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RESEARCH ARTICLE

Examining Human–Nature Relationships Through the Lens of Reciprocity: Insights from Indigenous and Local Knowledge

Commons are cared for: Coexistence between humans and wild birds on the island of Kihnu, Estonia

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Abstract

1. Local knowledge is an essential dimension of humanity's relationship with the environment. Investigating the interdependence between humans and wild birds holds value in fostering a mutually beneficial relationship with avian populations.
2. Gathering bird eggs is a significant practice for Kihnu islanders in Estonia. There are very few studies of this age-old, complex knowledge that assess the topic from the perspective of the local community. This paper investigates the reciprocity and the relationality between people and birds and the position of commons in the local community practice of bird semi-domestication.
3. Several methods (interviews, participant observation and literature study) were used in data collection. We obtained information on local knowledge concerning 58 bird taxa. Locals named at least 21 bird species from which they have collected eggs. While collecting eggs is a central activity, the relationship surrounding egg collection is far more intricate. Locals take care of nesting boxes in Common Merganser which birds reside, collecting only a few eggs from every box. These nesting boxes are also constructed for passerine birds. Furthermore, caring for birds influences the soundscape of Kihnu and significantly impacts the cultural bond between local communities and the birds. Kihnu islanders are mindful of the changes occurring in the bird population.
4. The intimate relationship between local people and birds is challenged when traditional ways of life are restricted by stricter nature conservation norms (e.g. banning the collection of bird eggs and visiting islets). However, birdlife is very important in ensuring biocultural diversity. Therefore, this study proposes several

important future perspectives in promoting the sustainable development of rural life: (1) the introduction of pluralistic nature protection, including the opinion of local communities in the management of natural resources; (2) the promotion of birds as a means of pest control; and (3) reinforcing the reciprocal coexistence of birds and humans on Kihnu. We advocate for community-centred nature management which takes into consideration Local Ecological Knowledge and its attached expertise, shared responsibility and benefits, sustainable development trajectories and local community-based governance systems.

KEYWORDS
commons, conservation, ethno-oology, ethno-ornithology, human–bird relationships, reciprocity

1 | INTRODUCTION

> It is well known that water and bird songs are sounds that produce relaxation in humans more than do human sounds, as has been proved physiologically by measuring heart rate, skin conductance, and electromyographic responses. (Farina, 2013, p. 131)

Local knowledge and practices have become increasingly crucial for contemporary bird conservation (Gilchrist et al., 2005). However, very little research on this has been done thus far in Europe (e.g. Aswani et al., 2018; Barua & Jepson, 2010; Merkel & Barry, 2008; Svanberg & Ægisson, 2006). Reyes-García et al. (2023) pointed out that biodiversity conservation strategies do not consider the cultural importance of species for conservation, which endangers cultural diversity. Therefore, they recommend a 'biocultural status' in nature conservation, as common, widespread species are often important for local communities.

Gathering wild bird eggs has been crucial in the subsistence economies of European coastal communities since time immemorial (see Figure 1b). Until recently, the collecting of sea bird eggs has been important for the local economy and diet of many peripheral areas, such as islands off the coast of Wales and Lundy Island (Baldwin, 2013), as well as the Orkney, Hebrides and Saint-Kilda archipelagos (Scotland), Ireland (Lefèvre, 1993) and Iceland (McGovern et al., 2006; Merkel & Barry, 2008). In England, harvesting seagull eggs, specifically from the Black-Headed Gull (*Chroicocephalus ridibundus*), is still practised in spring, and the eggs are considered a delicacy in fine dining London restaurants (Patel, 2019).

Nevertheless, ethno-oology, that is, the study of traditional knowledge and practices concerning eggs, remains an unexplored field in ethnobiology. According to a human ecology textbook, gathering wild bird eggs could be considered foraging since it deals with wild food harvesting and does not use sophisticated technology (Sutton & Anderson, 2014).

On Kihnu, a small island in the Gulf of Riga off the southwestern coast of Estonia, egg gathering has long been practised (Danto, 2018). Kihnu inhabitants refer to the island, its coastal meadows, neighbouring Manija Island, 56 uninhabited islets and the surrounding sea as the Kihnu cultural space (*Kihnu kultuuriruum* in Estonian) or simply their backyard. There is no separate word for 'nature' in the archaic Kihnu dialect, and to describe the natural environment, they use either the word *õues* (in the courtyard or backyard or farmyard) or *välläs* (outside). It is also a place where the identities of islanders and people's perceptions of the sea are affected in various ways by the interactions between different actors, including humans and animals (Plaan, 2018, 2019).

Given the importance of birds in Kihnu cultural space (see Appendix S2, subsections 1.2, 1.3, 1.5 and 1.6; Danto, 2018; Kalle et al., 2023; Plaan, 2018, 2019), we take egg foraging as a focus for exploring a much wider sphere of people–bird relations to address the aspects of reciprocity and relationality. The bond between nature and human beings is a fundamental concept of local ecological knowledge (Cebrián-Piqueras et al., 2020). Reciprocity is an 'obligate symbiosis', the relationship established by the continuous exchange, give and take, between society and the environment (Kimmerer, 2013; Miltenburg et al., 2022). Relationality is the principle of responsibility and the practice through which multiple connections between culture and nature are formed and strengthened (Dudgeon & Bray, 2019; Graham, 2014). Studying the traditional coexistence of birds and people and the cultural significance of birds can lead to incorporating local communities' knowledge and practices into functioning nature conservation actions without compromising both principles.

1.1 | Historical background of egg foraging in the North and Baltic seas

Along the Baltic coast and rivers in Sweden and Finland, it has, until recently, been common to construct wood nesting boxes for the Common Merganser (*Mergus merganser*) and Common Goldeneye (*Bucephala clangula* (Linnaeus, 1758)). These nesting boxes were described as early as 1555 by Olaus Magnus in his History of the Nordic Peoples (Svanberg, 2022) (see Figure 1a).

