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Zooplankton diversity of Gujarat: A review

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Abstract
The most essential and indispensable resource for life is water. In Gujarat State, the rivers serve as the primary natural water source, which the local population extensively uses for various purposes. However, pollution of these water bodies can have adverse effects on both, the ecosystem and human health. Zooplankton are tiny aquatic animals that spend all or part of their lives as plankton. They have a crucial role in the aquatic food chain by serving as a vital food source for various aquatic animals, particularly fish. Zooplankton are divided in major five groups included Protozoa, Rotifera, Copepoda, Cladocera and Ostracoda. In addition to larval forms and worms, there are other types of zooplankton present. A total of 368 zooplankton species are reviewed in the present review study. This review aims to compile a comprehensive list of zooplankton found in Gujarat on a single platform.

Keywords: Rotifera, Copepoda, checklist, water quality

Introduction

The Earth is known as the "blue planet" because a significant part of its surface, around 75%, is covered by water. Most of this water, approximately 97%, exists in the form of oceans, while the remaining is present as polar ice caps and groundwater. However, only a small percentage of this water, specifically 0.33%, is actually used by humans (India-WRIS wiki 2015) [38]. India has a rich abundance of water resources and accounts for 4% of the world's total water supply. (India-WRIS wiki 2015) [38]. Zooplankton are a varied group of small aquatic animals that can be found in freshwater, marine, and brackish environments. They are an essential part of aquatic food chains, providing sustenance for many organisms, including fish, marine mammals, and birds (Madhu and Jayalakshmi, 2018) [15]. These tiny creatures, ranging in size from a few microns to over a millimetre, come from almost every animal phylum and spend either their entire (holoplankton) or part (meroplankton) of their lives drifting as plankton (Goswami, 2004; Lindeque *et al*., 2013) [10][14]. Zooplankton play a crucial role in the aquatic ecosystem by affecting changes in phytoplankton populations, which in turn impact their own growth (Kumar *et al*., 2011) [12]. The abundance and diversity of zooplankton are influenced by various factors, such as temperature, nutrient availability, and predation pressure, and changes in these factors can lead to significant shifts in zooplankton communities that affect the entire ecosystem (Frost *et al*., 2020) [9]. Additionally, physicochemical parameters like temperature, pH, turbidity, and biological/chemical oxygen demand may also affect zooplankton distribution (Raut *et al*., 2015) [23].

As an important part of aquatic food webs, zooplankton act as bioindicators of water quality and ecosystem health. Changes in the composition of zooplankton and their densities can indicate changes in the physical and chemical conditions of aquatic environments (Cadjo *et al*., 2007) [3]. Wetlands, with their large number of ecological niches, harbor a significant percentage of the world's biological diversity and are among the most productive ecosystems in the world, comparable to rainforests and coral reefs (Thomas and Deviprasad, 2007) [33]. Seasonal changes can significantly impact zooplankton, as the dominant phytoplankton species can vary from one season to another. This change can then have a cascading effect on the entire aquatic food chain. (Carpenter *et al*., 1985) [4]. The process of water quality assessment involves the evaluation of the physical, chemical, and biological properties of water with respect to its natural quality, as well as its intended uses and potential impacts on human health and the health of the aquatic ecosystem. This includes an examination of the biological effects that water quality can have. (Chapman, 1996) [7].

Materials and methods

The aim of this study was to create a comprehensive annotated checklist of zooplankton in Gujarat State, based on a thorough review of published scientific documents and reports. Only research papers and articles were included in the checklist, while grey literature, popular articles, and newspaper articles were excluded.

Study area

Gujarat is considered as wetland rich state. In fact, from the view-point of extent of the wetlands, Gujarat is number one state as its wetland area contributes unmatchable 23% of wetland area of the country. Space Applications Center (SAC-ISRO) has estimated total wetland area of 34,749.50 sq. km in Gujarat state in its "National Wetland Atlas-Gujarat" (2010). It accounts for about 17.56% of geographical area of the state. The coastal wetlands dominate in the state, of which the major wetland types include intertidal mud flat (22,603.65 sq. km.), creek (1,498.98 sq. km) and salt marsh (1,442.68sq.km). Among inland wetlands river/stream (2,758.77 sq.km), and reservoir/barrage (2,489.79 sq.km) are the major wetlands in the state. Some of the unique wetlands like corals and mangrove are found in Gujarat state. (https://forests.gujarat.gov.in/wetlands.htm) [39]

The review was based on available online published research papers

Results and discussion

Table 1: Groupwise Diversity of Zooplanktons in Gujarat, India.

