Supplementary 1. Detailed Description of Rodent Risk Assessment

A list of ten rodent species in Wonji Shoa sugarcane farm and the surrounding natural ecosystem and details of their resource requirements were collected from the literature [33]. This study analyzed stomach contents of rodents to see their forage types in the study area. We applied cross-taxonomic sustainability index (the overlaps of the environmental threats from the sugarcane and the rodents resource requirements) to see the impact of the change on their abundance. The environmental threats from the sugarcane can have impacts on their feeding resources if it causes a change in foraging habitats availability and/or change in food abundance in the existing foraging habitats. It can also affect nesting success if it causes change in nesting habitats availability and/or reduction in nesting success in the existing nesting habitats. Thus:

$$Risk\ score\ =\ (Dt\ +\ Nt)\ /\ R$$

where *Dt* describes risk score associated with reduced foraging materials or foraging habitats, *Nt* describes the risk associated with reduced breeding habitat or breeding success and *R* describes species reliance on a particular habitat. We used trap successes in different habitats as a surrogate measure for species reliance on the habitat.

$$Dt\ =\ A/(D \times F)\ +\ B/F$$

where *A* describes the number of points of coincidence between environmental threats from sugarcane and foraging materials, *B* describes the number of points of coincidence between the environmental threats and foraging habitat, *D* describes total number of dietary components used by the species and *F* describes total number of foraging habitat components used by the species. The dietary component was determined by examining the stomach of each species in different habitats. Unidentified matters were not included in the risk score calculation.

$$Nt\ =C1/N + C2/N$$

where *C*1 and *C*2 are number of points of coincidence on the species' use of nesting habitat components if impact is through reduced success in existing habitat and loss of habitat, respectively, and N describes the number of nesting habitat components used by the species.

Risk score for each of the six environmental threats identified via key informant interview was calculated for each species. The total risk score for each species we summed the values of *Dt* and *Nt* over all six environmental threats from the sugarcane and divided the cumulative score by *R*, with higher scores representing greater impact.

The risk score was calculated for all rodents and the result was indicated (Table 2). Only the detail for three species were presented here under.

1) The Potential Impact of Environmental Threats from the Sugarcane on the Resource Requirements of M. natalensis

Resource Category	Components of resource requirement
Diet	Sugarcane fiber, grass, animal matter, water (D = 4)
Foraging habitat	RVF; ACw; SBL; GL; CL; IS; YS; MS (F = 8)
Nesting/Roosting habitat	RVF; ACw; SBL; GL; YS; MS; CR (F = 7)
Reliance on farmland	3

NB: Immature sugarcane cannot be resting habitat due to inadequate ground cover

Reliance on farmland (R) is 1 when species rely on 1 or 2 habitats, 2 when species rely on 3 or 4 habitats and 3 when the habitat or biotopes of the organism is 5 or greater

Sugarcane Related Environmental Threat	Impact on Foraging Materials	Impact on Foraging Habitat/Foraging Activity	Impact on Nesting Habitat/Nesting Success
Clearing and grubbing	↓ Grass	↓ RVF	↓ RVF

	↓ Animal matter	↓ ACw ↓ SBL ↓ GL	↓ ACw ↓ SBL ↓ GL
Increased agrochemical inputs	↓ Animal matter ↓ Grass ↓ Water	- - -	- - -
Fire	↓ Sugarcane fiber ↓ Grass ↓ Animal matter	↓ MS	↓ MS
Human disturbances		↓ RVF ↓ ACw ↓ SBL ↓ GL	↓ RVF ↓ ACw ↓ SBL ↓ GL
Effluent from the factory	↓ Animal matter ↓ Grass	↓ RVF ↓ GL	↓ RVF ↓ GL
Water Availability/Quality	↓ Sugarcane fiber ↓ Grass ↓ Animal matter ↓ Water	↓ CL	↓ CL

RVF = riverine forest; ACw = Acacia woodland; SBL = Shrub bushland; GL = grassland/Grazing land; CA = Crop land; IS = Immature sugarcane; YS = young sugarcane; MS = Mature sugarcane

Risk Score

Sugarcane Related Environmental Threats	**A**	**B**	**C**	**Risk Score [1]**
Land Clearing during expansion	2	5	5	0.38
Increased agrochemical inputs	3	0	0	0.03
Fire	3	1	1	0.12
Human disturbances	0	4	4	0.35
Effluent from the factory	2	2	2	0.20
Water Availability and Water Quality	4	1	1	0.13
Total risk				1.21

[1] Risk score = $(A/(D \times F) + B/F + C/N)/R$

2) The Potential Impact of Sugarcane on the Resource Requirements of Arvicanthis dembeensis

