

Management Plan of Krkn Valley Near Adana in Mediterranean Region in Turkey

Trkiye'de Akdeniz Blgesi'nde, Adana Yakınlarındaki Krkn Vadisinin Ynetim Planı

Research Article

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ABSTRACT

Different aquatic ecosystems are being evaluated to provide energy. A management plan is to be made to determine whether the projects are applicable or not. This study demonstrates possible changes and their potential causes of biological changes as well as measures to be taken regarding both living organisms (invertebrates and vertebrates: fish, amphibians, reptiles; bird and mammal species) and plants, the most important element of ecosystems. Only one species of aquatic living elements, called *Capotea damasciana*, lives in this area. This species are not in any danger of extinction either. Among the animal species of amphibians, *Salamandra s. Salamandra* is in danger of extinction. It will not be affected by the changes made in the water regime of the river, as it lives near the river basin. In addition, there are no reptile species in danger of extinction that live in the basin and near the basin. Those that are in danger of extinction live in other regions. A total of 112 bird species have been identified, and their status and levels of extinction danger have been determined. Of the bird species, *Neophron percnopterus* needs support for food. *Capra aegagrus* and *Lynx lynx* are the mammal species that are most likely to be under most effect. It is forbidden to game these species. *Capra aegagrus* come to the watercourse of Krkn in order to drink water. It is necessary to keep the river water to be used for hydropower in the watercourse at 25-30% level (as life water) in order to meet the water requirements of wild goat and other species to protect the biological elements in the ecosystems of Krkn. This study reveals the conditions of management plan so that the project will not lead to bad effect in the future.

Key Words

Hydroelectricity, Management plan; invertebrates, vertebrates, *Capra aegagrus*

ZET

Farklı sucul ekosistemler enerji sađlamak iin deđerlendirilmektedir. Projelerin uygulanabilir olup olmadıđını belirlemek iin bir ynetim planı yapılması gerekir. Bu alıřma ekosistemin en nemli elemanları olan gerek bitkiler ve gerekse hayvanlar (omurgasız hayvanlar ile omurgalılarından kuř, memeli, ift yařamlılar, srngen ve balıklar) zerinde oluřacak muhtemel deđiřim ve nedenleri ile biyolojik farklılařmaları ve alınacak nlemleri ortaya koymak iin yrtlmřtr. Burada sadece karabalık veya siraz adlı bir balık tr olan *Capotea damasciana* 'nın sucul sistemde yařadıđı belirlenmiřtir. Bu tr iin de her hangi bir tkenme tehlikesi sz konusu deđildir. Amfibi trlerinden blgede olduđu belirlenenler ierisinde sadece lekeli semenderin, *Salamandra s salamandra* soyu tkenme tehdidi ile karřı karřıyadır. Ancak bu tr de dođrudan dođruya su sistemine yakın bir blgede yařamadıđından nehirdeki deđiřiklikten etkilenmeyecektir. Bunların dıřında su havzası veya yakınında soyu tkenme tehdidi altına girecek bir srngen tr de yoktur. Blgede yařadıđı saptanan kuř tr sayısı 112'yi bulmaktadır. Bu alıřmada blgedeki kuř trlerinin stat ve karřı karřıya buldukları tehlike dereceleri de belirlenmiřtir. Kuř trlerinden beyaz akbabanın, *Neophron percnopterus*, besinle desteklenmesi gerekmektedir. Memeli hayvan trlerinden vařak, *Lynx lynx*, ve yaban keisinin, *Capra aegagrus*, deđiřimden etkilenebilecek hayvan trleri olup bunların korunmaları ve avlanmamaları gerekmektedir. Yaban keisi, *Capra aegagrus*, ve diđer hayvan trleri su ihtiyaını karřılamak iin Krkn ayına inmektedir. Bu nedenle Krkn ayında bırakılması gereken can suyu miktarının % 25-30 dolaylarında olması gerekir. Bu alıřma, Krkn Vadisi ekosisteminin bozulmaması ve gelecekte kt sonuçlarla karřılařmaması iin ynetim planının nasıl yapılması gerektiđini ortaya koymak amacıyla yrtlmřtr.

