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BUTTERFLIES OF THE RICE RESEARCH STATION AND ADJOINING LOCALITY IN CHINSURAH, WEST BENGAL, INDIA

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Abstract: Chinsurah is a small town on the western bank of the Hugli River, a distributary of the river Ganges. A survey from November 2006 to June 2014 with photographic documentation on the butterfly community in Chinsurah revealed the presence of a total of 70 species representing 53 genera in five families; most dominant family was the Nymphalidae having 34.3% of the total species. Six species are legally protected; one species under Schedule I; three species under Schedule II; and two species under Schedule IV of the Indian Wildlife (Protection) Act, 1972. Rare species like *Pareronia avator* (Moore), *Mahathala ameria* (Hewitson) and *Melanitis zitenius* (Herbst) were recorded in this rapidly degrading habitat. This study may help in planning conservation strategies in urban areas and sustainable development as well.

Keywords: Butterfly diversity, Hooghly River, insect diversity, Lepidoptera, Lycaenidae, lower Gangetic plain, Nymphalidae, urban conservation.

The Rice Research Station (RRS), Chinsurah was established in 1932. Previously it was known as 'Chinsurah Farm'. It is the main RRS in West Bengal and the campus area is approximately one square km. This walled area is situated between the urban and rural habitations of Chinsurah, which lies about 40km north of Kolkata on the bank of Hugli River. The area between the river and the RRS is densely populated. The western

side of the RRS is surrounded by mango orchards and cultivated fields. There is no trace of forest in the entire area and the vegetation is composed of local weeds, shrubs and planted trees. According to agro-climatic zonation Chinsurah is part of the Gangetic alluvial zone with clay loam type of soil and is very fertile (Adhikari et al. 2011; Bhowmik et al. 2014). The entire habitat in this area is rapidly degrading due to extensive urbanization.

The butterflies are our most fascinating arthropod neighbors that act as an important indicator of climate change and environmental degradation. The biology of this group of insects is being studied since time immemorial (Kehimkar 2008). Apart from their ecological importance butterflies and large moths are considered flagship species to promote insect conservation and resource protection (New 2011). Therefore, natural history studies on butterflies are still essential for the maintenance of biological diversity and conservation purposes. The butterfly fauna of India consists of about 1,504 different species. Diversity of butterflies in West Bengal seems to be very high especially in the northern region as, 161 species have been recorded from the Neora Valley National Park (Sengupta et al.

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2014). On the other hand, only 76 butterfly species were recorded from the globally famous deltaic eco-region, the Indian Sundarbans, with poor abundance (Chowdhury 2014). Study areas in both the reports were away from urban areas. The recent worldwide trend of urbanization is causing habitat degradation, destruction and fragmentation (Bates et al. 2014). In another case, severe anthropogenic stress has been assumed to be the cause of lower butterfly species diversity in Oussudu lake area in southern India (Murugesan et al. 2013). Therefore to propagate the conservation in urban areas further studies are necessary. An attempt was made to study and document the butterfly species diversity in Chinurah, West Bengal, having both urban and rural habitation. The present study was centered on the Rice Research Station, Chinsurah and adjoining areas extending up to the western bank of the Hugli River.

MATERIALS AND METHODS

Study area

The RRS, Chinsurah is located 22°52'N & 88°24'E at an altitude of 8.62m (Bhowmick et al. 2014). The area marked with red lines on the map indicates the boundary of RRS, Chinsurah (Fig. 1). The entire eastern and the southern sides of the RRS are densely populated by human habitation. The other two sides are rural areas with mango orchards and cultivated lands. The roadsides in RRS or in the rural areas contain bushes of *Lantana* sp. and other weeds. Additional to that, there are some ponds and ditches of various sizes of which, the sides are covered with bushes of weeds. On the other hand, the roadsides of urban areas are almost clean or scantily covered with weeds. There are some vacant lands in the urban area that are densely covered with weeds. These weeds and some garden plants attract the butterflies in the urban area. The western bank of the Hugli River is the easternmost boundary of the study area and it supports a large array of weeds and plants that attract butterflies. The climate of the study area is tropical and humid. The temperature normally varies from 24–40 °C during summer and from 7–26 °C during winter. According to Bhowmick et al. (2014), the average normal annual rainfall measured in RRS is 1453.7mm of which, the maximum occurs during May–October.

