

Impact on food chain due to the reduction in population of Indian House Sparrows

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ABSTRACT-- Due to various human activities including changes in the life style of human and overall industrial development have led to reduction of the population of the Indian house sparrows. As the environment is linked with one and other a natural ambiguity arises with respect to the impact caused in the food chain; sparrows occupy an indispensable role in the food chain, a sudden fall in the population of a particular species would definably affect the same. Thus, the study aims to identify the impact caused in the food chain due to the reduction in population of Indian house sparrows. The reduction in the population of Indian house sparrows can be traced only in current decade, so in order to trace the impact on food chain the awareness of individuals from different age groups are taken into account, as the targeted respondents are the witnesses for the fall above change. By virtue of simple random sampling with sample size of 1513, using correlation, chi-square and symmetric measures test, it was found out that due to reduction in population of Indian House sparrows there is an adverse impact is created on the food chain. Since there is a reduction in population of Indian house sparrows, it creates an impact over the plant life, the plants and crops such as grass, thorn, and weeds. There is a rapid increase in the population of insects and worms. The size of hawks and snakes has reduced. The study recommends that the government must carry out captive breeding process for protecting the Indian House sparrows

Key words--Indian house sparrows, food chain, population, ecosystem, impact

I. INTRODUCTION

The house sparrow under the zoology called as *Passer domesticus* is a bird of the sparrow family Passeridae, found in many parts of the world (Sivaperuman et al. 2008). A little bird, it has a run of the mill length of 16 cm and a mass of 24– 39.5 g ie 0.85– 1.39 oz (Johnsgard 2015). Females and youthful birds are hued pale dark colored and dim, and guys have more splendid dark, white, and darker markings. One of around 25 animal categories in the variety Passer, the house sparrow is local to the greater part of Europe, the Mediterranean Basin, and quite a bit of Asia (Rao et al. 2012). Its purposeful or incidental acquaintances with numerous districts, including parts of Australasia, Africa, and in the most parts of India, make it the most broadly dispersed wild bird. The sparrows that are mainly found in India are often addressed as Indian house sparrows (Bókony et al. 2007).

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The Indian house sparrow is unequivocally connected with human home, and can live in urban or rural settings(Belt 1888). Despite the fact that found in generally fluctuated living spaces and atmospheres, it regularly maintains a strategic distance from broad woodlands, grasslands, and deserts from human advancement(Markulak 2014). It nourishes for the most part on the seeds of grains and weeds, yet it is a shrewd eater and normally eats insects and numerous different small size organisms. Its predators incorporate household cats, falcons, owls, and numerous other ruthless birds and well evolved creatures(Markulak 2014; Cordero and Senar 1994).

On account of its numbers, pervasiveness, and relationship with human settlements, the house sparrow is socially conspicuous(Anon n.d.). It is broadly, and normally unsuccessfully, oppressed as an agrarian irritation. It has additionally regularly been kept as a pet, just as being a sustenance thing and an image of desire, sexual strength, normality, and obscenity. Despite the fact that it is broad and inexhaustible, its numbers have declined in a few regions(Wetmore et al. 1938). The creature's protection status is recorded as least worry on the IUCN Red List. The Indian house sparrow is an exceptionally social bird(Jordan 2016). It is gregarious amid all seasons when bolstering, frequently shaping rushes with different types of birds. It perches mutually, its homes are normally assembled together in clusters, and it participates in social exercises, for example, residue or water bathing and "social singing", in which birds assemble in bushes (de Melo et al. 2016). The house sparrow encourages for the most part on the ground, yet it rushes in trees and bushes(de Melo et al. 2016; Clements 2018). At sustaining stations and homes, female Indian house sparrows are prevailing notwithstanding their littler size, and they can battle about guys in the rearing season.

Sparrows for the most part incline toward seeds of millet, grass, thorn, weed and sunflower seed. Be that as it may, they likewise eat foods grown from the ground. Amid this procedure, sparrows spread seeds to places from the organic product tree. This is vital for germination of the seeds, in such a case that the seeds fall near the parent plant, they would need to go after nourishment with the develop plant(Neal Stewart & Jr. 2012; Ashraf et al. 2010). This would diminish the opportunity of germination of the seed just as development of the plant once the seed sprouted(Neal Stewart & Jr. 2012). By spreading seeds, sparrows help the survival of numerous plants that are the makers in an ecosystem(Ellenberg & German Appropriate Technology Exchange 1991).

They are essentially seed-eaters, sparrows likewise feed on little insects and worms, for example, caterpillars, creepy crawlies and aphids(Clements 2018; Stocker 2013; Maffei 2003). A portion of these animals devastate certain plants. Sparrows hold their populace under tight restraints; generally, the insects would have eaten certain plant species to annihilation. Here likewise sparrows assume an essential job in protecting the ecosystem(de Melo et al. 2016; Clements 2018; Stocker 2013; Maffei 2003).

