



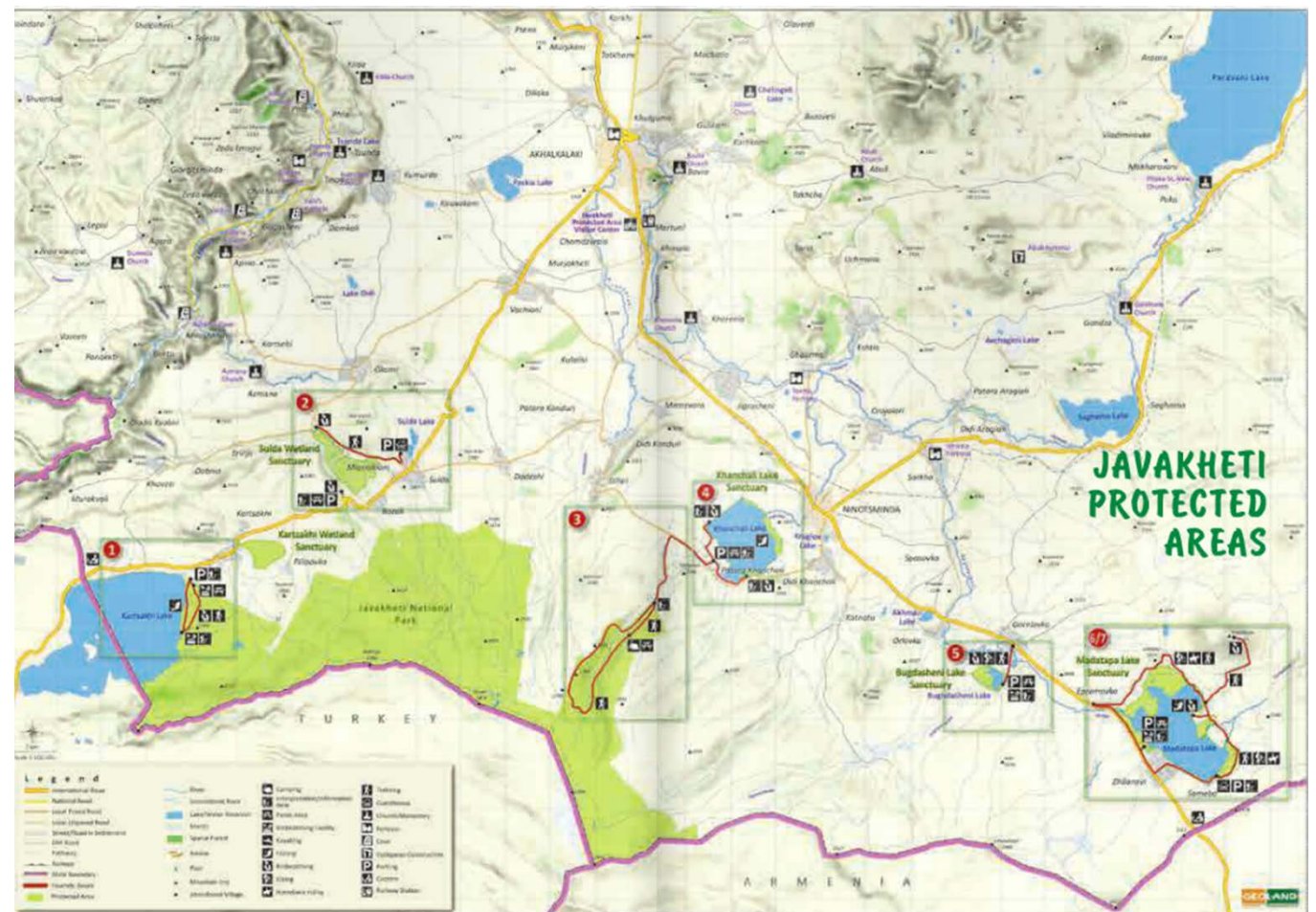
The diversity and abundance of aquatic insects in 5 major lakes of South Georgia

