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The Erfelek Stream and Ecological Importance

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Abstract: Although the Erfelek Stream is a small stream with a total length of 80 km and a flood discharge of 302.1 m^3/sec, from its source to the place where it merges with the sea. It is ecologically very important for its immediate environment in terms of the zonations created by it and the groups of living organisms it contains. The fact that it is the only stream that reaches the sea by forming a delta between the Kızılırmak and Filyos Stream and that it reaches the sea by drawing meanders in the delta after different geological formations it passes through starting from an altitude of 1370 meters allows it to be a stream rich in biodiversity. Karagöl, which is connected with the sea, which is almost destroyed within the delta, and the Aksaz wetlands, which are still continuing their existence increase the importance of the stream in terms of both aquatic products and other groups of living organisms. In the fauna and flora of the Erfelek stream, the presence e few benthic invertebrate, fish, birds, mammals and plant species have been identified up to now.
On this study, the importance of biodiversity and ecology of Erfelek Stream is aimed to be revealed as a result of present data and preliminary observations.

Keywords: Ecology, biodiversity, stream, benthic, ichthyofaunal.

Erfelek Çayı ve Ekolojik Önemi

Öz: Erfelek Çayı kaynağından denize karıştığı bölgeye kadar toplam uzunluğu 80 km, taşkın debisi 302.1 m^3/sn olan küçük bir akarsu olmasına rağmen gerek oluşturduğu zonasyonlar gerekse barındırdığı canlı grupları bakımından yakın çevresi için ekolojik olarak çok önemlidir. Kızılırmak ile Filyos Çayı arasında bir delta yaparak denize ulaşan tek akarsu olması, 1370 metre rakımdan başlayarak geçtiği farklı jeolojik formasyonlardan sonra delta içerisinde menderesler çizerek denize ulaşması biyolojik çeşitlilik bakımından zengin bir akarsu olmasını sağlamaktadır. Delta içerisinde neredeyse yok olmuş olan denizle bağlantılı Karagöl ile halen varlığını devam ettiren Aksaz sulak alanları hem su ürünleri hem de diğer canlı grupları bakımından akarsuyun önemini artırmaktadır. Şimdiye kadar Erfelek çayı fauna ve florasında, birkaç bentik omurgasız, balık, kuş, memeli ve bitki türünün varlığı belirlenmiştir.
Bu çalışma ile; mevcut veriler ve ön gözlemler sonucunda Erfelek Çayı'nın biyoçeşitliliği ve ekolojisinin öneminin ortaya konulması amaçlanmıştır.

Anahtar Kelimeler: Ekoloji, biyoçeşitlilik, akarsu, bentik, ihtiyofauna.

1. INTRODUCTION

Sinop is a region that is rich in inland water resources. In contrast to this richness, biodiversity studies are still not sufficient. Several streams in the region have been studied so far. The Erfelek Stream, which passes through a wide variety of geological structures from the areas covered with Alpine meadows and fir forests with an altitude of 1370 where it rises until reaching the Black Sea and which is supported by the springs and tributaries, has a particular importance because it has almost all zonations observed in streams (Anonymous 2015a).

The Erfelek Stream, which is located within the boundaries of Sinop province and rises from Gündüzlü forests in the Küre Mountains, flows in the south-north direction for a long time (Figure 1). The Erfelek Stream, which turns towards the east in the west of Abdurrahmanpaşa village in Erfelek district of Sinop province, again turns towards the north in the west of Veysel village and flows into the Black Sea in about 8 km west of Sinop province. The length of the Erfelek stream flowing on a

broad-based valley is approximately 80 km. The precipitation area of the stream is 249 $km^{2,}$ and its flood discharge is 302.1 m^3/sec. Unlike similar streams in the province, the stream that does not dry up in the summer reaches the Black Sea by meandering in a soil bed in the delta where the Aksaz and Karagöl lagoons are located, in the last 10 km-long section (Anonymous 2015a).