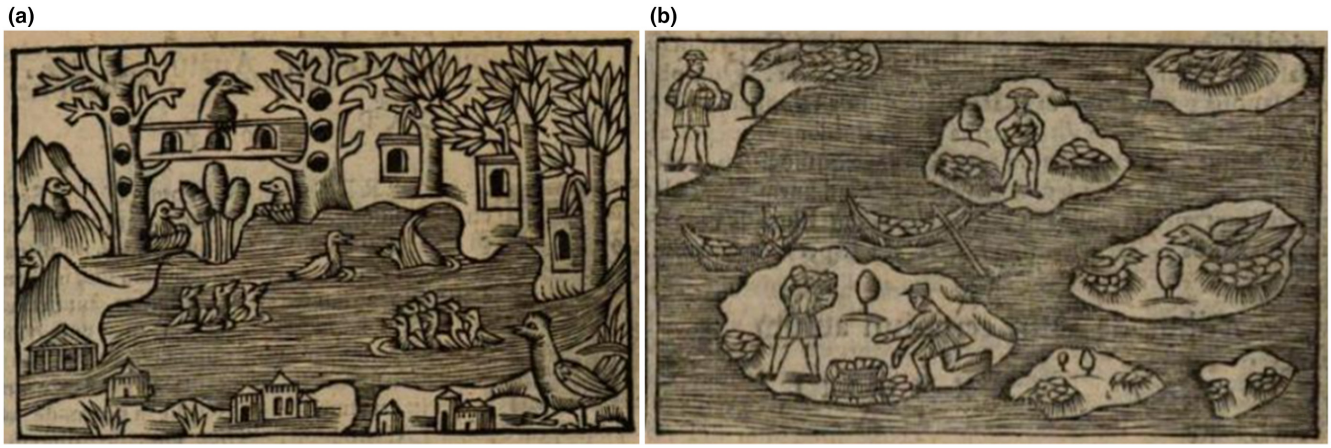

FIGURE 1 Drawings from Olaus Magnus's book, 'Historiae de gentibus septentrionalibus' (1555). (a) Waterbird nesting boxes (p. 653); (b) collecting seabird eggs from small islands (p. 681).

FIGURE 2 (a) Nesting box for Common Mergansers (*Mergus merganser*), Gräsö, Uppland, Sweden, in the 1940s (Photograph by Albert Eskeröd, the Nordic Museum NMA.0077203); (b) nesting box for Goldeneyes (*Bucephala clangula*), used by the Skolt Sami, Petsamo, Finland, in 1927 (Photograph by Kustaa Vilkuna, Museovirasto Helsinki, Finland).

The nesting boxes were placed on living trees or near waterbodies with the opening facing towards the water. People on the islands and along the rivers could own many nesting boxes. These nesting boxes were widespread in the Baltic Sea archipelago[1] (Berg, 1981; Brusewitz, 1983; Svanberg, 2022) (see Figure 2a,b). In addition, extensive egg collecting took place among various birds that had their nests on the ground in coastal areas, including Common Eider (*Somateria mollissima* (Linnaeus, 1758)), Mallard (*Anas platyrhynchos*), Northern Lapwing (*Vanellus vanellus*), Grey-Legged Goose (*Anser anser*), Common Crane (*Grus grus*) and Black-Tailed Godwit (*Limosa limosa* (Linnaeus, 1758)), among others (Berg, 1981). It was also common to harvest nestlings of various birds from the nests (Storå, 1966; Svanberg & Ægisson, 2006). On the island of Gotland, peasants in the 18th century constructed large numbers of small nesting boxes for the Common Starling (*Sturnus vulgaris*) and placed them on their farmhouses. At the end of the 19th century, the peasants on Gotland harvested nestlings and eggs for food from these boxes. Starling boxes for the harvesting of nestlings also existed in Denmark (Berg, 1981).

On the Faroes, there was a long tradition of collecting Common Guillemot (*Uria aalge* (Pontoppidan, 1763)) eggs by climbing along the cliffs where birds nested, especially on the islands of Skuvoy and Dímun. The islanders harvested eggs in large numbers and went to the capital Tórshavn with their tiny boats fully loaded with Guillemot eggs. Probably 1–2 million eggs were harvested in 1950. Since then,

[1]See project 'birdhouses to the Archipelago': https://www.aineetonkulttuuriperinto.fi/en/livind/pilots.

the Guillemot population has decreased, and egg foraging has been effectively banned. However, some islanders in Skuvoy and Sandoy collect Fulmar (*Fulmarus glacialis* Linnaeus 1761) eggs on the cliffs instead, as a way to keep the tradition alive. To climb along the cliffs with ropes is a dangerous task, but some islanders want to preserve the tradition for the future (Nørrevang, 1986). Seabirds are still typical food on the Faroes. Before World War II, some people also hunted small birds for food, but nowadays, when they are wealthier, they are ashamed to talk about this (I. Svanberg, field notes). In northern Sweden, Snow Buntings (*Plectrophenax nivalis* (Linnaeus, 1758)) were an essential source of protein when they arrived in large numbers in early spring. Young boys captured them in simple traps, and the small birds were boiled for human consumption (Svanberg, 2001).

In southern Sweden, seagull eggs were extensively harvested during World War II, and this practice continued on a much smaller scale until the 1980s (Andersson, 2001, 2007). Likewise, in Germany, in a few specific spots along the North Sea, such as the isles of Langeoog and Amrum, and the Baltic Sea coast, foraging eggs was widespread and the eating of seagull eggs was nearly a cult in the 1970s so that these eggs could be found in many gourmet shops from the coast to southern Bavaria (Lückel, 2009). On the isle of Amrum (Germany), diverse coastal areas were leased to hunters, who received permission to issue 'egg collection certificates'. After egg harvesting was banned, it was still possible to see some islanders getting their breakfast eggs from the dunes. Nowadays, this custom seems to have been completely abandoned on the German coast. On the same shores of the North Sea, in the Netherlands, the collection of Northern Lapwing (*Vanellus vanellus*) eggs was a subsistence practice for a long time (Both et al., 2005). Now listed as part of the Netherlands' National Inventory of Intangible Cultural Heritage, the eggs are sought in polder fields, only to be reported to farmers and ornithological institutions.[2]

The gathering of seagull eggs has long been known on the shores of Germany, Denmark, and England and on the northwestern shores of France. Despite the collection of wild eggs being prohibited in the UK since 1954, foraging seagull's eggs during specific periods and with special licences is still allowed (RSPB, 2023). Eating these eggs is still fashionable in a few expensive British restaurants. Seagull eggs and their marketing have been forbidden in Germany since 1989—apparently because of the danger of poisoning due to high concentrations of heavy metals (Sobich, 2004). Most of the restrictions regarding wild bird eggs in Europe emerged after the Birds Directive of the European Union, adopted in April 1979 and later amended in 2009; according to this directive, the eggs and nests of wild birds are protected (EU, 2009). In France, the last seabird eggs were collected on the cliffs of the Crozon peninsula in the 1990s (Péron, 2021), but the practice remained relatively common throughout the French Atlantic coast during the second half of the 20th century (Danto & Furiga, 2024).

