

# Saint Anthony's High School – Report of Actions taken in Cyprus Biodiversity of Rivers



## Biotic characteristics of a River in Cyprus

The flora and fauna of a region is the set of plant and animal organisms that lives and therefore developed in the river system as the organic material which decomposes, decomposers, the benthos, the aquatic macrophytes, flora of flooded surfaces, fish, birds, amphibians, natural and animal organisms that drift from the waters. This set of plant and animal organisms fits in the biotic characteristics of a river.

Freshwater ecosystems maintain a huge number of species and aquatic organisms. Often aquatic organisms are divided into three categories the benthos, plankton and waterflow.

- The benthos is the set of organisms that live on the bottom of the water and look for their food in this
- The plankton is the set of organisms that drifting by the stream and waving and distinguished in phytoplankton and zooplankton
- The waterfowl is consisted from organisms that swim

But generally rivers dominated by benthos while plankton is more rare. The adjustments in the morphology and behavior of river organisms reflect the trophic relationships that exist in rivers and some of which are aquatic invertebrates. Aquatic invertebrates animals can be divided into four food groups:

- Shredders that feed on dead plant material and using coarse organic matter such as leaves
- Collectors that fed fine material infiltrating water
- Voskites feeding on seaweed and natural materials that are attached onto rocks or other plants

- Predators

In mountains streams are abounding the shredders and collectors since there is a coarse organic matter and the presence of vorkites is limited. All these organisms are the biocommunity of rivers where there is balanced interdependence among species. For example if one kind of organism disappears due to different environmental conditions, it will be replaced by another kind that will be able to survive in these new conditions.



## **Fish fauna**

In the rivers of Cyprus generally find shelter species that are protected by international, European or national legislation like the eel *Anguilla Anguilla*, the freshwater crab *Potamon potamios*, the green toad *Bufo viridis*, the Cyprus water Snake *Natrix natrix cypriaca*, the water turtle *Mauremys rivulata* and the plant communities *Chara* spp.

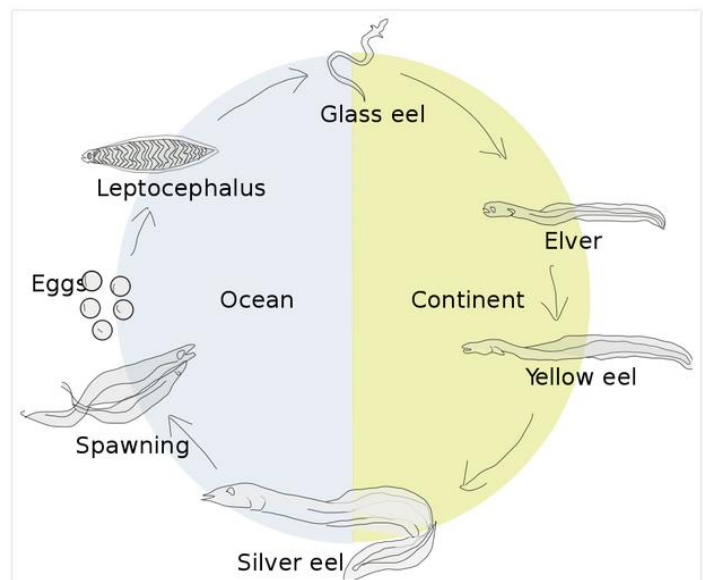
## **Eel *Anguilla Anguilla***

The Cyprus has a relatively limited fish fauna however recorded native species, such as eel *Anguilla Anguilla*. This species is classified as critically endangered by the International Union for Conservation of Nature. Until the 1980s there were plenty of eels in many rivers, but now after the reduction of surface runoff and the creation of artificial barriers, e.g dams, the movement of eel population has declined.