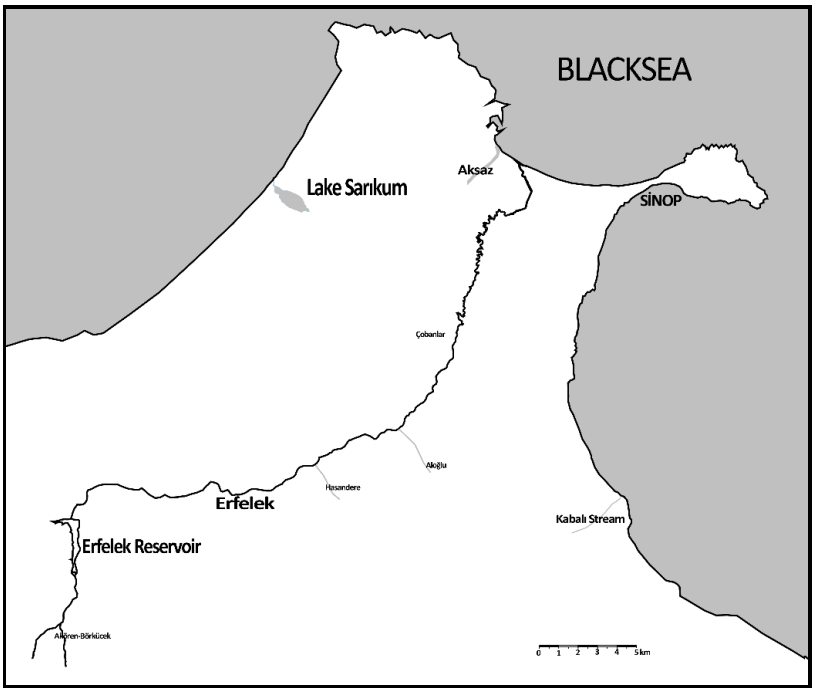

Figure 1. Downstream of erfelek stream (original).

The results obtained from the preliminary examinations carried out in the fish fauna of the stream show that different fish species from the Culupeidae to Cyprinidae family live there. The examination of the Erfelek Stream, which has been gradually changed due to increased agricultural activities and improvement studies, in terms of fish fauna will guide the dam, flood prevention and agricultural field acquisition studies to be carried out in the future. The biodiversity of the Erfelek stream and its importance from the ecological aspect were discussed in this study.

2. BIODIVERSITY OF THE ERFELEK STREAM

Mammal and Bird Species

The fact that the stream does not dry up all the year round enables it to host many different groups of living organisms (Güven 2000; Anonymous 2015b). The peasants working in the surrounding fields and the hunters say that they often see *Lutra lutra*. During the airport expansion studies, most of the old willow trees in the surrounding area and a certain part of the floodplain forestland within the Karagöl Wetland were removed along with the stream bed arrangements performed in the sections near the sea. The prevalence of sea otters has also decreased with the removal of these trees.

As a result of observations in the region; this basin is rich in water birds and raptors in addition to mammals such as martes, weasel and mouse of various species. Ducks, gooses and Anatinae, *Plegadis falcinellus*, Phalacrocoracidae, *Porphyrio porphyrio*, *Fulica atra*, Ardeidae, *Alcedo atthis*, Laridae and Sterninae are the most common water birds. Except these, raptors such as *Falco* sp., Eurasian *Falco subbuteo*, *Circus aeruginosus*, *Accipiter* sp., *Buteo* sp. and *Elanus* sp.permanently or temporarily dwell in this region.

Fish Species

As a result of the investigations carried out within the scope of this study, the Cyprinidae family members constitute the large part of the stream's ichthyofauna. These include culture and *Cyprinus carpio*, *Capoeta* sp, *Barbus* sp., *Squalius cephalus*, *Vimba vimba*, *Alburnus* sp. and *Alburnoides* sp., *Rhodeus sericeus*, *Rutilus rutilus*, *Gasterosteus aculeatus*, *Aphanius* sp., *Gobius* sp. and *Neogobius* sp., *Platichthys flesus* can be included among the other fish species that live continuously in the

stream. *Oncorhynchus mykiss*, *Mugil* sp. and *Liza* sp., *Alosa* sp. and *Syngnathus* sp. are the main species that go to the stream from the sea (Yardım and Erdem 2010).

Benthic Species

Sinop is a region that is rich in inland water resources. In contrast to this richness, biodiversity studies are still not sufficient. Several streams in the region have been studied so far. So far, only two studies have been carried out in the Erfelek Stream, and they were carried out in 2004.