[2]https://www.immaterieelerfgoed.nl/en/aaisykje.

It is important to note that eggs are highly regarded for their exceptional nutritional value, making them a popular food choice worldwide. Eggs are a universally accepted food item, transcending cultural barriers and being embraced by various cuisines across the globe. Regardless of geographical location or cultural background, eggs are widely consumed and incorporated into countless traditional dishes. They are a rich source of high-quality protein, containing all the essential amino acids that the human body requires. With their nutritive profile, eggs are considered a complete and highly beneficial food source (Seuss-Baum & Nau, 2011).

In the northern part of the globe, the relationship between wild birds and people has been studied quite thoroughly on the basis of utilitarianism; for example, quantifying regular reports of the Conservation of Arctic Flora and Fauna working group (e.g. Merkel & Barry, 2008). Undoubtedly, utilitarianism has the greatest impact on wild birds. However, little attention has been given to the impact of bird diversity on intangible cultural heritage. For example, Wyndham and Park's (2018, 2023) literature-based ecosemiotic studies that demonstrated the importance of bird sounds in the preservation of ecoculture.

In ethnobiology, community-centred nature management is nowadays considered a critical approach to ensuring the sustainable use of natural resources while preserving ecosystems for future generations. When communities are actively involved in managing local resources, they are more likely to make decisions that benefit both the environment and their well-being (Agrawal et al., 2023). Our conceptual framework is based on the need to provide positive examples of the self-regulation of shared resources in coastal communities across the world. Coastal communities are also affected by much wider global influences, such as seabird and fish migrations and marine pollution, which must be regulated by higher-level decision-makers (Berkes, 2006). At the same time, there are also positive examples, where in coastal areas, with the involvement of local communities, through cooperation and motivation, broader objectives for the protection of aquatic animals have been achieved, which extend beyond the community. However, this requires an understanding of socio-ecological systems (Pezzuti et al., 2018). Therefore, we took as an example the local community of the Kihnu archipelago in the Baltic Sea, which has co-existed with local and migrating birds for generations, and address three primary research questions: (a) if and how birds have influenced local language and customs, (b) if and how people have influenced birds (reciprocity), and (c) if and how external regulations (like nature conservation) affect local ways of life.

2 | DATA AND METHODS

In June 2021, Raivo Kalle, Renata Sõukand and Andrea Pieroni conducted fieldwork on Kihnu island (see Figure 3). We interviewed 21 people (14 women, 7 men) who called themselves locals from Kihnu and two women who came to live on Kihnu from the mainland many years ago in their youth and strongly perceived themselves as local.

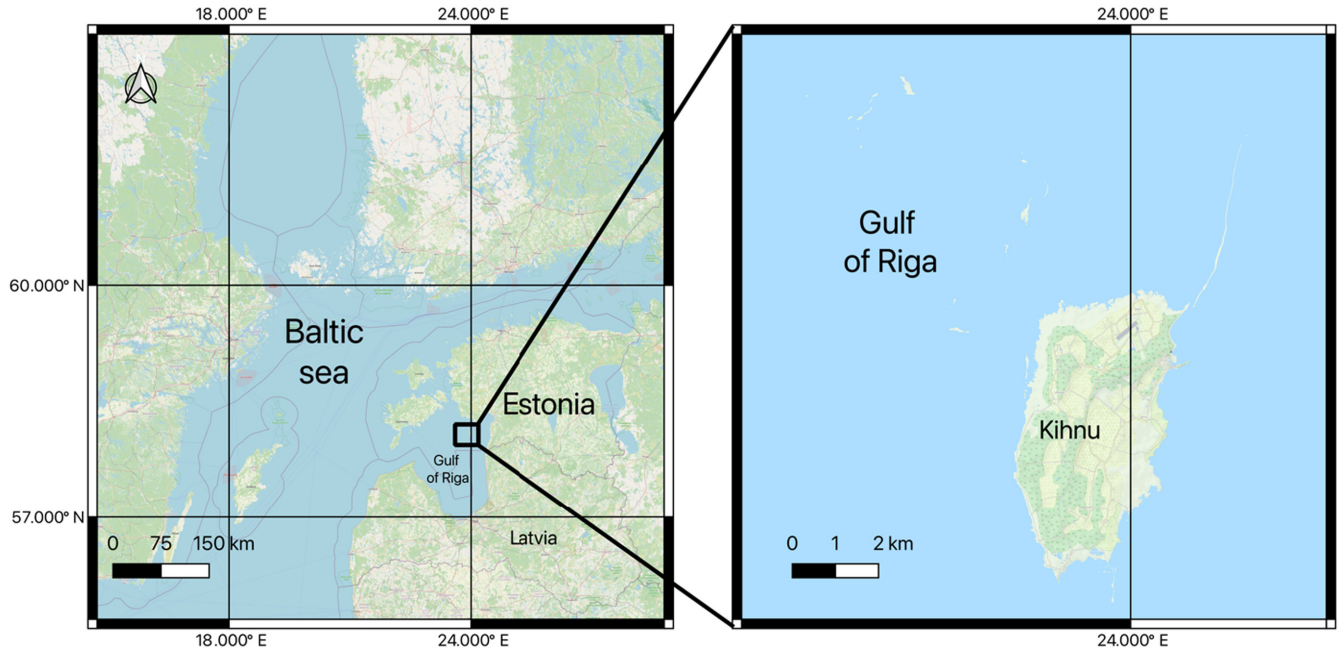

FIGURE 3 Location of the study area, Kihnu Island and islets.

