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Bird abundance and diversity in vicinity of urban-rural gradient in Khanewal, Punjab, Pakistan

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SUMMARY

For one year, the urban bird diversity of Khanewal, a heavily inhabited and significant agricultural area in Punjab, was studied. The current study was designed to analyze the rural and urban bird species of Khanewal. Shannon-wiener Index was recorded through MS Excel by formula. A total of 37 avian species were documented in rural and urban areas of District Khanewal. During study documented that avian diversity was higher in per-urban environments than in urban settings. According to the findings of this study, food, shelter, and nesting environments are the most important elements influencing avian diversity.

Keywords: Birds, Urban, Rural, District Khanewal

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INTRODUCTION

During the research no attention was given to the urban study along with other diversity studies until the mid-20th century (Altaf, 2010; Lugo, 2010; Kowarik, 2011; Perring *et al.*, 2013), while urban studies began after 1960s. Various studies have emerged in urban ecosystems (Wu, 2013; Altaf, 2016; Altaf *et al.*, 2018). Now a days, urban landscapes became a problem for researchers (Miller and Hobbs, 2002), cause of exponential growth of human, which has a bad effect on species of birds (Ashraf *et al.*, 2018). Residential landscapes are vary in original and fragmented (McKinney, 2002), native cultivated area (McNeill, 2001) as well as many native plants have changed by aliens plants (Umair and Ecology, 2020). Therefore, urban, agriculture and industries have changed the landscape. Although rural regions with plants and wetlands boost the biodiversity of certain taxa by offering feeding as well as breeding places, they can reduce the diversity of others (Blair, 1996).

Populations of bird species decrease in dense urban areas (Umair and Ecology, 2018; Ali *et al.*, 2020; Rahman, 2021). Various birds are affected differently by urbanization; few species are expanding while others are declining. Omnivore, herbivore, and insectivore bird species benefit from urbanization (Bashir *et al.*, 2018;

Bibi *et al.*, 2019), it is noted that birds (i.e. specialist) are more impacted due to residential areas (Emlen, 1974; Faulkner, 2004). Urbanization increases the availability of food for birds such as omnivores, insects, granivores, and nectivores receive nourishment from veggies, with native species outnumbering immigrants (Poague *et al.*, 2000), scavenger and herbivores obtain food from fallen waste (Shwartz *et al.*, 2008). Plant variety affects food resources; exotic plants have smaller amount pests i.e. insect than native plants, while lawns and gardens in urban have more "feeding" locations (Parsons *et al.*, 2006). Foragers and herbivores will benefit from these improvements. Previous studies have shown that urbanization has a greater harmful impact on specialized bird species. In reality, popular bird species are superior at colonization and dealing with urban and agricultural disturbances (Devictor *et al.*, 2008). Avian species are indicators of a high-quality surroundings (Khan *et al.*, 2021) and help identify areas of critical concern for landscape conservation (Myers *et al.*, 2000). Understanding the dangers and condition of birds in the urban context requires extensive research into urban ecosystems. As a result, the reason of this investigation is to know regarding the diversity of birds in urban areas of "district Khanewal".

MATERIALS AND METHOD

The information was gathered between April 2022 and February 2023. The data was taken monthly from Abdul Hakim, District Khanewal, Punjab, Pakistan, in the early morning and before the sun set (Figure 1).

STUDY AREA

Abdul Hakeem is a city in Pakistan's Punjab province, Tehsil Kabirwala, District Khanewal. The city lies 10 kilometres from Tulamba, 3 kilometres from the Ravi River, and 28 kilometres from Mian Channu (Figure 1).

CLIMATE

The city is located beside a river and riverine forest, with temperatures ranging from "1°C in winter" to "50°C in summer" (Malik, 2020).

METHODOLOGY

The avian species was noted utilizing both "direct" (i.e., "seen with naked eye" as well as "voices") and "indirect" (like body parts, photos, dead bodies, nests, as well as meetings with the local people) approaches. The "Birds of Pakistan" books were used to classify bird species (Roberts, 1997; Mirza and Wasiq, 2007; Altaf *et al.*, 2013).