Sampling and other methods

This study was carried out during November 2006 to May 2014. Surveys were carried out twice a month by random walking through roads and footpaths of different parts of the study area. Survey time was either from 07:00–13:00 hr or 15:00–18:00 hr. Butterflies



Figure 1. The study area marked with red lines indicates the RRS, Chinsurah. The white boxes are houses and the two curved lines are railway tracks. Inset - Base of the white arrow indicating location of the study area in India. (Maps downloaded from www.googleearth.org).

perched on the vegetation within 2m of either side of the walking line were observed and recorded. Butterflies were photographed and identified by comparing the characters of photographs with the published literature (Evans 1932; Haribal 1992; Kehimkar 2008) or web resources (Anonymous 2014; Saji & Pullatt 2014). No specimens were captured or harmed and thus identification of each and every specimen was based on photographs only. The data analysis was carried out using Microsoft Office Excel, 2007. The status of rarity of the observed species in India was determined following Kehimkar (2008) and Evans (1932).

RESULTS

The present study documented 70 species of butterfly from this small area of the lower Gangetic plain in West Bengal, India. The entire butterfly fauna represented 53 genera in 14 subfamilies and five families (Table 1). The family Nymphalidae appeared to be the most dominant with 34.3% of total species representing 14 genera and six subfamilies. The next species-rich family was Lycaenidae with 21.4% of total species representing three subfamilies (Table 1; Fig. 2). However, genera-wise the Lycaenidae was richer than Nymphalidae (Fig. 2). Hesperidae and Pieridae were represented by 18.6% and 15.7% of total species, respectively. The lowest species-rich family was Papilionidae with only 10.0% of total species representing four genera and one subfamily (Table 1; Fig. 2). A detailed checklist of the butterflies including different forms under species are presented in Table 2. The most important documentations were Pale Wanderer *Pareronia avator* (Moore), Falcate Oakblue *Mahathala ameria* (Hewitson), and Great Evening Brown

Table 1. Subfamily wise diversity of the butterflies of RRS, Chinsurah and adjoining area.

Family	Subfamily	Number of Genera	Number of Species
Hesperiidae	Coeliadinae	1	1
	Hesperiinae	11	12
Papilionidae	Papilioninae	4	7
Pieridae	Coliadinae	2	5
	Pierinae	6	6
Lycaenidae	Curetinae	1	1
	Theclinae	4	4
	Polyommatae	10	10
Nymphalidae	Danainae	3	4
	Satyrinae	4	8
	Heliconiinae	2	2
	Limnithinae	2	2
	Biblidinae	1	2
	Nymphalinae	2	6
Total: 5	14	53	70

Melanitis zitenius (Herbst) as the status of these species is rare in India (Evans 1932; Kehimkar 2008).

The ratio of species to genus was 1.32. Only the genus *Junonia* was represented by four species while, the genera, *Eurema*, *Melanitis*, *Mycalesis*, and *Graphium*, were represented by three species per genus. The genera *Pelopidus*, *Borobo*, *Papilio*, *Catopsilia*, *Danaus*, *Ariadne* and *Hypolimnas*, were represented by two species per genus and the remaining 41 out of 53 genera were represented by a single species each. The year wise species accumulation curve is slightly upwardly moving even after reaching the 6th year of the survey indicating scope for addition of a few species in the butterfly community of the present study area (Fig. 3). Among the butterflies enlisted in this survey, six species were legally protected under the Wildlife (Protection) Act, 1972 with the Wildlife (Protection) amendment Act 2002 (Anonymous 2003). Of these legally important species, one species was protected under Schedule I (Part-IV), three species under Schedule II and two species under Schedule IV (Table 3).

The representative photographs of each species recorded from the RRS, Chinsurah and adjoining areas are illustrated in Images 1–6. The members of the Family Hesperiidae are presented in Image 1, excepting Common Redeye *Matapa aria* (Moore). The most active and abundant member of the Family Papilionidae was the Lime Butterfly *Papilio demoleus* (Linnaeus) (Image 2j) and Common Mormon *Papilio polyets* (Linnaeus)

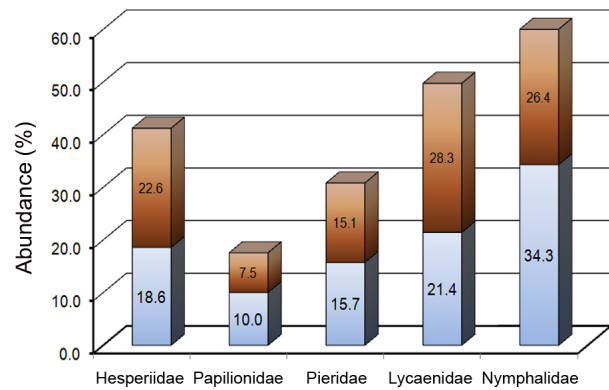


Figure 2. Abundance of the butterflies in and around RRS, Chinsurah. Species-wise (blue) and genus-wise (brown) abundance of butterflies under five families.

