



DIVERSITY OF FISH AND INSECT FAUNA OF 'SIDZII' A HILL STREAM, MANIPUR

¹Jiten Singh Soram, & ²Sunita Gurumayum and ³SantoshKumar Singh Abujam

¹Dept. of Zoology, Asufii Christian Institute, Mao, Senapati District, Manipur-795150

²Dept. of Botany, Asufii Christian Institute, Mao, Senapati District, Manipur-795150

³Dept. of Zoology, Gurukul Junior College, Dibrugarh, Assam-786003

ABSTRACT

The present investigation was carried out for a period of one year (August 2011 to September 2012) in the hill stream 'Sidzii' of Manipur. The study was randomly surveyed in different site of this stream. During the survey period, a total of 21 fish species belonging 9 family and 13 genera were recorded from this hill stream. Cyprinidae were found to be the most dominant family followed by Balitoridae, Channidae and Sisoridae. Altogether 18 aquatic insect species belonging to 18 families and 11 orders were recorded in the aforesaid stream. The results reveal that the Sidzii stream is in healthy condition as well as there is no sign of water pollution.

KEYWORDS: Fish diversity, Aquatic insect, Sidzii, Manipur.

INTRODUCTION

Manipur despite its relatively small land area of 22,327 km² is blessed with exceptionally high diversity of flora and fauna. This had earned the state recognition together with Indo-Myanmar as an area having one of the richest biodiversity in the world and is known as a biodiversity hotspot. The region lies between longitude 93.20^oE – 94.47^oE and latitude 23.50^oN-25.4^oN and of which 91.75% is hill and 8.29% valley. The state receives 131cm rainfall per year and has an altitude of 50-3,300 m above the sea level. The state is drained by two major river systems; the Barak and Chindwin-Irrawady drainage systems. Thus the state has both Assamese and Burmese elements (Hora & Mukherji, 1935).

Sidzii stream is the biggest hill streams in the Mao, a sub-division of Senapati District, Manipur. The stream is called Cheherii by local Mao community. The stream originates from the Barail Range called Pforphe (25°29'30.66"N 94°08'04.72"E, 1460 meter above mean sea level), the highest point on Imphal-Dimapur NH no. 39 located between Mao and Tadubi of Senapati district, Manipur. The stream is perennial and has a length of about 37 km upto the point where it joins Szüü River (which originating from the Japfü Hills located about 15 km south of Kigewema village of Kohima District inhabited by Angami people) at Chakhabina below Kijimetouma of Japfü peak and become Doyang, the largest and longest river of Nagaland. The Doyang drainage system receives many tributaries from Zunheboto, Wokha and Mokokchung before flowing into Assam and join to the mighty Brahmaputra river of Assam.

As far as North-eastern India is concerned, particularly Manipur, there are very limited work done on the hill streams with respect to the fish fauna and insect diversity. Among them Nath & Dey (1997, 2000), Bagra *et al.* (2009) reviewed the fish fauna in Arunachal Pradesh; Choudhury *et al.* (2011a & b) also investigated certain physico-chemical parameters and fish diversity of

Namdapha river in Arunachal Pradesh. Singh, *et al.*, (2009) also have reported 160 species of fish in both valley and hill streams of Manipur. On the other hand, there are also a few works on insect diversity recorded from the Manipur. Vartharanjan (2005) has also reported on the aquatic arthropods as a bioresources and Kiranbala & Gupta (2009) listed 5 species belonging to the order Hemiptera and 3 species belonging to the Odonata from the Phumdi of Loktak Lake. Recently, Tourangbam *et al.* (2012) have also reported 51 different edible insects from the state. These macro aquatic insects are very much helpful in assessing the streams and rivers as their densities depend on the purity of water. Among the various groups of aquatic insects of those belonging to the order Hemiptera are important as fish food, bio indicators, predators and bio control agents. The stomach examinations of small stream fishes have shown a high percentage content of mayfly larvae (Needham *et al.*, 1903). This suggests that the stream food webs around the globe are typically dominated by these aquatic insects. Similarly, an appreciable number of mayflies belonging to the order Odonata larvae, ephemerids can also be collected from the pure running streams. They are very sensitive to even negligible quantity of toxic chemicals present in the water (Vartharanjan, 2005). In certain cultures, these insects are also consumed by fish species as food (Das & Gupta, 2010). Therefore, based on the importance of aquatic insect with respect to the purity of water and as well as fish, the present study has been aimed to record diversity of fish and insect fauna of the Sidzii stream of Mao, Manipur.