STATISTICAL ANALYSIS

Shannon-wiener Index was recorded through MS Excel by formula (Weaver, 1963).

$$H' = - [\Sigma PI \text{ In } PI]$$

Where, H' = Diversity Index

FLORAL DIVERSITY

Plantation and/or agricultural land accounts for approximately “35%” of rural land, “20%” of semi-intensive urban land, and “1%” of intensive urban land. Rice, wheat, corn, sugarcane, and cow fodder are the principal crops. Herbs and shrub trees such as Beri, Bohr, Dharek, Jamun, Neem, Pupal, and Semal make up the natural flora.

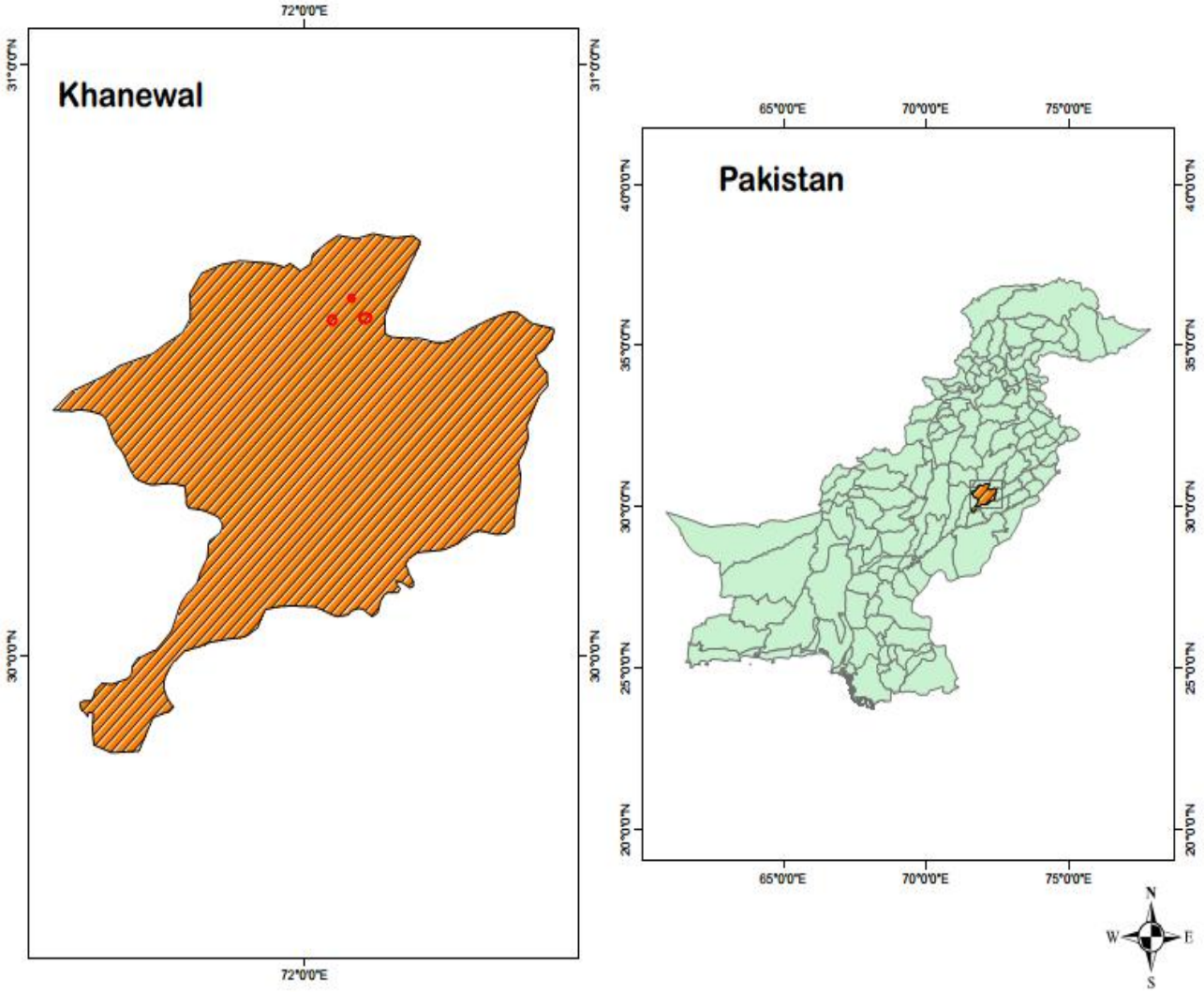

Figure 1: Map of study area.

