



Research Article

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House Crow (*Corvus splendens*) Eradication Measures from eThekweni Municipality, KwaZulu-Natal, South Africa

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Abstract

Within the Province of KwaZulu-Natal, in South Africa, eThekweni Municipality intends to implement a Project aimed at eradicating the House Crow (*Corvus splendens*) from its jurisdiction. In terms of the National Environmental Management: Biodiversity Act (NEMBA), Act 10 of 2004, the species is listed as a Category 1a under the Invasive Alien Species (IAS) Regulations gazetted in July 2014 and as such requires immediate eradication efforts. The species belongs to a cosmopolitan family Corvidae, which has well over 120 species including oscine passerine birds such as crows, ravens, magpies, rooks, treepies etc. In line with legislation, eThekweni Municipality has implemented a number of large-scale programmes and projects aimed at controlling invasive alien species. In achieving this, the municipality has a strong belief in forming partnerships with relevant stakeholders, including academic institutions, neighboring municipalities, conservation authorities, conservancies, non-profit organizations, the private sector, provincial and national government departments etc.

Keywords: House Crows; Invasive alien species; Indigenous biodiversity; Global invasion

Introduction

The House Crow (*Corvus splendens*) belong to the family Corvidae, which is a cosmopolitan family enriched with well over 120 species, comprising of birds that display remarkable levels of intelligence for their size and are among the most intelligent birds studied thus far [1]. Birds in this family include crows, ravens, magpies, treepies, rooks, jackdaws, choughs and nutcrackers [2,3]. Although it is known that *Corvus splendens* consisted of five subspecies (*Corvus s. splendens*, *C. s. zugmayeri*, *C. s. protegatus*, *C. s. maledivicus*, and *C. s. insolens*), in South Africa it is called *Corvus splendens* because of lack genetic study as to determine which subspecies they might belong to (also see) [4,5]. Their native origin is from South-Iran and Pakistan up to Burma, and North to Nepal and south up to Sri Lanka [6]. The species is known to

occur in approximately 25 countries in which it is establishing [7]. It was introduced in Zanzibar around 1900, where they spread to Kenya in 1947, more especially in the coastal areas between Mombasa and Malindi [8,9]. Its expansion has increased whilst leaving behind serious negative impacts and devastations to indigenous biodiversity [8-10]. Only when a large number of crows occurs outside its native distribution not only it creates devastations for biodiversity, it also has negative impacts on human health, affects tourism, negatively impacts infrastructure as well as general developments [7]. The species has shown a rapid expansion of its invaded range across Australia, Eastern Africa, the Arabian Peninsula, Europe, and USA [10,11-13]. In Ismailia Governorate alone, the population of House Crow has increased from 6000 per annum to 10,909 birds [10]. It is considered one of the world's most invasive bird species affecting well in excess of 25 nations throughout the Indian Ocean, Arabian Peninsula and South East Asia [11]. According to Fraser et al. the species is highly adaptable to varying environments, is also a gregarious commensal bird which is regarded as a pest of great concern due to its impacts on livestock, agricultural and horticultural crops, indigenous fauna as well as a faecal contaminator of human environments and water resources [14]. Whilst highly associated with human habitation, the species is greatly found around dumpsites, more especially in the areas with less hygiene [11,14-17].

The reason the House Crow is considered a serious agricultural pest is that it feeds on a range of crops, mainly maize and has been observed attacking and even killing small livestock and poultry [18-21]. The species only live in close association with humans in urban/semi-urban areas and is not known to live independently from humans [22,23]. The bird is highly competitive amongst other birds, where it will quickly outcompete and displace indigenous bird species through predation or through persistent attacks and mobbing for nesting sites by destroying eggs and nests of those birds [8,24,25]. Since the House Crow is highly affiliated with human habitation, the most likely point of entry and establishment is around major ports such as airport and ship, as has been the case in other countries like New Zealand, Yemen, Malaysia, and the Netherlands [7,17,25].