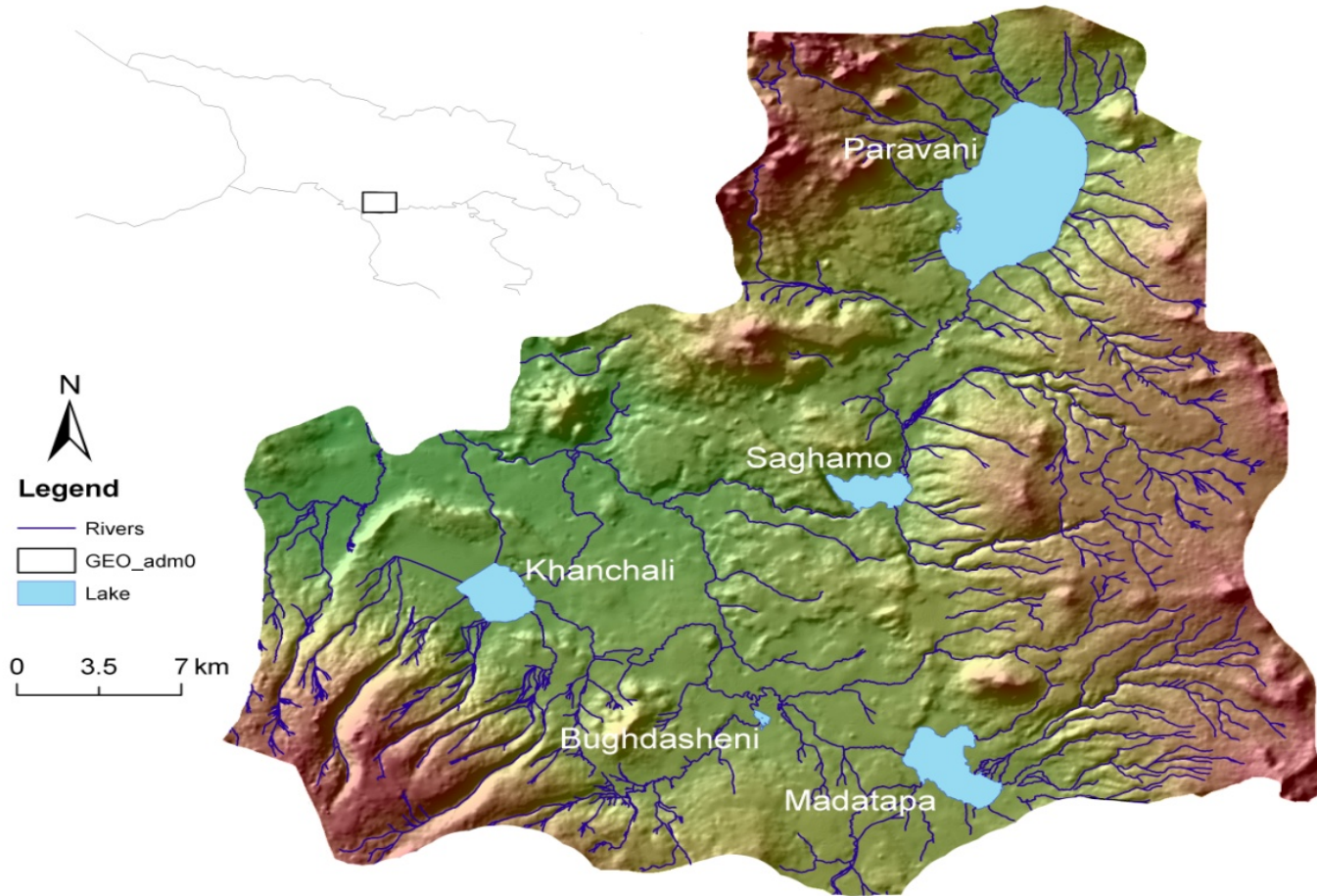
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Tulcea

Javakheti highland covers western part of South Georgian upland, which is surrounded by Trialeti range from the north and Samsar-Kechuti (Javakheti range) volcanic-tectonic highland from the east. Georgian-Turkish and Georgian-Armenian borders represent the southern margins of the region, while the Mtkvari Gorge is its western limit.