Resource Category	Components of resource requirement
Diet	Monocot seed, grass, animal matter, Water (D = 4)
Foraging habitat during	RVF; ACw; SBL; GL; CL, ISP; YS; MS (F = 8)
Nesting/Roosting habitat	RVF; ACw; SBL; GL; YS; CL, MS (F = 7)
Reliance on farmland	3

NB: Immature sugarcane cannot be resting habitat due to inadequate ground cover

Sugarcane Related Environmental Threat	**Overlaps with Foraging Materials**	**Overlaps with Foraging Habitat**	**Overlaps with Nesting Habitat**
Clearing and grubbing	↓ Grass ↓ Animal matter ↓ Monocot seed	↓ RVF ↓ ACw ↓ SBL ↓ GL	↓ RVF ↓ ACw ↓ SBL ↓ GL
Increased agrochemical inputs	↓ Animal matter ↓ Grass ↓ Monocot seed		
Fire	↓ Monocot seed ↓ Grass ↓ Animal matter	↓ MS	↓ MS
Human disturbances		↓ RVF ↓ ACw ↓ SBL ↓ GL	↓ RVF ↓ ACw ↓ SBL ↓ GL
Effluent from the factory	↓ Animal matter	↓ SBL	↓ SBL

	↓ Grass	↓ RVF	↓ RVF
	↓ Monocot seed	↓ GL	↓ GL
Water Availability/Quality	↓ Sugarcane fiber	↓ CL	↓ CL
	↓ Grass		
	↓ Animal matter		
	↓ Water		

RVF = riverine forest; ACw = Acacia woodland; SBL = Shrub bushland; GL = grassland; CA = Crop land; IS = Immature sugarcane; YS = young sugarcane; MS = Mature sugarcane.

Risk Score

Sugarcane Related Environmental Threats	**A**	**B**	**C**	**Risk Score** [1]
Clearing and Grabbing	3	5	5	0.38
Increased agrochemical inputs	3	0	0	0.03
Fire	3	1	1	0.12
Human disturbances	0	4	4	0.35
Effluent from the factory	3	3	3	0.30
Water Quantity and Quality	4	1	1	0.13
Total risk				1.4

Risk score = $(A/(D \times F) + B/F + C/N)/R$

3) The Potential Impact of Sugarcane on the Resource Requirements of Stenocephalemys albipes

Resource Category	Components of resource requirement
Diet	Sugarcane fiber, grass, animal matter, water (D = 4)
Foraging habitat during wet	RVF; ACw; SBL; GL; IS; YS; MS (F = 7)
Nesting/Roosting habitat	RVF; ACw; SBL; GL; YS; MS (N = 6)
Reliance on farmland	3

NB: Immature sugarcane cannot be resting habitat due to inadequate ground cover

Sugarcane Related Environmental Threat	**Overlap with Foraging Materials**	**Overlap with Foraging Habitat**	**Overlap with Nesting Habitat**
Clearing and grubbing	↓ Grass ↓ Animal matter	↓ SBL ↓ RVF ↓ ACw ↓ GL	↓ SBL ↓ RVF ↓ ACw ↓ GL
Increased agrochemical inputs	↓ Animal matter ↓ Sugarcane fiber ↓ Grass ↓ Water		
Fire	↓ Sugarcane fiber ↓ Grass ↓ Animal matter	↓ MSP	↓ MS
Human disturbance		↓ SBL ↓ RVF ↓ ACw ↓ GL	↓ SBL ↓ RVF ↓ ACw ↓ GL
Effluent from the factory	↓ Animal matter ↓ Grass ↓ Water	↓ SBL	↓ SBL
Water quantity and Quality	↓ Sugarcane fiber ↓ grass ↓ animal matter ↓ water	↓ IS ↓ YS ↓ MS	↓ YS ↓ MS

RVF = riverine forest; ACw = Acacia woodland; SBL = Shrub bushland; GL = grassland; CA = Crop land; IS = Immature sugarcane; YS = young sugarcane; MS = Mature sugarcane

Risk Score

Sugarcane Related Environmental Threats	**A**	**B**	**C**	**Risk Score** [1]

Clearing land and conversion to monocrop sugarcane	2	4	4	0.43
Increased agrochemical inputs	4	0	0	0.04
Fire	3	1	1	0.19
Human disturbance	0	4	4	0.41
Effluent from the factory	2	1	1	0.13
Water Quality and Quantity deterioration	4	3	2	0.30
Total risk				1.50

[1] Risk score = $(A/(D \times F) + B/F + C/N)/R$

Table S1. Rodent abundance in the different sugarcane growth stages and nearby bushland.