Although, Cooper found nothing when examining House Crows in Tanzania, this bird have been identified as carriers of human enteric disease organisms such as *Salmonella* spp., *Shigella* serotypes, *Proteus* spp., *Vibrionaceae* spp., *Pseudomonas* spp., *Escherichia coli*, *Campylobacter* spp., Newcastle disease and the potential for spread of bird flu [26]. House Crows are thus considered a major concern to human health, throughout their range, mainly due to their abundance in villages, towns, and cities where they also create considerable noise pollution [24-29]. Globally, the House Crow is regarded as an important pest species with significant potential for further global invasion [11,14,23].

In South Africa, at the beginning of 2018, eThekweni Municipality re-implemented the Monitoring, Surveillance, and Eradication (MSE) of the House Crow (*Corvus splendens*) within its area of jurisdiction. The MSE is a long-standing project that needs to continue as it was previously implemented and managed by the municipality (2009-2013) and later by the National Department of Environmental Affairs' Environmental Programmes branch (2013-2015). Previous intervention methods had drastically reduced House Crow numbers, but the populations began multiplying again and there is a high risk of the species dispersing further into other coastal areas of KwaZulu-

Natal Province and other South African parts, if not adequately controlled (Table 1).

No. of Individuals	Date of Sighting	Place Seen	Name of Municipality	GPS Coordinates of Sighting	
				Latitude	Longitude
2	05 June 2018	Snell Parade	eThekweni Municipality	-29.814452	31.038731
1	05 June 2018	Stamford Hill	eThekweni Municipality	-29.827515	31.036103
6	12 April 2018	Stamford Road	uMgungundlovu District Municipality	-29.617903	30.431066
2	05 June 2018	People's Park	eThekweni Municipality	-29.835936	31.027072
1	05 June 2018	People's Park	eThekweni Municipality	-29.833580	31.026888
4	05 June 2018	Spence Malverne Road,	eThekweni Municipality	-29.891793	31.910345
2	07 June 2018	Aberdare Drive	eThekweni Municipality	-29.727047	31.004918
18	07 June 2018	Stiebel Place	eThekweni Municipality	-29.812229	31.033603
2	07 June 2018	Maritime Place	eThekweni Municipality	-29.861839	31.027685
4	07 June 2018	Snell Parade	eThekweni Municipality	-29.843429	31.035270
3	07 June 2018	Old Dutch Road	eThekweni Municipality	-29.855087	31.006666
2	12 June 2018	Selborne Park	eThekweni Municipality	-29.882540	30.977781
2	12 June 2018	Hillary Club	eThekweni Municipality	-29.890351	30.938748
±25	09 August 2009	eSikhaweni	King Cetshwayo District Municipality*	-28.868335	31.915010
±60	16 August 2018	Merebank	eThekweni Municipality	-29.960454	30.971796
±50	22 September 2007	Jacobs, near Bluff	eThekweni Municipality	-29.942310	30.979838

Table 1: Preliminary locations of where individuals of invasive House Crows (*Corvus splendens*) have been sighted in three municipalities (Durban, esiKhaweni and Indlovu) in KwaZulu-Natal Province in in 2007, 2009, and 2018.

Currently, there are only three known populations of House Crows in South Africa, namely at eSikhaweni (near Richards Bay), Durban and Cape Town. In Durban, the species has been reported in areas near to and/or south of the City's CBD (Central Business District) specifically in the harbour, Merebank, and Jacobs [12,30]. Without proper control, these small populations can rapidly recover to alarming numbers and at that time the management would require significant financial and other resources. Failure to carry out the required control may result in the birds becoming permanent residents in eThekweni Municipality and also spreading onto to other areas around the municipality. Needless to say, this will have many negative consequences on both biodiversity and the economy of the country.

Large populations of House Crows self-introduced in neighboring Mozambique and on Inhaca Island and pose a threat to South Africa, as House Crows have previously been introduced to Richards Bay, Durban and Cape Town as stowaways on ships entering through the ports and harbours. The potential of House Crows occurring in future may be high, and such migrant individuals may establish new populations throughout South Africa.