(Images 2f–i). The forms *cyrus* (Image 2f) and *stichius* (Images 2g–i) of female *Papilio polyets* (Linnaeus) were recorded from the entire study area. Three varieties in the form *stichius* were observed based on the number of white spots on the hind wing adjacent to cell and the apex of the cell. Two varieties were devoid of any white spot on the apex of the cell and the numbers of white spots adjacent to the cell were either 2 or 3 (Images 2g,h). The other variety was with white spots on the apex of the cell and four white spots adjacent to the cell (Image 2i). Both the forms *clytia* and *dissimilis* of Common Mime *Chilasa clytia* (Linnaeus) were recorded (Images 2d,e). The only one red bodied swallowtail observed here was the Common Rose *Atrophaneura aristolochiae* (Fabricius) (Image 2k).

The images 3d–j indicate that seven morphological forms or variations of the Common Emigrant *Catopsilia pomona* (Fabricius) were observed during the entire study period. The other two butterflies of family Pieridae, Mottled Emigrant *Catopsilia pyranthe* (Linnaeus) and the male of Striped Albatross *Appias libythea* (Fabricius) were represented by two different morphological forms (Image 3k,l & n,o). The Indian Sunbeam *Curetis thetis* (Drury), Falcate Oakblue *Mahathala ameria* (Hewitson) and Monkey Puzzle *Rathinda amor* (Fabricius) under family Lycaenidae were observed only once during the entire study period (Images 4a–c). Only three tiger butterflies were recorded in the survey such as, Plain Tiger *Danus chrysippus* (Linnaeus), Blue Tiger *Tirumala limniace* (Cramer) and Striped Tiger *Danaus genutia* (Cramer) (Images 5a–c). The only species, *H. misippus*, recorded from the study area which is protected under Schedule I (Part-IV) of the Indian Wildlife (Protection) Act, 1972 and subsequent amendments illustrated in image 6f.



Image 1. Butterflies representing the family Hesperidae in and around RRS, Chinsurah.

a - Brown Awl *B. exclamatoris* (Fabricius); b - Common Dartlet *O. golooides* (Moore); c - Plain Palm Dart *C. acalle* (Hopffer); d - Blank Swift *C. Kumara* (Moore); e - Conjoined Swift *P. conjuncta* (Herrich-Schaffer); f - Small Branded Swift *P. mathias* (Fabricius); g - Rice Swift *B. cinnara* (Wallace); h - Lesser Rice Swift *B. bevani* (Moore); i - Indian Palm Bob *S. gremius* (Fabricius); j - Tree Flitter *H. adrastus* (Stoll); k - Chestnut Bob *L. salsala* (Moore); l - Grass Demon *U. folus* (Cramer). © Somnath Mandal.