Rodents Species	Species-Wise Abundance in Different Habitats					
	ISP	YSP	MSP	BLA	Individuals Captured (*)	Abundance %
Mastomys natalensis	15	45	27	24	111 (181)	27.33
Arvicanthis dembeensis	8	23	5	29	65 (96)	16.00
Arvicanthis niloticus	2	6	2	8	18 (32)	4.40
Stenocephalemys albipes	9	22	18	10	59 (94)	14.53
Pelomys harringtoni	3	6	4	22	35 (63)	8.62
Mus mahomet	7	8	13	4	32 (40)	7.90
Mus musculus	5	5	6	6	22 (26)	5.42
Rattus rattus	2	6	1	6	15 (25)	3.70
Crocidura flavescens	6	8	5	7	39(13)	6.40
Crocidura fumosa	5	8	5	5	23 (33)	5.70
Total	62	137	86	121	406 (629)	100

ISP = Immature sugarcane; YSP = Young Sugarcane; MSP = Mature Sugarcane; BLA = Bushland Area

Table S2. List of rodents, their foraging habitats, nesting habitats, forage types, risk score and abundance.

Species	Foraging Habitats [1]	Nesting Habitats [2]	Foraging [3] Materials	Risk Score	Abundance in %
Mastomys natalensis	RVF; ACw; SBL; GL; CL; IS; YS; MS	RVF; ACw; SBL; GL; YS; MS; CR	ABCE	1.29	27.33
Arvicanthis dembeensis	RVF; ACw; SBL; GL; CL, IS; YS; MS	RVF; ACw; SBL; GL; YS; CL, MS	BCDE	1.34	16.00
Stenocephalemys albipes	RVF; ACw; SBL; GL; IS; YS; MS	RVF; ACw; SBL; GL; YS; MS	ABCE	1.23	14.53
Pelomys harringtoni	SBL; IS; YS; MS	SBL; YS; MS	ABCE	8.00	8.62
Mus mahomet	SBL; IS; YS; MS	SBL; YS; MS	BCDE	1.59	7.90
Mus musculus	ACw; SBL; GL; IS; YS; MS	SBL; ACw; GL; YS; MS	ABCD	1.24	5.42
Arvicanthis niloticus	SBL; IS; YS; MS	SBL; YS; MS,	BE	1.29	4.40
Rattus rattus	SBL; IS; YS; MS	SBL; YS; MS	ABCDE	1.44	3.70
Crocidura flavescence	SBL; IS; YS; MS	SBL; YS; MS	ABCDE	1.20	6.40
Crocidura fumosa	SBL; IS; YS; MS	SBL; YS; MS	CE	1.28	5.7

[1] Foraging habitats = (ISP = Immature Sugarcane, YS = Young Sugarcane, MSP = Mature Sugarcane, ACw = Acacia woodland, SBL = Shrub land, GL = Grazing Land, CL = Crop Land, RVF = Riverine forest); [2] Nesting habitats = (ISP = Immature Sugarcane, YS = Young Sugarcane, MSP = Mature Sugarcane, ACw = Acacia woodland, SBL = Shrub land, GL = Grazing Land, CL = Crop Land, RVF = Riverine forest); [3] Foraging materials = (A = Sugarcane fibers, B = Grass, C = Animal matter, D = Monocot seed, E = water)

Supplementary 2. Detailed Description of Mammal Risk Assessment

We collected list of ten mammal species that used to live on the land currently occupied Wonji Shoa sugarcane and the surrounding area from our key informants. Information on species eco-requirements (feeding and nesting/roosting) was also collected via key informant interview and from the literature. We adopted the risk assessment framework in Butler et al. [35]. The sugarcane industry could affect the mammals if it alters foraging habitat availability and/or foraging materials abundance in the existing foraging habitats. Similarly, it affects mammals if it reduces nesting habitat availability and/or nesting success in the existing nesting habitat). Thus:

$$\text{Risk score} = (Dt + Nt) / R$$

where Dt describes the risk score associated with reduced foraging materials abundance or availability, Nt is the risk score associated with reduced habitats or breeding success, and R is the species' reliance on the land occupied by sugarcane.

$$Dt = \frac{A}{D \times F} + \frac{B}{F}$$

where A describes the number of points of coincidence between the impact on dietary components, B describes number of points of coincidence between the impact on foraging habitat components, D describes total number of dietary components used by the species and F describes total number of foraging habitat components used by the species.

$$Nt = C1/N + C2/N$$

where $C1$ and $C2$ describe number of points of coincidence between potential impact on the species' use of nesting habitat components if the impact is via reduced breeding success in existing habitat and loss of breeding habitat, respectively, and N describes the number of nesting habitat components used by the species.