Sr no	Zooplanktons	References
Protozoan		
1	*Amphileptus procerus*	Jani *et al*., (2022)
2	*Arcella sp.*	Sharma *et al*., (2010); Sharma and Mankodi., (2011); Sarang and Manoj., (2017)
3	*Aspidisca costata*	Soni and Thomas., (2013)
4	*Aspidisca sp.*	Jani *et al*., (2022)
5	*Campanella umbellaria*	Soni and Thomas., (2013); Soni and Thomas., (2014)
6	*Carchesium polyponium*	Jani *et al*., (2022)
7	*Centropyxis sp.*	Sharma *et al*., (2010); Sarang and Manoj., (2017)
8	*Chilodonella uncinata*	Soni and Thomas., (2013); Soni and Thomas., (2014)
9	*Chilodontopsis sp.*	Kumar *et al*., (2011)
10	*Chilomonas paramecium*	Kumar *et al*., (2011)
11	*Chilophrya utahensis*	Soni and Thomas., (2013); Soni and Thomas., (2014)
12	*Coleps hirtus*	Soni and Thomas., (2013); Soni and Thomas., (2014); Vyas and Raval., (2023); Pandya *et al*., (2023)
13	*Colepshirtus*	Jani *et al*., (2022)
14	*Cosmerium brebisonii*	Jani *et al*., (2022)
15	*Difflugia lebes*	Kumar *et al*., (2011)
16	*Difflugia oblong*	Kumar *et al*., (2011)
17	*Diffuzia Euglypha*	Sharma *et al*., (2010)
18	*Diffugia sp.*	Sharma and Mankodi., (2011); Prajapati (2017); Sarang and Manoj., (2017)
19	*Dileptus sp.*	Jani *et al*., (2022)
20	*Dileptus sp.*	Pandya *et al*., (2023)
21	*Enchelys sp.*	Kumar *et al*., (2011)
22	*Epistylis sp.*	Jani *et al*., (2022)
23	*Epistylis sp.*	Pandya *et al*., (2023)
24	*Euglena acus*	Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
25	*Euglena gracilis*	Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
26	*Euglena virdis*	Vyas and Raval., (2023); Pandya *et al*., (2023)
27	*Euplotes patella*	Jani *et al*., (2022); Pandya *et al*., (2023)
28	*Eutiutinnus tenuis*	Saravanakumar *et al*., (2007)
29	*Favella brevis*	Saravanakumar *et al*., (2007)
30	*Favella ehrenbergii*	Patel *et al*., (2017)
31	*Favella philippinensis*	Saravanakumar *et al*., (2007); Patel *et al*., (2017)
32	*Frontonia elliptical*	Jani *et al*., (2022)
33	*Glaucoma scintillans*	Soni and Thomas., (2013)
34	*Globigerina sp.*	Sharma and Mankodi., (2011)
35	*Heliozoa*	Jani *et al*., (2022)
36	*Keronopsis muscorum*	Soni and Thomas., (2013); Soni and Thomas., (2014)
37	*Loxophyllum sp.*	Jani *et al*., (2022); Pandya *et al*., (2023)
38	*Nassula sp.*	Kumar *et al*., (2011)
39	*Nebela sp.*	Prajapati (2017)
40	*Oppercularis sp.*	Sharma *et al*., (2010)
41	*Oxytrica sp.*	Sharma *et al*., (2010)
42	*Paramecium aurelia*	Soni and Thomas., (2013); Soni and Thomas., (2014)
43	*Paramecium bursaria*	Soni and Thomas.,(2013) ; Soni and Thomas.,(2014)
44	*Paramecium sp.*	Kumar *et al*., (2011); Gupte., (2014); Anand *et al*., (2016); Prajapati (2017)
45	*Paramoecium aurelia*	Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
46	*Paramoecium caudatum*	Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
47	*Perispira ovum*	Soni and Thomas., (2013)
48	*Peritricha sp.*	Jani *et al*., (2022)
49	*Phacus sp*	Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
50	*Placus luciae*	Soni and Thomas., (2013); Soni and Thomas., (2014)
51	*Podophrya bengalensis*	Soni and Thomas., (2013); Soni and Thomas., (2014)
52	*Polystomella sp.*	Sharma and Mankodi., (2011)
53	*Pseudoblepharisma sp.*	Anand *et al*., (2016)
54	*Rhabdonella sp.*	Sharma and Mankodi., (2011)
55	*Saccammina sp.*	Sharma and Mankodi., (2011)
56	*Spasmostoma viride*	Soni and Thomas., (2013); Soni and Thomas., (2014)
57	*Stentor coeruleus*	Soni and Thomas., (2013); Soni and Thomas., (2014)
58	*Stentor niger*	Jani *et al*., (2022)
59	*Stentor roeselii*	Jani *et al*., (2022); Pandya *et al*., (2023)
60	*Stentor sp.*	Sharma and Mankodi., (2011); Anand *et al*., (2016); Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)