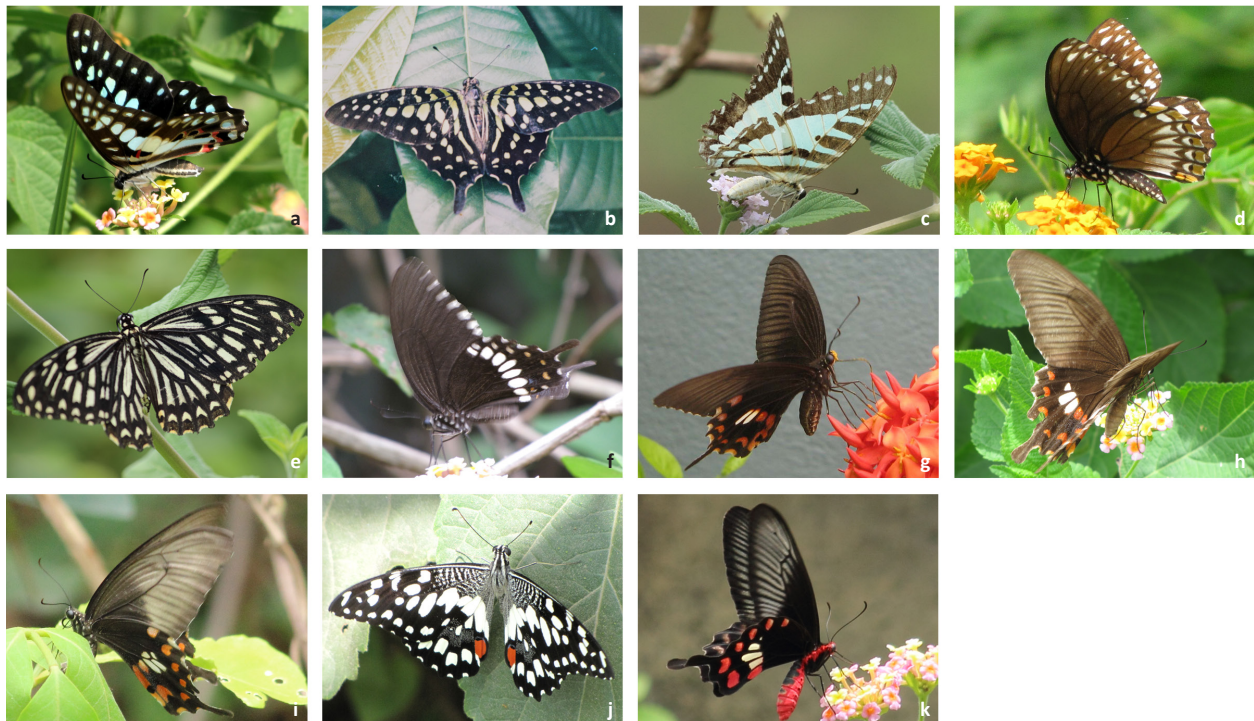


Image 2. Butterflies representing the family Papilionidae in and around RRS, Chinsurah.

a - Common Jay *G. doson* (C. & R. Felder); b - Tailed Jay *G. agamemnon* (Linnaeus); c - Spot Swordtail *G. nomius* (Esper); d - Common Mime *C. clytia* (Linnaeus) form: *clytia*, e - Common Mime *C. clytia* (Linnaeus) form: *dissimilis*; f - Common Mormon *P. polytes* (Linnaeus) form: *cyrus*; g-i - Common Mormon *P. polytes* (Linnaeus) form: *stichius*; j - Lime Butterfly *P. demoleus* (Linnaeus); k - Common Rose *P. aristolochiae* (Fabricius). © Somnath Mandal.

Table 2. Detailed checklist of the butterflies of RRS, Chinsurah and adjoining area.

	Scientific name	English name
Family: Hesperidae		
Subfamily: Coeliadinae		
1	<i>Badamia exclamationis</i> (Fabricius)	Brown Awl
Subfamily: Hesperinae		
2	<i>Oriens galoides</i> (Moore)	Common Dartlet
3	<i>Cephrenes acalle</i> (Hopffer)	Plain Palm-Dart
4	<i>Caltoris kumara</i> (Moore)	Blank Swift
5	<i>Pelopidas conjuncta</i> (Herrich-Schaffer)	Conjoined Swift
6	<i>Pelopidas mathias</i> (Fabricius)	Small Branded Swift
7	<i>Borbo cinnara</i> (Wallace)	Rice Swift
8	<i>Borbo bevani</i> (Moore)	Lesser Rice Swift
9	<i>Suastus gremius</i> (Fabricius)	Indian Palm Bob
10	<i>Hyarotis adrastus</i> (Stoll)	Tree Flitter
11	<i>Matapa aria</i> (Moore)	Common Redeye
12	<i>Lambrix salsala</i> (Moore)	Chestnut Bob
13	<i>Udaspes folus</i> (Cramer)	Grass Demon
Family: Papilionidae		
Subfamily: Papilioninae		
14	<i>Graphium doson</i> (C. & R. Felder)	Common Jay
15	<i>Graphium Agamemnon</i> (Linnaeus)	Tailed Jay
16	<i>Graphium nomius</i> (Esper)	Spot Swordtail
17	<i>Chilasa clytia</i> (Linnaeus) form: <i>clytia</i> & <i>dissimilis</i>	Common Mime
18	<i>Papilio polytes</i> (Linnaeus) form: <i>cyrus</i> & <i>stichius</i> only	Common Mormon
19	<i>Papilio demoleus</i> (Linnaeus)	Lime Butterfly
20	<i>Atrophaneura aristolochiae</i> (Fabricius)	Common Rose
Family: Pieridae		
Subfamily: Coliadinae		
21	<i>Eurema andersoni</i> (Moore)	One Spot Grass Yellow
22	<i>Eurema blanda</i> (Boisduval)	Three Spot Grass Yellow
23	<i>Eurema hecabe</i> (Linnaeus)	Common Grass Yellow
24	<i>Catopsilia Pomona</i> (Fabricius)	Common Emigrant
25	<i>Catopsilia pyranthe</i> (Linnaeus)	Mottled Emigrant
Subfamily: Pierinae		
26	<i>Pareronia avatar</i> (Moore)	Pale Wanderer
27	<i>Appias libythea</i> (Fabricius)	Striped Albatross
28	<i>Cepora nerissa</i> (Fabricius)	Common Gull
29	<i>Delias eucharis</i> (Drury)	Common Jezebel
30	<i>Leptosia nina</i> (Fabricius)	Psyche
31	<i>Belenois aurota</i> (Fabricius)	Pioneer
Family: Lycaenidae		
Subfamily: Curetinae		
32	<i>Curetis thetis</i> (Drury)	Indian Sunbeam
Subfamily: Theclinae		
33	<i>Mahathala ameria</i> (Hewitson)	Falcate Oakblue

