AGROECOLOGY and BIODIVERSITY

INFORMATION BRIEF 1

Agroecology and Mammals
From Commodity to Community

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April 2026

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Published by:	The Seed and Knowledge Initiative and the University of Cape Town
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Design and layout:	Fahdelah Hartley
Images:	https://canva.com
Citation:	van Niekerk, J. 2026. Agroecology and Mammals: From Commodity to Community. The Seed and Knowledge Initiative and the University of Cape Town.
Acknowledgements:	The DSTI/NRF Bio-economy Chair at the University of Cape Town gratefully acknowledges the support of the Seed and Knowledge Initiative (SKI), funded by the Swiss Agency for Development and Cooperation (SDC), Bread for the World, the Agroecology Fund, and Swedbio.

What are the linkages between agroecology and mammals?

There are two principal ways in which agroecology and mammals intersect – as livestock in integrated farming systems or as wild animals found in the landscapes surrounding agroecological farms. Unlike the industrial farming system which views animals as 'units of production,' agroecology treats animals as important components of the 'web of life' (Williams et al 2018; Lewis 2025; Gliessman 2026). This information brief explores the lives of mammals – domesticated and wild - in agroecological farmscapes.

Domesticated mammals in farming systems

Around the world, mammals, large and small, play vitally important roles in farming systems and landscapes. Many are introduced to farms by humans and utilised for their meat, milk, or fleece, provide transportation or ploughing power, or becoming moveable and sellable 'assets' in times of disasters such as floods, drought, and human conflict.

WHAT ARE MAMMALS?

Mammals are a diverse group of warm-blooded, air-breathing vertebrate animals belonging to the class Mammalia. They are primarily defined by possessing mammary glands (producing milk for their young), having hair or fur, and having specialised, highly developed brains, which help them adapt to various environments (Australian Museum 2020).

Domesticated mammals such as rabbits, sheep, goats, and cattle are essential elements of integrated small-scale farming systems. Not only for their consumption, but also for the important roles they play in "closing the small-scale farming loop" (personal communication, small-scale urban farmer, Cape Town) by consuming excess crops and agricultural waste and providing the farmer with arguably the most important input for enhancing the physical, chemical and biological properties of soils – manure. In a small-scale system animal genetics are as a rule diverse as farmers constantly seek to enhance and diversify the genetics of their livestock to improve their vigour and resilience.

Mammals feature prominently in industrial agricultural systems too. Here specific breeds are utilised for specific purposes, leading to the rearing of a limited number of high-producing, genetically similar animals. In the absence of the vigour and resilience brought about by diversity and relative freedom of movement, mammals on industrial farms are routinely treated with broad-spectrum antibiotics, steroids and other agrichemicals. This has implications not only for the wellbeing of the animals, but for healthy, sustainable human diets. Climate impacts are a serious concern related to industrial animal agriculture - for instance, ruminants like cattle, sheep and goats produce methane, a powerful greenhouse gas. Industrial feedlots are responsible for air and water pollution, land degradation, and use high volumes of water to provide fodder. Animal welfare concerns can be added to the list of negative aspects related to animal intensification.

To combat the negative impacts of industrial animal agriculture, particularly effects related to climate change - some call for a reduction in meat consumption – a view which has met with resistance from several quarters. Others argue that the diet of ruminants should be altered by supplementing feed with methane inhibitors such as 3-Nitrooxypropanol (3-NOP) and Bromoform-containing seaweed species so that they emit less methane (FAO 2023). A less drastic way of sustaining meat production is through agroecology with its holistic view which supports livelihoods, food and nutrition security, while enhancing biodiversity and conserving landscapes. Many livestock keepers may already practice agroecology, be they pastoralists or small-scale integrated crop and livestock farmers. These farmers know that good rangeland practices increase grassland plant diversity which in turn supports habitats for a range of animals.

Agroecology favours the integration of mammals (and other animals such as birds and insects) into the entire farm ecosystem as this enhances synergies between different farming components and reduces reliance on external, synthetic inputs. Furthermore, agroecological cycles depend on inputs of animal manure, while surplus produce and agricultural waste can be fed to farm animals. This circularity improves the productivity and resilience of a farming system while reducing input costs and wastage. And the regular movement of domesticated mammals between agroecosystems and surrounding landscapes transfers nutrients, biomass, and water in the form of manure.