Risk scores related to six environmental threats identified via key informant interview were calculated. The environmental threats are (land clearing, pre-harvest fire, agrochemicals, effluent from the factory, human disturbances, deterioration of water quality and quantity). To calculate the total risk score for each species, we summed the values of Dt and Nt over all six environmental threats and divided the cumulative score by R, with higher scores representing greater impact.

The risk score was calculated for all the selected mammals and the result was indicated (Table 2). Only the detail for three species were presented here under.

1) The Potential Impact of Sugarcane on the Resource Requirements of Tragelaphus scriptus

Categories of Resource requirement	Components of resource requirement
Diet	Herbs, twigs, Leaves, crops, flowers, grasses, water (D = 7)
Foraging habitat during wet	Forest edge, Bush lands, Riparian vegetation, (F = 3)
Nesting/Roosting habitat	Bush lands, Riparian vegetation (N = 2)
Reliance on farmland	2

Reliance of the animal on area occupied by the sugarcane is 1 when species relies on 1 or 2 habitats, 2 when species relies on 3 or 4 habitats and 3 when the habitat or biotopes of the organism is 5 or greater

Sugarcane Related Environmental Threats	**Overlap with Forage**	**Overlap with Foraging Habitat**	**Overlap with Nesting Habitat**	**Remark**
Clearing and grubbing	↓ Grass	↓ Bush land	↓ Riparian forest	Land clearing for plantation and during expansion has resulted in declining of bushlands, acacia woodlands and riparian vegetation
	↓ Flower	↓ Riparian Forest	↓ Bush land	
	↓ Leaves	↓ Forest age		
	↓ Herbs			
	↓ Flowers			

Increased agrochemical inputs	↓ Grass food			Agrochemicals had less impact of foraging and nesting habitats
	↓ Leaves			
	↓ Herbs			
Pre-harvest fire	↓ Flowers		↓ Riparian forest	Pre-harvest fire could disturb mammals in the nearby natural habitats and affect nesting successes
	↓ Grass		↓ Bush land	
	↓ Herbs			
	↓ Flowers			
Human disturbances	↓ Flowers	↓ Bush land	↓ Riparian forest	Human disturbance through cutting trees for charcoal, timber and for grazing has reduced habitats
	↓ Grass	↓ Riparian forest	↓ Bush land	
	↓ Leaves	↓ Forest age		
	↓ Herbs			
Effluent from the factory	↓ water			Effluents could reduce the water quality at the down stream
Water Quality and Quantity	↓ water			Too much water abstraction and access to the nearby river

Risk Score

Environmental Threats Related to Sugarcane	A	B	C	Risk Score [1]
Clearing and Grabbing	4	3	2	1.09
Increased agrochemical inputs	4	0	0	0.09
Fire	4	0	2	0.59
Human Disturbances	4	3	2	1.09
Effluent from the factory	1	0	0	0.02
Water Quality	1	0	0	0.02
Total risk				2.90

[1] Risk score $= (\frac{A}{D \times F} + \frac{B}{F} + C/N) / R$

2) The Potential Impact of Sugarcane on the Resource Requirements of Phacochoerus aethiopicus

Categories of Resource requirement	Components of resource requirement
Diet	Grass, tubers, invertebrates and leaves of woody plants, water (D = 5)
Foraging habitat during wet	Bush land, Riparian forest, woodland, Sugarcane (F = 4)
Nesting/Roosting habitat	Bush land, Open wood land, Riparian Forest, Sugarcane (N = 4)
Reliance on farmland	2

Reliance of the animal on area occupied by the sugarcane is 1 when species relies on 1 or 2 habitats, 2 when species relies on 3 or 4 habitats and 3 when the habitat or biotopes of the organism is 5 or greater.

Sugarcane Related Environmental Threats	Overlap with Forage	Overlap with Foraging Habitat	Overlap with Nesting Habitat	Overlap with Reproduction Active Member
Clearing and grubbing	↓ Grass	↓ Bush land	↓ Bush land nesting area	Unlike other mammals warthog is seen as pest as it feeds on the sugarcane.
	↓ tuber food	↓ Open woodland	↓ woodland nesting area	
	↓ Leaves food	↓ Open wood land Foraging area		
	↓ Invertebrate			
Increased agrochemical inputs	↓ Grass			Impact from agrochemicals is less on warthog
	↓ Leaves			
	↓ Tuber			