Project Value to Biodiversity Conservation

With unregulated developments and invasive alien species posing significant threats to indigenous biodiversity, at the Rio Earth Summit in 1992, the United Nations agreed that the best starting point for sustainable development is at the local level. Based on this agreement, the Local Agenda 21 concept was born. The Local Agenda 21 provides local decision-making for Integrated Development Plans (IDPs) have to be based on the goal of achieving social, economic and environmental sustainability. For South Africa, post-1994 (democratically elected government); there came opportunities for accessing international funds for conservation action in globally significant nodes to fulfill both constitutional and international obligations in safeguarding indigenous biodiversity. This stresses and highlights the fact that the biodiversity we have, is not only for us but is of great value even to the international community and hence the need to protect it.

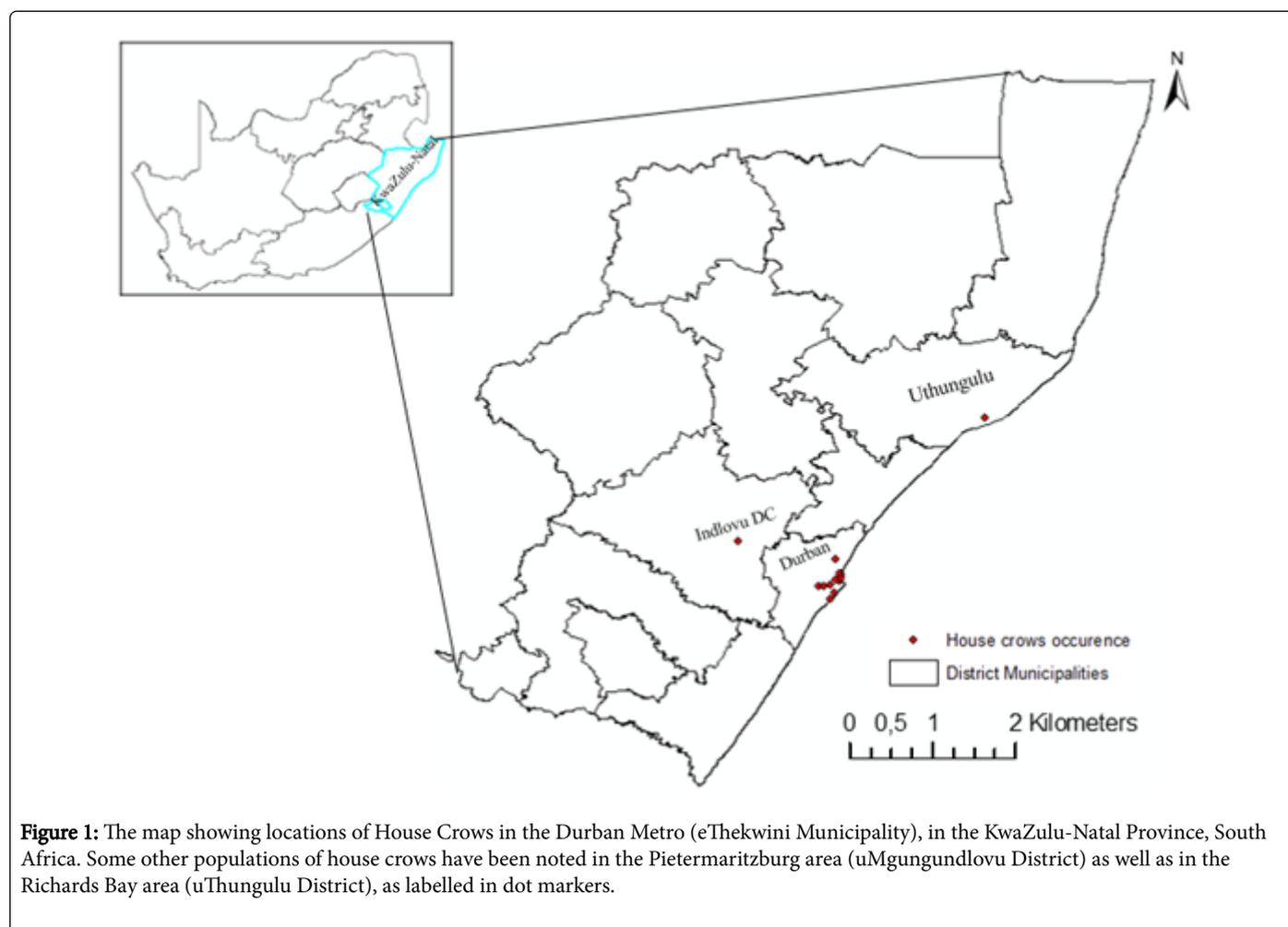
In South Africa, Corvids birds such as Pied Crows (*Corvus albus*) and Cape Crows (*Corvus capensis*); Kites (family Accipitridae), Kestrels (family Falconidae), raptors, chickens and many other small indigenous birds like doves, finches etc., are all threatened by House Crows. Furthermore, since House Crows also feed on chicks, eggs,