RESULTS AND DISCUSSION

In this study, total of 37 species of bird are documented Khanewal, Punjab, Pakistan. Shannon-Wiener diversity index (i.e.1.242), were documented (Table 1). Iqbal *et al.* (2007) documented “74 species” of birds from “Lahore”.

During present study noted that common myna, cattle egret, black drongo, house crow, red vented bulbul, rock pigeon are most dominant birds of the study area (Figure 2).

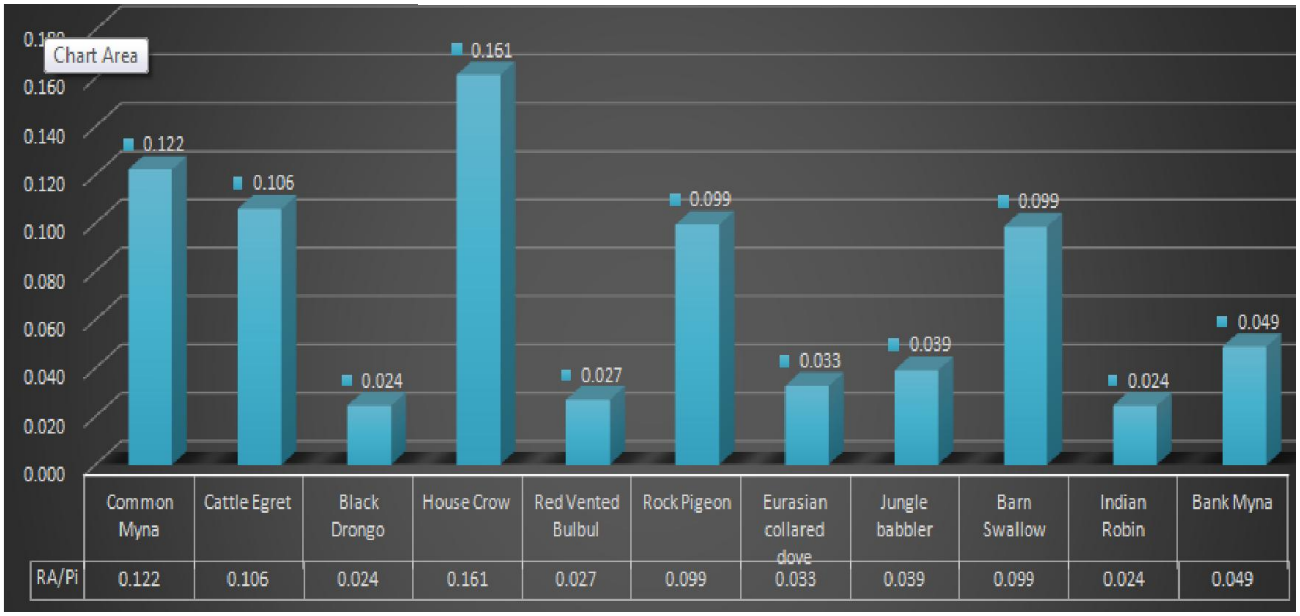

Figure 2: The most abundant avian species in urban areas of Khanewal.

The "feeding habitats" of bird's species (such as; 8 insectivore, 20 omnivore, 3 Piscivore, 4 Granivore and 5 carnivore) (Figure 3); while distribution (i.e. 3 summer breeder, 32 resident bird, 1 year round visitors as well as 1 winter visitor) (Figure 4). Researchers also discovered avian species in Azad Jammu and Kashmir, Khyber Pakhtunkhwa Punjab, and Sindh, Pakistan (Altaf *et al.*, 2012; Ali *et al.*, 2018; Ashraf *et al.*, 2018; Jadoon[1] *et al.*, 2019; Mughal *et al.*, 2020).