The collecting of wild eggs and people–bird relationships were part of a larger study, the goal of which was to document the complex local ecological knowledge of the Kihnu people. We asked about biota use and relationships with, and changes in, the natural environment in general (for more details on the other aspects considered, see Kalle et al., 2022, 2023; Sõukand et al., 2024). We used a qualitative interview format: We asked all respondents about their relationships with birds, and then, we conducted in-depth interviews with people who had a deeper knowledge of birds. The semi-structured interviews lasted from 1 to 3 h, and interviewees were recruited through pseudorandom and snowball sampling methods. The youngest interviewee was born in 1998 and the oldest in 1934. The sample consisted of people representing a cross-section of the main activities of Kihnu today: fishermen, home cooks, tourism workers, cultural workers, municipal workers, pensioners, entrepreneurs and artisans. All respondents gave prior verbal consent, and the research followed the ethical standards for ethnobiology data collection (ISE, 2008). Anonymity was maintained in data recording and processing. Although the interviews were recorded, the recordings were destroyed after transcription, as was promised to the interviewees, as it is a sensitive subject. All information on birds gathered in the interviews was entered into an Excel spreadsheet (see Appendix S1). After systematization, the transcripts will be stored in both the Kihnu Museum and the Estonian Literature Museum.

Local knowledge about birds was interpreted with the help of co-author Meelis Leas, a Kihnu resident. In addition, we consulted Mart Mäger's book on Estonian bird names (Mäger, 1967) and a dictionary of the Kihnu dialect (Pajusalu & Viikberg, 2016) to aid in the identification of local bird names and interpret the changes. Bird identification was assisted by ornithologist Eerik Leibak. The bird list is based on the IOC World Bird List 13.1 (Gill et al., 2023).

The previous ethnographic fieldwork of two authors was also helpful for data interpretation and framing the discussion. Joonas Plaan conducted field research in 2012 and 2013, surveying 23 local residents regarding their environmental knowledge of birds (Plaan, 2018). In addition, in 2013, he also mapped the locations of Common Merganser nest boxes and interviewed their owners (Plaan, 2019). Anatole Danto visited Kihnu four times between 2016 and 2022 and conducted five in-depth interviews that focused specifically on people's relationships with birds (Danto, 2018).

3 | RESULTS

The informants named 58 bird taxa, with two taxa identified on the genus level, belonging to 27 families (see Appendix S1). Anatidae was the taxonomic family with the highest number of species mentioned (15), yet in some circumstances (related to hunting), people referred to the family in general. The second most diverse family was Laridae, while two birds of one genus (*Sterna*) were not differentiated on the species level by our interviewees.

3.1 | Egg foraging on Kihnu

Kihnu inhabitants named 21 bird species belonging to six families from which eggs have been collected (Table 1). The most represented family was Anatidae (nine species), followed by Laridae (six species). In the past, eating eggs in spring was an essential source of protein for the locals. This is no longer the case as chicken and other poultry eggs are readily available. Eggs collected from the wild were mostly consumed, boiled, fried or used in baking.

TABLE 1 Twenty-one species from which eggs have been foraged and a description of the practice.

Family	Latin name	English name	Local name in 2021	Pajusalu and Viikberg (2016)	Description of foraging practice
Anatidae	*Anas platyrhynchos* (Linnaeus, 1758)	Mallard	sinikael part	sinikael, iäpart	Collecting is remembered by older generations only
	Aythya fuligula (Linnaeus, 1758)	Tufted Duck	prägisti, valgevetikas	valgeveetegija, veetegija	
	Cygnus olor (J.F. Gmelin, 1789)	Mute Swan	luik	luegõ, jues (young)	Based on archival data, eggs were collected on Kihnu in the past. Now, gathering swan eggs is taboo, according to the unwritten rules of the village
	Mareca penelope (Linnaeus, 1758)	Eurasian Wigeon	jõepart, viupart		Collecting is remembered by older generations only
	Melanitta fusca (Linnaeus, 1758)	Velvet Scoter	vaeras	vaerõs, pugalvaerõs	Eggs were collected on the islets in summer
	Mergus merganser (Linnaeus, 1758)	Common Merganser	kossal, koskel, kihnu kana, jääkoskel	iäkossal	Eggs are still collected from nesting boxes constantly taken care of. Ornithologists doubt whether Red-Breasted Mergansers still nest in boxes. They have not observed this activity before
	Mergus serrator (Linnaeus, 1758)	Red-Breasted Merganser	kossal, koskel, heinkoskel	einkossal	
	Spatula clypeata (Linnaeus, 1758)	Northern Shoveler	luitsnokk-part		No longer collected by the younger generation
	Spatula querquedula (Linnaeus, 1758)	Garganey	rägapart		
Charadriidae	*Charadrius dubius* (Scopoli, 1786)	Little Ringed Plover	tjõll	küllik, munarüdi	Eggs were collected on the islets and beach
	Charadrius hiaticula (Linnaeus, 1758)	Common Ringed Plover	tjõll	küllik, munarüdi	
	Vanellus vanellus (Linnaeus, 1758)	Northern Lapwing	kiivitaja, kiives		Eggs were collected on beach meadows in the past
Haematopodidae	*Haematopus ostralegus* (Linnaeus, 1758)	Eurasian Oystercatcher	merisk	merearakas	Eggs were very rarely collected on the islets
Laridae	*Chroicocephalus ridibundus* (Linnaeus, 1758)	Black-Headed Gull	kjarr, naerukajakas	kjärr	Eggs were collected on the islets
	Larus canus (Linnaeus, 1758)	Common Gull	kajakas, kull, väike kull, kalakajaks	kaakkull, räemekull, räämekull	Eggs were collected on the islets and beach
	Larus fuscus (Linnaeus, 1758)	Lesser Black-Backed Gull	kull, suur kull, kajakas, merikajakas	kalakull	
	Larus marinus (Linnaeus, 1758)	Great Black-Backed Gull	kull, suur kull, kajakas, merikajakas	kalakull	
	Sterna hirundo (Linnaeus, 1758)	Common Tern	randtiir, tiir, viires		
	Sterna paradisaea (Pontoppidan, 1763)	Arctic Tern	randtiir, tiir, viires		
Podicipedidae	*Podiceps cristatus* (Linnaeus, 1758)	Great Crested Grepe	tuttpütt, perssjalg	koarlant	Eggs were collected on the islets
Scolopacidae	*Tringa totanus* (Linnaeus, 1758)	Common Redshank	tillu	tjõld, küllik, liivatilder	The eggs were mainly collected by children

FIGURE 4 (a) *Kull* eggs in a nest; (b) breeding colony of *kjarr* on Sangelaid (*Sangõ*) islet. There are many different bird species in the breeding colonies, and so the bird species are not distinguished in detail when collecting eggs; (c) *Merisk* eggs in a nest; (d) *Vaerõs* eggs in a nest. See Table 1 for more information on the local names of birds. Photographs taken on 23 June 2009 by Meelis Leas.