**Description:** The European Eel is a snake-like fish. They can reach a length of 1.5 m, but are usually much smaller, about 60–80 cm and rarely more than 1 m. Even though the appearance on photos might make you mistake it for a moray, it is considerably smaller and less formidable in the water. Still all precautions must be taken. Remember. Never touch the wildlife! This beautiful fish is critically endangered with only 1% of their pre-1980 numbers remaining in the wild. Environmental stresses that have been implicated are diseases (mainly parasites), damming of rivers and pollution. Greenpeace has recently added this species of fish to its supermarket unsustainable fishing redlist.signifying fish commonly sold in supermarkets around the world caught in an unsustainable



**Habitat:** European eels are nocturnal, finding hiding places or burrowing into mud (or under stones) during the day and coming out in search of food at dusk. Eels are remarkably mobile, and are capable of movement over dams and even land.



**Feeding:** The diet is broad, and includes marine, estuarine and freshwater fauna. The principal food is invertebrates like molluscs and crustaceans and fishes. Eels also scavenge on dead fishes. Small eels feed on insect larvae, molluscs, worms, and crustaceans. The diet of larger specimens consists predominately of other fishes. European eels do not feed during the cold months. The cold months are spent in hibernation. The species is reported to leave the water and enter fields to feed on terrestrial fauna, such as slugs and worms.



**Life History:** Much of the eels life history had remained a mystery until fairly recently. The reason is simply the lack of juvenile specimens of the species. Unlike other migrating fish, the eel begins its life in the ocean's open water while they spend most of their lives in fresh water only to return to the ocean to spawn and then perish! Imagine that until the 1900s no one knew of even a location for their spawning grounds. Something that had changed with the studies of Johannes Schmidt who identified the Sargasso Sea as being the most likely candidate for the spawning grounds of the European Eel. Reaching maturity at 5 to 20 years of age these fish can live quite a while longer in captivity...should one dare to capture and imprison such a wonderful animal!!!

### **Potamon potamios-the crab**

There is a plenty population of the crab but there is not exact information on this. However, with the use of insecticide DDT have disappeared from many parts of the island.



**Range:** Potamon potamios has a wide but highly fragmented distribution and is found from Rhodes and Naxos in Greece, to southern Turkey and south throughout the Jordan and Litani River basins to the Sinai peninsula in Egypt. This species is found in the following countries that border the Mediterranean Sea: Greece (Crete and Karpathos plus Naxos in the Cyclades); Turkey (in the southern

coastal provinces of Mugla, Burdur, Isparta, Antalya, Icel, Adana, and Hatay); in Cyprus; in Syria; in Jordan (in Irbid, Balqa, Asimah, Karak, and Maan Provinces); in Lebanon (in Jabal Lubnan and Al-Janub Provinces); in Israel (coastal region, upper Jordan Valley, lower Jordan Valley, Dead Sea region, southern Israel); in the Occupied Palestinian Territories; and in Egypt (Sinai peninsula).

**Countries:** Cyprus; Egypt (Sinai); Greece (East Aegean Is., Kriti); Israel; Jordan; Lebanon; Palestinian Territory, Occupied; Syrian Arab Republic; Turkey (Turkey-in-Asia)



**Population:** There is not much information on the population size and abundance of *P. potamios* in most parts of its range, but it would appear that populations of this species on the islands of Naxos and Cyprus are declining. On Naxos, crabs were present during surveys of the western, northern, and central mountain regions, and the river southwest of Apolon in 1983 (Pretzmann 1993) but later surveys in 1988 did not find any crabs in these

localities, and the river near Apolon was completely dry. The only stable population of crabs found was at Engares in the eastern part of Naxos. In Cyprus, freshwater crabs are locally abundant in the numerous year-round small springs and seepages in the Akamas peninsula, and in the mountain streams of the Troodos mountains and Paphos Forest. However, freshwater crabs have disappeared from many parts of Cyprus probably as a result of the extensive use of DDT and other insecticides during the campaign against malaria. The use of less harmful insecticides in recent years has seen some recovery of certain populations of this species, but not all populations have recovered and some must be presumed extinct in some areas. Populations of *P. potamios* in Cyprus are now recovering from the use of DDT.