61	*Tetrahymena pyriformes*	Jani *et al*., (2022); Pandya *et al*., (2023)
62	*Textularia sp.*	Sharma and Mankodi., (2011)
63	*Tintinnopsis beroidea*	Saravanakumar *et al*., (2007); Patel *et al*., (2017)
64	*Tintinnopsis radix*	Patel *et al*., (2017)
65	*Tintinnopsis sp.*	Patel *et al*., (2017)
66	*Tintinnopsis tocantinensis*	Chavada *et al*., (2017)
67	*Tiutinnopsis butscheli*	Saravanakumar *et al*., (2007)
68	*Tiutinnopsis directa*	Saravanakumar *et al*., (2007)
69	*Tiutinnopsis minuta*	Saravanakumar *et al*., (2007)
70	*Tiutinnopsis tubulosa*	Saravanakumar *et al*., (2007)
71	*Trachelius ovum*	Jani *et al*., (2022)
72	*Trachelophyllum apiculatum*	Soni and Thomas.,(2013)
73	*Tretmophalus sp.*	Sharma and Mankodi., (2011)
74	*Vorticella campanula*	Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
75	*Vorticella campanula*	Soni and Thomas., (2013); Soni and Thomas., (2014)
76	*Vorticella infusionum*	Jani *et al*., (2022); Vyas and Raval., (2023)
77	*Vorticella sp.*	Kumar *et al*., (2011); Sharma and Mankodi., (2011); Anand *et al*., (2016); Prajapati (2017)
78	*Zoothamnium*	Jani *et al*., (2022)
	Rotifera	
79	*Asplanchna herrick*	Jani *et al*., (2022); Vyas and Raval., (2023)
80	*Asplanchna priodonta*	Jani *et al*., (2022)
81	*Asplanchna sp.*	Kumar *et al*., (2011); Kumar *et al*., (2011); Jani *et al*., (2022); Pandya *et al*., (2023)
82	*Brachionus angularis angularis*	Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
83	*Brachionus calyciflorus*	Saravanakumar *et al*., (2007); Kumar *et al*., (2011); Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
84	*Brachionus caudatus*	Soni and Thomas., (2013); Soni and Thomas., (2014)
85	*Brachionus diversicornis*	Jani *et al*., (2022)
86	*Brachionus forficula*	Kumar *et al*., (2011); Patel *et al*., (2017); Kuvadiya *et al*., (2020)
87	*Brachionus mirabilis*	Kumar *et al*., (2011)
88	*Brachionus plicatilis*	Jani *et al*., (2022)
89	*Brachionus quadridentata*	Kumar *et al*., (2011); Jani *et al*., (2022)
90	*Brachionus rubeus*	Saravanakumar *et al*., (2007); Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
91	*Brachionus sp.*	Sharma *et al*., (2010); Kumar *et al*., (2011); Gupte., (2014); Anand *et al*., (2016); Prajapati (2017); Sarang and Manoj., (2017); Vagh *et al*., (2019)
92	*Brachionus urceolaris*	Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
93	*Brachionus filinia*	Sharma *et al*., (2010)
94	*Branchionus falcatus*	Kuvadiya *et al*., (2020)
95	*Chydorus bicornutus*	Soni and Thomas., (2013)
96	*Chydorus ciliates*	Soni and Thomas., (2013); Soni and Thomas., (2014)
97	*Cristaluta sp.*	Vagh *et al*., (2019)
98	*Euchlanis sp.*	Sarang and Manoj., (2017)
99	*Filinia longiseta*	Kumar *et al*., (2011); Jani *et al*., (2022); Pandya *et al*., (2023)
100	*Filinia minuta*	Anand *et al*., (2016)
101	*Filinia opolienses*	Kumar *et al*., (2011)
102	*Filinia sp.*	Sharma *et al*., (2010); Kumar *et al*., (2011); Sarang and Manoj., (2017)
103	*Filinia terminalis*	Kumar *et al*., (2011)
104	*Gastropus sp.*	Prajapati (2017)
105	*Hexarthra sp.*	Anand *et al*., (2016)
106	*Keralullo sp.*	Prajapati (2017)
107	*Keratella cochlearis*	Kumar *et al*., (2011)
108	*Keratella procurva*	Kumar *et al*., (2011)
109	*Keratella quadrata*	Jani *et al*., (2022); Pandya *et al*., (2023)
110	*Keratella sp.*	Sharma *et al*., (2010); Gupte., (2014); Anand *et al*., (2016); Sarang and Manoj., (2017); Vagh *et al*., (2019)
111	*Keratella tropica*	Saravanakumar *et al*., (2007); Kumar *et al*., (2011); Jani *et al*., (2022); Pandya *et al*., (2023)
112	*Keratella tropica tropica*	Kumar *et al*., (2011)
113	*Keratella valga*	Kumar *et al*., (2011)
114	*Kerattla tropica*	Raval *et al*., (2019); Kuvadiya *et al*., (2020)
115	*Lecane bulla*	Jani *et al*., (2022); Pandya *et al*., (2023)
116	*Lecane crepida*	Patel *et al*., (2017)
117	*Lecane luna*	Patel *et al*., (2017); Kuvadiya *et al*., (2020)
118	*Lecane sp.*	Sarang and Manoj., (2017)
119	*Monostyla decipiens*	Kumar *et al*., (2011)

