



### LIFE AT SEWAGE - A CASE STUDY ON AVIAN COMMUNITY

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Climate change- the defining issue of recent times is resulting in several disastrous events such as the shift in weather patterns, rise in sea level and the impacts of climate change are global in scope, threatening the entire biodiversity. The results of climate change affect the populations and distribution of flora and fauna and the composition of ecological communities. Humans and wild animals face new challenges for survival because of climate change. Global warming is likely to be the greatest cause of species extinction in this century.

Focusing on our feathered friends, the rate of global warming is already influencing their habitat and their prey. Birds are excellent indicators of the environment and their study can provide information about the impacts of climate change on biodiversity. Folklore and natural history observation which dates back to ancient times, suggest that some aspects of bird behavior can be used to predict changes in weather. Aristotle, in his *Historia Animalium* of 342 B.C. describes this aspect in details. Birds are highly adapted to typical vegetation and specific habitat types. Climate change affects different species of birds differently; therefore, the behavior of birds remains no longer the same in accordance with their food resources and habitat utilization. More than 30% of breeding birds are declining and require our focus. Species that depend on high-elevation forest habitat, long-distance migrants, and coastal breeders are more at risk due to changes in climatic patterns.

India has been highly threatened by climate-related events like floods, cyclones, droughts, and similar issues which not only affects the humans, but also the flora and fauna. Various species of flora and fauna have been influenced by climatic issues. In many cases, the influence of climate change among the birds is indirect, such as varied effects on forests and bird habitats. Many studies have found that birds are changing their reproductive strategy, migration patterns, changes in body size and foraging habits to cope with the climate crisis. Spring, which is an important time in the biological cycle of birds, is arriving much earlier now. This has led to changes in egg-laying, nesting, and migration patterns. Birds in various landscapes are getting triggered by un-timely natural signals. Climate change has impacted the distribution and range of many bird species due to changes in their habitat. Water birds are greatly affected by oil pollution. According to reports, approximately 500,000 water birds are killed every year globally due to environmental issues. These environmental pollutants not just degrade the quality of their feathers, but are also fatal for the avian group. Birds in India are exposed to contaminants either through locally discharged or through trans-boundary movements of pollutants.



**Fig 1: Agricultural field beside sewage treatment plant**



**Fig 2: Sewage Treatment Plant\_1**



**Fig 3: Purple Swamphen**

Cauvery delta zone (CDZ) is a region of Tamil Nadu in Southern India. It is bounded by Bay of Bengal on the East and the Palk Strait on the South. The CDZ has a total geographical area of 14.47 lakh ha. It is one of the most biodiversity-rich areas in Southern India. The covered habitat is one of the most viable sites for many bird species. The types of birds found here are not only adapted to live in water or land but also in degraded habitats such as sewage treatment plants and pesticide-induced agricultural fields. The study site is one such degraded habitat (Sewage Treatment Plant) in which we have observed many species of birds that are surviving in that harsh environment in spite of the toxic nitrogenous wastes that are harmful to the birds but we have observed that certain facts have led the birds to reside and breed there. This is a very rare occurrence considering the avifauna that is currently present here. Usually there are two kinds of birds that are present in these kinds of degraded habitats; terrestrial birds such as Jerdon's Bush Lark, Blue-faced Malkoha, White Browed Wagtail, etc. and aquatic birds such as Black Tailed Godwit, Little Grebe, Eurasian Coot etc.



**Fig 4: Little Grebe**



**Fig 5: Black Tailed Godwit**



**Fig 6: Black Winged Stilt**

There is another very important phenomenon called migration which is an integral part of the avian life cycle where they move from one place to another for reproduction, shelter, and other resources. In our study site we have also come through such species (e.g. Wood Sandpiper, Little Stint, etc.) that migrate to the Indian subcontinent in winter. Other than winter migration there is another type of migration that is the summer or spring migrant birds (e.g. Grey Headed Lapwing, Little Ringed Plover etc.) which are found in the study site. The birds found here migrate from Europe, China, Japan, and other parts of the globe. Many migratory bird species as stated above, use this area as a resting site on their route. We have encountered various records of this kind. There can be many reasons for such behavior of the avian community in this kind of habitat which is not suitable for these species. The area is adjacent to an agricultural field which has a large amount of pesticide release that makes the life of organisms found here more miserable but the birds have figured out how to use these conditions for their advantage. Many resident birds (e.g. Asian Paradise Fly Catcher, Jacobin Cuckoo, Purple Swamphen, Greater Painted Snipe etc.) have started breeding in this degraded habitat.



**Fig 7: Jerdon's Bush Lark**



**Fig 8: Pheasant Tailed Jacana**

This area houses not only birds but also small mammals, livestock population, a handful of reptiles, and amphibians. There can be many probable reasons for the mammalian, avian, and other species to survive in this habitat. One of the major reasons can be the immense amount of food resources for the birds as the place is very less exploited by human and they can reside peacefully. After having conversations with the local people we have comprehended that the birds have been coming there for a long time but the numbers were less as compared to the present scenario. As they have become accustomed to the toxic materials their numbers started gradually increasing. Despite of being a dumping area of human trash and agricultural waste, the sewage treatment plant serves as an abode to hundreds of floral and faunal species. Though we human have always had a hard feeling towards wastes and its dump-yard, our feathered friends have made these areas their home and survival grounds. As these waste water treatment plants are constructed on the outskirts of human habitation, they are less disturbed and flourishes various life forms. Not much of studies have been carried out in these types of habitats, but given a chance, these habitats can prove to be an excellent environment for various lives to sustain.



**Fig 9: Lesser Whistling Duck**



**Fig 10: Little Grebe and Common Coot**



**Fig 11: Sewage Treatment Plant\_2**