Key Words

Hydroelectricity, Management plan; invertebrates, vertebrates, *Capra aegagrus*

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INTRODUCTION

The amount of energy of Turkey gains from hydraulic systems constitutes only around one-third of the potential available. In the process of increasing this amount and caring to avoid the destruction of the natural habitat, the management plan of the regions where the investments are to be carried out is made [1, 2].

For this reason, the biological and ecological properties which are significant for the management planning of the Körkün basin have been investigated.

Scientific studies have been carried out about birds in the region of the project and in the biotopes in its neighbourhood along a line or at some points and squares using optic instruments (Figures 1, 2).

The Project Area and Some Ecological Properties of the Körkün Stream

The bedrock in the region of the project is composed of lime rocks [3]. It includes the Antalya and Adana divisions of the Mediterranean Region. The Körkün Stream is a system whose level diminishes like other streams in the region because the summer is very arid and hot.

In the region of the project, typical conditions of the Mediterranean climate exist. During July and August when the highest temperatures are recorded, the level of precipitation also decreases.

The biological properties of the project region

In the measurements carried out in the Körkün stream in January, the average water temperature at midday was recorded as 8-9°C, and in September

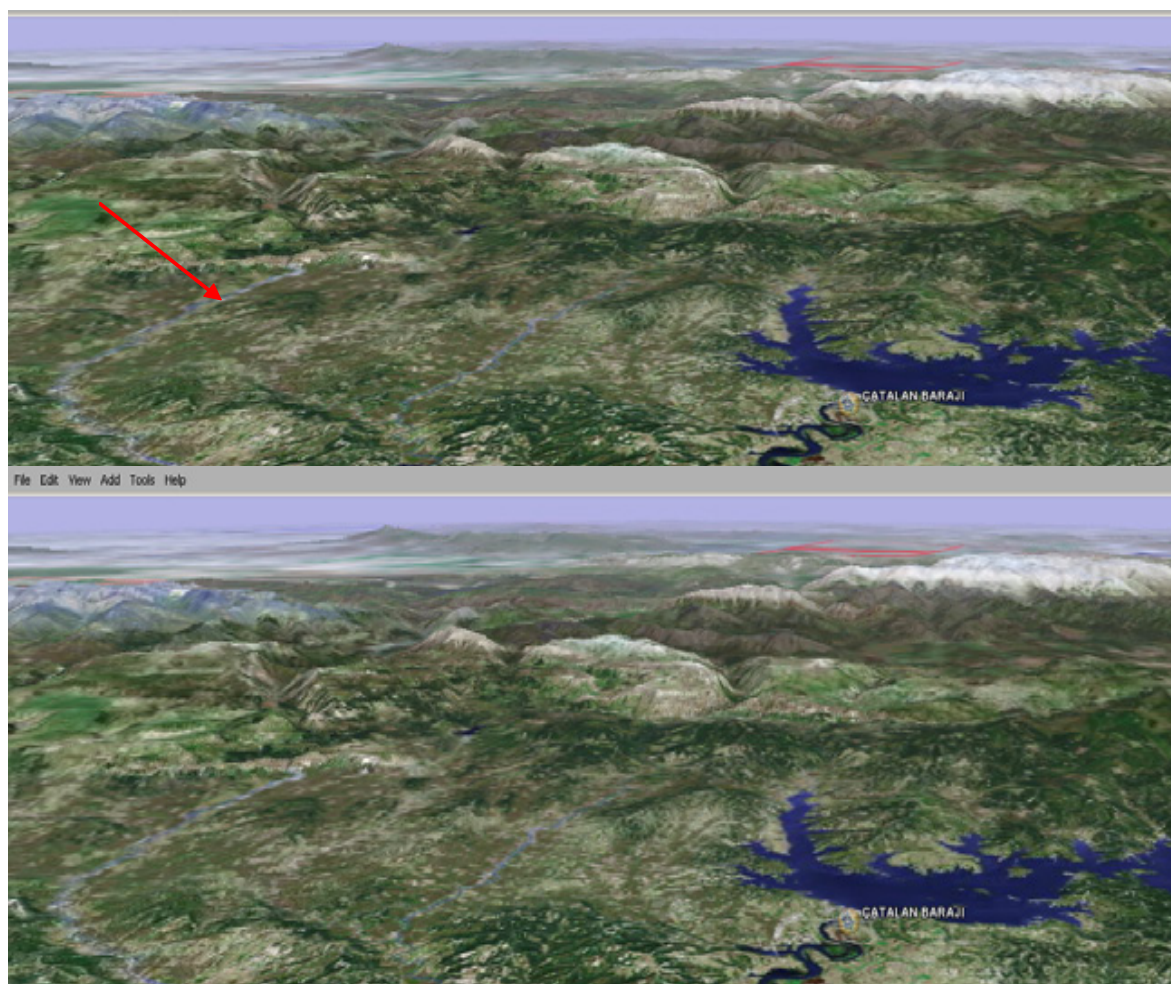


Figure 1. Project Area and Körkün river flow direction followed by the Seyhan River Dam (from Google).



Figure 2. Qamishli River localities.

and October, the water temperature was found to be 14.5-15.8°C

The main purpose of the environmental database research in management planning is to determine the flora, vegetation, aquatic and terrestrial fauna in the region. In addition, the following means of protection should be taken into consideration about the danger of extinction the biological elements determined face [2, 4-6].

The plant existence in the region (Flora)