Most birds of prey, for example, hawks and birds of prey, eat other littler birds. Snakes, which are likewise auxiliary shoppers, are known to eat sparrows. For instance, sharp-shinned birds of prey lean toward sparrows for nourishment.. Consequently by giving nourishment to the auxiliary purchasers, sparrows assume a critical job in their survival and in protecting the ecosystem(Rittner & McCabe 2009).

But in the present decade the population of sparrows has reduced rapidly in country, Human population is developing at a wild eyed pace. Therefore, advancement is going on excessively quick, and in way which doesn't take issues like biodiversity protection into thought, when (the development of) structures, townships and

improvement is attempted. The new structures and landscaped greenery enclosures which are being developed are not in the least sparrow amicable. The advanced glass-clad match box shape structures don't have holes which are vital for sparrows to make homes (Mauney 1986).

The way of life of individuals has additionally changed. Ladies never again sit outside their homes to clean grain or offer grain or chapatti, which was an everyday schedule quite a long time ago and this was a wellspring of food for sparrows (Mauney 1986; Huang et al. 2018).

As the living space and food is contracting, so are the quantities of Indian house sparrows. Subsequently, we need individuals to participate in the production of elective territories for Indian house sparrows by receiving home boxes and bird feeders. Mobile towers dotting the skyline of urban and rural areas are seen as plausible causes for decline of sparrows across the country (Mauney 1986; Huang et al. 2018; N'Diaye et al. 2018).

Thus, as discussed in the above paragraphs, The Indian house sparrows were once commonly found in India, but now due to various progressions and dynamics such as, human activities and changes in the life style of human, development of Industries and internet, the population of the Indian house sparrows have reduced rapidly. As the sparrows occupy an important role in the food chain, a sudden fall in the population may affect the food chain. Thus a natural ambiguity prevails with respect to the impact that is caused in the food chain due to the reduction in population of Indian house sparrows. This study aims in finding out the impact that is caused in the food chain due to rapid reduction in population of Indian house sparrows.

II. MATERIALS AND METHODS

The purpose of carrying out this study is to know the impact caused in the food chain due to rapid reduction in the population of Indian House sparrows. As the researcher intends to understand the Impact in Food chain and takes the role of Indian House Sparrows into account, the study is divided into 3 categories – impact over the plant life, impact on Insects and worms and impact on predators. This research is primarily based on public opinion and food chain because the population of these sparrows have reduced only in the current decade, hence general awareness of individuals from different age groups could help in the process of ascertaining the impact, because these targeted respondents have been the witnesses for the fall in the population of Indian house sparrows. The study includes both qualitative as well as quantitative method. Since analysing the role of sparrows in food chain under the study is needed, the study also includes analytic method. Present study is based on Primary as well as Secondary sources of data, which are as Primary Sources collected by collecting questionnaire from general public and Secondary Sources collected through literature of N.G.O. reports, Government Reports, Websites, Research Articles, Newspapers. The independent variable as age group and dependent variable namely, public opinion on presence of plants and crops such as grass, thorn, and weeds in the countryside as well as in the city, population of insects and worms. The study is carried out with the help of simple random sampling method, having 1513 sample size. where the 623 respondents are from the age group 18-25 years, 405 respondents are from age group 26 to 35 years 335 respondents are from age group 36 to 50 years and 150 respondents are from age groups 50 above. The statistical tools used for the purpose of deriving results are chi square analysis and correlation.

III. HYPOTHESIS

H₀ : There is no awareness among the public about the adverse impact in the food chain due to the reduction in population of Indian House Sparrows

H₁: There is awareness among the public about the adverse impact in the food chain due to the reduction in population of Indian House Sparrows