Seabirds that live in breeding colonies have open nests between sand and rocks that are close to each other, and thus, more eggs can be gathered at the same time (see Figure 4b). Seagulls (*Larus*) and *Sterna* are the best-known breeding colony-living birds whose eggs are collected. Black-Headed Gulls (*Chroicocephalus ridibundus*) start laying (smaller) eggs at the end of April and primarily in May, while Common Gulls (*Larus canus*) start laying (bigger) eggs in May in nests lined with dry reeds and other grasses. *Sterna* lays (smaller) eggs from May to June. Because their eggs are variegated to resemble the surrounding landscape, the collector must have experience. One egg only is gathered from nests with two eggs present (see Figure 4c), while three eggs in the nest indicate that the birds are already hatching (see Figure 4a). Kihnu islanders had a particularly favourable attitude towards collecting the eggs of big seagulls, because the recent increase in the seagull population was not viewed favourably, given that these birds prey on other birds' eggs, hatchlings and smaller birds.

There are many breeding colonies located on the islets (see Figure 4b) surrounding Kihnu, which are accessible by boat. Therefore, collection was carried out by fishermen and children. This resulted in an excessively large quantity of eggs being gathered in a short period. These seabird eggs were shared with community members, especially elderly neighbours, friends and co-workers.

Birds that lay uniformly light-toned eggs form a separate emic category (see Figure 4d). For example, Anatidae species nest in more concealed locations, such as bushes and reeds on beaches, while the Great Crested Grebe (*Podiceps cristatus*) nests in reeds along the water's edge of islets. These birds lay more than three eggs in a nest,

FIGURE 5 Common Merganser nesting boxes, Sääre village, October 2018. Photograph by Anatole Danto.

and the end of gathering is indicated when the bird has started to line the nest with down feathers and has covered the nest. However, the younger and middle-aged people of Kihnu disapprove of collecting Anatidae eggs (except for those of the Common Merganser), and thus, this tradition is now not favoured, as told to us by a man born in 1978 and a woman born in 1975: '*We also know duck eggs, and they have been collected. However, it is not wise to collect duck eggs because it is wise to let the ducks grow up. Then you can hunt a whole duck and eat more*'.

The arrival of breeding birds sets the stage for the most beautiful time of the year. As a woman born in 1971 told us, Kihnu is most beautiful when the Common Merganser arrives to begin breeding in

March. These birds are among the earliest arrivals in spring when ice is still present in the sea but has melted in some places. It is considered a Kihnu tradition to place nesting boxes (Figure 5) on trees at a height of about 3 m (for differences in box placement compared with neighbouring Manija, see Appendix S2, section 1.1).

Caring for birds is not limited to just placing nesting boxes; these boxes need to be regularly maintained: cleaned and, if necessary, repaired in the spring before breeding. Eggs are harvested sustainably: 10–15 eggs are left in every nest to ensure the species' survival. Since there are now fewer nesting boxes, multiple females may lay eggs in a single box, and there may be 40 or more eggs in a nest simultaneously. A large problem today is the abundance of predatory birds, especially Hooded Crows (*Corvus corone cornix*), who have been observed by locals eating eggs from nests. Recently, European pine martens (*Martes martes* (Linnaeus, 1758)) have arrived on the island and started eating eggs. Therefore, it is now also the responsibility of people to drive predatory birds and animals away from their nests. When most of the nestlings have already hatched, they jump out of the box with their mothers to reach the sea. However, they must walk since the boxes can be hundreds of metres or even a kilometre from the shore. At that time, predators—birds: seagulls, Hooded Crows, etc.; pets: cats and dogs; wild mammals: Red foxes (*Vulpes vulpes* (Linnaeus, 1758)), European pine martens, Common raccoon dogs (*Nyctereutes procyonoides* (Gray, 1834))—attack the chicks, and a large number of them perish on this journey. Therefore, when locals see a mother bird walking with her youngsters, they accompany them to the water. If the mother bird has left the nest with most of the hatchlings, the last ones will hatch within a few days, but they cannot reach the sea alone. Again, people take these chicks to the seashore, where Common Merganser mothers can also adopt the ducklings of other females.

3.2 | Game birds and hunting traditions

Natural sounds largely influence the Kihnu soundscape as there are no permanent artificial sounds. However, locals mentioned that in the last 10 years, in connection with extensive bird-hunting tourism, aggressive alien sounds have appeared in the soundscape of Kihnu: '*I am not in favour of the mass shootings happening on Kihnu right now; it is not okay. When I'm at home, it's peaceful and quiet, and then suddenly, there's loud gunfire that scares me. I remember all those wars and things seen in movies, and so this gunshot is horrible*' (Kihnu woman born in 1977).

An ethnographic text from 1941 (Loorits, 1941) describing bird hunting on Kihnu states that Anserinae, Mute Swan, Anatidae (including typical mergansers (*Mergus*)), Velvet Scoter (*Melanitta fusca*) and Grey Partridge were hunted. Hunting was done with a rifle, and game birds were not much sought after. Already at that time, many domestic geese were kept on the island for sale (Ibid). The Grey Partridge is no longer seen on the island, and its numbers are decreasing all over Estonia because of the reduction in breeding areas and the abundance of small predators (Kuus & Leibak, 2018). The community does not regard Swan hunting as acceptable today, and Velvet Scoter is no longer considered a game bird. While the Common Merganser has only recently been removed from the list of recommended game birds in Estonia, the current local Kihnu hunters claimed that they have never hunted this bird for ethical reasons (this bird is like a family member). Locals said that Kihnu is too small for large flocks of Anserinae (including True Geese (*Branta*)) to find food when they pass by the island during their migration, and so they only stop on Kihnu when there are strong winds and need a break before flying to mainland Estonia. Locals used the fat of Geese (but more often that of the domesticated Goose) to treat coughs by rubbing it on the chest.