Javakheti Region is characterized with uplifted plain relief on 1500-2200 m a.s.l. and less continental climate supports a vast amount of freshwater habitats (more than 60 lakes, mires and rivers). Javakheti upland is eminent by multitude of freshwater ecosystems and biodiversity, although much of the animal groups (especially invertebrate fauna) is poorly known. E.g. aquatic insects which represents the most diverse and important groups of freshwater ecosystems is strongly understudied in the area.





Javakheti region and the studding lakes

Paravani Lake is located at an altitude of 2080 m. a.s.l, is the biggest lake for the country by its surface area 37.5 km², with its maximum depth reaching 3.3. m. Paravani lake is connected to the Saghamo Lake (4.8 km²) by the river Paravaini.

Lake Khanchali is located in a large hallow (length 9 km) west of Ninostminda. The lake is very shallow. Khanchali was 5th largest lake in the country with the total area 13.3 km² until more than 2/3 of it was drained.

Lake Madatapa is located south west of mount Madatapa and north-east of Childir ridge. The total water volime in the lakes is 9.5 milion cubic meter.

Lake Bughdasheni is a little, shallow, triangle-shaped lake located on flat plateau north of the Childiri ridge. The Lake has a small island, $\frac{3}{4}$ of its catchment area is the basin of the river Zagranichnaia.



Madatapa lake



Bughdasheni lake



Khanchali lake



Saghamo lake



Paravani lake

- Aquatic insects comprise taxonomically diverse and ecologically important and interesting group of animals in fresh water systems.
- Aquatic insects and other benthic invertebrates are the most widely used organisms in freshwater biomonitoring of human impact. Some of them are identified as indicator species, because there are species with different tolerance of pollution. Some are very sensitive, some are very tolerant.
- Very few studies were conducted on above mentioned lakes. First record on the Javakheti lakes dated in 30th last century, by foreign scientists. By Arnoldi, Fortunatova, late in 1959 by Ovinikova, but only Paravani and Saghamo lake were studied.
- Last time the investigation of Paravani and Saghamo lake was carried out more than 30 years ago, in 1982 by Pataridze, in this work macroinvertebrates were identified only to order level, except Family Chironomidae, and from Insects were recorded: Ephemeroptera, Hemiptera, Odonata, Trichoptera, Diptera (Chironomidae).



The aim of our study was to (a) acquire family level diversity data of aquatic insects in five major lakes of Javakheti plateau and make comparison with historical data; (b) test the effects of lake surface area and altitude on the family level diversity of aquatic insect; (c) assess the organic pollution based on composition of insect families.



Laka Madatapa

Materials and Methods

- Materials were collecting during 2013-2015 years, seasonally, except winter as the lakes are freezing at this period.
- Litoral sampling locations was established proportional to the lake size (Paravani – 4, Madatapa – 3, Saghamo, Khnachali, Bughdasheni – 2). At each location three subsamples were collected using kick-net (0.5 mm, 30X30 cm).
- Apart this sampling scheme a single location in middle lake was sampled (using the Petersen grab sampler) during the 2014.
- Obtained materials were immediately placed in ethanol and were sorted in the laboratory.