Wild mammals in agroecological systems

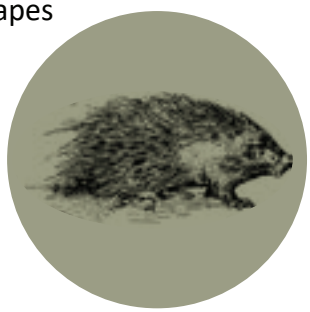
Aside from domesticated livestock – whether cattle, camels, goats, sheep or rabbits – several mammals visit agroecological landscapes in other, more stealthy ways. They might fly in at night like the nectar-seeking flying foxes (fruit bats) of the tropics which pollinate mangoes, durians and bananas; burrow beneath the soil, providing 'bioturbation' or aeration of the soil; or destroy crops like raiding elephants. Some of these visitors are welcomed by fruit farmers, such as bats which pollinate fruit crops or rodents which disperse seed. Others inhabit a grey area where they might provide so-called 'ecosystem services' (see the **Overview Brief** in this series for more) for example bioturbation by subterranean rodents, but they may also be viewed as pests by farmers since their activities disturb the soil. Then there are those which are almost unanimously perceived to be pests by farmers due to their destructive behaviour, for instance rodents which eat crops in the field or in storage, or the raiding elephants mentioned above.

Of the species most frequently welcomed by farmers, pollinators dominate. But when one thinks about pollinators, bees, moths, and other insects immediately come to mind, rarely mammals. Nevertheless, in Africa, bats, tree squirrels, certain rodents and lemurs fulfil an important pollination role. For instance, the largest African tree, the baobab, which flowers at night, is exclusively pollinated by moths and bats. In West Africa, large flying foxes may be motivated by drinking the nectar of the baobab flowers, but in the process, they pollinate the flowers as they spread the pollen from bloom to bloom. In East Africa, baobab flowers are smaller and sturdier than those in West Africa and they are pollinated by smaller flying foxes which crash-land onto the flowers - demonstrating how pollinator and plant have evolved together over millennia. Worryingly, Africa is witnessing a decline in populations of flying foxes due to habitat destruction, roost site disturbance or loss, rising temperatures, disease, and hunting by humans as bush meat (Venter 2025).

Of the animals caught in the 'grey zone' between friend and foe, true moles (*Chrysochloridae*), and mole-rats (*Bathyergidae*) are common examples. For instance, burrowing animals increase plant nutrients in the soil by taking organic matter from the top of the soil to the lower levels. Although industrial farmers

may view these creatures as pests which create tunnels that damage their pastures or fields – modifying physical and chemical soil properties and earning them the title of 'landscape engineers,' these mammals are in fact mining nutrients by making them available to roots located deeper down. And although mole-rats are herbivorous and may eat plant bulbs or roots, thus causing damage to crops, true moles are insectivorous and may save the farmer from an insect infestation (Hagenah and Bennet 2013; Foster et al 2019).

The largest group of wild mammals in farming landscapes – those labelled 'unwelcome' - range from the largest land animal in Africa – the African elephant (*Loxodonta Africana*), to tiny striped mice. In between there are herbivorous and omnivorous mammals such as rats, gerbils, wild rabbits or hares, porcupines, aardvark, baboons and monkeys, antelope and others. Carnivorous mammals such as lions, leopards and caracal also play a role in farmscapes as they may predate on domestic animals. The numbers, diversity and composition of these wild mammals rely heavily on the biome they are found in. Since the dawn of agriculture, farmers have waged a battle with these 'intruders,' often resorting to hunting, poisoning, or capture to control their numbers.



Can agroecology improve the abundance and diversity of mammals on and around farms?

Livestock are essential elements of farming life, supporting livelihoods, providing nutrient-dense foods, and fostering food security - especially in areas where crop cultivation poses challenges. But if keeping animals is to provide other benefits such as the enhancement of biodiversity, landscape conservation, nutrient cycling, and the sequestration of soil carbon, a holistic approach to farming, such as agroecology, needs to be adopted.