Local hunters (only men hunt) gave us the following list of game birds that they hunt on Kihnu: Garganey (*Spatula querquedula*), Northern Shoveler (*Spatula clypeata*), Eurasian Wigeon (*Mareca penelope*), Mallard (*Anas platyrhynchos*), Common Teal (*Anas crecca*), Tufted Duck and Common Snipe (*Gallinago gallinago*). The shooting of Common Snipe is a new phenomenon brought to Kihnu by Italian hunting tourists. These birds like to be near the sea, where cattle are nearby.

A local hunter described the local custom: '*Locals shoot little. They hunt at the end of September or even in October when ducks are fattest and preparing to fly away. Locals hunt in the evening when it gets dark. I guess 3-4-5 birds at once, no more*' (Kihnu man born in 1960). The bird-hunting season in Estonia starts on 20 August and lasts until 31 October inland and until 30 November on the sea and large lakes; apart from that of Geese (*Branta* sp., *Anser* sp.), whose hunting officially occurs from 20 September to November. However, Kihnu hunters said that hunting traditionally begins there in late September and October, when waterfowl are at their fattest, before flying south. Stealth and stalk hunting are utilized, as decoys are not used. Traditionally, game birds have been hunted for personal consumption: the meat is usually cooked, and nowadays, it is also smoked. On Kihnu, birds have never been hunted for the sale of their meat.

Hunting tourists arrive as soon as the official date of 20 August arrives and engage in hunting for the purpose of selling meat, for which they use various prohibited decoys. Italian hunting tourists, who first came to Kihnu about 10 years ago, brought with them the practice of mass shooting, where hundreds of birds are shot in 1 day and thousands upon thousands in one season, as narrated by locals. The shot birds are handled very roughly: only the breast meat is removed, while the rest of the bird is left floating along the shoreline. In some places, there are, therefore, large piles of dead birds on the beach. Although this practice is against the law, law enforcement is not implemented in those cases. This attitude scares the locals since waterfowl hunting has always been unimportant in Kihnu. Local community members are angered by this behaviour. They had never encountered such an act of bird devastation before. Also, locals noted that hunting tourists do not select which species they shoot but rather shoot all birds one after the other.

The same type of bird-hunting tourism is now present everywhere along the coast of Western Estonia. Several rules have been established for hunting in Estonia; for example, you may not lure

birds with electronic aids or use lead shot. However, bird-hunting tourists continue to use prohibited hunting methods. After the COVID-19 pandemic, Italian bird hunters have not returned to Kihnu, and locals hope they never come back.

4 | DISCUSSION

The extensive knowledge of bird egg gathering is notable and specific to Kihnu. In the past, eggs from 50 to 60 bird species were collected in Estonia (Leinbock, 1934). Gathering eggs was quite common, especially along the coast, where birds live in breeding colonies. However, by the 1930s, this activity had become objectionable everywhere in Estonia due to the influence of school education and ideas about nature conservation/bird protection, and as a result, egg pickers were belittled (ibid).

Some of the major islets, such as Sangelaid (*Sangõ* in the Kihnu language) and Sorgu (*Sorgo* in Kihnu language), were inhabited only during the summer months. There, fishermen lived in tiny makeshift huts and were surrounded by breeding seabirds and Baltic grey seal (*Halichoerus grypus* subsp. *grypus*). Later, island keepers also lived in temporary buildings on islets, for example, it was so in Sangelaid. They fished in the surrounding waters, provided shelter for other fishermen during inclement weather, and cared for the islets by removing unnecessary reeds and protecting breeding birds from predators (Jõgisalu, 2006).

In the late winter, Sangelaid served as a point for Baltic grey seal hunting; in the spring, it was one of the islets where eggs were collected. Older islanders recall that children collected seagull eggs and demolished Hooded Crow nests on the islets surrounding Kihnu in the spring. Men who practised this kind of foraging believed it helped maintain a healthy bird population. As Hooded Crows were perceived as intruders from the mainland and hunters were paid a bounty by the state for each killed specimen, islanders attempted to eliminate as many individuals as possible (today, their number is not regulated by the state). Later, seagulls were recognized as predatory birds by the Soviet regime. The eggs were used to make pastries back home or consumed as hard-boiled eggs on fishing trips. Men observed that otherwise there would be an excessive number of seagulls that would scavenge the nests of other birds, which some fishermen considered part of their family. An unwritten rule of the permanent residents of Kihnu is that food obtained from the wild or sea (common property) must be shared with neighbours, friends, coworkers etc. This rule is widespread across all northern Indigenous communities, for example, it is especially well documented among Indigenous Peoples in Canada (Gombay, 2010).

Leinbock (1934) wrote the most comprehensive summary article on the collection of bird eggs in Estonia. Loorits (1941) states that the activity of egg collecting was quite common on Kihnu, listing birds (Common Merganser, Plover, *Sterna*, Northern Lapwing, Grey Partridge, seagulls, Common Redshank, Great Crested Grepe and Velvet Scoter) and specifying that the incubation stage was determined by placing an egg in water: An incubated egg would rise to the surface and such eggs were not collected. While Hooded Crow eggs were not eaten but simply destroyed by youngsters, the nests of all other birds were protected; there was also a belief that if you breathed on bird eggs, the bird would leave the nest (Loorits, 1941).

Collecting eggs from the wild today is also reduced due to poultry farming. In addition to chickens, we saw several types of domestic ducks being raised on the island. It can be clearly seen that if traditional landscape management practices—grazing and mowing—disappear so will the birds living in meadows and the birds that feed on insects near barns.

4.1 | Common Merganser cultural and economic importance on Kihnu

The Common Merganser is a bird that previously was widely semi-domesticated around the Baltic Sea. An article published in 1934 (Leinbock, 1934) describes in detail the types of nesting boxes for this bird and suggests that Kihnu boxes are more advanced and possess several essential features not present in other regions. Kihnu boxes are most similar to those made on the island of Gotland. Two hypotheses were presented to explain this likeness: the similarities developed independently, or they occurred under the influence of cultural exchange (Leinbock, 1934). Also, a folklore text from the 1940s stated that nesting boxes are placed for these birds and that they are held in high esteem, equal to that of poultry (Loorits, 1941). Nowadays, there are fewer and fewer nesting boxes in villages, but the sharing of these eggs with those who do not have their own boxes is increasing.