Aeshnidae, Lake Madatapa



Calopterygidae, Lake Madatapa



Libellulidae, Lake Khanchali



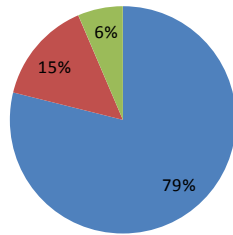
Coenagrionidae, Lake Paravani

Results

Dominant Families

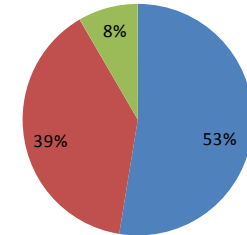
Bughdasheni Lake

■ Chironomidae ■ Corixidae ■ Notonectidae



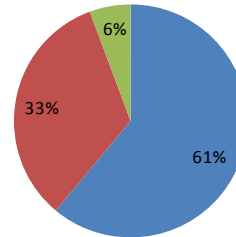
Khanchali Lake

■ Chironomidae ■ Corixidae ■ Limnephilidae



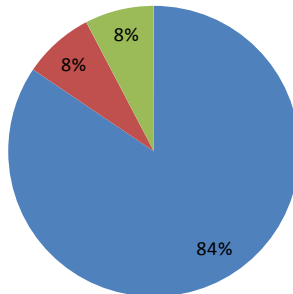
Paravani Lake

■ Chironomidae ■ Caenidae ■ Notonectidae



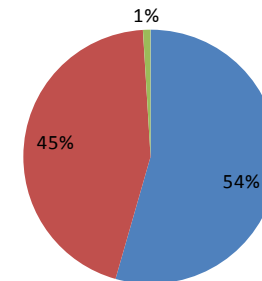
Madatapa Lake

■ Chironomidae
■ Corixidae
■ Coenagrionidae



Saghamo Lake

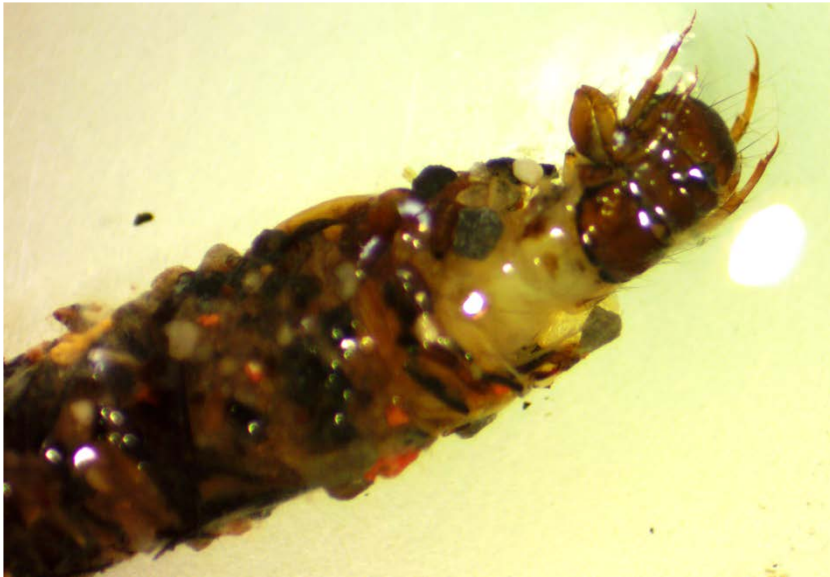
■ Chironomidae ■ Corixidae ■ Caenidae



Lake	Family	density	Family	density	Family	density	% of single dominant family	% of dominant families
Paravani	Chironomidae	2143	Caenidae	1167	Notonectidae	200	0.57608	0.94355
Saghamo	Chironomidae	3531	Corixidae	2892	Caenidae	62	0.53322	0.97931
Madatapa	Chironomidae	1235	Corixidae	115	Coenagrionidae	112	0.68421	0.80997
Khanchali	Chironomidae	786	Corixidae	584	Limnephilidae	125	0.48459	0.9217
Bughdasheni	Chironomidae	172	Corixidae	32	Notonectidae	14	0.69919	0.88618