**Habitat and ecology:** This species has a very wide distributional range from the Mediterranean and Aegean islands of Greece to the semiarid inland regions in Turkey, Syria, Lebanon, Israel, Palestine, and Egypt. Its habitat includes diverse environments including streams, rivers and lakes, and *P. Potamios* is semi-terrestrial in habit. In Israel *P. potamios* occurs near rivers and fish ponds in the coastal plain, and inland to the Sea of Galilee near rivers draining into the Dead Sea and south into Sinai, Egypt. Medium-sized crabs are nocturnal whereas the larger ones are diurnal and are active during daytime in the water and on the banks of the rivers.



**Major threats:** In Cyprus, *P. potamios* is threatened by deforestation, loss of water in its habitat, and pollution from pesticides. Protection from these threats may be provided to those populations of crabs that are found in the State Forests which are protected areas

in the westernmost tip of the island of Cyprus that may become part of a National Park in the near future.

## **Frogs In Cyprus.**

There are three species of frog in Cyprus. The Green Toad, *Bufo viridis*, is the most widespread as it is the hardiest of the three frogs and can survive in fairly dry conditions for long periods.

The small green Tree Frog lives mainly in the lowlands but can be found in the valleys of Troodos. The small green Tree Frog, *Hyla savignyi* (or *Hyla arborea* ssp *savignyi*) can be found, as is to be expected, in areas with fairly lush vegetation and fairly near water. It is mainly a lowland frog but it can be found in the valleys of Troodos.

Its main breeding area is Phasouri Marsh to which it travels from the nearby plantations in the breeding season.

The Green Toad is the most widespread of the Cyprus frogs and can survive in fairly dry conditions for long periods.



**The small green tree frog**



**Marsh Frog *Rana ridibunda***

antimalaria campaign. Now less harmful chemicals are used. Drainage of the marshes between the Kouris delta and Akrotiri lake and in other places has no doubt also had its toll as these were prime habitats for many aquatic species.

The frogs can often be seen on reed and rushes in the reedbeds at Phasouri and in the area north-west of Akrotiri Salt Lake. They are also often seen on the vegetation on the banks of streams and other water-courses. The most aquatic of the Cyprus frogs is the Marsh Frog *Rana ridibunda*. This leads an exclusively aquatic life and is never far away from a permanent water body. All frogs together with many other aquatic animals and animals that have an aquatic stage in their life were practically exterminated from the island by the use of DDT in the

## **The Grass Snake Of Cyprus: *Natrix natrix cypriaca***

The snake is an endemic subspecies of the island and lives in lakes, streams and rivers whose banks are rich sense. The kind found in Paralimni lake and some streams of Troodos. It is a good swimmer and not bring with poison glands where it makes harmless. Protected by Cypriot and European legislation and has been identified as a priority species on the conservation of.

**Introduction:** The Grass snake is one of the most rare and endangered snakes in Cyprus. This snake, was first mentioned as 'water snake' by Dr. J. Sibthorp who visited Cyprus in 1787. Boulenger in 1888 in his list 'On Reptiles and Batrachians from Cyprus' cites it as *Tropidonotus natrix*. This snake was common in Cyprus, and it was believed that after the early 1960's it was extinct. A small population was rediscovered in 1992 by H. Wiedl. This and another recently discovered populations are so small that they urgently need protection!!



**Cypriot Grass Snake. Normal pattern**

**Species range:** Northwest Africa, Iberia, middle and Eastern Europe, middle England, Scandinavia up to 67° N, former northern Russia, Corsica, Sardinia, Italy, Sicily, Balkans, Greece, many Aegian islands, Turkey, southern Russian, northern Iran, Asia up to lake Baikal. The cyptiot form has been considered an endemic subspace.



**Cypriot Grass Snake. Melanistic**

Localities on Cyprus where specimen were observed: It can be found from sea level up to 700m above sea level. In a dam and stream at the northern foot hills of Troodos massif. In addition in a lake at the east part of island. The earliest archaeological site in Cyprus Akrotiri Aetogremmos has produced a sample of *Natrix natrix* which was living in the island 10,000 years ago. This suggest to

us that the snake was isolated long.