	↓ Invertebrate			
Fire	↓ Grass	↓ Mature Sugarcane	↓ Mature Sugarcane	Pre-harvest fire could affect Warthog as it uses sugarcane as a hiding place
	↓ tuber			
	↓ Leaves			
	↓ invertebrate			
Human disturbances	↓ Grass	↓ Bush land	↓ Bush land	Increased human disturbances through forest clearing, grazing and charcoal making reduces foraging and resting resources
	↓ tuber	↓ Open woodland	↓ woodland	
	↓ Leaves	↓ Open wood land	↓ Riparian Forest	
	↓ invertebrate			
Effluent from the factory	↓ water			Effluents could affect downstream water quality
Water Quality and Quantity	↓ water			Too much water abstraction for irrigation affects downstream water availability

Risk Score

Environmental Threats Related to Sugarcane	A	B	C	Risk Score
Clearing and Grabbing	4	3	2	0.72
Increased agrochemical inputs	4	0	0	0.10
Fire	4	1	1	0.35
Human Disturbances	4	3	3	0.85
Effluent from the factory	1	0	0	0.025
Water Quality and Quantity	1	0	0	0.025
Total risk				2.07

$$\text{Risk score} = \left(\frac{A}{D \times F} + \frac{B}{F} + C/N\right) / R$$

3) The Potential Impact of Sugarcane on the Resource Requirements of Canis aureus

Categories of Resource requirement	Components of Resource requirement
Diet	Small animals, Plants, water (D = 3)
Foraging habitat during wet	Shrub lands, Woodlands, Riparian forest (F = 3)
Nesting/Roosting habitat	Bushlands, Woodlands, Riparian forest (N = 3)
Reliance on farmland	2

Reliance of the animal on area occupied by the sugarcane is 1 when species relies on 1 or 2 habitats, 2 when species relies on 3 or 4 habitats and 3 when the habitat or biotopes of the organism is 5 or greater

Sugarcane Related Environmental Threats	Overlap with Forage	Overlap with Foraging Habitat	Overlap with Nesting Habitat	Overlap with Reproduction Active Member
Clearing and grubbing	↓ Small animals	↓ shrub land	↓ shrub land	*Canis aureus* sometimes appears in the sugarcane
	↓ Plants food	↓ Woodland	↓ Woodland	
		↓ Riparian forest	↓ Riparian forest	
Increased agrochemical inputs	↓ Small animals			Agrochemicals has less impact on habitats
	↓ Plants			
	↓ water			

Fire	↓ Small animals		↓ shrub land	Pre-harvest fire disturbs *Canis aureus* when the burning field is close to the natural habitats
	↓ Plants		↓ Woodland	
			↓ Riparian forest	
Human disturbances	↓ Small animals	↓ shrub land	↓ shrub land	Human disturbances affects both the resting and the nesting habitats
	↓ Plants	↓ Woodland	↓ Woodland	
		↓ Riparian forest	↓ Riparian forest	
Effluent from the factory	↓ water			
Water Quality and Quantity	↓ water			Too much water abstraction in the dry season affects the downstream water availability

Risk Score

Environmental Threats Related to Sugarcane	A	B	C	Risk Score
Clearing and Grabbing	2	3	3	1.11
Increased agrochemical inputs	3	0	0	0.16
Fire	2	0	3	0.61
Human Disturbances	2	3	3	1.11
Effluent from the factory	1	0	0	0.05
Water Quantity and Quality	1	0	0	0.05
Total risk				3.09

$$\text{Risk score} = \left(\frac{A}{D \times F} + \frac{B}{F} + C/N\right) / R$$

Table S3. List of mammals in the area.

No	Common Name	Scientific Name	Local Name
1	Spotted hyena	*Crocuta crocuta*	Waraabessa
2	Grey duiker	*Sylvicapra grimmia*	Kuruphee
3	Klipspringer	*Oreotragus oreotragus*	Gicii
4	Warthog	*Phacochoerus aethiopicus*	Goljaa
5	Leopard	*Panther pardus*	Qeerransa
6	Bat eared fox	*Otocyton megalotis*	Jeedala gurra bal,aa
7	Serval cat	*Felis serval*	Deeroo
8	Common jackal	*Canis aureus*	Jeedala bakka maraa
9	Anubis baboon	*Papio Anubis*	Jaldeessa
10	Vervet monkey	*Cercophitecus pygerythrus*	Qamalee
11	Aardvark	*Orycteropus afer*	Awwaal diigessa
12	Porcupine	*Hystrix cristata*	Dhaddee
13	Mongoose /Egyptian	*Herpestes inchneumon*	Amaa
14	Abyssinian Hare	*Lepus capensis*	Hilleettii
15	Honey badger	*Mellivoracapensis*	Amaa gaaguraa
16	White tailed mongoose	*Icneumia albicauda*	Amaa gootaa/eegee adii
17	Greater kudu	*Tragelaphus strepsiceros*	Gadamsa gammojjii guddaa
18	Lesser kudu	*Tragelaphus imberbis*	Hammarreesa
19	Striped hyena	*Hyena hyena*	Waraabessa sarara qabu
20	Black-backed jackal	*Canis mesomelas*	Sardiida dugda gurrraacha
21	Side striped jackal	*Canis adustus*	Jeedala cinaan sararaa
22	African civet	*Civettictis cuivetta*	Moor'ee
23	Abyssinian genet	*Genetta abyssinica*	Adala
24	Caracal	*Felis caracal*	Warbaa/daalga anbassaa
25	Ichneumon mongoose	*Herpestes ichneumon*	Amaa