	Scientific name	English name
34	<i>Rathinda amor</i> (Fabricius)	Monkey Puzzle
35	<i>Rapala manea</i> (Hewitson)	Slate Flash
36	<i>Spindasis vulcanus</i> (Fabricius)	Common Silverline
Subfamily: Polyommatae		
37	<i>Castalius rosimon</i> (Fabricius)	Common Pierrot
38	<i>Catochrysops Strabo</i> (Fabricius)	Forget-Me-Not
39	<i>Tarucus nara</i> (Kollar)	Rounded Pierrot
40	<i>Pseudozeeria maha</i> (Kollar)	Pale Grass Blue
41	<i>Zizeeria karsandra</i> (Moore)	Dark Grass Blue
42	<i>Zizina otis</i> (Fabricius)	Lesser Grass Blue
43	<i>Zizula hylax</i> (Fabricius)	Tiny Grass Blue
44	<i>Neopithecops zalmora</i> (Butler)	Quaker
45	<i>Euchrysops cnejus</i> (Fabricius)	Gram Blue
46	<i>Chilades lajus</i> (Stoll)	Lime Blue
Family: Nymphalidae		
Subfamily: Danainae		
47	<i>Tirumala limniace</i> (Cramer)	Blue Tiger
48	<i>Danaus genutia</i> (Cramer)	Striped Tiger
49	<i>Danaus chrysippus</i> (Linnaeus)	Plain Tiger
50	<i>Euploea core</i> (Cramer)	Common Crow
Subfamily: Satyrinae		
51	<i>Melanitis leda</i> (Linnaeus)	Common Evening Brown
52	<i>Melanitis phedima</i> (Cramer)	Dark Evening Brown
53	<i>Melanitis zitenius</i> (Herbst)	Great Evening Brown
54	<i>Elymnias hypermnestra</i> (Linnaeus)	Common Palmfly
55	<i>Mycalesis perseus</i> (Fabricius)	Common Bushbrown
56	<i>Mycalesis mineus</i> (Linnaeus)	Dark-Brand Bushbrown
57	<i>Mycalesis visala</i> (Moore)	Long-Brand Bushbrown
58	<i>Ypthima huebneri</i> (Kirby)	Common Fourring
Subfamily: Heliconiinae		
59	<i>Acraea violae</i> (Fabricius)	Tawny Coster
60	<i>Phalanta phalantha</i> (Drury)	Common Leopard
Subfamily: Limenitinae		
61	<i>Moduja procris</i> (Cramer)	Commander
62	<i>Euthalia aconthea</i> (Cramer)	Common Baron
Subfamily: Biblidinae		
63	<i>Ariadne ariadne</i> (Linnaeus)	Angled Castor
64	<i>Ariadne merione</i> (Cramer)	Common Castor
Subfamily: Nymphalinae		
65	<i>Junonia orithiya</i> (Linnaeus)	Blue Pansy
66	<i>Junonia atlites</i> (Linnaeus)	Grey Pansy
67	<i>Junonia almana</i> (Linnaeus)	Peacock Pansy
68	<i>Junonia lemonias</i> (Linnaeus)	Lemon Pansy
69	<i>Hypolimnas bolina</i> (Linnaeus)	Great Eggfly
70	<i>Hypolimnas misippus</i> (Linnaeus)	Danaid Eggfly