**Identification:** The body length rarely exceeds 100cm, female grow larger than males. A slight stout non – venomous water snake with a well – defined rounded head and round pupil. The colour is variable, and within the subspecies there are three colour morphs. The original of normal pattern has a gray, beige to dark brown ground colour with round dark brown spots or bars in the middle and lateral part of the body. Many melanistic individual can be found . There are a member of dark brown individual speckled with small light dots, called *picturata* – morph, which most probably are hydrids between the normal colour individuals with the black ones. The belly is white with black bars to black in melanistic individuals. The preanal scale is divided, whereas in the viper (*Vipera lebetina*) it is undivided. However in both species all dorsal scales are keeled



## Cypriot Grass Snake. Picturata morph

**Habits:** Diurnal and occasionally nocturnal. It is mainly aquatic and prefer moist areas around streams and dams. In case of disturbance the snake tries to escape into the water and dives. Natrrix is a good swimmer and hunts its prey from water, When handled it does not bite, however it tries to defend itself by emptying a strong bad smelling fluid from the anal glands. This species can be observed mainly between the end of March and the end of October. Sometimes in suitable weather conditions, it can be seen during winter. It seems to be mainly active between May and August. Mating occurs between May and June, oviposition between July and August and hatching between September and October. Based on data from captivity, the clutch size is 4 – 9 eggs. The oviposition sites in nature are unknown.

**Food:** A very special feeder, diet depends almost only in frogs (*Rana levantina*), and very rarely on fish (*Cyprinus carpio*).

**Enemies:** Man who kills it out of ignorance, and other snakes.



Cypriot Grass Snake. *Vipera lebetina*

**Conservation measures and advice for the public:** It seems that the greatest danger that this species faces, is the collection of snakes for private collections and possibly for trade, both by locals and foreigners. Therefore, it is necessary to strengthen control against collection. The public is advised to report to the Game Fund or to the Police anyone who is chasing or collecting grass snakes.

The public should be taught to identify and respect this snake, and should know that is harmless and in danger of extinction.



## **Turtles in Cyprus**

**Reptile population:** Known reptile species is the freshwater turtle *Mauremys rivulata* living in healthy wetlands including rivers. Because of the intense drought observed in our island but also because of the degradation of several natural wetlands, the population has declined and is found mainly in river areas in Paphos and Nicosia. Freshwater turtles are omnivorous and feed on frogs, tadpoles and fresh water fish, and plants with parafdatia. The breeding season is spring. These turtles are threatened with extinction by the intrusion of foreign turtle species that is resistant to contamination of rivers and environmental changes resulting displace natives populations of freshwater turtles. For this reason the freshwater turtle protected by European legislation.

### **Mauremys rivulata**

**Description:** *Mauremys rivulata* is a medium sized terrapin with a not particularly wide head and a long neck. The shell is low and oval and it is tan to olive or blackish in color. The head, neck, limbs and tail are tan-grey to olive-blackish, with yellow or pale-creamy stripes. Females have a more convex carapace, are bigger and have a thinner and shorter tail than males.

**Ecology:** The Balkan terrapin is a semiaquatic reptile, found in a wide range of fresh water lakes, ponds and streams. Settled streams usually have water all around the year or at least divided into larger pools. Edges and shore areas of settled streams are usually covered with dense vegetation providing shelter. Adult Balkan terrapins are omnivorous, feeding on metamorphosed amphibians and their tadpoles, aquatic insects and their larvae, mollusks and plants. The juveniles exist on a strictly carnivorous diet.



Little data are available on the reproduction cycle of *Mauremys rivulata* in Cyprus. In large open air compounds, young usually hatch during April and May. During hotter and more acid years, hatching occurs in February and at the beginning of March. A typical clutch of Cyprus terrapins consists of four to six elongated white, brittle shelled eggs measuring around 22 mm to 36 mm. In Cyprus, terrapins are generally regarded to bring luck. They are therefore collected in the wild and sold. More over the Balkan terrapin is highly endangered due to the destruction of its habitat.



**Behaviour:** Mating usually occurs underwater, but can occasionally also occur on land. Eggs are laid in a hole in the ground dug by the female. The Balkan terrapin aestivates in Cyprus, at least in seasons with drought.