120	*Monostyla sp.*	Sarang and Manoj., (2017)
121	*Mytilina ventralis*	Soni and Thomas., (2013); Soni and Thomas., (2014)
122	*Notholca accuminata*	Anand *et al*., (2016)
123	*Notholca sp.*	Sarang and Manoj., (2017)
124	*Notommata sp.*	Kumar *et al*., (2011)
125	*Pedipartia gracilis*	Soni and Thomas., (2013)
126	*Philodina roseola*	Jani *et al*., (2022)
127	*Philodina sp.*	Sarang and Manoj., (2017); Vyas and Raval., (2023)
128	*Polyartha sp.*	Kumar *et al*., (2011); Prajapati (2017); Sarang and Manoj., (2017)
129	*Polyarthra vulgaris*	Kumar *et al*., (2011); Vyas and Raval., (2023); Pandya *et al*., (2023)
130	*Polyarthra vulgaris*	Jani *et al*., (2022)
131	*Platyias sp.*	Sarang and Manoj., (2017)
132	*Rotaria neptunia*	Anand *et al*., (2016); Jani *et al*., (2022); Pandya *et al*., (2023)
133	*Rotaria sp.*	Kumar *et al*., (2011); Prajapati (2017); Vagh *et al*., (2019)
134	*Rotaria vulgaris*	Soni and Thomas., (2013)
135	*Testudinella sp.*	Sarang and Manoj., (2017); Vagh *et al*., (2019)
136	*Trichodera sp.*	Vagh *et al*., (2019)
137	*Trichocerca rattus*	Jani *et al*., (2022); Pandya *et al*., (2023)
138	*Trichotria sp.*	Sarang and Manoj., (2017)
Copepoda		
139	*Acartia clausi*	Patel *et al*., (2017); Kuvadiya *et al*., (2020)
140	*Acartia danae*	Saravanakumar *et al*., (2007)
141	*Acartia erythraea*	Saravanakumar *et al*., (2007)
142	*Acartia sp.*	Saravanakumar *et al*., (2007)
143	*Acartia spinicauda*	Saravanakumar *et al*., (2007)
144	*Acrocalanus gibber*	Chavada *et al*., (2017); Vyas and Raval., (2023)
145	*Acrocalanus gibber*	Saravanakumar *et al*., (2007); Kuvadiya *et al*., (2020)
146	*Acrocalanus gracilis*	Raval *et al*., (2019); Kuvadiya *et al*., (2020)
147	*Bosmina sp.*	Gupte., (2014)
148	*Calanopia elliptica*	Raval *et al*., (2019)
149	*Calanopia minor*	Patel *et al*., (2017); Raval *et al*., (2019); Kuvadiya *et al*., (2020)
150	*Calanus finmarchicus*	Kuvadiya *et al*., (2020)
151	*Calanus sp.*	Vachhrajani and Mankodi., (2007)
152	*Calanus tenuicornis*	Patel *et al*., (2017)
153	*Caligus epinepheli*	Patel *et al*., (2017)
154	*Canthocalanus pauper*	Raval *et al*., (2019)
155	*Centropages furcatus*	Saravanakumar *et al*., (2007); Raval *et al*., (2019)
156	*Centropages orsinii*	Saravanakumar *et al*., (2007)
157	*Centropages tenuiremis*	Raval *et al*., (2019)
158	*Ceriodaphnia pulchella*	Pandya *et al*., (2023)
159	*Chaoborus sp.*	Gupte., (2014)
160	*Ciriodaphnia sp.*	Vyas and Raval., (2023); Pandya *et al*., (2023)
161	*Clytemnesera Scutellated*	Chavada *et al*., (2017)
162	*Cyclops sp.*	Vachhrajani and Mankodi., (2007); Sharma *et al*., (2010); Kumar *et al*., (2011); Soni and Thomas., (2013); Soni and Thomas., (2014); Gupte., (2014); Anand *et al*., (2016); Vyas and Raval., (2023); Pandya *et al*., (2023)
163	*Daphnia carinata*	Vyas and Raval., (2023); Pandya *et al*., (2023)
164	*Daphnia obtusa*	Vyas and Raval., (2023); Pandya *et al*., (2023)
165	*Daphnia sp.*	Gupte., (2014)
166	*Diacyclops sp.*	Raval *et al*., (2019)
167	*Diaphanosoma sp.*	Gupte., (2014)
168	*Diaptomus castor*	Raval *et al*., (2019)
169	*Diaptomus sp.*	Gupte., (2014); Anand *et al*., (2016); Prajapati (2017)
170	*Eucyclop sp.*	Prajapati (2017); Sarang and Manoj., (2017)
171	*Epischura lacustris*	Patel *et al*., (2017)
172	*Eucalanus crassus*	Saravanakumar *et al*., (2007)
173	*Eucalanus elongatus*	Saravanakumar *et al*., (2007); Patel *et al*., (2017)
174	*Eucalanus monachus*	Saravanakumar *et al*., (2007)
175	*Eucalanus sp.*	Vachhrajani and Mankodi., (2007)
176	*Eucalanus sp.*	Saravanakumar *et al*., (2007)
177	*Euchaeta marina*	Saravanakumar *et al*., (2007)
178	*Euchaeta sp.*	Saravanakumar *et al*., (2007)
179	*Euterpina acccutifrons*	Chavada *et al*., (2017)
180	*Encyclops sp.*	Vagh *et al*., (2019)
181	*Harpacticoid copepod*	Patel *et al*., (2017)
182	*Heliodiaptomus sp.*	Prajapati (2017)
183	*Heliodiaptomus viddus*	Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)

