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FAUNAL COMPOSITION AND ABUNDANCE IN TEMPORARY AQUATIC HABITATS OF SOUTHWESTERN ETHIOPIA

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ABSTRACT: The study was conducted in a small rural village called Waktolla, within Jimma Zone of Oromia National Regional State, where there were burrow pits of various sorts. The objective of the study was to make an inventory data on the diversity of aquatic animals on these least studied habitats. A scoop net with a mesh size of 1 mm was used to sweep the water for a length of 1 m. A total of 19,678 aquatic animals were sampled from 79 burrow pits during the two peak rainy months, August and September, 2011. The only vertebrate representatives, tadpoles of order Anura comprised only 8.1% of the total faunal collection and the rest was comprised by invertebrates (91.9%). Insects and nematomorphs were found to be the most (59.1%) and the least (0.3%) abundant invertebrates, respectively. The organisms in Class Insecta were grouped into 7 Orders (which except Order Collembola could be further identified to families): Orders Diptera (12), Ephemeroptera (2), Hemiptera (11), Coleoptera (4), Odonata (2), and, Lepidoptera (1), with dipterans and collembolans being the most (36.9%) and the least (0.4%) abundant insects, respectively. Invertebrates in subphylum Crustacea were classified into Class Ostracoda, and Orders Cladocera and Cyclopoida, which except Ostracodas were identified into two and a single family, respectively. The most and least abundant crustaceans were cladocerans (71%) and cyclopoids (0.1%), respectively. Class Gastropoda was also identified into 2 families, but the remaining animals in Orders Araneae and Anura, Class Oligochaeta, Phyla Nematoda and Nematomorpha could not be identified to successive lower taxa. It is anticipated that as such type of inventory work continues in different water bodies of Ethiopia, catalogues and keys of aquatic invertebrates of the country will be developed.

Key words/phrases: Abundance, Aquatic fauna, Burrow pits, Composition, Taxa.

INTRODUCTION

Aquatic systems can be classified into a number of water types with respect to the extent of drying they experience. At one extreme are permanent waters and at the other are temporary waters that differ in many abiotic and biotic factors (Johansson and Suhling, 2004).

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Temporary ponds represent an extreme environment for aquatic organisms (Mahoney *et al*., 1990). They may be considered as habitats with harsh abiotic conditions, the dry period obviously being the factor limiting the distribution of most freshwater organisms (Brönmark and Hansson, 2005). These ponds do not seem to contain many species as there are too many predators (Foss and Dearborn, 2002) and changing environmental conditions.

Temporary waters are found throughout the world, and although there are considerable regional differences in their type and method of formation, they have many physical, chemical and biological properties in common. They are bodies of water that experience a recurrent dry phase of varying length that is sometimes predictable in its onset and duration. Based on this, they are subdivided into two basic types: intermittent temporary waters which contain water in a recognizably cyclical pattern and episodic temporary waters which are water-filled on a more or less unpredictable manner (Williams, 1997).

Intermittent temporary waters are essentially closed waters with influents largely from precipitation and runoff (Wetzel, 2001). They can range from few centilitres of water that support rich communities of microorganisms, a few insects and occasional anuran tadpoles in phytotolemata, i.e., aquatic habitats residing on or in terrestrial plants (Eisenberg *et al*., 2000), to proper ponds ranging in area up to several square kilometres as in large playas (Wilbur, 1997).

Organisms adapted to temporary waters are few but are a consistent and predictable assemblage (Wetzel, 2001). Aquatic fauna that live in temporary waters are remarkably diverse and invertebrates constitute the largest share and the usual vertebrate representatives are tadpoles (Dodds, 2002). Among invertebrates the majority are drawn from 11 orders of the arthropod class Insecta (Hynes, 1984).

In orders with incomplete metamorphosis (Ephemeroptera, Odonata, Plecoptera, Hemiptera and Collembola), growth and development occur in an immature larval stage, frequently termed a nymph or naiad. The remaining six aquatic orders (Megaloptera, Trichoptera, Neuroptera, Coleoptera, Lepidoptera and Diptera) have complete metamorphosis where the larval stage includes both growth and development, but in the non-feeding pupal stage only development occurs (Butler, 1984; Ward, 1992). In addition to insects, aquatic fauna includes invertebrates from Subphylum Crustacea, Phylum Rotifera, Class Arachnida, Phylum Nematoda, Phylum Nematomorpha, Phylum Mollusca and others (Barnes, 1974).

