

Best practice bird control

RIU

Validated RNRRS Output.

Plant protection teams in Sub-Saharan Africa now have best practices to guide them in controlling bird pests. The Red-Billed Quelea devastates subsistence crops of sorghum and millet, as well as of commercial wheat and rice. But current methods of dealing with the birds—spraying them with chemicals or blowing up their roosts with a mix of diesel and petrol—are harmful to the environment. Plant protection departments in ministries of agriculture in Botswana, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe now use these best practices. They assess the effects of their bird control measures and adapt them to have less harmful effects on the environment. This means lower doses of chemicals and smaller charges of explosive.

Project Ref: **CPP74:**

Topic: **4. Better Water Harvesting, Catchment Management & Environments**

Lead Organisation: **Natural Resources Institute (NRI), UK**

Source: **Crop Protection Programme**

Document Contents:

[Description](#), [Validation](#), [Current Situation](#), [Environmental Impact](#), [Annex](#),

Description

CPP74

Research into Use

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Geographical regions included:

[Botswana](#), [Mozambique](#),
[Namibia](#), [South Africa](#),
[Swaziland](#), [Zimbabwe](#),

Target Audiences for this content:

[Crop farmers](#),

A. Description of the research output(s)**1. Working title of output or cluster of outputs.**

In addition, you are free to suggest a shorter more imaginative working title/acronym of 20 words or less.

Title:

Environmental impact assessments of Quelea bird control

Working title:

Quelea birds: environmental impacts of control (QUEBEC)

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

Crop Protection Programme

The activity received funds (2001 onwards) directly from DFID (R7967, R8314, R8426) and was collaborative with the ICOSAMP project (R7890, R8315).

ICART CRARF SADC Region (EU) "Environmental and Human Health Impact Assessment of Quelea bird control in southern Africa and novel means of harvesting quelea birds for protein and income generation." Project approved for funding, September 2006, due to commence November 2006.

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

R7967 **2001-2003** *Forecasting movements and breeding of the Red-billed Quelea bird in southern Africa and improved control strategies*

R8314 **2003-2005** *Quelea birds in southern Africa: protocols for environmental assessment of control and models for breeding forecasts*

R8426 **2005-2006** *Early warning systems and training for improved quelea bird management in eastern and southern Africa*

Associated projects:

R7890 **2001-2003** *Establishment of an information core for southern African migrant pests (ICOSAMP)*

R8315 **2003-2005** *Establishment of satellite ICOSAMP systems and improved migrant pest reporting network*

R7065 **1998-2000** *Modelling the performance of barriers of insect growth regulator for locust and grasshopper control to maximise their efficiency and minimise their environmental effects*

Associated Programme Development / dissemination

1999-2000 *Migrant pest workshop (NRInt. Refs. ZA0274 & ZA0336)*

2002 *Presentation of paper, assistance with Planning of & Attendance at 2nd ICOSAMP Meeting, South Africa,*

April 2002 (NRInt. Ref. ZA0497)

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Botswana

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South Africa

(4) ARC Plant Protection Research Institute, Private Bag X134, Pretoria 0001, Republic of South Africa. Contact person: Margaret Kieser. Email: KieserM@arc.agric.za

(5) National Dept of Agriculture, Directorate of Land Use & Soil Management, P/Bag X120, Pretoria 0001, Republic of South Africa, Contact person: Mr Luka Geertsema. Email: lukag@nda.agric.za.

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(10) The Macaulay Institute, Craigiebuckler, Aberdeen, AB15 8QH, UK
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International Organizations

(7) Desert Locust Control Organisation for East Africa (DLCO-EA), P.O.Box 30023, Nairobi, Kenya Contact person: Joseph Ndege. Email: rietmek@plant2.agric.za ndege@wananchi.com

(8) Food and Agriculture Organization of the United Nations (FAO), Italy. Contact person: Peter Kenmore. Email: Peter.Kenmore@fao.org

(9) International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA), P.O. Box 240252, Ndola, Zambia. Contact person: John Katheru Ngondi. Email: locust@zamnet.zm

4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? (max. 400 words). This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.

The Red-billed **Quelea** *Quelea quelea* is a major migrant pest of subsistence agriculture in semi-arid areas throughout sub-Saharan Africa. The birds devastate millet and sorghum fields of subsistence farmers and attack

wheat and rice produced commercially, causing up to US\$70 million worth of damage per annum. The Red-billed Quelea, the most numerous land bird in the world (population 1,500 million), breeds and roosts communally at sites providing targets for control with avicides or destruction with explosives. In South Africa alone there is an annual average of 173 control operations killing c.50 million birds. Both control methods used (spraying with organophosphate pesticides and mixtures of diesel and petrol exploded underneath the birds at night) have environmental impacts. The outputs consist of a service (desk study), a process (EIA protocols) and a technology (environmental impact assessments) related to the investigation of, and mitigation against, the environmental consequences of quelea bird control.