**Water Turtle**  
**Mauremys rivulata at**  
**Zoo Park in Limassol.**

## **Charophyta Chara spp**

One of the groups of organisms used to assess the ecological quality of rivers is the makrofyta. Among them these are a specific group of plants Charofyta. Charofyton plant communities have been identified as species habitat by the European Union. Found in many areas of Cyprus and are sensitive to environmental changes such as water pollution. Also, large amounts of calcium salts and promote conservation as fossils and therefore as objects of paleontological study.



The **Charophyta** are a division of freshwater green algae that includes the class Charophyceae, a sister group to the terrestrial plants, the Embryophyta. In some charophyte groups, such as Zygnematophyceae or conjugating green algae, flagellae are absent and sexual reproduction does not involve free-swimming flagellate sperm. Flagellate sperm, however, are found in stoneworts (Charales) and Coleochaetales, orders of parenchymous charophytes that are the closest relatives of the land plants, where flagellate sperm are also present in all except the conifers and flowering plants. Fossils of a stonewort of Devonian age that are similar to those of the present day have been described from the Rhynie chert of Scotland.

## Visit to the Krios River (Observation of the flora and microorganisms that live in rivers)

On Tuesday, September 30th we took the trip to the river Krio to do some measurements of aquatic organisms that live in rivers. The expedition was held by 11 students of our school, two teachers and with Mrs Athina Papatheodoulou which is a biologist and dealing with river systems.



When we reached the river we put the proper attire to be able to enter the river and gathered for the first instructions about our activities. Specifically, Ms. Papatheodoulou told us that the whole activity will be divided into two sections: During the first phase we had to gather leaves from the river (inside the river) and from the banks of the river to identify these leaves with trees that we have in Cyprus, dealing with this way with the Flora of the river that we investigating. The second unit or activity would have to do with the microorganisms living in the rivers and then to analyze. Before we start describing the fauna of the river that we are dealing too we should mentioned that the day we had arranged to go on the river were not the right conditions to make measurements because the day before it was raining in all over Cyprus and the water of the river had rather a lot of mud and soil and we couldnt see clearly inside the water but this was a problem that we dealt with and we try to pass it. Actually we couldn't go



another day just because that day we had the necessary equipment that will be needed for the measurements.





## Flora of the River.

First we talked about the rivers of Cyprus and their characteristics. Then, we went to find leaves from the river. We are trying to find as much as we could from different trees or plants. When we gather all the leaves we had a meeting and a conversation of the different kinds of leaves that we found. We learned about a lot of trees in our rivers with this conversation. We analyzed them and we learned what trees can be identified near rivers and trees which when we will know that there is somewhere near water. In next paragraphs we are describing the trees and plants from the leaves that we found in our river exploration at Krios on 30<sup>th</sup> of September 2014.







As we can see from the photo above, the water the previous day that it had rained throughout the mountainous Cyprus, water the previous day swelled the river until it reached the top of the dried herb to see.