The Food and Agriculture Organization of the United Nations (FAO) maintains that smallholder farmers can increase their resilience and at the same time reduce their vulnerability to climate-induced shocks such as floods and droughts by adopting agroecology-based practices which embrace efficiencies, synergies and diversity. One way of achieving this is through improved pasture management which includes the adjustment of grazing pressure by moving animals around; another

relates to adding different species such as legumes to improve grazing; while some advocate for the integration of trees to provide shade and fodder.

Given that animal health is a key element of agroecology, it follows that animal welfare should feature prominently on an agroecological farm. Although the literature on agroecology does not specify how animals should be housed, it does suggest that animals should be kept in semi-natural conditions so that they can express natural feeding, reproduction and social behaviours. These conditions correspond to the 'five freedoms for animals' [1] referred to in animal welfare circles (Lewis 2025).

Agroecology also provides for wild animals found on farms or living in the surrounding landscape, acting as a catalyst for their conservation and maintaining biodiverse, thriving communities by creating diverse habitats. A common example is a pollinator which nests and forages in wildland habitats but provides pollination 'services' to neighbouring orchards or croplands.

Embraced by agroecology, indigenous knowledge may lead the way to more harmonious human-wild animal relations. Studies in Botswana and Sri Lanka show that 'natural' deterrents informed by local and indigenous knowledge may alleviate human-elephant conflict. Elephants typically target maize and sorghum crops, but interventions such as wires which disturb bees living in beehives spaced alongside fields or buffer zones planted with chillies which elephants intensely dislike, or other unpalatable crops such as ground nuts, tea and sisal work to keep them at bay. The diversity of crops planted in buffer zones also serves to supplement rural livelihoods.

Another way to ameliorate human-wildlife tensions is through maintaining a balance between predator and prey, for example by welcoming predators like owls and snakes as these keep rodent numbers down. Domestic predators like household cats can also do a great job of controlling rat and mouse numbers.

1 Freedom from hunger and thirst; freedom from discomfort; freedom from pain, injury or disease; freedom to express normal behaviour; and freedom from fear and distress. See https://www.animalhumanesociety.org/health/five-freedoms-animals.

Can agroecology facilitate a transition from commodity to community?

In this information brief we have seen that farming systems contain both domesticated and wild mammals and that agroecology has much to offer such systems. By protecting local food cultures and supporting diversity in its many forms, agroecology stimulates healthy, meaningful diets and boosts overall ecosystem resilience.

In agroecological farming systems everything is connected. Plants provide niches where mammals, other vertebrates, invertebrates, fungi and microorganisms gather and interact synergistically.

These interactions are however being disrupted by global environmental change. For example, a recent heatwave in Australia resulted in the death of thousands of flying foxes. If the same were to occur in Africa, tropical crops might suffer from low pollination rates, and the existence of the iconic baobab tree may be under threat as bats are likely to be more susceptible to climate change than the trees themselves.

To mitigate environmental change, the adoption of agroecology provides a measure of hope. By fostering a diversity of biological organisms and their habitats, and optimising interactions between the environment, plants, animals and humans - agroecology can support water flows, improve carbon sequestration and boost overall ecosystem health.

How can mammal diversity be preserved in agroecological farmscapes?

- **If you are a livestock farmer, make sure your animals are genetically diverse – this will confer resilience.**
- **Incorporate indigenous breeds into farming stock – they are likely to be better adapted to local conditions and resistant to endemic diseases.**
- **Try to maintain a predator-prey balance in order to prevent an overpopulation of prey animals.**
- **Incorporating animals into agroecological farming works best in small-scale integrated agricultural systems.**
- **An agroecological way of farming dictates that the health, welfare and wellbeing of animals be taken into consideration.**

By protecting both large and small mammal species and their habitats, major parts of the remaining mammalian community will be conserved, and by affording domesticated mammals a life which approximates a 'natural' one, commodity becomes community.

In closing, this brief has demonstrated the vital importance of maintaining a balance in agroecosystems, and this extends to the animal life held within them. Lawrence Mkhaliphi, agroecology manager at the NGO, Biowatch South Africa gives a striking example of what might occur, should this balance be disturbed: "There's a reason why a small mammal in an agricultural system becomes known as a 'pest.' It's because its habitat has been destroyed or its predator has been removed."

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SKI Seed and Knowledge Initiative

SwedBio NRF National Research Foundation Brot für die Welt AFSA AGROECOLOGY FUND