Ø *Desk study*: a review of published and unpublished literature on the environmental effects of control measures against quelea birds was conducted and distributed as a report, summarised in a peer-reviewed publication.

Ø *Protocols*: a set of protocols for procedures to be adopted as best practice when conducting environmental impact assessments of quelea control were drawn up. The protocols were modified and endorsed by stakeholders at workshops in Kenya and South Africa. Means to put the protocols into practice were disseminated as training packages at workshops in Botswana, Kenya and South Africa.

Ø *Environmental Impact Assessments (EIAs)*: two assessments of quelea control actions were conducted in the field in Botswana, including use of custom-made kits for assessing avian cholinesterase levels. One assessment was of a spray action with the pesticide fenthion, the other was the destruction of a roost by explosives. Means to conduct EIAs in practice were disseminated as training packages at workshops in Botswana, Kenya and South Africa.

5. What is the type of output(s) being described here?

Please tick one or more of the following options.

Product	Technology	Service	Process or Methodology	Policy	Other Please specify
	X	X	X		

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

Main commodity: Small-grain cereals (grain sorghum *Sorghum bicolor*, millet *Panicum miliaceum*, bullrush millet *Pennisetum typhoides*, finger millet *Eleusine coracana* and Italian millet *Setaria italica*) and rice *Oryza sativa*.

Quelea birds are also major pests of wheat *Triticum* sp. and attack oats *Avena aestiva*, barley *Hordeum disticum*, buckwheat *Phagopyrum esculentum*, manna *Setaria italica*, triticale (hybrid between wheat and rye *Secale cereale*), teff *Eragrostis tef* and sunflower *Helianthus annuus*. Therefore the output could be applied to these commodities e.g. rice (Chad, Kenya, Malawi, Mali, Mozambique, Senegal and Tanzania), wheat (Ethiopia, Kenya, Sudan, Tanzania) and teff (Ethiopia).

7. What production system(s) does/could the output(s) focus upon?

Please tick one or more of the following options. Leave blank if not applicable

Semi-Arid	High potential	Hillsides	Forest-Agriculture	Peri-urban	Land water	Tropical moist forest	Cross-cutting
X	X				X		X

8. What farming system(s) does the output(s) focus upon?

Please tick one or more of the following options (see Annex B for definitions).

Leave blank if not applicable

Smallholder rainfed humid	Irrigated	Wetland rice based	Smallholder rainfed highland	Smallholder rainfed dry/cold	Dualistic	Coastal artisanal fishing
	X			X		

9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

Value could be added to the output by clustering it with those of other migrant pest projects, in particular those dealing with armyworms and locusts. Control of both of these and the pests listed below involves use of pesticides with potential for environmental damage. A possible 'migrant pest' cluster could include Quelea (R8426, R7967, R6823, R8314), Brown Locust *Locustana pardalina* (R7779), Red Locust *Nomadacris septemfasciata* (R7818), Desert Locust *Schistocerca gregaria* (R6809, R6822), Senegalese Grasshopper *Oedaleus senegalensis* (R6788), Community-based Armyworm Forecasting (CBAF, R8407/R7966/R6762), Novel control of armyworm (R8408), ICOSAMP (R8315, R7890), Armoured Bush Cricket (ABC; R8253, R7428) and Larger Grain Borer *Prostephanus truncatus* (LGB; R7486, R6684). ABC and LGB are not strictly migrants but their control is often organised by the same organisations. From the perspective of environmental impacts of quelea control, the most important link has been with ICOSAMP for information exchange and dissemination via websites and training courses.

Validation

B. Validation of the research output(s)

10. How were the output(s) validated and **who** validated them?

Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income

category the validation was applied and any increases in productivity observed during validation (max. 500 words).

The main validation process for the desk study was acceptance of a shortened version as a publication in a peer-reviewed journal (see McWilliam, A. N. & Cheke, R. A. (2004) A review of the impacts of control operations against the Red-billed Quelea (*Quelea quelea*) on non-target organisms. *Environmental Conservation* 31: 130-137). Validation of the EIA training courses consisted of positive feedback from three training courses and the successful performance during his participation in EIA field-work of a trainee from Botswana in 2003 and 2004. Validation of the EIA protocols consisted of their endorsement by both a workshop for representatives from Ethiopia, Kenya, Sudan, Tanzania, Uganda and Zimbabwe on quelea management held in Kenya (May 2005) and a workshop for representatives from SADC countries on migrant pests held in South Africa (September 2005). Validation of the protocols was further confirmed by putting them into practice during EIA field work in Botswana in 2003 and 2004. Validation of the EIA field work itself is incomplete as further studies under the auspices of a forthcoming EU project will be added to the data-set on impacts before the work is submitted for peer review. However, consistent and meaningful results have been obtained to date, including validation of the custom-made equipment for field assessments of acetylcholinesterase levels in birds.

11. Where and when have the output(s) been validated?

Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above (max 300 words).