insects, fish, frogs, lizards, rodents and other small mammals, their population is most likely to have negative effects on nocturnal birds like owls that feed on some of the same prey predated by House Crows [31]. With pressures exerted by House Crows on various prey species, even some migratory bird species can easily be affected by increase in House Crow populations. Alien invasive species, including House Crows, have huge, negative ecological and economic impacts [21,32,33]. It is sadly our inability to effectively manage invasions, due to a number of factors including lack of management tools, resources, coordination efforts as well as economic and political constraints, which often worsen the situation [34]. The immediate reaction to invasions, in light of limited resources and strict constraints, is always a better option for resource managers with limited funds [35]. The aims of this work were to 1) implement measures to eradicate invasive House Crows establishing in eThekweni municipality, Durban, South Africa, and 2) encourage neighboring local authorities and provincially to take part and control House Crows (and other alien invasive species)

within their jurisdictions. A coordinated effort is essential if we are to have an impact in these invasive alien species.

Project sites

For about three months, eThekweni Municipality intends to conduct a survey of the behavior and distribution of House Crows within the municipality. Information will be collated from various sources, including the general public and submitted to the service provider appointed to control the species. Through this process sites, where crows have been seen, will then be confirmed. A database will thus be created, and this will serve as the basis for sites frequented by House Crows and the control operation will then resume. However, for now, a few sites have been confirmed in some areas such as Merebank, the Harbour (south of CBD) and at Jacobs, near the Bluff (Figure 1). The survey will help establish if there are any other sites within eThekweni Municipality.



Method of engagement

Awareness material in the form of an information flyer, as well as the word of mouth which will be communicated at every relevant Forum, will serve to spread the word on which species specifically is being controlled and why. The flyer has pictures of potential birds that might be confused with House Crows because House Crows may easily be confused with native crows. Additional information on House Crow impacts on indigenous biodiversity as well as human health risks

linked to House Crows, was drafted and communicated to relevant stakeholders like eThekweni Conservancies; Durban SPCA (Society for the Prevention of Cruelty to Animals); Provincial CROW (Centre for Rehabilitation of Wildlife); neighbouring Municipalities; national Department of Environmental Affairs (DEA); Provincial Endangered Wildlife Trust (EWT); Ezemvelo KZN Wildlife (EKZNW), etc.

This engagement phase serves to create broad awareness on the initiative of House Crow control, within eThekweni Municipality, but

also to try and not only seek partnerships but also to prompt neighboring municipalities and the Province at large, to initiate complementary projects in other municipalities. This will help increase the chances of eradicating House Crows but it will also help in strengthening collaborative environmental management between municipalities, otherwise, the project might be all in vain.

Method of control

- Within eThekweni Municipality, a number of control methods are available and these include;
- Shooting (licensing if necessary & compliance with relevant legislation depending on the type of caliber to be used),
- Baiting & poisoning (strict application of registered avicide and close monitoring of baits to prevent secondary, unintended mortalities),
- Trapping (monitoring of traps & in accordance with Bylaws),
- Egg & chick collection,
- Sample collection for DNA analysis (in collaboration with the University of KwaZulu-Natal).