Although aquatic invertebrates are an integral part of aquatic food webs, and in some cases important in terrestrial food webs by breaking down material from primary producers and consuming materials such as fungus, dead animals, and bacteria so as to make energy and nutrients available to other invertebrates and fish (Bouchard, 2004), neglect of invertebrate, especially aquatic invertebrate research, is a universal phenomenon in general and, in Ethiopia, research on aquatic invertebrates is almost non-existent or at its infancy being limited to only a few records of zooplankton and benthic invertebrates in the rift valley lakes (Seyoum Mengistou, 2006).

This study had endeavoured to provide preliminary basic information on the faunal composition and abundance of intermittent temporary fresh water aquatic habitats found in southwestern Ethiopia.

MATERIALS AND METHODS

Description of the study area

The sampling sites were burrow pits formed when people nearby dug to extract mud for their house construction (Eyob Chukalo, 2011). They are found in Waktolla village, Omo Nada district, within Jimma Zone of Oromia National Regional State, 303 km away from Addis Ababa in southwestern part of Ethiopia and located astride a major road linking the southwest zone of Jimma to Addis Ababa (Koch and McCann, 2010). Jimma town is the capital and administrative centre of the zone, located 335 km away from Addis Ababa (ESA, 2006).

It is within these geographic location and altitudes that Jimma valley bottom wetlands, dominated by marshes and swamps, are found. With regard to vegetation, the zone is one of the areas in the country where high tropical rainforest remnant is found. In Jimma Zone, rainfall varies between 1,200 and 2,400 mm per annum. The heaviest rainfall distribution is in February-March and July-September. The average maximum and minimum temperature of the zone is 28.8°C and 11.8°C, respectively. The average elevation of Waktola is about 1,775 m (Hayal Desta and Seyoum Mengistou, 2009).

Site selection, characterization, sample collection, labeling and preservation

A total of 79 different burrow pits were selected arbitrarily, numbered, photographed and the coordinates of the burrow pits were taken by Global Positioning System (GPS). A scoop net of mesh size 1 mm was swept for 1 m length, being totally submerged during the entire sweep (DiFranco, 2006). The number of sweep nets taken varied from 1 to 5, and in exceptionally big and water rich burrow pit, 10 nets were taken from different parts of the pond and pooled into the buckets. It was then filtered by finer net of mesh size 0.4 mm and collected into plastic cups with labels inside and 95–96% of alcohol was added for preservation.

Sample clearing, sorting, data collection and analysis

In the Limnology laboratory of Addis Ababa University, the samples were cleared from muds, debris, algae, and plant parts, and sorted into different taxa using the white pans, forceps, petri dishes and sorting trays (Stoker *et al.*, 1972) and identified by using hand lens, dissecting microscope, and the appropriate identification keys (Veronne, 1962; Durand and Lévêque, 1980; Fernando, 1981; Defaye, 1988; Largen and Spawls, 2000; Largen, 2001; Fernando, 2002; Bouchard, 2004). Eggs were not counted. Since the taxonomic hierarchy for taxa varies from author to author, the taxonomical rendering was based on Pechenik (1996) to be consistent. The total number of organisms in the sample were counted. The data were analyzed by using Ms-excel (2007).

RESULTS AND DISCUSSION

A total of 19,678 faunal organisms were collected (Table 1). The dominance of invertebrates goes in line with their dominant universal abundance (Dodds, 2002).

Table 1. The composition, abundance, and occurrence of vertebrates in the burrow pits and sampling months.

Faunal composition	Total abundance	Composition	In the burrow pits	In August	In September	In both months	In total samples
Vertebrate	1,586	8.1%	77(97.5%)	76(96.2%)	59(74.7%)	58(75.3%)	135(85.4%)
Invertebrate	1,8092	91.9%	79(100%)	79(100%)	79(100%)	79(100%)	79(100%)

Vertebrates

Vertebrates were solely represented by an amphibian Order Anura. All the vertebrates collected were the aquatic larval stages called tadpoles (Largen and Spawls, 2000; Largen, 2001). Besides the abundance of potential invertebrate prey, their relative low abundance is due to their being mainly herbivorous in contrast to the adult forms which are carnivorous (Stoker *et al.*, 1972; Largen and Spawls, 2000).