184	*Hemicycpris anomala*	Vyas and Raval., (2023); Pandya *et al*., (2023)
185	*Hyperia galba*	Raval *et al*., (2019)
186	*Hyperia macrocephala*	Patel *et al*., (2017)
187	*Labidocera acuta*	Saravanakumar *et al*., (2007)
188	*Longipedia coronata*	Patel *et al*., (2017)
189	*Macrocyclops fuscus*	Patel *et al*., (2017)
190	*Macroselella Gracilis*	Chavada *et al*., (2017); Waghade *et al*., (2021)
191	*Macrothrix sp.*	Gupte., (2014)
192	*Megacyclops viridis*	Patel *et al*., (2017)
193	*Mesocyclops sp.*	Sharma *et al*., (2010); Kumar *et al*., (2011); Anand *et al*., (2016); Sarang and Manoj., (2017); Jani *et al*., (2022)
194	*Microcyclop rubellus*	Kuvadiya *et al*., (2020)
195	*Microcyclops sp.*	Raval *et al*., (2019)
196	*Microsetella norvegica*	Patel *et al*., (2017)
197	*Microsetella Rosea*	Chavada *et al*., (2017); Kuvadiya *et al*., (2020)
198	*Microsetella sp.*	Patel *et al*., (2017)
199	*Nannocalanus minor*	Patel *et al*., (2017)
200	*Nauplis sp.*	Kumar *et al*., (2011); Jani *et al*., (2022); Vyas and Raval., (2023); Pandya *et al*., (2023)
201	*Nitokra spinipes*	Patel *et al*., (2017)
202	*Neodiaptomus sp.*	Sarang and Manoj., (2017)
203	*Oithona similis*	Patel *et al*., (2017)
204	*Oithonidae Spinirostris*	Chavada *et al*., (2017)
205	*Oncaea Mediterranea*	Chavada *et al*., (2017)
206	*Oncaea Venulsta*	Chavada *et al*., (2017)
207	*Paracyclops sp.*	Prajapati (2017)
208	*P.elongatus*	Saravanakumar *et al*., (2007)
209	*P.strigilipes*	Saravanakumar *et al*., (2007)
210	*Paracalanus parvus*	Patel *et al*., (2017)
211	*Paracalanus sp.*	Patel *et al*., (2017)
212	*Paracalauus parvus*	Saravanakumar *et al*., (2007)
213	*Pontella brevicornis*	Saravanakumar *et al*., (2007)
214	*Pontella danae*	Saravanakumar *et al*., (2007); Chavada *et al*., (2017)
215	*Pontellopsis scotti*	Saravanakumar *et al*., (2007)
216	*Pseudodiaptomus*	Saravanakumar *et al*., (2007)
217	*Pseudodiaptomus aurivilli*	Kuvadiya *et al*., (2020)
218	*Pseudodioptomus Serricaredatus*	Chavada *et al*., (2017); Raval *et al*., (2019)
219	*Serricaudatus*	Saravanakumar *et al*., (2007)
220	*Temora discaudata*	Saravanakumar *et al*., (2007); Chavada *et al*., (2017); Raval *et al*., (2019); Kuvadiya *et al*., (2020)
221	*Tropocyclop sp.*	Sarang and Manoj., (2017)
222	*Tortanus Barbules*	Chavada *et al*., (2017); Raval *et al*., (2019); Kuvadiya *et al*., (2020)
223	*Tortanus forcipatus*	Raval *et al*., (2019)
224	*Undinula vulgaris*	Saravanakumar *et al*., (2007)
Cladoceras		
225	*Alona monocantha*	Kumar *et al*., (2011)
226	*Alona sp.*	Kumar *et al*., (2011); Prajapati (2017); Sarang and Manoj., (2017); Vagh *et al*., (2019)
227	*Alonella sp.*	Anand *et al*., (2016)
228	*Bosmina longirostris*	Kumar *et al*., (2011)
229	*Bosmina sp.*	Anand *et al*., (2016) ; Kumar *et al*.,(2011) ; Prajapati (2017)
230	*Ceriodaphnia pulchella*	Jani *et al*., (2022)
231	*Ceriodaphnia sp.*	Sharma *et al*., (2010); Sarang and Manoj., (2017); Jani *et al*., (2022)
232	*Chydorus sp.*	Kumar *et al*., (2011); Sarang and Manoj., (2017)
233	*Coleps hirutus*	Kumar *et al*., (2011)
234	*Daphnia carinata*	Jani *et al*., (2022)
235	*Daphnia lumholtzi*	Soni and Thomas., (2013); Soni and Thomas., (2014); Anand *et al*., (2016)
236	*Daphnia obtusa*	Jani *et al*., (2022)
237	*Daphnia pulex*	Jani *et al*., (2022)
238	*Daphnia Sp.*	Sharma *et al*., (2010); Kumar *et al*., (2011); Anand *et al*., (2016); Prajapati (2017); Sarang and Manoj., (2017); Vagh *et al*., (2019)
239	*Diaphanosoma birgei*	Kumar *et al*., (2011)
240	*Diphanosoma brachyurum*	Kuvadiya *et al*., (2020)
241	*Evadne tergestina*	Saravanakumar *et al*., (2007)
242	*Halophrya simplex*	Kumar *et al*., (2011)
243	*Leydigia sp.*	Sarang and Manoj., (2017)
244	*Macrothrix rosea*	Kumar *et al*., (2011)