Image 3. Butterflies representing the family Pieridae in and around RRS, Chinsurah.

a - One Spot Grass Yellow *E. andersoni* (Moore); b - Three Spot Grass Yellow *E. blanda* (boisduval); c - Common Grass Yellow *E. hecabe* (Linnaeus); d-j - Common Emigrant *C. pomona* (Fabricius); k&l - Mottled Emigrant *C. pyranthe* (Linnaeus); m - Pale Wanderer *P. avatar* (Moore); n&o - Striped Albatross *A. libythea* (Fabricius) male; p - Striped Albatross *A. libythea* (Fabricius) female; q - Common Gull *C. nerissa* (Fabricius); r - Common Jezebel *D. eucharis* (Drury); s - Psyche *L. nina* (Fabricius); t - Pioneer *B. aurota* (Fabricius). © Somnath Mandal.

DISCUSSION

The species diversity of butterfly in Chinsurah seems to be comparable with Sundarban Biosphere Reserve, West Bengal, India (Chowdhuri 2014). Although the habitat in the present study area is different, about 59 species appeared to be similar with the Sundarban Biosphere Reserve. Predominance of the family Nymphalidae with respect to species diversity in the present study area is in good correlation with Neora Valley National Park in West

Bengal (Sengupta et al. 2014) as well as other regions in India starting from Himalayan landscape (Singh 2009, 2012; Kunte et al. 2012) through central India (Palot & Soniya 2003; Chandrakar et al. 2007; Singh 2010; Tiple 2011, 2012) to Western Ghats (Mathew & Rahamathulla 1993; Kunte 1997; Kunte et al. 1999; Arun 2002; Eswaran & Pramod 2005; Kumar et al. 2007; Dolia et al. 2008) and southern India (Ramesh et al. 2010; Murugessan 2013).

The number of genera representing Lycaenidae

Table 3. The butterflies of RRS, Chinsurah and adjoining area protected under various schedules of Wildlife (Protection) Act, 1972.

Schedule	Family	Scientific name	Common name
I	Nymphalidae	<i>Hypolimnas misippus</i> (Linnaeus)	Danaid Eggfly
II	Lycaenidae	<i>Euchrysops cnejus</i> (Fabricius)	Gram Blue
	Lycaenidae	<i>Mahathala ameria</i> (Hewitson)	Falcate Oakblue
	Nymphalidae	<i>Melanitis zitenius</i> (Herbst)	Great Evening Brown
IV	Hesperiidae	<i>Hyarotis adrastus</i> (Stoll)	Tree Flitter
	Pieridae	<i>Appias libythea</i> (Fabricius)	Striped Albatross

was more than Nymphalidae and other families. The inherent reason may be the single species per genus distribution of all the members representing the family. Furthermore, six genera, namely, *Danaus*, *Melanitis*, *Mycalesis*, *Ariadne*, *Junonia* and *Hypolimnas* under the Family Nymphalidae were represented by more than one species that reduced the number of representative genera. Recording of seven morphological forms in the species *C. Pomona* (Fabricius) is consistent with published literatures (Haribal 1992; Kehimkar 2008).

Observation of 70 butterfly species including three rare species in an urbanized area seems to be encouraging for conservation purposes. The species accumulation curve indicates scope for the addition of some new species upon further sampling in this rapidly degrading habitat. Very low species to genus ratio indicates the presence of strong intra-generic competition (Elton 1946). Additional to that, six species in the study area are legally protected under Schedule I, II and IV of the Wildlife (Protection) Act, 1972 with the Wildlife (Protection) amendment Act 2002 (Anonymous 2003). Reports on butterfly diversity from other habitats in the vicinity of human habitation like the Tropical Forest Research Institute campus in Madhya Pradesh and Ossudu Lake area in Puducherry and Tamil Nadu also indicate the presence of rich butterfly diversity (Tiple 2012; Murugesan et al. 2013). Very poor abundance of butterflies excepting one common tiger butterfly, two very common swallowtail butterflies and two emigrants, in the present study area may be due to the increasing destruction of larval food plants. The conservation scenario in urban areas may be improved by preserving the weeds and shrubs in unused pieces of land. Creation of vacant lands by demolishing old and abandoned structures could offer space for preserving declining species as well as restoration of ecosystem

