet, sorghum and maize). The study revealed that 20 birds are exchanged for 1 kilogram of grain. The quelea harvesters reported making 300 to 350 kilograms of grain per month from selling the birds in exchange with small grain or maize during the quelea harvesting season. The grain is stored for household use and some of the small grain is fed to the caged captive birds. The captive birds were reported to consume up to 50 kilograms per month.

All the respondents reported having enough food in their households and rarely go without food. The harvesters reported making US$ 350 to $500 in cash per month.

Utilisation of Money Realized from Quelea Birds

The study found that the money realised from quelea sales is used to purchase food, pay school and medical fees, purchase chickens, goats and medication, Figure 7. This was reported by 18%, 9%, 36%, 9% and 27% of respondents respectively.

The main food source in the past six months prior to the survey was reported to be from income realised from quelea sale (27%), own food production (27%) and remittances (46%). The grain from quelea sales is never sold but kept for household use.

Livestock Ownership by Quelea Harvesters

The study found out that 36% of the quelea harvesters reported using some money realised from sales to invest in cattle and small livestock. It was revealed in this study that 46% of the respondents had more than 7 cattle, whilst 36% had none. Only 18% of respondents had no goats. Sheep seem not to be a popular animal in the area, with 64% of the respondents with none. The respondents indicated that the livestock can be sold to raise money in cases of household shortages (Table 2).

Chicken ownership was found to be quite high, with 55%, 36% and 9% of respondents having more than 15 birds and 5 to 10 birds and none respectively.

DISCUSSION

The harvesting and use of quelea as food is highly developed in the communal areas of Hwange district. The local communities have been trapping and harvesting the

Table 2: Livestock ownership among quelea harvesters

	% respondents with none	% respondents with 1-3 animals	% respondents with 4-6 animals	% respondents with > 7 animals
Cattle	36	9	9	46
Goats	18	36	10	36
Sheep	64	9	27	0
Pigs	36	18	18	28

quelea as food, barter trading with grain and for income for generations. The harvesting of quelea has been a source of employment for the males in the communities.

The "Chembwe" trapping system has been developed and used by local communities in Hwange for generations. The knowledge and skill has been passed from one generation to the other. When the birds in the cage are being fed, their chirping noise and the dummies on top of the hide attract the flocking birds. The red billed male are usually caged, so that they attract the flocking females to come and perch on the bushes and the hides blend very well with the natural environment.

The communities in Hwange use latex and wax from *Euphorbia ingens, Euphorbia persistentifolia* and *Euphorbia fortissima* and wax from *Colophospermum mopane.* All these tree species are found in the district. The collection of the latex and wax is done in such a way that these trees are not destroyed. The communities have now begun to plant the *Euphorbia spp* they require for quelea harvesting at their homesteads. This will lead to the conservation of these species.

This ingenious way of trapping potentially provides large numbers of uncontaminated quelea for both home consumption and the market. With this trapping concept, it is possible that this approach could also sufficiently reduce the consumption of quelea collected after the use of toxic control methods. This would be beneficial to the environment as a whole, while providing a source of food and revenue to the rural communities of western Zimbabwe.

Indigenous Knowledge Systems (IKS) is unique to a particular culture and society. It is the basis for local decision making in agriculture, human, natural resource management and other activities. IKS is embedded in community practices. It provides the basis for problem solving strategies for local communities, especially the poor and also represents an important component of global knowledge development issues. In most cases, IKS is an under utilised resource in the development processes, (Woytek, 1998). Learning from IK, by investing first, in what local communities know and has, can improve the understanding of local conditions and provide a productive context for activities designed to help the communities. The importance of indigenous knowledge about the status and trends of wildlife resources is critical and the Hwange community has been using the Chembwe trapping concept for generations and have perfected it.

This method provides uncontaminated quelea birds for the protein starved rural communities. The operation is relatively simple, not requiring high-level skills, whilst providing a measure of control against damage of subsistence small grain crops, environmental pollution, providing income and a source of livelihoods to the rural communities. Developed to potential, the system could also provide a valuable foreign currency resource to the country. The study showed that households are more food secure can pay school fees, medical expenses and have invested in both cattle and small livestock. The livestock can be used in times of need to pay for household requirements. The harvesters do not view the annual quelea outbreaks as a menace but as a time when they can generate income from a renewable natural resource.

The importance of social factors in regulating use and developing policies has to be stressed. The concept of ownership of resources by stakeholders is very great. The harvesters have improved attitudes to conservation and they only harvest what they can handle and process. The study found that the harvesters are now involved in the conservation of the tree species that provide them with their raw materials. The harvesters are now planting the desirable *Euphorbia spp* at their homesteads. There is scope that these species could be used as live fencing materials in the small grains fields.

CONCLUSION/RECOMMENDATION

The use of quelea as food and an income source is highly developed in the communities of Hwange District. The capture and exploitation of quelea as food benefits the communities even if the impact on quelea crop damage was likely to be great and the communities have a cheap source of protein.

With the Chembwe trapping concept, it is possible that this approach could also sufficiently reduce toxic control methods used in other parts of the country and would be beneficial to the environment as a whole, while providing a source of food and revenue to the rural communities of western, northern and southern Zimbabwe that all experience invasions of quelea in autumn and winter.

The recognition of quelea as a potentially economic renewable resource has made the communities perfect their harvesting technique over generations, culminating in the "Chembwe" method. The method potentially provides large numbers of uncontaminated quelea for the market. With careful monitoring this could provide a source of cheap and affordable protein and revenue to Zimbabwe.

The study recommends the assessment of the economic potential and livelihood benefit of the control of quelea by harvesting in the whole district and the neighbouring Binga District.

It is recommended that an assessment and investigation of methods and means of preserving quelea birds for later consumption as food and for sale by harvesters to generate income be carried out.

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