245	*Macrothrix sp.*	Sharma *et al*., (2010); Kumar *et al*., (2011); Sarang and Manoj., (2017)
246	*Moina sp.*	Sharma *et al*., (2010); Kumar *et al*., (2011); Sarang and Manoj., (2017); Vagh *et al*., (2019)
247	*Moinodaphnia sp.*	Sarang and Manoj., (2017)
248	*Nemata sp.*	Kumar *et al*., (2011)
249	*Oxyurella singalensis*	Soni and Thomas., (2013); Soni and Thomas., (2014)
250	*Oxyurella tenuicaudis*	Soni and Thomas., (2013)
251	*Phyllodiaptomus blanci*	Kumar *et al*., (2011)
252	*Plagiocampa mutabilis*	Kumar *et al*., (2011)
253	*Sida sp.*	Kumar *et al*., (2011)
Ostracoda		
254	*Cypris pubera*	Soni and Thomas., (2013); Soni and Thomas., (2014)
255	*Cypris sp.*	Prajapati (2017); Sarang and Manoj., (2017)
256	*Cyclocypris sp.*	Prajapati (2017)
257	*Cyprinotus sp.*	Sarang and Manoj., (2017)
258	*Hemicypris anomala*	Jani *et al*., (2022)
259	*Ostracod nauplii*	Jani *et al*., (2022)
260	*Ostracoda sp.*	Anand *et al*., (2016)
261	*Stenocypris major major*	Jani *et al*., (2022)
262	*Stenocypris sp.*	Kumar *et al*., (2011); Prajapati (2017); Sarang and Manoj., (2017)
Others		
263	*Acartiella sp.*	Kumar *et al*., (2011)
264	*Actinomonas mirabilis*	Soni and Thomas., (2013); Soni and Thomas., (2014)
265	*Actinomonas sp.*	Kumar *et al*., (2011)
266	*Actinophrys sol*	Soni and Thomas., (2013); Soni and Thomas., (2014)
267	*Adenophorea sp.*	Sharma and Mankodi., (2011)
268	*Aelosoma sp.*	Jani *et al*., (2022)
269	*Ambassis commersonii*	Saravanakumar *et al*., (2007)
270	*Ammonia beccarii*	Patel *et al*., (2017)
271	*Amoeba proteus*	Soni and Thomas., (2013); Soni and Thomas., (2014)
272	*Ancyclostoma duodenale*	Jani *et al*., (2022)
273	*Arcella megastoma*	Soni and Thomas., (2013); Soni and Thomas., (2014)
274	*Arcella sp.*	Kumar *et al*., (2011)
275	*Astramoeba sp.*	Kumar *et al*., (2011)
276	*Balantidium sp.*	Kumar *et al*., (2011)
277	*Barnacle Nauplii*	Patel *et al*., (2017)
278	*Bipinnaria larvae*	Saravanakumar *et al*., (2007); Baxi *et al*., (2018)
279	*Bivalve Veliger*	Saravanakumar *et al*., (2007); Patel *et al*., (2017)
280	*Bodo caudatus*	Soni and Thomas., (2013); Soni and Thomas., (2014)
281	*Bodo sp.*	Kumar *et al*., (2011)
282	*Bodopsis godboldi*	Soni and Thomas., (2013); Soni and Thomas., (2014)
283	*Bolivina subaenariensis*	Patel *et al*., (2017)
284	*Brachiuran larvae*	Saravanakumar *et al*., (2007)
285	*Bullinularia sp.*	Kumar *et al*., (2011)
286	*C.acicula*	Chavada *et al*., (2017)
287	*Caenorhabditis sp.*	Patel *et al*., (2017)
288	*Cerripede nauplius*	Saravanakumar *et al*., (2007)
289	*Chaetogaster*	Jani *et al*., (2022)
290	*Chaetopterus sp.*	Saravanakumar *et al*., (2007)
291	*Chironomidae larva*	Jani *et al*., (2022)
292	*Colpoda sp.*	Kumar *et al*., (2011)
293	Copepod Nauplii	Patel *et al*., (2017); Raval *et al*., (2019); Kuvadiya *et al*., (2020)
294	Crab Larva	Patel *et al*., (2017)
295	*Cresis Aricala*	Chavada *et al*., (2017)
296	Crustacean larva	Kuvadiya *et al*., (2020); Waghade *et al*., (2021)
297	*Cumaceae*	Saravanakumar *et al*., (2007)
298	Cumaceans larvae	Saravanakumar *et al*., (2007)
299	Cyclops nauplius larva	Patel *et al*., (2017)
300	Cypris Larvae	Vachhrajani and Mankodi., (2007); Patel *et al*., (2017)
301	Damsel fly nymph	Jani *et al*., (2022)
302	*Difflugia oblongata*	Soni and Thomas., (2013); Soni and Thomas., (2014)
303	*Difflugia sp.*	Kumar *et al*., (2011)
304	Drain fly larva	Jani *et al*., (2022)
305	Drosophila larva sp.	Jani *et al*., (2022)
306	*Entamoeba sp.*	Kumar *et al*., (2011)
307	Ephemeroptera nymph	Jani *et al*., (2022)
308	Euphausid larvae	Saravanakumar *et al*., (2007)
309	*Eutardigrade sp.*	Jani *et al*., (2022)
310	*Euterpina acutifrous*	Saravanakumar *et al*., (2007)