MATERIALS AND METHODS

The stream was surveyed and fixed a spot as sampling site (25°29'36.97"N 94 °10'44.39"E, 1193 meter above mean sea level) throughout during the study time which was carried out from August 2011 to September 2012. Sampling was done every month. Fishes were caught by

using drag net, hooks and lines and preserved in 5% formalin solution. Identification was also carried simultaneously with the help of standard keys of Jayaram Talwar & Jhingran (1991) and Vishwanath (2007). The evaluation of abundance and status of the recorded fishes were carried out as per CAMP report (1998). Aquatic insects were caught and collected by using aquatic net and preserved in 5% formalin solution for identification. The insects were identified up to the lowest possible taxa with the help of available literature of Khan & Ghosh (2001), Mitra (2006), Subramanian & Sivaramakrishna (2007) and Thirumalai (2007).

Morphology of the study area

The bank of the Sidzii stream during the survey period was U-shaped with mean stream width of 13.8 m, while width at water level was 3.7m during dry months. The maximum depth recorded was 4.3 m with an average of 2.1 m. The substrate was almost exclusively made up of boulders of varying sizes packed with cobble and pebbles. The sand deposited on the bank was very shallow.

RESULT AND DISCUSSION

During the study period a total of 21 fish species were recorded from the sampling site (Table-1). Among them Cyprinidae (38.1%) were found to be the most dominant family followed by Balitoridae (14.29%), Channidae (14.29%) and Sisoridae (9.52%).

TABLE 1: Fish species abundance in Sidzii hill stream

Scientific name	Abundance	Conservation status (CAMP-Report)
Family: Cyprinidae		
1. <i>Danio naganensis</i> (Ham-Buch)	+	VU
2. <i>Esomus danricus</i> (Ham-Buch)	+++	LR-lc
3. <i>Parluciosoma daniconius</i> (Ham)	+++	LR-nt
4. <i>Puntius manipurensis</i> (Menon, Rema & Vishwanath)	+	NE
5. <i>P. sophore</i> (Ham-Buch)	+++	LR-nt
6. <i>P. ticto</i> (Ham-Buch)	+++	LR-nt
7. <i>Garra kempfi</i> (Hora)	++	VU
8. <i>G. naganensis</i> (Hora)	+	VU
Family: Psilorhynchidae		
9. <i>Psilorhynchoides homaloptera</i> (Hora & Mukherji)	+	VU
Family: Balitoridae		
10. <i>Schistura manipurensis</i> (Chaudhury)	+	VU
11. <i>S. naganensis</i> (Menon)	+	EN
12. <i>S. sikmaiensis</i> (Hora)	+	EN
Family: Cobitidae		
13. <i>Acantophthalmus pangia</i> (Ham-Buch)	++	NE
Family: Sisoridae		
14. <i>Glyptothorax manipurensis</i> (Menon)	++	NE
15. <i>G. trilineatus</i> (Blyth)	++	NE
Family: Mastacembelidae		
16. <i>Macrognathus morenhensis</i> (Arunkumar & Tombi)	++	NE
Family: Chandidae		
17. <i>Chanda nama</i> (Ham-Buch)	++	NE
Family: Gobiidae		
18. <i>Glossogobius giuris</i> (Ham-Buch)	+	LR-nt
Family: Channidae		
19. <i>Channa punctatus</i> (Bloch)	++	LR-nt
20. <i>C. orientalis</i> (Bloch & Schneider)	++	VU
21. <i>C. stewartii</i> (Playfair)	++	NE

Legend: + = Rare; ++ = Occasional; +++ = Common, EN= Endangered; VU = Vulnerable; LR-nt = Lower Risk near threatened; LR-lc = Lower Risk least concerned; NE = Not evaluated

Pasilorhynchidae, Cobitidae, Mastacembelidae, Chandidae and Gobiidae families had the least abundances with 4.76% each. As far as abundance of the species is concerned, certain species like, *Puntius sophore*, *Puntius ticto*, *Esomus danricus* and *Parluciosoma daniconius* were mostly common and recorded during study period (Fig. 1). While some species such as *Garra kempfi*, *Acantophthalmus pangia*, *Glyptothorax manipurensis*, *Glyptothorax trilineatus*, *Macrognathus morenhensis*, *Chanda nama*, *Channa punctatus*, *Channa orientalis* and *Channa stewartii* were found occasionally. Species like