Invertebrates

Invertebrates were represented by seven taxa that are at or above Order level (Table 2). Though in general, the diversity of aquatic insects is lower in temporary than in permanent waters, insects constituted the largest abundance among the invertebrate faunal assemblage (Williams, 1996) which is in line with the fact that insects are the most dominant invertebrates globally (Barnes, 1974). The last four taxa could not be further identified into successive lower taxa and they were represented only by 461 individuals (2.5% of the total invertebrates).

The lowest abundance of spiders could be due to their association with vegetation but the lowest abundance of nematodes, oligochaetes, and nematomorphs could be related to their association with benthic habitats of the burrow pits (Bouchard, 2004).

Table 2. The composition, abundance, and occurrence of invertebrates in the burrow pits and sampling months in the order of their decreasing abundance.

Invertebrate	Total abundance	Composition	In the burrow pits	In August	In September	In both months	In total samples
Class Insecta	10,692	59.1%	79(100%)	76(96.2%)	77(97.5%)	74(93.7%)	153(96.8%)
Sub phylum Crustacea	5,231	28.9%	71(89.8%)	59(74.7%)	46(58.2%)	42(59.1%)	105(66.5%)
Class Gastropoda (Snails)	1,708	9.4%	65(82.5%)	48(60.8%)	59(74.7%)	42(64.6%)	107(67.7%)
Order Aranea (Spiders)	236	1.3%	65(82.5%)	39(49.4%)	59(74.7%)	33(50.8%)	98(62%)
Phylum Nematoda (Round worms)	89	0.5%	28(35.4%)	16(20.2%)	18(22.8%)	6(21.4%)	34(21.5%)
Class Oligochaeta (Earth worms)	87	0.5%	25(31.2%)	14(17.7%)	18(22.8%)	7(28%)	32(20.2%)
Phylum Nematomorpha (Horsehair worms)	49	0.3%	23(29.1%)	8(10.1%)	18(22.8%)	2(8.7%)	26(16.5%)

A. Insects

Insects were constituted by 7 orders (Table 3). The foremost abundance of dipterans is in line with their universal abundance (Bouchard, 2012) and the second most abundance of ephemeropterans is related with their being herbivorous and the plenty of food found in the burrow pits (Hynes, 1984).

Lepidopterans and collembolans were represented only by 189 individuals (1.8% of insects) which could be related with their adults being mainly terrestrial (Hynes, 1984; Bouchard, 2012) and the paucity of larval foems in aquatic burrows.

Megalopterans and neuropterans were not found in the faunal assemblage as they are mainly terrestrial, and the absence of plecopterans and trichopterans could be attributed to the fact that they mainly live in rivers and streams (Butler, 1984).

Table 3. The composition, abundance, and occurrence of orders of insects in the burrow pits and sampling months in the order of their decreasing abundance.

Insecta	**Total abundance**	**Composition**	**In the burrow pits**	**In August**	**In September**	**In both months**	**In total samples**
Diptera	3,950	36.9%	79(100%)	76(96.2%)	76(96.2%)	73(92.4%)	152(96.2%)
Ephemeroptera	2,506	23.4%	71(89.9%)	57(72.5%)	62(78.5%)	50(70.4%)	119(75.3%)
Hemiptera	1,848	17.3%	75(94.9%)	71(89.9%)	73(92.4%)	69(92%)	144(91.1%)
Coleoptera	1,159	10.8%	78(98.7%)	67(84.8%)	74(93.7%)	63(80.7%)	141(89.2%)
Odonata	1,040	9.7%	67(84.8%)	49(62%)	62(78.5%)	44(65.7%)	111(70.2%)
Lepidoptera	146	1.4%	41(51.9%)	26(32.9%)	31(39.2%)	16(39%)	57(36.1%)
Collembola	43	0.4%	20(25.3%)	3(3.8%)	18(22.8%)	1(5%)	21(13.3%)

i. Dipterans (True flies)

Order Diptera was represented by 12 families (Table 4). Only larvae were found as the adults of all the dipterans are terrestrial (Hynes, 1984). Mosquitoes were the first most dominant dipterans (59.6%) as they can abundantly inhabit water bodies that are temporary, small, shallow, turbid and close to human dwellings (Stoker *et al.*, 1972; Yemane Ye-Ebiyo *et al.*, 2003a). In addition, the new agroecology of the area formed by the cultivation of a hybrid maize (BH660) synchronizes extension of tasseling time of the maize with the peak larval development period. The pollen contributed to microbial abundance which results in increased larval nourishment. In various studies, in close proximity to flowering maize, larval development was little affected by water turbidity and larval crowding; larvae develop to the pupal stage more rapidly, more frequently, and produce larger adults. Adult mosquitoes that fed on maize pollen as larvae are larger and live longer (Service, 1971; Yemane Ye-Ebiyo *et al.*, 2000; 2003a; Adugna Woyessa *et al.*, 2004; Asnakew Kebede *et al.*, 2005; Yemane Ye-Ebiyo *et al.*, 2003b; Mutuku *et al.*, 2006).

