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A STUDY ON THE DECLINE OF FARMLAND BIRD COMMUNITIES: A REVIEW

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ABSTRACT

The population of farmland birds has declined sharply across the Asian subcontinent, especially in India, where several species are now on the verge of extinction. Vegetation structure in farmlands and bird communities are closely correlated. The decline in seed-eating bird populations has been driven primarily by herbicide use and a shift from spring-sown to autumn-sown cereals, both of which have adversely affected food availability. Reduced survival and reproductive rates, land drainage, and intensive grassland management have further accelerated population losses. These changes have resulted in a food scarcity crisis, disturbance from livestock, and increased nest predation. As birds are key indicators of environmental change, there is an urgent need for ecological studies and conservation measures to support farmland biodiversity.

Keywords: Ecological Indicators, Farmland Birds, Decline Factors, Biodiversity. Habitat Fragmentation, Pesticide Impact.

1. INTRODUCTION

Agricultural ecosystems harbor unique and valuable biodiversity that is increasingly threatened by industrialization and various anthropogenic pressures. Farmland habitats, in particular, are experiencing steep declines in biodiversity across Asian countries. Over the past decades, agricultural intensification has exerted both social and environmental pressures, leading to a sharp decline in farmland species especially birds, which serve as key ecological indicators of environmental change and agricultural sustainability.

Birds are of central importance both for their value as well as an ecological indicator for the conservation of concerned species associated with agricultural ecosystems. However very little study on ecological basis of utilising avian community trophic level as biological indicator of biodiversity conservation is yet carried out. Some of the common species of farmland birds includes Passer domesticus (House sparrow), Passer montanus (Tree sparrow), Linaria cannabina (common Linnet), Linaria flavirostris (Twite), Grey partridge (Perdix perdix), Turtle dove (Streptopelia turtur), starling (Sturnus vulgaris) etc. The drastic decline of farmland birds may be attributed to various interrelated factors which include both on agricultural practices, various soil types, environmental factors and also drastic climatological changes. In this study it was explored that bird richness was correlated with the agroecosystems. The effect of crop diversity, changes in the agricultural practices like reduction in landscape and use of various pesticides for more production has indirectly, directly affected food resources as well as disturbance of their suitable breeding habitats. As a result, endemic farmland birds are declining and are being replaced with other exotic harmful avian fauna, thus disturbing the ecological biodiversity. The Planet Earth is in midst of extinction crisis. Thus integrated, efficient and global prioritization approaches are needed to manage the ongoing sharp decline of these birds for safeguarding evolutionary diversity of avianfauna.

1.1 Habitat

The preferred habitat of farmland birds is mixed agricultural lands which was prevalent from time immemorial. Presently loss of mixed farming causing, a loss of habitat diversity thus leading to less diversity of plants and animals and fewer opportunities for birds to forage in different habitats throughout the year. Also loss of winter fallow habitats, such as winter stubbles, which are important for winter foraging, is also affected by various anthropogenic activities and over exploitation of land.

1.2 Important of Birds in Ecosystem: Birds are obviously important members of many ecosystems. They are integral parts of food chains and food webs. The feeding relationships among all the animals in an ecosystem help prevent any one species from becoming too numerous.

- Birds play a vital role in keeping this balance of nature. In addition to being important parts of food webs, birds play other roles within ecosystems.
- Birds eat insects. They are a natural way to control pests in gardens, on farms, and other places. A group of birds gliding through the air can easily eat hundreds of insects each day.

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- Many fruit-eating birds help disperse seeds. After eating fruit, they carry the seeds in their intestines and deposit them in new places. Fruit-eating birds include mockingbirds, orioles, finches and robins.
- Nector-feeding birds are important pollinators, meaning they move the pollen from flower to flower to help fertilize the sex cells and create new plants.

2. DECLINING FACTOR OF SOME COMMON FARMLAND BIRD

2.1 House Sparrow (**Passer domesticus)-** Declined in urban as well as in rural areas; several causal factors mooted, including decline of food supply (insects and seeds), increased predation from an expanding cat population, increased pollution from traffic in cities, and in some areas reduced availability of nest-site, but further work needed. In one experiment, responded to provision of extra food on some farms where numbers previously declined, but not on others where numbers were previously stable or increasing (Hole et al. 2002). Decreased survival during the years of decline (Siriwardena et al. 1999); also increased nest success (Siriwardena et al. 2000), but no information on possible change in duration of breeding season or total seasonal productivity (Freeman and Crick 2002).