The first one of these studies was carried out by Ertorun and Tanatmış to determine the Ephemeroptera fauna in the Erfelek Stream. 24 taxa belonging to 8 families were reported from this study. These are *Baetis muticus, B. buceratus, B. rhodani, B. fuscatus, B. digitatus, B. vernus, B. lutheri, Baetis sp., Procloeon bifidum, Cloeon dipterum, Centroptilum luteolum, C. pulchrum, Heptagenia longicauda, Epeorus alpicola, Ecdyonurus dispar, Habrophlebia lauta, Choroterpes picteti, Paraleptophlebia werneri, Oligoneurella rhenana, Isonychia ignota, Potamanthus luteus, Ephemera vulgata, Ephemeralla ignita* and *Caenis macrura*.

The Ephemeroptera fauna is one of the important groups discussed in zoogeographic studies due to the factors that prevent their spread such as the fact that they are one of the oldest-known insect taxa and have lifetime in the adult stage, and that they weakly fly during this period, and their nymphs are totally aquatic (Brittain, 1982; Kazancı, 2001; Aydınlı, 2008). Ephemeroptera nymphs constitute 10-25% of all macrozoobenthos in clean natural waters. Ephemeroptera nymphs play a very important role in the secondary production of the food chain in waters due to the fact that majority of them are herbivorous and feed with detritus and algae, and that they can exist in all kinds of aquatic environments such as rivers or stagnant waters, especially almost in all fresh waters in the world all the year round (Brittain and Sartori, 2003; Aydınlı, 2008).

All freshwater fish species, frogs, many birds, Odonata, Plecoptera, Trichoptera larvae, and the larvae and adults of many aquatic insects such as Coleoptera and Hemiptera consume Ephemeroptera larvae as nutrients (Harker, 1989; Aydınlı, 2008).

The other study was carried out by Öktener on the mollusca fauna in some freshwater ecosystems in Sinop and Bafra. As a result of this study, a total of 18 mollusca taxa, including 12 taxa belonging to Gastropoda taxon and 6 taxa belonging to Bivalvia taxon, were determined. Among these taxa, only *Succinea putris*, which is a species belonging to the gastropoda taxon, was reported from the Erfelek Stream. The number of studies carried out to determine the mollusc in the inland waters of Turkey's Black Sea Region is quite limited.

In conclusion, 24 species belonging to Ephemeroptera taxon and 1 species belonging to Gastropoda taxon of the benthic invertebrate organisms have been reported from the Erfelek Stream until now.

3. ECOLOGICAL IMPORTANCE OF THE ERFELEK STREAM

The basic studies that will reveal the fauna, flora, and physical and chemical structures of streams, lakes and wetlands in Turkey are the issues that should be primarily addressed to be able to make protection and management plans, and these are the areas in which accumulation of knowledge is most difficultly provided (Kazancı, 2001).

Natural water resources are more important because they are used as drinking water and irrigation water. The fact that they contain many organisms that are important in the food chain and sensitive to environmental changes also increases their importance. The streams, one of the natural water resources, are rich in oxygen due to the fact that they have a permanent current and are not too deep. Since they are sensitive to ecosystem changes and pollution, macro-invertebrate communities can be used as indicators for biological evaluation. Macro-invertebrates living in polluted water live under stress in fresh water, and those living in fresh water live under stress in polluted water, and they cannot become dominant taxa. This makes it easier to comment on pollution. Macro-invertebrates provide information about the extent of pollution because they cannot escape easily from pollution (APHA, 1998; Demir, 2005).

The Erfelek Stream, which shapes its surroundings and also has a unique importance in terms of the species it has, is one of the unique ecosystems that will provide us with new study opportunities. The Erfelek Stream is an ecologically important ecosystem located within the boundaries of Sinop province. Precautions should be taken to keep safe the Erfelek Stream's ecosystem from being

negatively affected and destroyed by the factors such as climate change, pollution, domestic waste, construction activities, road construction and the presence of dams.

4. CONCLUSION AND DISCUSSION

Located along streams, we can compare the innovations in the truck or the destruction of any source has been found. In the studies and research to be carried out in this important ecosystem, it should be aimed to determine the hydrological, biological, chemical and physical state of the stream and to determine the measures to be taken to identify and improve its social and economic benefits. It is important to study and investigate this ecosystem, which is also important in terms of the specified features, with them. Thus, important data can be obtained on the general state and water parameters of the systems and the potential of living organisms they have. According to the results of the research the basin has a rich biodiversity compared to its immediate surroundings in terms of water birds, raptors and fish fauna.

This study revealed the general biological productivity of the Erfelek Stream and provided a resource for the studies in the future.

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