Table S4. Risk score of the selected mammals.

Scientific Name	English Name	Foraging Materials	Foraging Habitats	Roosting/ Breeding Habitat	IUCN Category	Qualitative Population Trend	Risk Score
Tragelaphus scriptus	Lesser Kudu	Herbs, twigs, Leaves, crops, flowers, grasses, water	Forest edge Bush lands, Riparian vegetation, Sugarcane	Bush lands, Riparian vegetation	Least concern	Decreasing	2.90
Phacochoerus aethiopicus	Warthog	Grass, bulbs tubers, invertebrates and leaves of woody plants, water	Bush land Open wood land Sugarcane	Bush land, Open wood land, Riparian Forest, Sugarcane	Least concern	Stable	2.07
Canis aureus	Common Jackal	Small animals Plants	Grassland, scrub forest	Bushlands, Woodlands, Riparian forest	Least concern	Decreasing	3.09
Hippopotamus amphibius	Hippopotamus	Grass,	Water Body	River	Vulnerable	Decreasing	5.36
Cercopithecus ethiopis	Vervet monkey	acacia seeds, flowers, foliage and gum, fruits	open woodland, forest-grassland mosaic, riparian vegetation	Woodland, Shrub land, Riparian forest	Least concern	Decreasing	2.54
Papio anubus	Anubus baboon	Grass, fruit and insect	Woodland, forest patch, agricultural area	Woodland, Shrub land, Riparian forest	Least concern	Stable	2.19
Hystrix cristata	Crested Porcupine	Roots, tubers, cultivated crops, bark, and fallen fruit	Shrub land, abandoned farmland, steppe, forest and dry rocky areas (den deep burrow or a cave)	Deep burrow or a cave	Least Concern	Increasing	0.79
Crocuta crocuta	Spotted hyena	Small animals Scavenges	Open wood land Forest Patch	Riparian forest, shrub land	Least Concern	Decreasing	1.73
Lepus habessinicus	Abyssinian Hare	leaves seeds, grains, and nuts, flowers, crops	open grassland, steppe, shrub land , sugarcane	Deep burrow or a cave	Least Concern	Stable	1.67
Sylvicapra grimmia	Grey Duiker	foliage, herbs, fruits, seeds, and cultivated crops	Woodland, agricultural land, Sugarcane	Woodland, Riparian Vegetation,	Least Concern	Increasing	2.43

Supplementary 3. Detailed Description of Bird Risk Assessment

Three birds that are familiar to key informants in Wonji Shoa sugarcane farm area were selected as indicator. The risk score of each species were done as per the risk assessment framework developed by Butler et al. [35]. The main ecological requirements considered is foraging and nesting resources. The top six environmental threats are land clearing, agrochemicals, pre-harvest fire, human disturbances, effluent discharge from factory, and water quantity and quality deterioration. The risk score for each species were calculated based on the overlaps of environmental threats from the sugarcane on species resource needs. Thus:

$$\text{Risk score} = (Dt + Nt) / R$$

where *Dt* describes the risk score associated with reduced food abundance or availability, *Nt* describes the risk score associated with reduced breeding success and *R* is the species' reliance on farmland habitat. Species that relies on 1 or 2 habitats is assumed to have major reliance (*R* = 1), species that relies on three to four habitats has intermediate reliance (*R* = 2); species that relies on five or more habitats has less reliance (*R* = 3).

$$Dt = A/(D \times F) + B/F$$

where *A* describes number of points of coincidence risk and foraging materials, *B* describes number of points of coincidence between the environmental threats from the sugarcane and foraging habitats, *D* describes the total number of dietary components used by the species and *F* describes total number of foraging habitat components used by the species.

$$Nt = C/N$$

where *C* describes number of points of coincidence between sugarcane related environmental threats that cause reduced nesting success in existing habitat and loss of nesting habitat, and *N* describes number of nesting habitat components used by the species.