311	*Euterpina sp.*	Kumar *et al*., (2011)
312	Fish larvae	Baxi *et al*., (2018)
313	*Gastropod veliger*	Saravanakumar *et al*., (2007)
314	*Globigerina sp.*	Saravanakumar *et al*., (2007); Patel *et al*., (2017)
315	*Glycerid larvae*	Saravanakumar *et al*., (2007)
316	Hermit crab larvae	Saravanakumar *et al*., (2007)
317	*Juvenile Sand Dollar*	Patel *et al*., (2017)
318	*Leiognathus sp.*	Saravanakumar *et al*., (2007)
319	*Lucifer hansenii*	Saravanakumar *et al*., (2007)
320	*Macrosetella gracilis*	Saravanakumar *et al*., (2007)
321	*Mastigamoeba replans*	Soni and Thomas., (2013); Soni and Thomas., (2014)
322	Megalopa larvae	Baxi *et al*., (2018)
323	*Microsetella rosea*	Saravanakumar *et al*., (2007)
324	*Microstomum sp.*	Jani *et al*., (2022)
325	*Mugil sp.*	Saravanakumar *et al*., (2007)
326	Mysid larvae	Saravanakumar *et al*., (2007)
327	Mysis larva	Vachhrajani and Mankodi., (2007); Baxi *et al*., (2018)
328	Nauplius larva	Vachhrajani and Mankodi., (2007); Sarang and Manoj., (2017); Baxi *et al*., (2018)
329	Nemotode larvae	Saravanakumar *et al*., (2007)
330	Nepa water fly	Jani *et al*., (2022)
331	*Oikopleura* larvae	Saravanakumar *et al*., (2007)
332	*Oithona brevicornis*	Saravanakumar *et al*., (2007)
333	*Oithona plumifera*	Saravanakumar *et al*., (2007)
334	*Oithona rigida*	Saravanakumar *et al*., (2007)
335	*Oncaea sp.*	Saravanakumar *et al*., (2007)
336	*Ophiodromus sp.*	Saravanakumar *et al*., (2007)
337	*Paradiastylis sp.*	Saravanakumar *et al*., (2007)
338	Parasitic egg	Jani *et al*., (2022)
339	*Parmulina sp.*	Kumar *et al*., (2011)
340	*Penaeid nauplius*	Saravanakumar *et al*., (2007)
341	*Phyllomitus amylophagus*	Soni and Thomas., (2013)
342	*Plagiopyxis sp.*	Kumar *et al*., (2011)
343	*Planula larvae*	Baxi *et al*., (2018)
344	*Platynereis dumerilii*	Patel *et al*., (2017)
345	*Pleurobrachia globosa*	Saravanakumar *et al*., (2007)
346	Polychaete larva	Vachhrajani and Mankodi.,(2007) ; Baxi *et al*.,(2018) ; Waghade *et al*.,(2021)
347	*Propsilocerussaetheri*	Jani *et al*., (2022)
348	*Pyxidicula scutella*	Soni and Thomas.,(2013) ; Soni and Thomas.,(2014)
349	*Pyxidicula sp.*	Kumar *et al*., (2011)
350	*Rhabdolaimus sp.*	Sharma and Mankodi., (2011)
351	*Sabellaria Cementarium* Larvae	Patel *et al*., (2017)
352	*Sagitta enflata*	Saravanakumar *et al*., (2007)
353	*Sagitta serratodentata*	Saravanakumar *et al*., (2007)
354	*Sagitta sp.*	Saravanakumar *et al*., (2007); Vachhrajani and Mankodi., (2007)
355	*Spadella sp.*	Patel *et al*., (2017)
356	*Stenostomum unicolor*	Jani *et al*., (2022)
357	*Textularia sp.*	Patel *et al*., (2017)
358	*Thecamoeba sp.*	Kumar *et al*., (2011)
359	*Thecamooeba verrucosa*	Soni and Thomas., (2013); Soni and Thomas., (2014)
360	*Therapon sp.*	Saravanakumar *et al*., (2007)
361	*Thryssa sp.*	Saravanakumar *et al*., (2007)
362	*Trigonopyxis sp.*	Kumar *et al*., (2011)
363	*Trimastigamoeba sp.*	Soni and Thomas., (2014)
364	*Trimastigamoeba Whitmore*	Soni and Thomas., (2013)
365	Trochophor larva	Vachhrajani and Mankodi., (2007)
366	Veliger larvae	Baxi *et al*., (2018)
367	Water mite sp.	Jani *et al*., (2022)
368	Zoeae larva	Vachhrajani and Mankodi., (2007); Baxi *et al*., (2018); Vagh *et al*., (2019)