Danio naganensis, *Puntius manipurensis*, *Garra naganensis*, *Psilorhynchoides homaloptera*, *Schistura manipurensis*, *Schistura naganensis*, *Schistura sikmaiensis* and *Glossogobius giuris* were rare and showed some degree of seasonality. Again, as per CAMP(1998) report, two species viz. *Schistura naganensis* and *Schistura sekmaiensis* are enlisted as (EN) endangered while six other species viz. *Danio naganensis*, *Garra kempfi*, *Garra naganensis*, *Schistura manipurensis*, *Channa orientalis* were enlisted as (VU) vulnerable category and five species were in lower risk (LR-nt) near threatened; one species

was in lower risk least concerned (LR-lc) and the rest of the species have not been evaluated yet. During the study period, aquatic insects of 19 different species were also recorded belonging 18 families and to 11 orders (Table-2). Out of recorded species, 6 species were of the order

Hemiptera, 3 species of order Odonata, 2 each of order Coleoptera, Orthoptera and Dictyoptera; 1 species each of order Ephemeroptera, Placoptera, Dermaptera, Diptera and Tricoptera. *Teloganodes sp.* and *Gerris sp.* were the most abundant species recorded (Fig. 2).

PLATE –I

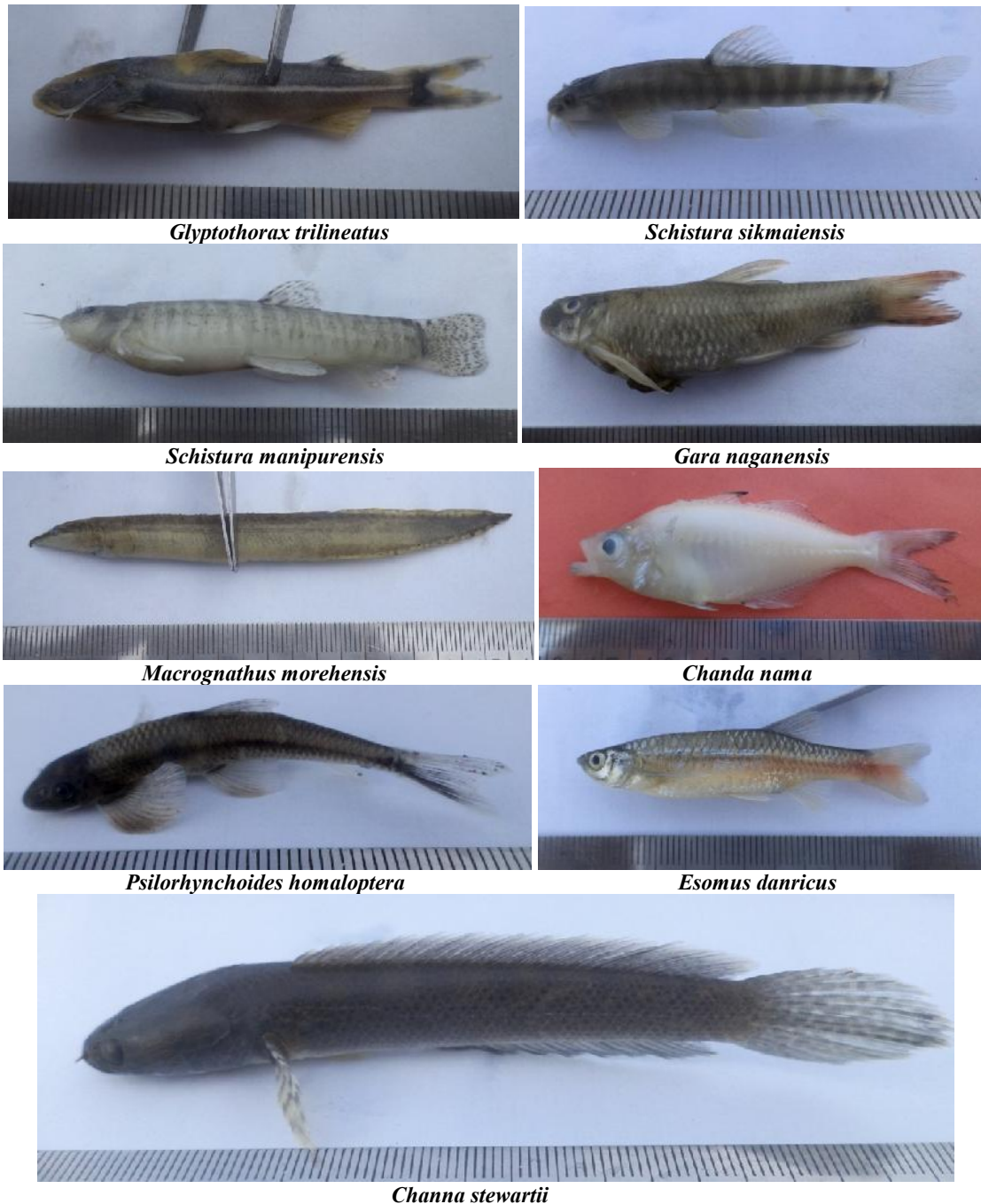


FIGURE 1: Certain ornamental fish species of Sidzii hill stream

The availability of diverse forms of stream fishes can directly be correlated to the diverse forms of aquatic insects, either the adult or larval forms, because many of the recorded aquatic insects are a major source of food for fishes. Thus, food availability affects the distribution of fish in streams and aquatic bodies. The water boatman,

larval forms of mayfly, stonefly, caddisfly and many others are the good food source for fishes. Stream organisms generally have short life cycles that last only one day or so. Since life cycles are short the reproductive rate leads to be very high (Juneja, 2002).

TABLE 2: Aquatic insects recorded (Class Insecta) in Sidzii hill stream

Diversity of fish and insect fauna of Manipur

Order	Family	Genus	Common name
Odonata	Cordulegasteridae	<i>Cordulegaster sp.</i>	Dragon fly
	Coenagrinoidea	<i>Argia sp.</i>	Damse fly