Risk scores for each of the five risk types ranked were calculated for each species. To calculate the total risk score for each species we summed the values of *Dt* and *Nt* over all five risk types and divided the cumulative score by *R*, with higher scores representing greater impact.

The risk score was calculated for all the selected birds and the result was indicated (Table 2). Only the detail for three species were presented here under.

1) The Potential Impact of Sugarcane on the Resource Requirements of Bucorvus abyssinicus (Abyssinian Ground Hornbill).

Categories of Resource requirement	Components of resource requirement
Diet	Terrestrial vertebrates, Insects, non-insect arthropods, scavenger (*D* = 4)
Foraging habitat during wet	Woodland, Cropped land, Sugarcane, Grassland (*F* = 4)
Nesting/Roosting habitat	Large tree cavity, Rock holes (*N* = 2)
Reliance on farmland	2

Sugarcane Related Environmental Threats	**Key Impacts**		
	Foraging Materials	**Foraging Habitats**	**Nesting Habitats**
Land clearing	↓ Insects	↓ Woodland	Large tree cavity
	↓ Terrestrial vertebrates,	↓ Crop land	
	↓ non-insect arthropods	↓ Grassland	
Increased agrochemical inputs	↓ Insects	↓ Agricultural land (Sugarcane Fallow)	
	↓ Terrestrial vertebrates,		
	↓ non-insect arthropods		
Fire during cane harvest	↓ Insects		
	↓ Terrestrial vertebrates,		
	↓ non-insect arthropods		
Human disturbances	↓ Insects	↓ Woodland	↓ Large tree cavity
	↓ Terrestrial vertebrates,	↓ Crop land	

	↓ non-insect arthropods	↓ Grassland
Effluent from the factory	↓ Insects	
	↓ Terrestrial vertebrates,	
	↓ non-insect arthropods	
Water Quality		

Risk Score

Sugarcane Related Environmental Threats	A	B	C	Risk Score [1]
Clearing and Grabbing	3	3	1	0.78
Increased agrochemical inputs	3	1	0	0.21
Fire	3	0	0	0.09
Human disturbances	3	3	1	0.78
Effluent from the factory	3	0	0	0.09
Water Quantity and Quality	0	0	0	0.00
Total risk				1.95

[1] Risk score = $(A/(D \times F) + B/F + C/N)/R$

2) The Potential Impact of Sugarcane on the Resource Requirements of Francolinus castaneicollis (Chestnut-napped Francolin).

Categories of Resource requirement	Components of Resource requirement
Diet	Seeds, insects, plant grass shoot (D = 3)
Foraging habitat during wet	Shrub land, Cropped land, Sugarcane, Riparian forest (F = 4)
Nesting/Roosting habitat	Forest, Cropped land, Sugarcane, Grassland (N = 4)
Reliance on farmland	2

Sugarcane Related Environmental Threats	Key Impacts		
	Foraging Materials	↓ Foraging Habitats	↓ Nesting Habitats
Land Clearing	↓ Seeds	↓ Shrub land	↓ Shrub Land
	↓ Insects	↓ Crop Land	↓ Riparian Forest
	↓ Grass shoots	↓ Riparian Forest	
Increased agrochemical inputs	↓ Seeds		
	↓ Insects		
	↓ Grass shoots		
Fire during cane harvest	↓ Seeds	↓ Mature Sugarcane	↓ Mature Sugarcane
	↓ Insects		
	↓ Grass shoots		
Human disturbances	↓ Seeds	↓ Shrub land	↓ Shrub Land
	↓ Insects	↓ Riparian Forest	↓ Riparian Forest
	↓ Grass shoots		
Effluent from the factory	↓ Seeds	↓ Forest	↓ Forest
	↓ Insects	↓ Grassland	↓ Grassland
	↓ Grass shoots		
Water Quantity	NA		

Risk Score

Agricultural Change	A	B	C	Risk Score [1]
Clearing and Grabbing	3	3	1	0.63
Increased agrochemical inputs	3	1	0	0.25
Fire	3	1	1	0.37

Human disturbances	3	2	2	0.63
Effluent from the factory	3	2	2	0.63
Water Quality and quantity	0	0	0	0.00
Total risk				2.51

[1] Risk score = $(A/(D \times F) + B/F + C/N)/R$

3) The Potential Impact of Sugarcane on the Resource Requirements of Numida meleagris (Guinea Fowl).