Discussion

Publishing this material at the onset was imperative in order to encourage other local authorities (bioregions), to control invasive species within their municipality. The control measure such as eradication of House Crows was feasible in countries such as Socotra Island, Singapore, Mauritius, and recently in the Netherlands with aid of public [10,11,36,37]. This has helped to reduce the number of House Crows established [10,11]. This article intends to create awareness about what eThekweni Municipality is doing to control the House Crows, to indicate methods of control that will be implemented and to plead with neighboring municipalities to initiate similar projects to complement the work done in eThekweni Municipality. In a year or two, collaboration with any stakeholders who initiate a similar project could be looked at in publishing results and achievements and the Environmental Planning & Climate Protection Department of eThekweni Municipality strongly encourages this.

In as much as House Crows are creatures of habit, they are very mobile when necessary to evade danger and a collaborative project across the Province, if not the country, is a key to successful control project. A coordinated approach to achieving this, across both the Province and the country, is needed otherwise House Crows will keep repopulating areas that have been controlled or simply seeking refuge in areas where there is no active control. Section 4 of Chapter 3 of the Constitution of the Republic of South Africa (Act No. 108 of 1996), requires that "all government spheres and all organs of state must consult and inform one another on matters of common interest and coordinate their actions and legislation with one another". This article serves to do and to encourage just that because indigenous biodiversity is a matter of common interest. Industries such as ecotourism (biodiversity-driven) and agriculture, as well as the unsung role played by biodiversity in the production of ecosystem services, all play a critical role and also form the cornerstone of the South African economy and therefore the safeguarding of these from the impacts of invasive alien species is fundamental to the maintenance of the country's economic and social well-being [17,38,39].

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References

1. Prior H, Schwarz A, Güntürkün O (2008) Mirror-induced behaviour in the Magpie (*Pica pica*): Evidence of self-recognition. *PLoS Biol* 6: 202.
2. Robertson D (2000) Bird Families of the World: Corvidae.
3. Clayton N, Emery N (2005) Corvid cognition. *Curr Biol* 15: 80-81.
4. Madge S, Burn H (1994) A guide to the crows, jays & magpies of the world. *Crows & Jays*, Christopher Helm, London, UK.
5. Ottens G (2003) Background and development of the dutch population House Crows (*Corvus Splendens*). *Limosa* 76: 69-74.
6. Ali S (2002) The book of Indian birds. (13th Edtn) Oxford University Press, New Delhi, India.
7. Suliman AS, Meier GG, Haverson PJ (2011) Eradication of the House Crow from Socotra Island, Yemen. *Island Invasives: Eradication and management*, IUCN, Gland, Switzerland.
8. Ryall C (1992) Predation and harassment of native bird species by the Indian House Crow (*Corvus Splendens*) in Mombasa, Kenya. *Scopus* 16: 1-8.
9. Ryall C, Reid C (1987) The Indian House Crow in Mombasa. *Swara* 10: 9-12.
10. Kamel AM (2014) Potential impacts of invasive house crows (*Corvus splendens*) bird species in Ismailia Governorate, Egypt: ecology, control and risk management. *J Life Sci Technol* 2: 86-89.
11. Brook BW, Sodhi NS, Soh MC, Lim HC (2003) Abundance and projected control of invasive house crows in Singapore. *J Wildl Manage* 67: 808-817.
12. Ryall C (2002) Further records of range extension in the House Crow (*Corvus splendens*). *Bulletin of British Ornithologists Club* 122: 231-240.
13. State of Queensland (2016) Indian House Crow.
14. Fraser DL, Aguilar G, Nagle W, Galbraith M, Ryall C (2015) The House Crow (*Corvus Splendens*): A threat to New Zealand? *ISPRS Int J Geoinf* 4: 725-740.
15. Vertebrate Pest Committee (VPC) (2007) List of exotic vertebrate animals in Australia. VPC, Australia.
16. Koul S, Sahi DN (2013) Feeding ecology of House Crow (*Corvus Splendens*) in open agricultural fields in Jammu (J&K), India. *Int Res J Environ Sci* 2: 85-87.
17. Ryall C, Meier GG (2008) House Crow in the middle east. *Wildlife Middle East News* 3: 8237-1990.
18. Bhardwaj TK (1991) Damage patterns of House Crow (*Corvus Splendens*) to maize and wheat in some farmlands in Indian Punjab. *Trop Pest Manage* 37: 144-119.