Chironomids were the second most abundant dipterans (36.2%) which is in line with their being bottom dwellers and the fact that a great variety of microhabitats can be found there, each one suited to particular modes of life, and the great quantity and variety of food present (Stoker *et al.*, 1972; Hynes, 1984; Pinder, 1986).

The remaining ten families were represented only by 169 individuals (4.3% of the total dipterans) which could be related to their being outcompeted by the two dominant families (Ward, 1992).

Table 4. The composition, abundance, and occurrence of dipterans in the burrow pits and sampling months.

Dipteran families	Total abundance	Composition	In the burrow pits	In August	In September	In both months	In total samples
Culicidae (Mosquitoes)	2,356	59.6%	76(96.2%)	66(83.5)%	68(86.1%)	58(73.4%)	134(84.8%)
Chironomidae (Non-biting midges)	1,428	36.2%	77(97.5%)	70(88.6%)	73(92.4%)	66(83.5%)	143(90.5%)
Psychodidae (Moth flies)	56	1.4%	27(34.2%)	11(13.9%)	14(17.7%)	6(22.2%)	25(15.8%)
Ceratopogonidae (Biting midges)	25	0.6%	17(21.5%)	9(11.4%)	10(12.7%)	2(11.8%)	19(12%)
Muscidae (House flies)	22	0.6%	16(20.2%)	4(5.1%)	14(17.7%)	2(12.5%)	18(11.4%)
Stratiomytidae (Soldier flies)	21	0.5%	13(16.5%)	8(10.1%)	8(10.1%)	3(23.1%)	16(10.1%)
Sciomyzidae (Snail killing flies/Marsh flies)	16	0.4%	10(12.7%)	2(2.5%)	9(11.4%)	1(10%)	11(7%)
Ptychopteridae (Phantom crane flies)	9	0.2%	2(2.5%)	1(1.3%)	1(1.3%)	0	2(1.3%)
Tipulidae (Crane flies)	7	0.2%	5(6.3%)	4(5.1%)	1(1.3%)	0	5(3.2%)
Tabanidae (Horse flies/Deer flies)	5	0.1%	5(6.3%)	1(1.3%)	4(5.1%)	0	5(3.2%)
Ephydridae (Shore flies)	5	0.1%	5(6.3%)	3(3.8%)	2(2.5%)	0	5(3.2%)
Syrphidae (Rat-tailed maggots/Flower flies)	3	0.1%	3(3.8%)	3(3.8%)	0	0	3(1.9%)

ii. Ephemeropterans (Mayflies)

Order Ephemeroptera was represented by 2 families (Table 5). Only nypmphs of ephemeropterans were collected as they are semi-aquatic (Ward, 1992) but adults are terrestrial - they disperse and mate on land which is usually brief and reproductive.

Table 5. The composition, abundance, and occurrence of ephemeropterans in the burrow pits and sampling months in the order of their decreasing abundance.

Ephemeropteran families	Total abundance	Composition	In the burrow pits	In August	In September	In both months	In total samples
Caenidae (Small square-gill mayflies)	1385	55.3%	60(75.9%)	50(63.3%)	42(53.2%)	32(53.2%)	92(58.2%)
Baetidae (Small minnow mayflies)	1121	44.7%	62(78.5%)	40(50.6%)	55(69.6%)	33(53.2%)	95(60.1%)

iii. Hemipterans (True bugs)

Order Hemiptera was represented by 11 families (Table 6). Both the nymphs and adults of hemipterans were found since both are aquatic - they live and mate in the water (Hynes, 1984; Ward, 1992). The dominant abundance of notonectids is due to their predatory feeding type and the abundance of their prey mosquitoes (Amelework Tesfaye, 2008; Fischer *et al*., 2012). The last three families were represented by 56 individuals only (3% of the dipterans) which could be related with their association with vegetation (Bouchard, 2012).

Table 6. The composition, abundance, and occurrence of hemipterans in the burrow pits and sampling months.