The flora and vegetation in the mid-Taurus Mountains were examined by Gemici [7]. The most important coniferous tree species in the region are *Pinus nigra*, *Pinus brutia*, *Abies cilicica*, *Cedrus libani*, *Juniperus excelsa*, *J. Oxycedrus*, *J. phoenicea*, *J. sabiniae*, *J. foetidissima* and *Cupressus sempervirens*. The number of species of forest trees is 27 and the most important ones are *Platanus orientalis*, *Quercus coccifera*, *Q. pubescens*, *Q. cerris*, *Q. infectoria*, *Fagus orientalis*, *Carpinus orientalis*, *Acer monspessulanum*, *Ulmus minor*, *Crataegus monogyna* and *Fraxinus ornus*. 37 Plant species belonging to the maquis vegetation have been determined. The number of plant species frequently observed in wetlands is 11 [8] (Figures 3-5).



Figure 3. General floristic structure of the project area.



Figure 4. Found in forest openings *Cyprus crocus*, *Colchicum troodii*.

Animal (Faunal) characteristics

Among these, in aquatic ecosystems and especially under rocks are flies, the species *Baetis buceratus* and *Pseudocentropilum pennulatum* from the order *Ephemeroptera* and the family *Baetidae* and Spurge hawk moth Caterpillar (Figure 6).

Fish

In the Körkün Stream, the species named *Capoeta damascina*, peculiar to the family *Cyprinidae* of the order *Cyprinoformes* is found (Figure 7).



Figure 5. One of the most important sources of income people in the region is the production of apples.

Amphibians

In the project region, fruits, especially apples, are cultivated and pesticides are widely used. This situation negatively affects the aquatic life in the stream, especially amphibians along with fish [9, 10].

It has been discovered that in the project region, seven species of amphibians belonging to five amphibian families are located in the category "LC" (Least Concern), which means "Under Threat at Lowest Level".

It was also discovered that the most common amphibians in the region are frog, *Pelophylax ridibundus* (Bacık et al. P-KD-YHGS, 2009).



Figure 6. Spurge hawk moth Caterpillar (27/09/2010).



Figure 7. Black fish, *Capoeta damascina*.

S. salamandra belonging to the salamander family was found under a rock block in front of a fountain and pictured (Figures 8, 9).

Reptiles (Reptilia)

Reptiles have the species shelled *Testudinata* (Turtles) and tortoise (*Testudo graeca*) and the species of shellless order *Squamata* (lizards and snakes).

It was discovered that the project region has a fauna rich in species of reptiles. In the project region and its neighbourhood, 36 species belonging to 11 reptile families have been discovered, and their national and international (IUCN, BERN) status of protection have been stated.