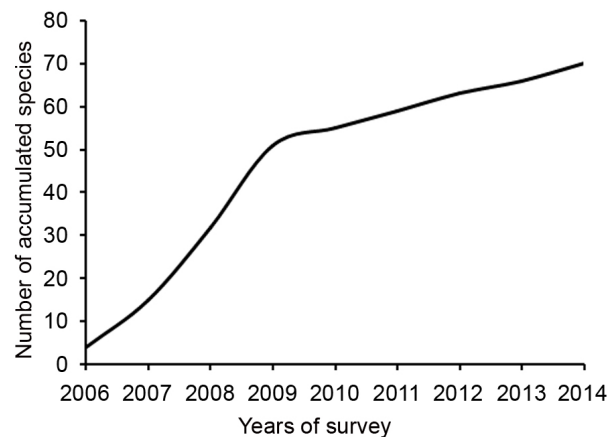


Figure 3. Species accumulation curve of the butterflies in and around RRS, Chinsurah.

functions and food production in urban areas (Gardiner et al. 2013). Conservation of these important pollinators is essential for sustainable development. Designing suitable methodology for conservation in urbanized areas involving local people is awaiting further research.

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Image 4. Butterflies representing the family Lycaenidae in and around RRS; Chinsurah.

a - Indian Sunbeam *C. thetis* (Drury); b - Falcate Oakblue *M. ameria* (Hewitson); c - Monkey Puzzle *R. amor* (Fabricius); d - Slate Flash *R. manea* (Hewitson); e - Common Silverline *S. vulcanus* (Fabricius); f - Common Pierrot *C. rosimum* (Fabricius); g - Forget-Me-Not *C. Strabo* (Fabricius); h - Rounded Pierrot *T. nara* (Kollar); i - Pale Grass Blue *P. maha* (Kollar); j - Dark Grass Blue *Z. karsandra* (Moore); k - Lesser Grass Blue *Z. otis* (Fabricius); l - Tiny Grass Blue *Z. hylax* (Fabricius); m - Quaker *N. zalmora* (Butler); n - Gram Blue *E. cnejus* (Fabricius); o - Lime Blue *C. lajus* (Stoll). © Somnath Mandal.

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Image 5. Butterflies representing the family Nymphalidae in and around RRS; Chinsurah.

a - Blue Tiger *T. limniace* (Cramer); b - Striped Tiger *D. genutia* (Cramer); c - Plain Tiger *D. chrysippus* (Linnaeus); d - Common Crow *E. core* (Cramer); e - Common Evening Brown *M. leda* (Linnaeus); f - Dark Evening Brown *M. phedima* (Cramer); g - Great Evening Brown *M. zitenius* (Herbst); h - Common Palmfly *E. hypermnestra* (Linnaeus) male; i - Common Palmfly *E. hypermnestra* (Linnaeus) female; j - Common Bushbrown *M. perseus* (Fabricius); k - Dark-Brand Bushbrown *M. mineus* (Linnaeus); l - Long Brand Bushbrown *M. visala* (Moore); m - Common Furring *Y. hubeneri* (Kirby); n - Tawny Coster *A. violae* (Fabricius); o - Common Leopard *P. phalantha* (Drury); p - Commander *M. procris* (Cramer); q - Common Baron *E. aconthea* (Cramer); r - Angled Castor *A. ariadne* (Linnaeus); s - Common Castor *A. merione* (Cramer); t - Blue Pansy *J. orithiya* (Linnaeus). © Somnath Mandal.

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Image 6. Butterflies representing the family Nymphalidae in and around RRS, Chinsurah.

a - Grey Pansy *J. athletes* (Linnaeus); b - Peacock Pansy *J. almana* (Linnaeus); c - Lemon Pansy *J. lemonias* (Linnaeus); d - Great Eggfly *H. bolina* (Linnaeus) female; e - Great Eggfly *H. bolina* (Linnaeus) male; f - Danaid Eggfly *H. misippus* (Linnaeus). © Somnath Mandal.

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