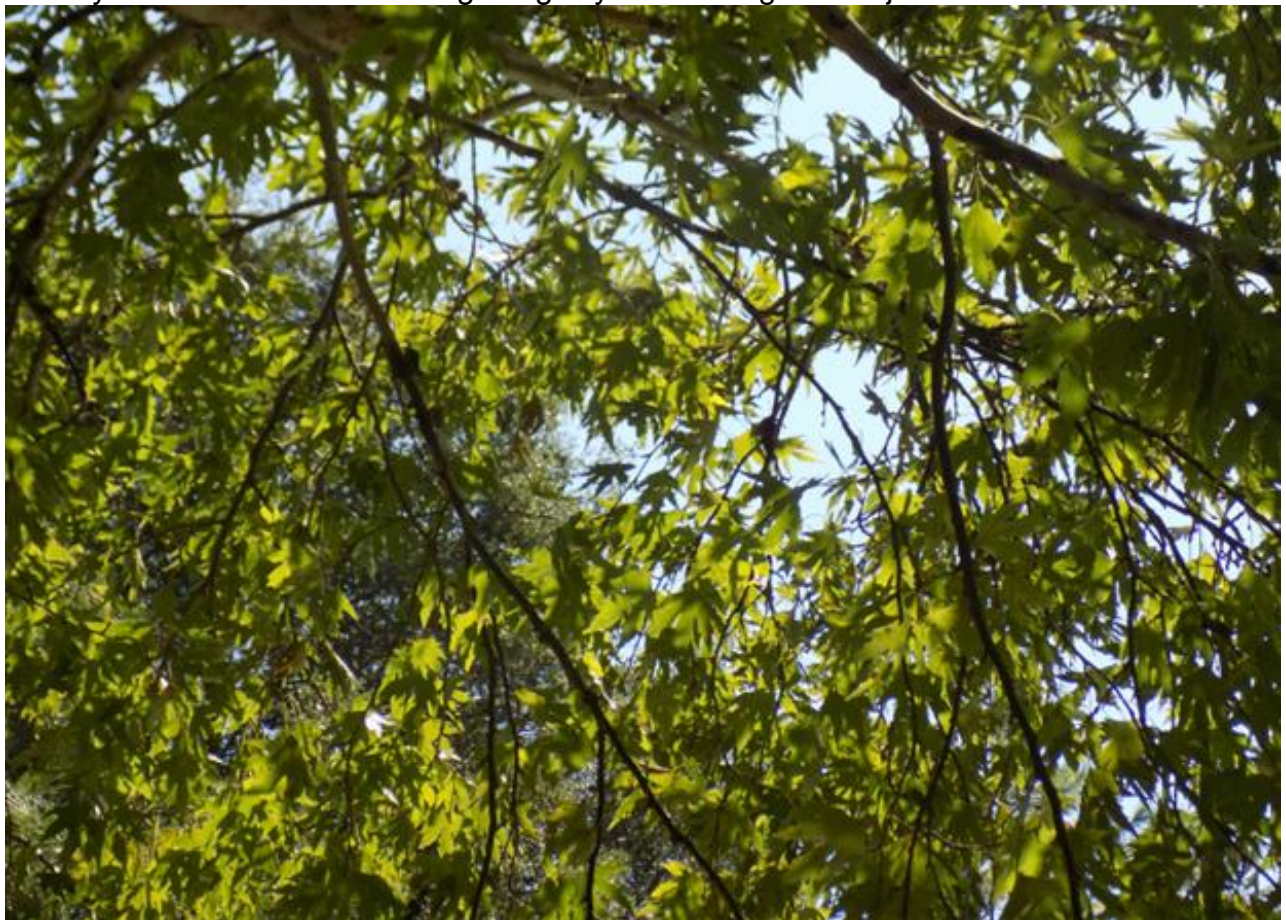


## Platanus orientalis, Plane tree



Plane leaves are look like the palm of our hand and we need to know that where there is this tree there is water. Robust deciduous tree, up to 30 meters with massive trunk and crown spreader. Leaves in a shape of a palm, large with toothed

lobes. Male and female flowers in clusters that form spherical heads. Globe, consisting of simple, oblong, hairy achiness. Can be found in rivers and water sources, from sea level to 1600 meters altitude. It has great ecological and aesthetic value because it is one of the few broadleaf tree of Cyprus occurring in rivers and it's very beautiful tree mainly in autumn because it's getting a yellow-orange color just before he leaves. It is



relatively resistant to fire. The wood is used for furniture, paper and firewood.

### ***Nerium Oleander***

*Nerium oleander* is an evergreen shrub or small tree in the dogbane family Apocynaceae, potentially toxic in all its parts. It is the only species currently classified in the genus *Nerium*. It is most commonly known as oleander, from its superficial resemblance to the unrelated olive *Olea*. It is so widely cultivated that no precise region of origin has been identified, though southwest Asia has been suggested. The ancient city of Volubilis in Morocco may have taken its name from the Berber name *oualilt* for the flower. Oleander is one of the most poisonous of commonly grown garden plants.