It was discovered that the family Real lizards (*Lacertidae*) with seven, the family whip snakes (*Colubridae*) with seventeen species are the two families possessing the richest amount of species in the region.

In addition, two snake species preferring the aquatic ecosystem have been discovered. They are *Natrix tessellata* and *Natrix natrix*.

While it was found out that 6 reptile species found in the region aren't in the IUCN list, it was discovered that 30 species are located in the category "LC" (Least Concern) which means "Under Threat at Lowest Level". Again it was discovered that ordinary tortoise (*Testudo graeca*) located in the category "VU" (Vulnerable) in the evaluation based on the list IUCN 2010, is commonly found in the region [2, 3].



Figure 8. Fire salamander, *Salamandra s. salamandra*.



Figure 10. Egyptian vulture, *Neophron percnopterus*.

Bird Species (Aves)

The criteria for threats and dangers birds face have also been evaluated in terms of IUCN categories [4]. As a support to area observations, interviews with the residents living in the project region have been carried out, and extensive literature check was also conducted.

According to the results of observations, examinations and evaluations, the number of bird species discovered to be living in the action area and its neighbourhood is 106 (Figures 10-15).

In the area of research, 112 bird species, 38 from the group *Nonpasseres* and 74 from the group *Passeres* have been discovered. 79 of them are local, 28 of them are emigrants, 2 of them are transit emigrants and 3 are winter visitors [1-2, 6].

Mammals (Mammalia)

As a result of faunistic area observations, survey applications and literature review conducted in 2003; 2009 and 2010, 24 mammal species have



Figure 11. Lang legged buzzard, *Buteo rufinus*.



Figure 12. Eurasien Hobby, *Falco subbuteo*.



Figure 9. Marsh Frog, *Pelophylax ridibundus* (*Rana ridibunda*).



Figure 13. Caspian snowcock, *Tetraogallus caspius*.



Figure 14. Bee-eater, *Merops apiaster*, breed in the region, migration can be of the group 30-40 individual back in September



Figure 15. Black headed bunting, *Emberiza melanocephala melanocephala*

been determined in the project area, its basin and neighbourhood (Figure 16).

Among the mammal species, 20 mammal species belong to the category "LC" (Least Concern); which means Under threat at lowest level". Wild goat *Capra aegragus*, belongs to the category "VU" and lynx, *Lynx lynx* to "NT" and are declining in population.



Figure 16. Cape hare, *Lepus (europaeus) capensis*

The Target Species Anatolian Wild Goat (*Capra A. Aegagrus*)

Wild goat finds opportunity to survive in rocky, rugged and mountainous areas, in caves, cavities and ecosystems with dense vegetation (Graph 1). Generally prefers regions with altitude up to 2500-3000 NN (Figure 17) [11].

DISCUSSION

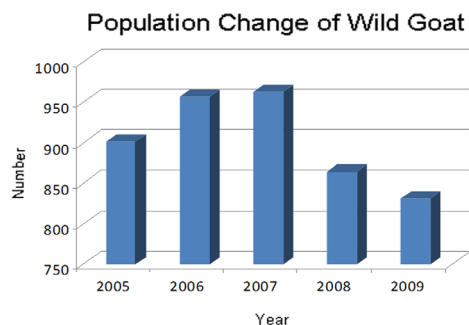
Generally, the required attention must be paid to the entire live habitat in the Wild Life Development Area and the Absolute Protection, Sensitive Usage and Sustainable Usage regions inside it.

One of the rare species extinct in the region is the white vulture (*Neophron percnopterus*). This species whose population size is gradually declining globally must be breed and must be taken under protection with constant supervision.

Lifeline water has been determined to be 30% of the water of the stream and it has been stated that this amount must be adhered to. All sorts of activities to arise as a result of the precautions to be taken being sustainable is the most important part of all these efforts. The local residents must not be totally expelled



Figure 17. Anatolian wild goat (*C. A. aegagrus*), men.



Graph 1. Anatolian wild goat (*C. a. aegagrus*) [Baçık, et al., PKD-YHGP, 2009]

from the area and **“integrated management planning of protection and usage”** must be executed in a balanced way.

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