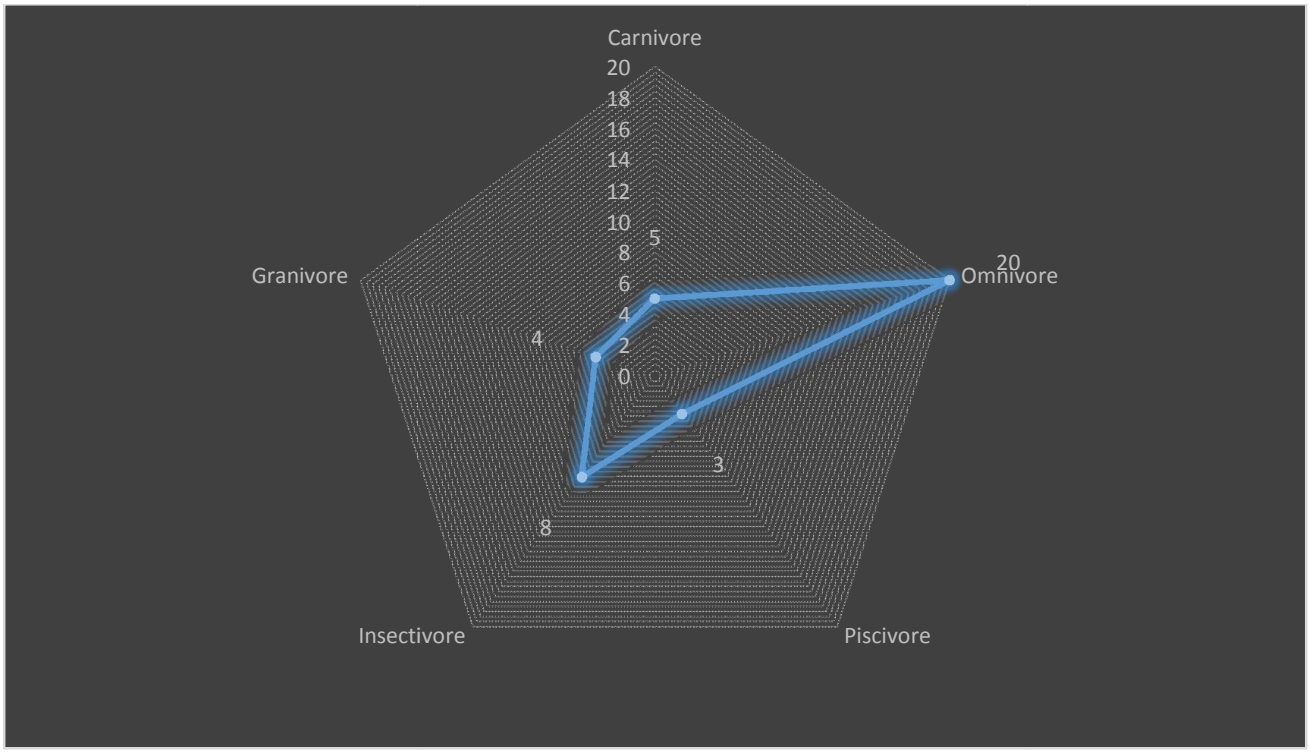

Figure 3: Feeding habits of avian species in urban landscapes of Khanewal.