The desk study was presented and discussed by plant protection staff of the Ministry of Agriculture at an EIA workshop held at Sebele near Gaborone, Botswana in February 2004 and further validated by international referees for the journal *Environmental Conservation*. The protocols were validated by plant protection staff with responsibility for quelea control in Ethiopia, Kenya, Sudan, Tanzania, Uganda and Zimbabwe and regionally (DLCO-EA & IRLCO-CSA) at a workshop held in Machakos, Kenya, in May 2005. They were also validated by in-country by end-user groups consisting of plant protection staff with responsibility for quelea control in Angola, Botswana, Democratic Republic of the Congo, Lesotho, Malawi, Mozambique, Namibia, Swaziland, South Africa, Tanzania, Zambia and Zimbabwe at an ICOSAMP migrant pest workshop held at the Plant Protection Research Institute, Pretoria, South Africa held in September 2005.

The outputs are not targeted directly at particular social groups but to the national plant protection teams who then seek to protect the crops of resource-poor farmers in smallholder rain-fed dry/cold and irrigated systems in semi-arid areas in the most environmentally benign means possible.

Current Situation

C. Current situation

12. How and by whom are the outputs currently being used? Please give a brief description (max. 250 words).

The messages from the desk study and the protocols are currently being used by scientists in the national plant protection departments of the Ministries of Agriculture in Botswana and South Africa, when conducting assessments of the effects of their control measures.

Lessons learnt from the training courses have been used in Botswana where an area with globally threatened species of stork present was protected from contamination by pesticides when a locust control operation in northern Botswana was aborted because of the presence of the non-target birds. Improved safety and health protection measures were also adopted as a result of the courses.

Following the finding during the Kenya workshop that different dosages of fenthion are used by different plant protection departments but that the lowest dosages used were reported as being effective, the country using the highest dosages (South Africa) undertook to examine their procedures in order to minimise likely environmental damage and associated costs.

13. *Where* are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used (max. 250 words).

The outputs are currently being used by plant protection personnel in Botswana, Mozambique, Namibia, South Africa, Swaziland and Zimbabwe.

14. *What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading (max 250 words).*

Botswana was equipped with the means to assess acetylcholinesterase levels in birds, sample insects and soil and conduct other studies as part of intended plans to conduct EIA surveys. South Africa is conducting EIA work on quelea control on a routine basis and is benefiting from lessons learnt at the workshops. No further information is available on current use.

15. *In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? (max 350 words).*

The Southern African Development Community (SADC), the Desert Locust Control Organisation for Eastern Africa (DLCO-EA, responsible also for quelea control within its region), The Food and Agriculture Organization of the United Nations (FAO), the International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA, responsible for quelea control in some countries within its region e.g. Mozambique, Zambia) and the Information Core for Southern African Migrant Pests (ICOSAMP) have all assisted with the promotion and adoption of the outputs. In addition, national plant protection departments have supported the work.

In terms of capacity strengthening, the key facts of success have hinged on the training of SADC staff in how to conduct EIA work and become more aware of the ecological effects of pesticide applications. International policy on quelea control was raised through meetings with SADC officials instrumental in drawing up their Migratory Pest Control policy. It is hoped that the EIA protocols will be adopted as regional policy. The outputs and national policies on the control of quelea were also discussed at senior levels in the Ministries of Agriculture in Botswana,

Mozambique, Namibia and Zimbabwe.

Dissemination

Environmental Impact

H. *Environmental impact*

24. *What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? (max 300 words)*

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

The technologies developed are beneficial in their effects on the environment. The desk study drew attention to the damaging effects on non-target organisms of wanton quelea control measures, as did the training courses. Adoption of the protocols as regional policy in SADC countries will lead to standardised data-sets with which to assess the effects of control actions regionally. They will encourage mitigation measures and hence reduced environmental damage in terms of contamination with organophosphate pesticides or the result of explosions, and thus fewer non-target organisms killed or poisoned.

25. *Are there any adverse environmental impacts related to the output(s) and their outcome(s)? (max 100 words)*

No.

26. *Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? (max 200 words)*

No, other than that an increased level of awareness of environmental matters will lead to appreciation of factors that can cause "natural" disasters e.g. deforestation leading to erosion and causing landslides is a man-made disaster but such events are usually attributed to natural causes being often associated with impulses of heavy rainfall.

Annex

References

Publications on the Outputs

CHEKE, R. A. (2003) Environmental impacts of quelea control and a model for forecasting quelea movements and breeding in southern Africa. pp. 58-65 in M. E. Kieser (ed.) Proceedings of the ICOSAMP Workshop, 21-23 May 2002, Pretoria, South Africa.

MCWILLIAM, A. N. & CHEKE, R. A. (2004) A review of the impacts of control operations against the Red-billed Quelea (*Quelea quelea*) on non-target organisms. *Environmental Conservation* 31: 130-137.