	Lebelluidae	<i>Sympetrum sp.</i>	Dragon fly
Ephemeroptera	Ephemerellidae	<i>Teloganodes sp.</i>	May fly
Plecoptera	Perlidae	<i>Neoperla sp.</i>	Stone fly
Hemiptera	Corixidae	<i>Corixa sp.</i>	Water boatman
	Notonectidae	<i>Notonecta sp.</i>	Backswimmers
	Gerridae	<i>Gerris sp.</i>	Water strider
	Nepidae	<i>Nepa sp.</i>	Water scorpion
	Nepidae	<i>Ranatra sp.</i>	Water scorpion
Orthoptera	Gryllidae	<i>Gryllus sp.</i>	Cricket
	Acrididae	<i>Grasshopper sp.</i>	Grass hopper
Coleopteran	Dytiscidae	<i>Cybister sp.</i>	Diving beetle
	Dytiscidae	<i>Laccophilus sp.</i>	Diving beetle
Dictyoptera	Blattidae	<i>Blatta sp.</i>	Water cockroach
	Mantidae	<i>Mantis sp.</i>	Praying mantis
Dermaptera	Forficulidae	<i>Forficula sp.</i>	Earwig
Diptera	Syrphidae	<i>Eristalis sp.</i>	Rat tailed maggot
Trichoptera	Limnaphilidae	<i>Limnephilus sp.</i>	Caddisfly

PLATE –II





Eristalis sp. (Rat tailed Maggot) *Telogonodes sp. (Mayfly)* *Cybister sp. (Diving Beetle)*

FIGURE 2: Certain aquatic insects of Sidzii hill stream

On the other hand among the recorded insects, many of them are biological indicators of streams and water bodies. Because some insects like, mayfly, stonefly, caddisfly, water striders cannot tolerate the slightest toxic substances present in the stream water. They are also usually present in an area where DO is high with swift flow of stream riffles. Some other insects like dragonfly, damselfly and diving beetles amongst the recorded insects can live in a wide range of water conditions. On the other hand streams with reduced forest cover exhibit decline in overall abundance of aquatic biota and subsequent increased in sediment tolerant and invasive species (Sutherland *et al.* 2002).

CONCLUSION

As a whole the present study can be concluded from the biological view point that the Sidzii streams of Mao, Manipur is still in healthy condition as well as there is no sign of any kind of water pollution caused. But still, there is an urgent need for intensive study to monitor and sum up the correct stream health and condition of the biodiversity rich hill stream so that the correct methods for conservation and restoration of the same is enabled.