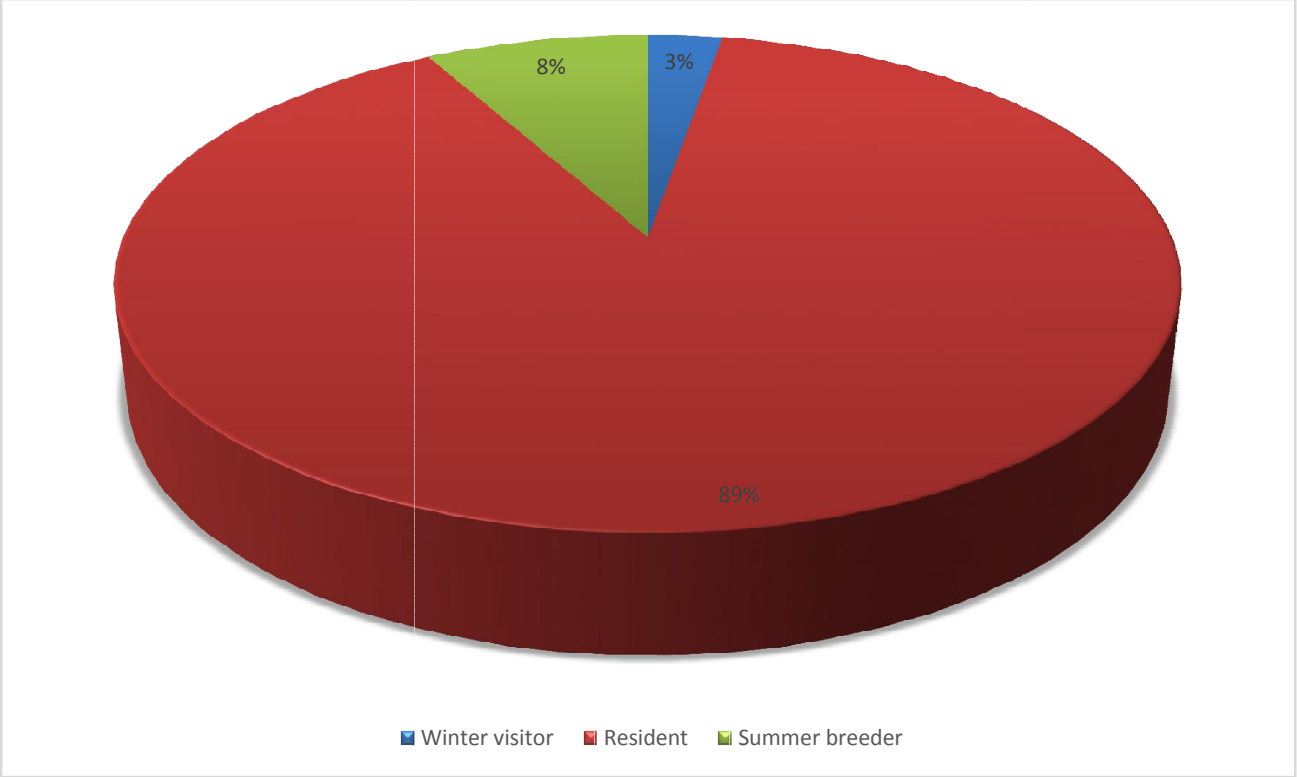

Figure 4: Distribution of birds in Khanewal.

Many species of birds like blue rock pigeon, mynas, common rock chat, Indian kite, doves, house crow, purple sunbird, and sparrows can be found in a variety of habitats, including rural, suburban, and intensive urban areas, as well as low and high traffics infrastructure. These species can also be found on "trees", "wires", "towers" and "flying" close to roadways. Crows build nests on tiny towers and trees, but black kites build nests at the highest points of the tallest structures. Common hoopoe and red-vented bulbul are noted in "urban" and "peri-urban habitats". Swifts and swallows are plentiful, as well as nests may be found beneath bridges near lakes, canals, and ponds. Ring-necked doves are commonly found at trees in suburban and rural regions. A common hoopoe may be spotted on the ground. Indian pond heron, barn swallow, bank myna, black-winged stilt, white-breasted waterhen, white-throated kingfisher, rufous treepie and common moorhen are observed in this area. These birds are present there due to presence of small ponds in this city and Ravi river also passing through this area. The "red-vented bulbul" is frequently observed on plants and builds nests on "trees" in human residential areas.

The "garbage" in residential areas contains foodstuff for "carnivorous" and "omnivorous" avifauna (Owusu Boadi and Kuitunen, 2002; Shwartz *et al.*, 2008). Our findings imply that "open habitat" with the presence of food for birds are a major factor in "avian dispersion". Intensive and semi-urban settings provide food and shelter, such as roofs (Ali *et al.*, 2018), little moist spots and dwellings spaces. The human being might be a main cause of the distribution or dispersal of avifauna that

eat plant foodstuff in residential habitats to keep away from human being (Altaf, 2021).

Table 1: Diversity of Birds in study area.