2.2 Tree Sparrow (**Passer montanus**)

National population decline has exceeded 95%. In local conservation projects has benefited provision of winter food (small seeds) and nest boxes, especially when sited near water, where insects are still plentiful (Field & Anderson 2004). Showed increased nest success during the years of decline, but no information on possible changes in duration of breeding season or total seasonal productivity (Siriwardena et al. 2000).

2.3 Turtle Dove (**Streptopelia turtur**) –

Decline attributed to reduction of tall hedgerows used for nesting and weed-seeds used as food (Browne & Aebischer 2001), Increased nest success recorded during the years of decline (Siriwardena et al. 2000), but reductions in duration of breeding season and in total seasonal productivity (Browne & Aebischer 2001, 2003).

2.4 Linnet (**Carduelis cannabina)** –

Reduce survival and nest success during the years of decline (Siriwardena et al. 1999, 2000), but no information available on possible change in duration of breeding season or on total seasonal productivity. In a French study, annual variations in production of fledglings influenced year to-year population increase (Eybert et al. 1995). For importance of oilseed rape as a food source, see (Moorcroft et al. 1997and Moorcroft and Wilson 2000).

2.5 Twite(Carduelisflavirostris)–

Has suffered in summer from loss of weeds from meadows near the moorland edge (through improved grassland management), and in winter from loss of weeds from arable land, and especially from loss of winter feeding areas of coastal saltmarsh, which have been converted to farmland (Brown et al. 1995, Atkinson 1998, Dierschke 2002).

2.6 Grey Partridge (**Perdix perdix)** –

Population decline has exceeded 85%. One of the most thoroughly studied species, with proposed mechanisms tested by experiment (Potts 1986, Rands 1985, Potts & Aebischer 1995, Tapper et al. 1996).

2.7 Bullfinch (**Pyrrhula pyrrhula**) –

Adverse habitat changes involve loss of tall thick hedgerows from farmland and loss of under storey shrubs from many deciduous woods (often through increased deer browsing). These changes also involve loss of food-plants, in addition to loss of farmland weeds. Further more recovery of Sparrowhawk numbers may have confined Bullfinches to feeding close to cover (through a behavioral response), and thus reduced the total land area over which they can forage, compared with the 1960s (Newton 1967). The demographic cause of decline is uncertain (Siriwardena et al. 2001), but higher nest success was recorded during the decline (Siriwardena et al. 2000), with no information on possible change in duration of breeding season or total seasonal productivity. The latter is greatly influenced by the amount of late summer nesting (Newton 1999, Profit et al. 2004).

2.8 Yellowhammer (**Emberiacitronella)**

Breeding densities in different parts of Britain strongly correlated with the proportion of land under arable crops, with crop diversity and with hedgerow length. Decline began later than in some other seed-eaters, and most marked following loss of minority cereal crops from western areas now dominated by grass and non-cereal crops (Kyrkos 1997, Kyrkos et al. 1998). Individual nest success was higher during years of population decline (Siriwardena et al. 2000), but in one study on nine scattered farms total seasonal productivity was too low to maintain a stable population (Bradbury et al. 2000).

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2.9 Cirl Bunting (Emberiza cirlus) –

Decline attributed to lack of insect food for chicks in breeding season and seeds in winter. Appropriate conservation measures, within the framework of an agri-environment scheme, promoted an increase in food-supplies, leading to a four-fold increase in the remnant population within 10 years (Evans & Smith 1994, Evans 1997, Wotton et al. 2000, Peach et al. 2001).

2.10 Reed Bunting (Emberiza schoeniclus) –

Probably suffered from both land drainage and destruction of 'rank patches' (reducing nesting habitat) and decline in food supply (insects in summer, weed and grass seeds in winter). During the years of decline (1975– 83) breeding numbers fell rapidly on arable and mixed farms, but remained relatively stable on pastoral farms (Peach et al. 1999). The decline was greater in northern Britain than in the southeast. Annual survival was lower during the years of decline (Peach et al. 1999), as was nest success (Siriwardena et al. 2000), and recent study suggests a decline in total seasonal productivity in some areas (Brickle & Peach 2004). Oilseed rape crops and small wetland features (such as ditches) now provide most nesting places in farmland (Burton et al. 1999).

2.11 Corn Bunting (Miliaria calandra)–

National population decline has exceeded 80%. Fewer birds now raise a second brood than in the past, reducing the seasonal production of young (Brickle & Harper 2002), but success per nesting attempt was recorded as slightly higher during the years of decline (Crick 1997, Siriwardena et al. 1998). Nest survival was lower in localities with little invertebrate chick food (owing to pesticide use), which led to chick starvation and predation (Brickle et al. 2000). Population decline in Schleswig-Holstein, Germany, was attributed to increased chick starvation (Busche 1989). Benefits from low-input spring-sown cereals (barley) associated weedy winter stubbles and wide field margins (Donald et al. 1994).