Kihnu's cultural space has been included in the UNESCO list of Intangible Cultural Heritage since 2008 (UNESCO, 2008). The people of Kihnu today consider the placing of Common Merganser nesting boxes and the collecting of their eggs as part of their culture. In 1985, Mark Soosaar made a documentary about the Common Merganser (Soosaar, 1985) and its relationship with people on Kihnu. In addition, in his 2012–2021 documentary series, Soosaar depicted the children of Kihnu and their general attitude towards birds, including the Common Merganser (Soosaar, 2021). However, putting up new nesting boxes has decreased quite significantly, and families now also have fewer boxes, and thus, this tradition is disappearing. UNESCO's attention helps to keep this tradition alive and has global importance. So, practical training has now been introduced for Kihnu schoolchildren, where ornithologists talk about the importance of this bird. Local masters also teach children how to make nesting boxes for this species (Paluoja, 2016). In Kihnu culture today, the species is equated with a domestic bird and is called 'Kihnu's chicken'. Since there are fewer boxes, fewer people are accustomed to the taste of these eggs, and thus, their consumption decreases. The eggs are mainly boiled, but they are also fried. However, it is more traditional to make *kosklamuna kook* (Common Merganser egg cake) in the spring (Appendix S2, section 1.7). Therefore, the reciprocity between a given bird and a person is clear: a person receives eggs from the bird, while the bird receives a nest box from the

person and protection for its nest and its young. With this kind of activity, it is also possible to observe how the pre-domestication of wild birds takes place.

4.2 | Law and its enforcement

Official nature conservation in Estonia started in 1910 with the banning of bird egg collecting from small islets rich in birds on the coast of Saaremaa (Kalling, 2010). Even after World War II, during the time of Soviet occupation, collecting bird eggs for food was prohibited by USSR law (Anonymous, 1964). However, people were allowed to collect wild bird eggs on Soviet islands/islets in the Arctic Ocean, but only those of Brünnich's Guillemot (*Uria lomvia* (Linnaeus, 1758)), Common Guillemot (*Uria aalge*), Black Guillemot (*Cepphus grylle* (Linnaeus, 1758)), Lesser Auk (*Alca torda* Linnaeus, 1758), Atlantic Puffin (*Fratercula arctica* (Linnaeus, 1758)) and seagulls (*Larus*) that lived in breeding colonies. However, the collection of Common Merganser eggs from man-made nesting boxes was favourably viewed and supported in Estonia (Kumari, 1954). In addition to banning the collection of eggs, visiting islets during the breeding period was also prohibited. For example, by the end of 1968, four islets in Estonia had a bird conservation programme, where it was forbidden to enter and remain during the spring and summer. Subsequently, 19 more small islets were taken under protection, among them Sangelaid near Kihnu (Onno & Renno, 1970). In fact, Sangelaid had already been under protection since 1964. In 1994, the protected area around Kihnu was expanded to include another eight islets. In modern Estonian ornithology books, collecting Common Merganser eggs is no longer considered acceptable as it harms the bird population (Kuus & Leibak, 2018).

The islets were used for navigation by Kihnu inhabitants travelling in a westerly direction. Thus, fishermen frequently passed the islets and were well-versed in the local environmental conditions. The numerous isle surrounding Sangelaid thus became part of the Kihnu cultural space, the Kihnu people's backyard (Plaan, 2018). In 2014, all areas close to Kihnu were included in a comprehensive protected area. With this, the areas in which people had been accustomed to go foraging for centuries were incorporated into the forbidden zone. Therefore, today's nature protection restrictions that prohibit the visiting of these islets seem particularly painful to locals as it has destroyed their memory landscape.

Today, the large breeding colonies of Great Cormorant have drastically changed the islets. Specifically, they have destroyed trees, bushes and vegetation with their faeces, making the islets, as locals called them, 'witch islands'. In addition, the droppings of these birds smell horrible. With their activities, they also destroy the breeding area of other birds (for more information on Great Cormorants, see Appendix S2, section 1.4). We were repeatedly told that if people had been allowed to continue visiting the islets, they would have limited the distribution of the Great Cormorant. There are now 35,000 breeding pairs in Estonia (Reinhold, 2023), and only now, in 2023, is it allowed, with a special permit, to start controlling Great Cormorants in specific areas: oiling bird eggs in breeding colonies, deterring birds in important fish spawning areas (e.g. shooting blank shells, disturbing birds with lasers), etc. However, most of the breeding areas of the Great Cormorant are protected. Hunting outside the protected area is allowed and about 700 birds are shot annually (Reinhold, 2023).

Ornithologists have justified the protection of cormorants by the fact that this bird was nested in the Baltic Sea a 100 years ago and has since disappeared as a species. However, it is now a question of new environmental and social conditions that have encouraged the explosive growth of the species. For people today, it is an alien species. It is only now, in 2023, that research has started to discuss how such a reappearance of a once-vanished bird affects the sociocultural context (White et al., 2023).

Despite significant fines, people have continued to collect eggs illegally on the islets. For example, in 2015, an article appeared in the newspaper about an ornithologist who caught illegal egg collectors on the Kihnu islets on 23–24 May. He identified the following species from the eggs of two collectors: 70 eggs were found in the first bucket, including those of Black-Headed Gull, Common Tern (*Sterna hirundo*), Mute Swan (*Cygnus olor*), Mallard and Tufted Duck; while the second bucket contained 30 eggs of Gadwall (*Anas strepera*), Mallard, Black-Headed Gull, European Herring Gull (*Larus argentatus* Pontoppidan, 1763) and Great Black-Backed Gull (*Larus marinus*). Guilty individuals faced a fine of at least 600 Euros (Link, 2015). However, during fieldwork, we were told that the Mute Swan is considered sacred and collecting its eggs was forbidden within the community. The Gadwall was also not mentioned to us because its habitat range reached Kihnu only recently (in the 2000s) (Kuus & Leibak, 2018).