REFERENCES

Bagra K., Kadu, K., Sharma, K. N., Laskar, B. A., Sarkar, U. K. and Das, D. N. (2009) Ichthyological survey and review of the checklist of fish fauna of Arunachal Pradesh, India. *Check List*, 5(2): 330–350.

CAMP (1998) Report on the workshop on Conservation Assessment and Management Plans (CAMP) for Freshwater Fishes of India, organized by Zoo outreach and NBFGR, 21-26 September, 156p.

Choudhury, A. G., Abujam, S. K. S., Biswas, S. P. and Gupta, A. (2011a) Investigation on certain limnological parameters of Namdapha river in Arunachal Pradesh. *Geobios*, 38:91-95.

Choudhury, A. G., Abujam, S. K. S., Gupta, A. and Biswas, S. P. (2010b) On certain aspects of fish diversity in Namdapha National Park, Arunachal Pradesh. *Bulletin of Life Science*, 18:109-117.

Das, K. and Gupta, S. (2010) Aquatic Hemiptera community of Agricultural fields and rain pools in Cachar District, Assam, NE India, *Biological and Environmental Sciences*, 5(1): 123-128.

Hora, S. L. & Mukherji, D. D. (1935) Fishes of Naga Hills, Assam. *Records of Indian Museum*. 37: 381-404.

Juneja, K.. (2002) Ecology: Anmol publication, 431 p, ISBN: 8126111623.

Khan, R. A. and Ghosh, L. K. (2001) Faunal diversity of aquatic insects in freshwater wetlands of South Eastern West Bengal. *Z. S. I. Kolkata*. 104 p.

Kiranbala T. and Gupta, S. (2011) Distribution of aquatic insects in phumdis (floating island) of Loktak Lake, Manipur, northeastern India, *JoTT*, 3(6): 1856–1861

Mitra, T. R. (2006) *Handbook on common Indian Dragonflies* (Insecta: Odonata) *Zool. Surv. India*. 136p.

Needham, J. G., Davis, K. C., Johannsen, O. A., MacGillivray, A. D. (1903) Aquatic insects in New York state; a study conducted at the entomologic field station, Ithaca, N. Y. under the direction of Ephraim Porter Felt. Publication info: Albany, University of the state of New York, 1903. Contributed by: Cornell University Library.

Nath, P. and Dey, S. C. (1997) Fish and Fisheries of Northeastern India. Vol. I: Arunachal Pradesh, 140 p.

Nath, P. and Dey, S. C. (2000) Conservation for Fish Germplasm resources of Arunachal Pradesh, p. 49-67. In: Ponniah, A.G. and UK Sarkar (Eds). *Fish Biodiversity of Northeast India*. NATP Publ. No. 32, NBFGR, Lucknow, 228 p.

Singh, E. J., Singh, N. K. Sh. and Singh N. R. (2009): Biodiversity conservation and natural resources in North East India – with special reference to Manipur. *NeBIO*, 1(1): 42-47.

Subramaniam K. A. and Sivaramakrishnan K. G. (2007) Aquatic insects of India: A Field Guide. Ashoka Trust for Research in Ecology and Environment (ATREE), Bangalore.

Sutherland, D. G., Ball, M. H., Hilton, S. J. and Lisle, T. E. (2002) Evolution of a landslide-induced sediment wave in the Navarro River, California, *GSA Bulletin*, 114(8): 1036-1048.

Diversity of fish and insect fauna of Manipur

Tourangbam, Sh., Rajkumari, L., Gourshyam, Th. and Bharat, G. S. (2012) Medicinal and edible insects of Manipur Insect. *India Bioinformation*, 8(10): 489-491

Talwar, P. K. and Jhingran, A. G. K. (1991) *Inland Fishes of India and Adjacent Countries*. Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.

Thirumalai, G. (2007) A Synoptic List of *Nepomorpha* (Hemiptera: Heteroptera) From India. *Rec. Zoo. Surv. India. Occ. Paper*, 273: 1-84.

Varatharanjan, R. (2005) Aquatic Arthropods as a Bio-Resource. NASFAB.

Vishwanath, W., Lakra, W. S. and Sarkar, U. K. (2007) Fishes of North East India. National Bureau of Fish Genetic Resources, Lucknow, 264 p.