Hemipteran families	Total abundance	Composition	In the burrow pits	In August	In September	In both months	In total samples
Notonectidae (Backswimmers)	669	36.2%	55(69.6%)	40(50.6)	48(60.8%)	33(60%)	88(55.7%)
Corixidae (Water boatmen)	279	15.1%	56(70.9%)	34(43%)	47(59.5%)	26(46.4%)	81(51.3%)
Mesovelidae (Water treaders)	276	14.9%	43(54.4%)	30(38%)	35(44.3%)	22(51.2%)	65(41.1%)
Saldidae (Shore bugs)	251	13.6%	59(74.7%)	32(40.5%)	50(63.3%)	24(40.7%)	82(51.9%)
Velidae (Broad-shouldered water striders)	148	8%	51(64.6%)	21(26.6%)	42(53.2%)	12(23.5%)	63(39.9%)
Hydrometridae (Marsh treaders)	65	3.5%	28(35.4%)	17(21.5%)	15(19%)	4(14.3%)	32(20.2%)
Nauchoridae (Creeping water bugs)	55	3%	30(38%)	21(26.6%)	12(15.2%)	3(10%)	33(20.9%)
Gerridae (Water striders)	49	2.7%	16(20.2%)	7(8.9%)	9(11.4%)	0	16(10.1%)
Nepidae (Water scorpions)	27	1.5%	17(21.5%)	9(11.4%)	12(15.2%)	4(23.5%)	21(13.3%)
Belostomatidae (Giant water bugs)	17	0.9%	4(5.1%)	4(5.1%)	4(5.1%)	4(100%)	8(5.1%)
Gelastochoridae (Toad bugs)	12	0.6%	6(7.6%)	3(3.8%)	3(3.8%)	0	6(3.8%)

iv. Coleopterans (Beetles)

Order Coleoptera was represented by 4 families (Table 7). The pupae of all the coleopterans were not found due to the fact that they are terrestrial (Ward, 1992).

The occurrence of hydrophilids and dytiscids as the first and the second most abundant coleopterans can be attributed to their being carnivorous predators and the abundant occurrence of preys in the burrow pits (Amelework Tesfaye, 2008).

Scirtids and psephenids were represented only by 25 individuals (2.2% of the coleopterans) which could be related with their association with vegetation and running waters, respectively (Ward, 1992).

Table 7. The composition, abundance, and occurrence of coleopterans in the burrow pits and sampling months in the order of their decreasing abundance.

Coleopteran families	Total abundance	Composition	In the burrow pits	In August	In September	In both months	In total samples
Hydrophilidae (Water scavenger beetles)	719	62%	73(92.4%)	48(60.8%)	64(81%)	39(53.4%)	112(70.9%)
Dytiscidae (Predaceous diving beetles)	415	35.8%	71(89.9%)	49(62%)	63(79.7%)	41(57.7%)	112(70.9%)
Scirtidae (Marsh beetles)	17	1.5%	11(13.9%)	8(10.1%)	5(6.3%)	2(18.2%)	13(8.2%)
Psephenidae (Water pennies)	8	0.7%	3(3.8%)	0	3(3.8%)	0	3(1.9%)

v. Odonates (Dragonflies and damselflies)

Order Odonata was represented by 2 families (Table 8). Only nymphs of odonates were collected because after they underwent the final molt, known as emergence, they change into the air-breathing adult life stage. The adults are terrestrial - they disperse and mate on land which are usually brief and reproductive (Hynes, 1984).

The highest and the lowest abundance of Lestids and Aeshnids is related with their association with standing water and vegetation, respectively (Bouchard, 2012).

Table 8. The composition, abundance, and occurrence of odonates in the burrow pits and sampling months in the order of their decreasing abundance.

Odonatan families	**Total abundance**	**Composition**	**In the burrow pits**	**In August**	**In September**	**In both months**	**In total samples**
Lestidae (Spread-winged damselflies)	741	71.2%	64(81%)	41(51.9%)	55(69.6%)	32(50%)	96(60.8%)
Aeshnidae (Darner dragonflies)	299	28.8%	50(63.3%)	27(34.2%)	43(54.4%)	20(40%)	70(44.3%)

vi. Lepidopterans (Butterflies and moths)

Order Lepidoptera was represented by a single family; Pyralidae (aquatic moths). Only larvae of lepidopterans are found as the pupae and adults are terrestrial. They are less abundantly found in the burrow pits because they are most commonly found associated with higher plants (Hynes, 1984) and the larvae may not survive well in temporary burrow pit habitats.

vii. Collembolans (Spring tails)

Order Collembola could not be further identified into family level. Both nymphs and adults were collected as they are either aquatic or semi-aquatic. They were the least abundant insects because members of the order are primarily terrestrial, commonly inhabiting soil and other moist habitats. Even the aquatic species cannot tolerate permanent submergence and are associated with the upper surface of the air-water interface (Ward, 1992).