The laws regulating hunting are much milder. The first legal acts to regulate bird hunting were established in Estonia in the Middle Ages (e.g. hunting law of 1682) (Randla, 1974). However, peasants obtained the right to hunt in Estonia with the Hunting Act of 1892; before that, it was only a privilege of the nobility. Spring bird hunting has been considered objectionable and was banned by law in 1954 (Ibid). Since hunting is the main cause of the death of game birds, one of the critical protection measures for water birds is to limit their hunting and establish hunting ban areas (Anonymous, 1984). In the USSR in the 1960s, poaching was on such a scale that in some regions of the Soviet Union, the entire waterfowl population was hunted (Boreyko, 2010). In Estonia and Latvia, for example, the number of Mallard was significantly reduced due to overhunting (Onno & Renno, 1970).

The protection of (migratory) birds requires international agreements, the first and most important of which was adopted in 1979 in Bonn, Germany (CCMSWA, 1979). Yet even more, it requires the involvement of local communities through their everyday activities. The birds, being part of the biocultural space, carry multiple meanings for local people that go beyond hunting, which may conflict with today's nature conservation (see Karris et al., 2020). Traditional egg collection and the disappearance of wild birds may not be related. Rather, the latter is the result of the cumulative effect of various

factors. However, there are also positive examples, such as how Canadian Inuit communities have self-regulated the collection of migratory bird eggs, which does not conflict with nature conservation (Natcher et al., 2012).

4.3 | Fostering biocultural diversity and 'commoning' practices

The intimate coexistence of humans and wild birds that we have illustrated in this study highlights several positive impacts on sustainable rural development, biodiversity, and the practices of commoning and reciprocity between nature and humans. Therefore, social scientists should definitely be included in the preparation of bird protection strategies (Dayer et al., 2020) while local elders should be involved in the teaching of bird knowledge (Ibarra et al., 2020). Indeed, international regulations need to build on the nature stewardship traditions that local communities already have (Berkes, 2006), while supporting multi-level and participatory governance with diverse, flexible and pluralistic conservation (Berkes, 2021). Contemporary conventional environmental regulations generally fail to take account of local customs and customary rights, leading to environmental controversies. Local systems of governance and management of nature conservation are often ill-adapted to this issue: generally speaking, public conservation policies perpetuate a form of opposition between nature and culture at the local level (Danto et al., 2020). Today's school education is also a reason why the oral and experiential transmission of traditional knowledge is interrupted (Barreau et al., 2016).

The following are our suggestions for improving human-nature coexistence:

1. Rural Ecotourism: Peripheral areas like Kihnu attract birdwatchers, which could be fostered, helping communities generate small economies while preserving their natural environment (Liu et al., 2021).
2. Enhancing biodiversity: Wild birds also play an essential role in controlling rodent agricultural pests that can damage crops. By encouraging the presence of specific rodent-eating birds, such as owls (Strigiformes), hawks (Accipitridae) and kestrels (*Falco* sp.), farmers can reduce their dependence on pesticides, which can be harmful to both the environment and human health. Many bird species are also important pollinators of plants. By promoting the presence and diversity of bird species, rural communities can ensure the health and productivity of their crops (Whelan et al., 2008).
3. Biodiversity-centred cultural heritage (including spiritual values): Many bird species have cultural and spiritual significance for rural communities, as with the species highlighted in this study. By protecting and preserving bird habitats, communities can maintain their cultural heritage and strengthen their connection to the natural world (Posey, 1999). The 2003 UNESCO Convention on the Safeguarding of the Intangible Cultural Heritage, which led to the inclusion of the Kihnu Cultural Space on one of its lists, promotes 'knowledge and practices concerning nature and the universe' and calls for their safeguarding as living heritage and a tool for sustainability (Danto, 2022).
4. Reciprocity and commoning-based conservation strategies: The dynamic and daily interactive coexistence of humans and wild birds fosters commoning practices within the community, promoting healthier and more resilient socio-ecological systems for future generations (Tidemann & Gosler, 2010). The concept of the commons refers, therefore, to resources that are owned and used collectively by a community, rather than being held privately (Bassignana & Volpato, 2024). This can include natural resources such as diverse ecosystems, soils, water bodies, plants and animals (Batiran et al., 2021; Sirimorok et al., 2023). In an isolated island community, the commons of the wild are not considered to be for their own personal profit. Sharing wild food also creates invisible bonds in the community, and it keeps the community resilient, healthy, and able to overcome difficulties. This demonstrates that the so-called 'tragedy of commons' (sensu Hardin, 1968) is not automatically transferable to the local communities that maintain its relationship with the land regardless of the turbulent times and restricting regulations. Our case study shows that bird–human relations are also based on the crucial role of local communities in decision-making processes and resource allocation.

The 'lesson' that the local Kihnu community offers us is a representative example of how very intimate relationships between nature and humans can survive in a postmodern world and foster virtuous holistic sustainability, as well as how they need to be urgently considered by conservationists and policymakers. We advocate for community-centred nature management which takes into consideration local ecological knowledge and its attached expertise, shared responsibility and benefits, sustainable development trajectories, and local community-based governance systems.

AUTHOR CONTRIBUTIONS

Raivo Kalle, Renata Sõukand and Andrea Pieroni conceived the idea and designed the methodology; Raivo Kalle, Renata Sõukand, Andrea Pieroni and Meelis Leas collected the data; Ingvar Svanberg collected data from historical sources; Raivo Kalle, Renata Sõukand, Ingvar Svanberg, and Hannes Pehlak analysed the data; and Raivo Kalle led the writing of the manuscript. All authors contributed critically to the draft and gave final approval for publication.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Transcripts of the interviews (in Estonian) are stored in the public Folklore Archives of the Estonian Literary Museum, Vanemuise 42, 51,003 Tartu, Estonia https://www.folklore.ee/rl/fo/efita/ and can be consulted on the spot. Archive data does not have DOI numbers, only the archive number EFITA, F13-011. We cannot make public the full interviews, even fully anonymized, as the interviews were made in small communities and people may be recognizable from little details we cannot assess. All the publicly available data is provided in Appendix S1 ('Kihnu peoples' knowledge of birds') and Appendix S2 ('A small additional summary of Kihnu residents' cultural observations about birds').

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Appendix S1: Kihnu peoples' knowledge of birds.

Appendix S2: A small additional summary of Kihnu residents' cultural observations about birds.

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