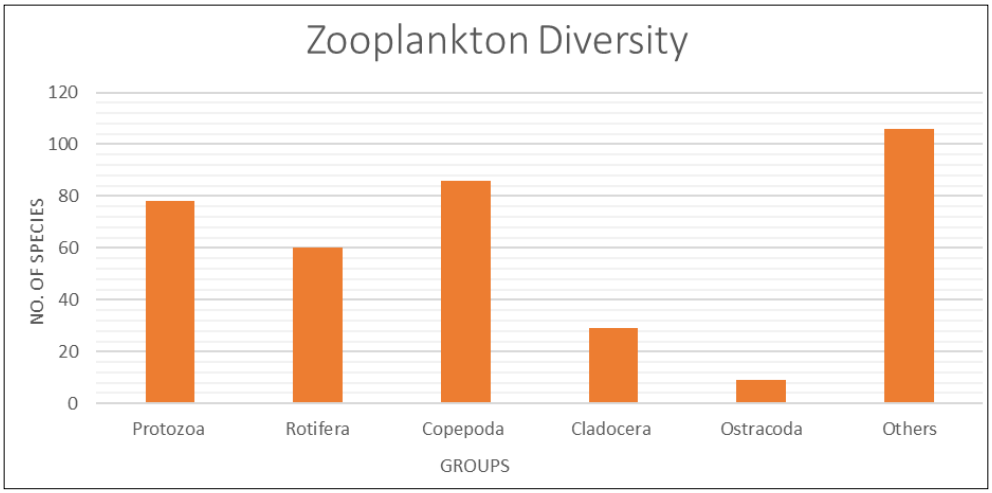

Fig 1: Groupwise Distribution of Zooplanktons

During the review preparation, a total of 368 species were observed and documented (refer to Table 1). As depicted in Figure 1, the number of species in five distinct groups are presented, and the remaining aquatic organisms were categorized as "Group 6: Others".

Group 1, Protozoa, has the highest number of species with 78 identified species. Protozoa are unicellular organisms that are commonly found in aquatic environments and are important in the food web as a food source for larger organisms.

Group 2, Rotifers, has 60 identified species. Rotifers are small, multicellular organisms that are also found in aquatic environments. They are important in the food web as they consume smaller organisms such as algae and bacteria.

Group 3, Copepods, has the highest number of identified species with 86 species. Copepods are small crustaceans that are important in the food web as they are a food source for larger organisms such as fish.

Group 4, Cladocera, has 29 identified species. Cladocera are also small crustaceans that are important in the food web as they consume smaller organisms such as algae and bacteria.

Group 5, Ostracoda, has only 9 identified species. Ostracoda are small, bivalved crustaceans that are commonly found in aquatic environments. They are important in the food web as they are a food source for larger organisms such as fish.

And, Group 6, Others, has the highest number of species with 106 identified species. This group includes a wide range of aquatic organisms such as insects, molluscs, and other small invertebrates that are important in the food web as they provide a food source for larger organisms.

In summary, the identified aquatic organism groups, namely Protozoa, Rotifers, Copepods, Cladocera, and Ostracoda, perform vital functions in the aquatic ecosystem by serving as a food source for higher trophic levels and participating in nutrient cycling processes. The variability in the number of species within each group is evident, with the group Copepods exhibiting the highest species richness and Ostracoda demonstrating the lowest. Thus, comprehending the diversity of aquatic organisms is crucial for upholding the robustness and resilience of the aquatic ecosystem.

Authors like Castilho *et al*., in 2023 reviewed 121 years of studies on the freshwater zooplankton of brazil (Castilho *et al*., 2023) [5]. Ferdous and Muktadir in 2009 reviewed Potentially of zooplankton as bioindicator (Ferdous and Muktadir, 2009) [37]. de Paggi *et al*., in 2022 reviewed Taxonomic Diversity of the Freshwater Zooplankton in Argentina: A Review (de Paggi *et al*., 2022) [8]. Cervantes-Martínez et l., in 2023 reviewed Freshwater Diversity of Zooplankton from Mexico: Historical Review of Some of the Main Groups (Cervantes-Martínez *et al*., 2023) [6].

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