B. Crustaceans

Sub phylum Crustacea was classified into 3 taxa at or above order level (Table 9). Cladocerans were much more abundant because of the shallower depth of burrow pits and the abundant occurrence of vegetation and the characteristic association of cladocerans with benthic or littoral substrates (Mahoney *et al*., 1990).

Cyclopoids were represented only by 6 individuals (0.1%) which could be related with their smallest size and the large mesh size of the scoop net used (Bouchard, 2012). Cyclopoids are also known to prefer large aquatic habitats such as lakes, reservoirs and large wetlands (Fernando, 2002).

Table 9. The composition, abundance, and occurrence of crustaceans in the burrow pits and sampling months in the order of their decreasing abundance.

Crustacea	**Total abundance**	**Composition**	**In the burrow pits**	**In August**	**In September**	**In both months**	**In total samples**
Order Cladocera	3,714	71%	69(87.3%)	5(73.4%)	44(55.7%)	33(47.8%)	102(64.6%)
Class Ostracoda	1,511	28.9%	48(60.8%)	14(17.7%)	44(55.7%)	10(20.8%)	58(36.7%)
Order Cyclopoida	6	0.1%	5(6.3%)	1(1.3%)	4 (5.1%)	0	5 (5.1%)

Class Cladocera could not be further identified into successive lower taxa.

i. Cladocerans (Water fleas)

Order Cladocera was represented by two families (Table 10).

Table 10. The composition, abundance, and occurrence of cladocerans in the burrow pits and sampling months in the order of their decreasing abundance.

Cladoceran families	**Total abundance**	**Composition**	**In the burrow pits**	**In August**	**In September**	**In both months**	**In total samples**
Chydoridae	2016	54.3%	68 (86.1%)	54 (68.4%)	40(50.6%)	26 (38.2%)	94 (59.5%)
Daphnidae	1698	45.7%	62 (78.5%)	10 (12.7%)	60(75.9%)	8 (12.9%)	70 (44.3%)

ii. Cyclopoids

Order Cyclopoida was represented by a single family; Cyclopoidae.

C. Gastropods (Snails)

Class Gastropoda was represented by two families (Table 11). The dominant abundance of physids is in line with their universal abundance (Bouchard *et al*., 2012).

Table 11. The composition, abundance, and occurrence of gastropods in the burrow pits and sampling months in the order of their decreasing abundance.

Gastropodan families	**Total abundance**	**Percentage composition**	**In the burrow pits**	**In August**	**In September**	**In both months**	**In total samples**
Physidae	1523	89.2%	57(72.1%)	42(53.2%)	53(67.1%)	38(66.7%)	95(60.1%)
Planorbidae	185	10.8%	17(21.5%)	8(10.1%)	14(17.7%)	5(29.4%)	22(13.9%)

CONCLUSION AND RECOMMENDATION

Invertebrates constituted 91.9% and Amphibian tadpoles constituted 8.1% of the total faunal abundance in the burrow pits. Insects, crustaceans, snails, spiders, round worms (nematodes), earth worms (oligochaetes), and horsehair worms (nematomorphs) were found in decreasing abundance in burrow pits. Among invertebrates, insects were the most numerous (59.1%) and nematomorphs were the least numerous (0.3%). Among insects dipterans were the most numerous (36.9%) and collembolans were the least (0.4%). The organisms in Class Insecta were grouped into 7 orders which except order Collembola could be further identified to family level; orders Diptera, 12 families, Ephemeroptera, 2 families, Hemiptera, 11 families, Coleoptera, 4 families, Odonata, 2 families, Lepidoptera, 1 family in decreasing abundance order. Among crustaceans cladocerans and cyclopoids were the most (71%) and least (0.1%) abundant, respectively. Class Gastropoda was identified into 2 families and other less common taxa that could not be identified further to lower taxonomy include Orders Araneae and Anura, Class Oligochaeta, Phyla Nematoda and Nematomorpha. The number of fauna increased from August to September.

This study indicates that a key of aquatic invertebrates, if possible to the lowest possible taxonomical hierarchy, is relevant to the country and has to be developed and compiled as an annotated Catalogue.

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