Categories of Resource requirement	Components of Resource requirement
Diet	Seeds, insects, plant grass shoot ($D = 3$)
Foraging habitat during wet	Shrub land, Cropped land, Sugarcane, Riparian forest ($F = 4$)
Nesting/Roosting habitat	Forest, Cropped land, Sugarcane, Grassland ($N = 4$)
Reliance on farmland	2

Sugarcane Related Environmental Threats	**Key Impacts**		
	↓ Food	**↓ Foraging Habitat**	**↓ Nesting Habitat**
Land Clearing	↓ Seeds	↓ Shrub land	↓ Shrub Land
	↓ Insects	↓ Crop Land	↓ Riparian Forest
	↓ Grass shoots	↓ Riparian Forest	
Increased agrochemical inputs	↓ Seeds		
	↓ Insects		
	↓ Grass shoots		
Fire during cane harvest	↓ Seeds	↓ Mature Sugarcane	↓ Mature Sugarcane
	↓ Insects		
	↓ Grass shoots		
Human disturbances	↓ Seeds	↓ Shrub land	↓ Shrub Land
	↓ Insects	↓ Riparian Forest	↓ Riparian Forest
	↓ Grass shoots		
Effluent from the factory	↓ Seeds	↓ Forest	↓ Forest
	↓ Insects	↓ Grassland	↓ Grassland
	↓ Grass shoots		
Water Quantity	NA		

Risk Score

Sugarcane Related Environmental Threats	**A**	**B**	**C**	**Risk Score**
Clearing and Grabbing	3	3	1	0.63
Increased agrochemical inputs	3	1	0	0.25
Fire	3	1	1	0.37
Human disturbances	3	2	2	0.63
Effluent from the factory	3	2	2	0.63
Water Quality and quantity	0	0	0	0.00
Total risk				2.51

Risk score = $(A/(D \times F) + B/F + C/N)/R$

Table S5. List of bird species in the area

No	**Common Name**	**Scientific Name**
1	Little bee eater	*Merops pusillus*
2	African Hoopoe	*Upupa africana*
3	Black wood hoopoe	*Phoeniculus aterrimus*
4	African grey woodpecker	*Dendropicos goertae*
5	Grey headed sparrow	*Passer griseus*
6	Shinning sun bird	*Nectarinia habessinicus*
7	Ruppell's long tailed starling	*Lamprotornis purpuroptera*

8	Red checked corden blue	*Uraeginthus bengalus*
9	Speckled mouse bird	*Colius striatus*
10	Ring necked dove	*Strreptopelia capicola*
11	Laughing dove	*Streptopelia senegalensis*
12	Helmeted guine fowl	*Numida meleagris*
13	African hawk eagle	*Hieraaetus spilogaster*
14	Black kite	*Milvus migrans*
15	Superb starling	*Lamprotornis superbus*
16	Black headed batis	*Batis minor*
17	African paradise monarchy	*Terpsiphone viridis*
18	Speckled pigeon	*Columba guinea*
19	Pied crow	*Corvus albus*
20	African rock	*Corvus capensis*
21	Tawny flanked prinia	*Prinia subflava*
22	Hemprich's hornbill	*Tockus hemprichii*
23	Sinnamon breasted rock bunting	*Emberiza tahapisi*
24	Village indigobird	*Vidua chalybeate*
25	Red billed firefinch	*Lagonosticta senegala*
26	Northern black tit	*Parus leucomelus*
27	Blue breasted bee eater	*Merops variegatus*
28	Stout cisticola	*Cisticola robustus*
29	Northern red bishop	*Euplectes franciscanus*
30	Morning weather	*Oenanthe lugens*
31	Common bulbul	*Pycnonotus barbatus*
32	Chestnut-naped francolin	*Francolinus castaneicollis*
33	Abyssinian crimson wing	*Cryptospiza salvadorii*
34	Eurasian redstart	*Phoenicurus phoenicurus*
35	House bunting	*Emberiza striolata*
36	Coppery sunbird	*Cinnyris cupreus*
37	Red billed ox pecker	*Buphagus erythrorhynchus*
38	Abyssinian Ground Hornbill	*Bucorvus abyssinicus*

Table S6. Risk score assessment of bird species.

Species	Foraging Habitat	Nesting	Foraging Materials	Risk Score
Bucorvus abyssinicus	Terrestrial vertebrates, Insectivore, non-insect arthropods, scavenger	Large tree cavity, Rock holes	Terrestrial vertebrates, Insects, non-insect arthropods, scavenger	1.95
Francolinus castaneicollis	Seeds, insects, plant grass shoot	Forest, Grassland, Cropped land, Sugarcane	Seeds, insects, plant grass shoot	2.51
Numida meleagris	Seeds, insects, plant grass shoot	Forest, Grassland, Cropped land, Sugarcane	Seeds, insects, plant grass shoot	2.51