2.12 Meadow Pipit (Anthus pratensis)–

In lowland, decline associated with loss of patches of rough grass. In upland, reduced breeding densities evident in heavily grazed, shorter swards (Vanhinsberg & Chamberlain 2001, Pierce-Higgins & Grant 2002). Intensive grazing of heather moorland encourages the replacement of heather by grass, which favours Meadow Pipits, whose densities decline under further grazing, which reduces sward height and diversity, and associated insect densities (Smith et al. 2001).

2.13 Yellow Wagtail (Motacilla flava)-

Breeds in damp grassland and in dry sparsely vegetated arable land (Mason & Lyczynski 1980, Nelson 2001). Decline attributed to drainage and reductions in the area of damp grassland, and generally more intensive grassland management, and to change from spring-sown to autumn-sown crops. Decline most marked in pastoral regions (Chamberlain & Fuller 2001). No published information on possible change in reproductive or mortality rates or on possible effects on population levels of events in African wintering areas. Yellow Wagtails have responded with increased breeding density to raised water levels in some grassland nature reserves (Bradbury and Bradter 2004, Henderson et al. 2004).

2.14 Starling (Sturnus vulgaris) –

Reduction of food supply caused by conversion of former grass to arable in eastern districts, and by more intensive management of grassland generally, leading to reduction in soil invertebrates, and also by reduction in the numbers of accessible feed-sites for farm stock. Reduced survival during the years of decline recorded for Britain, and reduced reproductive rate recorded in Finland (Tiainen et al. 1989).

2.15 Blackbird (Turdus merula) –

Decline associated with loss of hedgerows and field boundaries, and land drainage which reduces food availability. In The Netherlands, the main demographic change was reduced annual survival (Dix et al. 1998). Increased breeding density and success followed various conservation measures (including predator control) at the Game Conservancy Trust's farm in Leicestershire (Stoate & Szczur 2001).

3. CONCLUSION

Globally, about 23% of bird species are threatened or near-threatened with extinction (BirdLife International, 2014), with the majority inhabiting agricultural landscapes. The major factors contributing to their decline include habitat loss due to intensive farming, excessive pesticide use, altered cropping patterns, field drainage, and increased predation. Addressing these challenges requires integrated management approaches that combine sustainable agriculture, habitat restoration, and biodiversity conservation strategies to ensure the long-term survival of farmland bird species.

The main factors driving declines are:-

- **Loss of mixed farming** causing a loss of habitat diversity, leading to less diversity of plants and animals and fewer opportunities for birds to forage in different habitats throughout the year
- **Increased use and efficacy of pesticides** leading to the loss of insect food and weed seeds
- **Changes in crops grown**, such as the loss of spring crops which provide nesting habitat for lapwings and better habitat for other ground-nesting birds such as skylark, yellow wagtail and corn bunting. Also loss of winter fallow habitats, such as winter stubbles, which are important for winter foraging. Large areas of single crops can have dramatic impacts on the abundance of less mobile invertebrates, particularly when insecticides are used
- **Changes in grassland management** have led to a reduction in the abundance of seeds and insects, and the quality of grassland as a nesting habitat. These include increased stocking rates, more efficient grazing systems, increased nutrient inputs, reseeding and the switch from hay to silage
- **Increased field sizes** have caused the loss of nesting habitat for some species, but more importantly, the loss of insect-rich foraging habitat and weedy field margins
- **Field drainage** has not only removed wetland habitats, but also damp areas with more soil invertebrates which provided food for birds such as tree sparrows, reed buntings and yellow wagtails.
- **Predation** has had an additive effect to the impacts of pesticide use on grey partridges and the loss of nesting habitat on some local populations of lapwings when populations are already at low levels. Many predators, such as foxes and crows, have increased.
- **Weather** has an impact on all bird species: Much of the annual variation in population trends is related to weather, with stable species declining in years with poor weather (such as cold winters or dry summers) but bounce back in better years. weather-related factors have not been found to cause any long-term declines
- **Migration**: There are a number of declining bird species which make an annual migration across the Sahara, including two declining farmland birds - the turtle dove and the yellow wagtail. The decline of turtle doves has been linked to the shortage of summer seed sources on farmland, but it is also likely that factors affecting them on their migration routes or wintering grounds are exacerbating this decline.

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