IV. CONCEPT ANALYSIS

Determining the Impact on the food chain

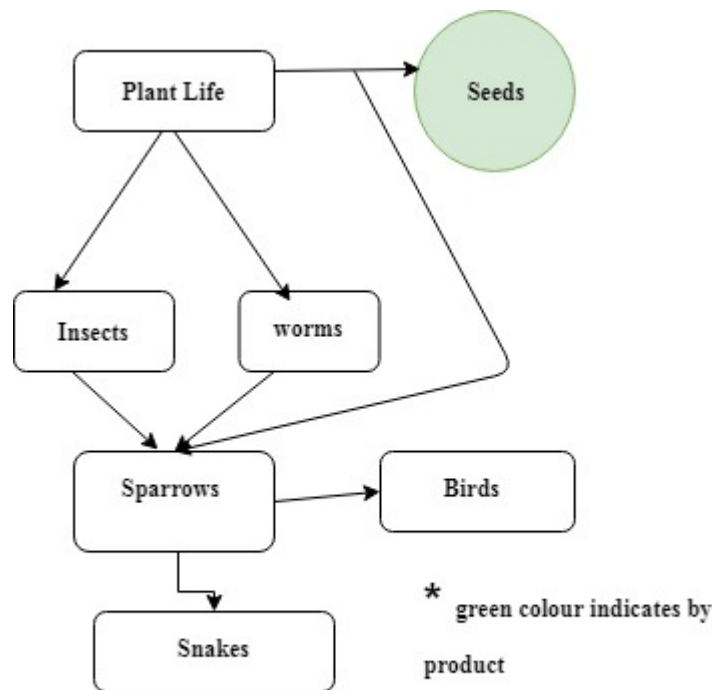


Figure 1:Sparrows in the food chain

For the purpose of this study, three levels of food chain where the sparrows are taken into account (as explained in figure 1). Public opinion is taken into account in order to understand the impact in the three levels of food chain, as only in the recent decade the population of sparrow is reduced the age factor of the respondents is taken into account because for the purpose of identifying the change or impact age is the scope. Hence using age the impact in three levels of food chain is studied.

V. RESULTS

Table 1:Public opinion on presence of plants and crops such as grass, thorn, and weeds in the countryside as well as in the city

Crosstab							
Count							
		Public opinion on presence of plants and crops such as grass, thorn, and weeds in the countryside as well as in the city					Total
		strongly disagree	disagree	neutral	agree	strongly agree	
AGE	18-25	99	262	61	113	88	623
	26-35	21	160	86	130	8	405
	36-50	3	137	42	97	56	335
	50 above	11	64	51	22	2	150
Total		134	623	240	362	154	1513

Table 2:Descriptive Statistics

	Mean	Std. Deviation	N
AGE	2.01	.883	1513
Public opinion on presence of plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower in the countryside as well as in the city	2.63	1.038	1513

		AGE	Public opinion on presence of plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower in the countryside as well as in the city
AGE	Pearson Correlation	1	-.258**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	1224.720	-372.137
	Covariance	.779	-.237

	N	1513	1513
Public opinion on presence of plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower in the country side as well as in the city	Pearson Correlation	-.258**	1
	Sig. (2-tailed)	.000	
	Sum of Squares and Cross-products	-372.137	1694.453
	Covariance	-.237	1.078
	N	1513	1513

Sparrows for the most part incline towards grass, thorn, and weeds. They are also responsible for the seed dispersion of these plants, sparrows help the survival of numerous plants that are the makers in an ecosystem. Since there is a reduction in population of Indian house sparrows, it creates an impact over the plant life, the plants and crops such as grass, thorn, and weeds that were found abundantly in the country side as well as in the city couldn't be found now. The people from older age group agree with respect to the statement plants and crops such as grass, thorn, and weeds could be seen or found abundantly but the younger generation responses state that plants and crops such as grass, thorn, and weeds could not be found or seen abundantly. Thus it could be stated that since, growth and presence of plants and crops such as grass, thorn, and weeds have been affected adversely.

Correlation of the age and public opinion ($r = -.258$), based on $n = 1513$ observations with pair wise non missing values. The correlations in the main diagonal are all equal to 1. This is because a variable is always perfectly correlated with itself. (If you have opted to flag significant correlations, SPSS will mark a 0.05 significance level with one asterisk (*) and a 0.01 significance level with two asterisks (0.01). The Pearson correlation coefficient for the awareness and the acceptance ($r = -.258$), which is significant ($p < .001$ for a two-tailed test), based on 1513 complete observations. Since the r value is negative it proves that the correlation is negative.

Table 4:Public opinion on population of insects and worms

		Public opinion on population of insects and worms					Total
		strongly agree	agree	neutral	disagree	strongly disagree	
AGE	18-25	152	193	117	78	83	623
	26-35	130	76	110	67	22	405
	36-50	73	84	123	25	30	335
	50 above	6	57	76	8	3	150
Total		298	410	426	241	138	1513

Table 5: Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	227.901 ^a	12	.062
Likelihood Ratio	229.665	12	.210
Linear-by-Linear Association	.002	1	.969
N of Valid Cases	1513		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.68.