Common name Scientific Name	Feeding type	Status	Distribution	Total No	RA/Pi	LogPi	PiLogPi
Indian Roller *Coracias garrulus*	Carnivore	LC	R	2	0.0016	-2.79	0.00
Indian Grey Hornbill *Ocyceros birostris*	Omnivore	LC	R	2	0.0016	-2.79	0.00
Red Wattled Lapwing *Vanellus indica*	Insectivore	LC	R	28	0.0228	-1.64	-0.04
Common Myna *Acridotheres tristis*	Omnivore	LC	R	145	0.1182	-0.93	-0.11
Common moorhen *Gallinula chloropus*	Omnivore	LC	W	5	0.0041	-2.39	-0.01
Purple sunbird *Cinnyris asiaticus*	Omnivore	LC	S	14	0.0114	-1.94	-0.02
Cattle Egret *Bublcus ibis*	Piscivore	LC	R	130	0.1059	-0.97	-0.10
Brown rock chat *Cercomela fusca*	Carnivore	LC	R	25	0.0204	-1.69	-0.03
Pied Bushchat *Saxicola caprata*	Insectivore	LC	R	19	0.0155	-1.81	-0.03
Black Drongo *Dicrurus macrocercus*	Insectivore	LC	R	30	0.0244	-1.61	-0.04
House Crow *Corvus splendens*	Omnivore	LC	R	198	0.1614	-0.79	-0.13
Asian Koel *Eudynamys scolopacea*	Omnivore	LC	R	16	0.0130	-1.88	-0.02
Red Vented Bulbul *Pycnonotus cafer*	Omnivore	LC	R	33	0.0269	-1.57	-0.04
Indian Robin Saxicoloides fulicatus	Omnivore	LC	R	35	0.0285	-1.54	-0.04
House Sparrow *Passer domesticus*	Omnivore	LC	R	27	0.0220	-1.66	-0.04
Alexandrine parakeet *Psittacula eupatria*	Omnivore	LC	R	4	0.0033	-2.49	-0.01
Rock Pigeon *gallinula chloropus*	Granivore	LC	R	122	0.0994	-1.00	-0.10
Ashy prinia *Prinia socialis*	Granivore	LC	R	40	0.0326	-1.49	-0.05
Jungle babbler *Turdoides striata*	Insectivore	LC	R	48	0.0391	-1.41	-0.06
Greater coucal *Centropus sinensis*	Carnivore	LC	R	6	0.0049	-2.31	-0.01
Barn Swallow *Hirundo rustica*	Granivore	LC	S	122	0.0994	-1.00	-0.10
Pond Heron *Ardeola grayii*	Omnivore	LC	R	18	0.0147	-1.83	-0.03
Black-rumped flameback *Dinopium benghalense*	Omnivore	LC	R	26	0.0212	-1.67	-0.04
Common Hoopoe *Upupa epops*	Carnivore	LC	R	25	0.0204	-1.69	-0.03

Loughing Dove *Stigmatopella chinensis*	Granivore	LC	R	36	0.0293	-1.53	-0.04
Bank Myna *Acridotheres albocinctus*	Omnivore	LC	R	60	0.0489	-1.31	-0.06
Green Bee eater *Merops orientalis*	Insectivore	LC	R	7	0.0057	-2.24	-0.01
Rosy Starling *Pastor roseus*	Insectivore	LC	R	6	0.0049	-2.31	-0.01
Black-winged stilt *Himantopus himantopus*	Carnivore	LC	S	2	0.0016	-2.79	0.00
White-breasted waterhen *Amauromis phoenicurus*	Omnivore	LC	R	5	0.0041	-2.39	-0.01
White-throated Kingfisher *Halcyon smyrnensis*	Piscivore	LC	R	2	0.0016	-2.79	0.00
Grey Francolin *Francolinus pondicerianus*	Omnivore	LC	R	2	0.0016	-2.79	0.00
Short-eared Owl *Asio flammenus*	Omnivore	LC	R	9	0.0073	-2.13	-0.02
Black Kite *Milvus migrans*	Omnivore	LC	R	4	0.0033	-2.49	-0.01
Spotted Owl *Athene brama*	Omnivore	LC	R	3	0.0024	-2.61	-0.01
Rufous treepie Dendrocitta vagabunda	Omnivore	LC	R	2	0.0022	-2.78	-0.005
Total				1227	1.0000	-69.9	-1.24
Shannon-wiener Diversity Index (H')				1.24			

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