Caenidae, Lake Paravani



Lepidostomatidae, Lake Paravani



Hydropsychidae, Lake Madatapa



Notonectidae, Lake Khanchali



Chaoboridae, Lake Madatapa



Corixidae, Lake Bugdasheni



Dytiscidae, Lake Saghamo

Results

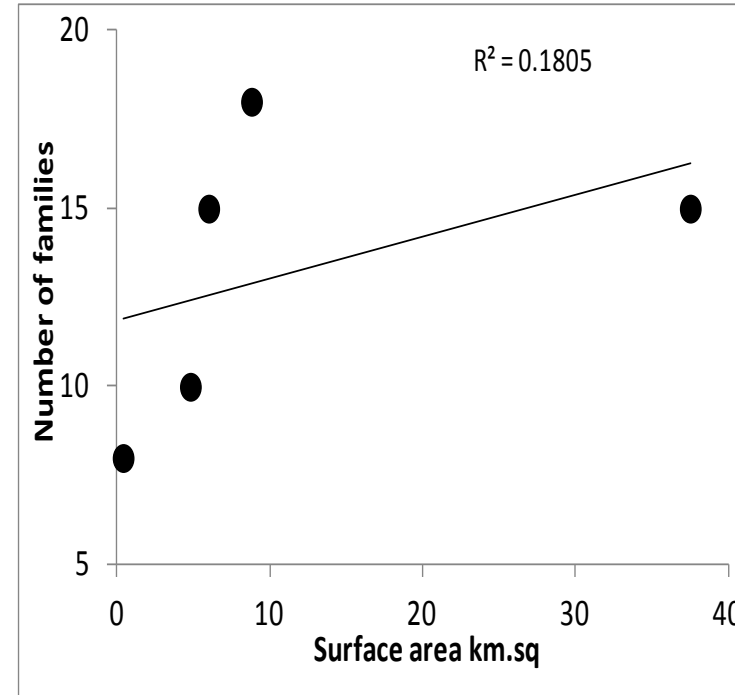
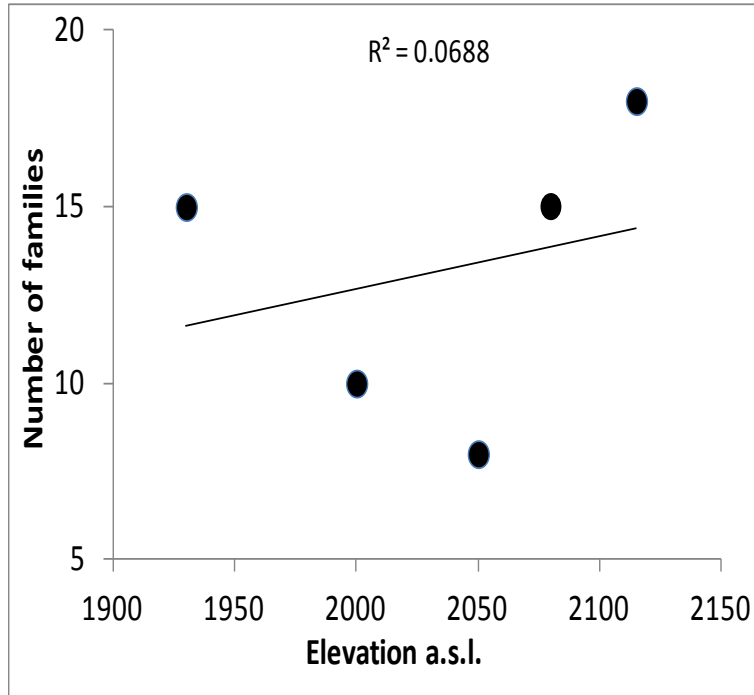
Unique families

Madatapa	Paravani	Saghamo	Khanchali	Bughdasheni
Lestidae	Baetidae	Stratiomyidae	Coenagrionidae	Anthribidae
Libellulidae	Caenidae	Caenidae	Lestidae	
Aeshnidae	Lepidostomatidae	Psychomyiidae	Libellulidae	
Calopterygidae	Psychomyiidae	Goeridae	Stratiomyidae	
Corduliidae			Syrphidae	
Phryganeidae			Tipulidae	
Tabanidae			Haliplidae	
Empididae				
Syrphidae				



Goeridae, Lake Saghamo

Results



Scatter plots expressing the relationship between number of families and surface area/elevation.

Family level diversity could not significantly related to the lake area or altitude ($p > 0.05$), however including both factor in a regression produce a model with a significant parameter estimates at 5% significance level.

Family biotic index

Lake	Surface area (km ²)	max. depth	Elevation (a.s.l.)	Number of insect families	FBI
Paravani	37.5	3.3	2080	15	5.81
Madatapa	8.78	1.7	2108	18	6.03
Khanchali	5.0	1.4	1930	15	5.25
Saghamo	4.81	2.3	1996	10	5.51
Bughdasheni	0.39	0.8	2040	8	5.77

Since our data currently contains abundance data of the family level taxa of aquatic insects, we applied a FBI index (Family Biotic Index (Hilsenhoff, 1988)) which are designed to assess the organic pollution of water. As the value of FBI approaches to 10, then the organic pollution intensity is supposed to be the stronger.

Our team



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Thank you for your attention