19. Dhindsa KK, Ghazi NK, Tribasti P (1991) Damage proportions to sprouting sunflowers. *Trop Pest Manage* 37: 1607-1612.
20. Ali H (2008) Behaviour and ecology of the House Crow (*Corvus Splendens*) in Islamabad-Rawalpindi and Adjoining areas. University of Agriculture, Faisalabad, Pakistan.
21. Akram N, Khan HA, Javed M (2013) Inhibiting the House Crow (*Corvus Splendens*) damage on maize growth stages with reflecting ribbons in a farmland. *J Anim Plant Sci* 23: 182-189.
22. Lim HC, Sodhi NS, Brook BW, Soh MC (2003) Undesirable aliens: factors determining the distribution of three invasive bird species in Singapore. *J Trop Ecol* 19: 685-695.
23. Nyari A, Ryall C, Townsend PA (2006) Global invasive potential of the House Crow (*Corvus Splendens*) based on ecological niche modelling. *J Avian Biol* 4: 306-311.
24. Al-Sallami S (1991) A possible role of crows in the spread of diarrhoeal diseases in Aden. *J Egypt Public Health Assoc* 66: 441-449.
25. Ryall C (2003) Notes on ecology and behaviour of house crows at Hoek van Holland. *Dutch Bird* 25: 167-172.
26. Cooper JE (1996) Health studies on the Indian House Crow (*Corvus Splendens*). *Avian Pathol* 25: 381-386.
27. Roy P, Venugopalan AT, Manvell R (1998) Isolation of newcastle disease virus from an Indian House Crow. *Trop Anim Health Prod* 30: 177-178.
28. Peh KSH, Sodhi NS (2002) Characteristics of nocturnal characteristics roosts of House Crows. *J Wildl Manage* 66: 1128-1133.
29. Reddy VR (1998) Bird damage to maize crop on the student's research farm at Rajendranagar, Hyderabad, Andhra Pradesh. *Pavo* 36: 77-78.
30. Allan DG, Davies GB (2005) Breeding biology of House Crows (*Corvus Splendens*) in Durban, South Africa. *Ostrich* 76: 21-31.
31. Animalia (2018) House Crow.
32. Khan HA (2002) Damage patterns of House Crow (*Corvus Splendens*) on some food crops in Faisalabad. *Int J Agri Biol* 2: 500-502.
33. Pimentel D, Zuniga R, Morrison D (2005) Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecol Econ* 52: 273-288.
34. Hobbs RJ, Humphries SE (1995) An integrated approach to the ecology and management of plant invasions. *Conserv Biol* 9: 761-770.
35. Larson DL, Phillips-Mao L, Quiram G, Sharpe L, Stark R, et al. (2011) A framework for sustainable invasive species management: environmental, social, and economic objectives. *J Environ Manage* 92:14-22.
36. Puttoo M, Archer T (2004) Control and/or eradication of Indian Crows (*Corvus Splendens*) in Mauritius. *Food and Agricultural Research Council, Mauritius* 83: 299-309.
37. Vane M, Runhaar HA (2016) Public support for invasive alien species eradication programs: Insights from the Netherlands. *Restor Ecol* 24: 743-748.
38. Ryall C (2010) Further records and updates of range extension in House Crow (*Corvus Splendens*). *Bull Br Ornithol Club* 130: 246-254.
39. Xavier R, Komendantova N, Jarbandhan V, Nel D (2017) Participatory governance in the transformation of the South African energy sector: Critical success factors for environmental. *J Cleaner Prod* 154: 621-632.