Table 6 :Symmetric Measures

	Value	Asymptotic Standardized Error ^a	Approximate T ^b	Approximate Significance
Interval by Interval Pearson's R	.001	.023	.039	.969 ^c
Ordinal by Ordinal Spearman Correlation	.034	.025	1.335	.182 ^c
N of Valid Cases	1513			

Sparrows also feed on little insects and worms, for example, caterpillars, creepy crawlies and aphids. A portion of these animals devastate certain plants. Sparrows hold their populace under tight restraints; generally, the insects would have eaten certain plant species to annihilation. Since there is a rapid reduction in the population of sparrows, the population of insects and worms has increased. The people from older age and younger age group agree to the fact that the population of worms and insects have increased. Thus it could be stated that the population of worms and insects have increased have been affected favorably.

Pearson chi square 'Asymp Sig' value is 0.00 which value is less than 0.05, which proves that there is a relationship between independent and dependent variable. independent variable chosen is age group which is tested against the dependent variable Public Opinion . therefore from the analysis statistics the could infer that there is a conflicting opinion between the younger and the older generations

Table7: Public opinion the statement large and huge sizes of snake and hawks could be found in cities as well

Table 7 :Crosstab Count

Public opinion the statement large and huge sizes of snakes and hawks could be found normally in the city as	Total
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		well			
		yes	no	maybe	
AGE	18-25	227	228	168	623
	26-35	110	163	132	405
	36-50	135	170	30	335
	50 above	12	115	23	150
Total		484	676	353	1513

Table 8 :Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	141.224 ^a	6	.000
Likelihood Ratio	154.749	6	.000
Linear-by-Linear Association	.620	1	.431
N of Valid Cases	1513		

Most birds of prey, for example, hawks and birds of prey, eat other littler birds. Snakes, which are likewise auxiliary shoppers, are known to eat sparrows. However since these predators feed on other small preys also, their population is not adversely affected but their size is affected when compared to the past decade. The people from older age group agree with respect to the statement large and huge sizes of snakes and hawks could be found normally in the city as well but the younger generation responses state that large and huge sizes of snakes and hawks could not be found normally in the city as well. Thus it could be stated that size of predators are affected when compared to the past decade.

Pearson chi square value is 0.00 which value is less than 0.05, thus there is a relationship between the age group and their realization about the impact of house sparrows in food chain.

VI. DISCUSSION

The people from older age group agree with respect to the statement plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower could be found abundantly but the younger generation responses state that plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower could not be found abundantly. Hence it could be stated that, growth and presence of plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower have been affected adversely. The people from older age and younger age group agree to the fact that the population of worms and insects have increased. Thus it could be stated that the population of worms and insects have increased have been affected favorably. The people from older age group agree with respect to the statement large and huge sizes of snakes and hawks could be found normally in the city as well but the

younger generation responses state that large and huge sizes of snakes and hawks could not be found normally in the city as well. Thus it could be identified that size of predators are affected when compared to the past decade. Thus from these findings it could be stated that due to reduction in population of Indian House sparrows there is a adverse impact is created on the food chain.

The current study is influenced by ones or individual observational skills over the nature. Observation skills inform us about objects, events, attitudes and phenomena using one or more senses. Additionally, being able to observe and gather information about the world is important because it's the basis of communicating well. There are three main parameters based on which the above analysis is made and it includes, Public opinion on presence of plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower in the countryside as well as in the city, Public opinion on population of insects and worms and Public opinion the statement large and huge sizes of snake could be found in cities as well

When this study is compared with the case of hummingbird in Northern America, it could be stated that though the change in lifestyle affected the habitation of these birds, their way of nesting was mainly linked with the trees hence the impact was very less. Previous studies prove that since the ways of nesting and habitations of a hummingbird is different the plants and crops on which it feed is not affected. However the situation in the case of population of insects and worms and large and huge sizes of snake could be found in cities as well remains the same

Thus the study recommends that the government must take necessary actions for the purpose of protecting the Indian House sparrows which may include captive breeding. The Laws on construction and development of housing and industries must be amended on the basis on the protection of Indian House Sparrows.

VII. CONCLUSION

From the above analysis it could be understood that in the present scenario, due to the process of development and Industrialization the population of Indian House Sparrows have reduced rapidly. The study reveals that the people from older age group agree with respect to the statement plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower could be found abundantly but the younger generation responses state that plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower could not be found abundantly. Thus it could be stated that since, growth and presence of plants and crops such as millet, grass, thorn, weed chrysanthemum and sunflower have been affected adversely. The people from older age and younger age group agree to the fact that the population of worms and insects have increased. Thus it could be stated that the population of worms and insects have increased have been affected favorably. The people from older age group agree with respect to the statement large and huge sizes of snakes and hawks could be found normally in the city as well but the younger generation responses state that large and huge sizes of snakes and hawks could not be found normally in the city as well. Thus it could be stated that size of predators are affected when compared to the past decade. Thus from these findings it could be Concluded that due to reduction in population of Indian House sparrows there is a adverse impact is created on the food chain.

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