Oleander grows to 2–6 m (6.6–19.7 ft) tall, with erect stems that splay outward as they mature; first-year stems have a glaucous bloom, while mature stems have a grayish bark. The leaves are in pairs or whorls of three, thick and leathery, dark-green, narrow lanceolate, 5–21 cm (2.0–8.3 in) long and 1–3.5 cm (0.39–1.38 in) broad, and with an entire margin. The flowers grow in clusters at the end of each branch; they are white, pink to red 2.5–5 cm (0.98–1.97 in) diameter, with a deeply 5-lobed fringed corolla round the central corolla tube. They are often, but not always, sweet-scented. The fruit is

shrub or small tree in



a long narrow capsule 5–23 cm (2.0–9.1 in) long, which splits open at maturity to release numerous downy seeds.

**Habitat and range:** *N. oleander* is either native or naturalized to a broad area from Mauritania, Morocco, and Portugal eastward through the Mediterranean region and the Sahara (where it is only found sporadically), to the Arabian peninsula, southern Asia, and as far East as Yunnan in southern parts of China.<sup>[5][6][7][8]</sup> It typically occurs around dry stream beds. *Nerium oleander* is planted in many subtropical and tropical areas of the world. On the East Coast of the US, it grows as far north as Washington DC, while in California and Texas it is

naturalized as a median strip planting.

Ecology: Some invertebrates are known to be unaffected by oleander toxins, and feed on the plants. Caterpillars of the polka-dot wasp moth (*Syntomeida epilais*) feed specifically on oleanders and survive by eating only the pulp surrounding the leaf-veins, avoiding the fibers. Larvae of the common crow butterfly (*Euploea core*) also feed on oleanders, and they retain or modify toxins, making them unpalatable to would-be predators such as birds, but not to other invertebrates such as spiders and wasps.

The flowers require insect visits to set seed, and are pollinated through a deception mechanism. The showy corolla acts as a potent advertisement to attract pollinators from a distance, but the flowers are nectarless and offer no reward to their visitors. They therefore receive very few visits, as typical of many rewardless flower species. Fears of honey contamination with toxic oleander nectar are therefore unsubstantiated.

**Therapeutic efficacy:** Drugs derived from *N. oleander* have been investigated as a treatment for cancer. According to the American Cancer Society, the trials have produced no evidence of benefit, but they did cause adverse side effects.

**Toxicity:** *Nerium oleander* has historically been considered a poisonous plant because some of its compounds may exhibit toxicity, especially to animals, when consumed in high amounts. Among these compounds are oleandrin and oleandrogenin, known as cardiac glycosides, which are known to have a narrow therapeutic index and can be toxic when ingested.

Toxicity studies of animals administered oleander extract concluded that rodents and birds were observed to be relatively insensitive to oleander cardiac glycosides. Other mammals, however, such as dogs and humans, are relatively sensitive to the effects of cardiac glycosides and the clinical manifestations of "glycoside intoxication".

However, despite the common "poisonous" designation of this plant, very few toxic events in humans have been reported.

According to the Toxic Exposure Surveillance System, in 2002, 847 human exposures to oleander were reported to poison centers in the United States. Despite this exposure level, from 1985 through 2005, only three deaths were reported. One cited death was apparently due to the ingestion of oleander leaves by a diabetic man. His blood indicated a total blood concentration of cardiac glycosides of about 20 µg/l, which is well above the reported fatal level. Another study reported on the death of a woman who self-administered



"an undefined oleander extract" both orally and rectally and her oleandrin tissue levels were 10 to 39 µg/g, which were in the high range of reported levels at autopsy. And finally, one study reported the death of a woman who ingested oleander 'tea'. Few other details were provided.

In contrast to consumption of these undefined oleander-derived materials, no toxicity or deaths were reported from topical administration or contact with *N. oleander* or specific products derived from them. In reviewing oleander toxicity, Lanford and Boor concluded that, except for children who might be at greater risk, "the human mortality associated

with oleander ingestion is generally very low, even in cases of moderate intentional consumption (suicide attempts)".

Toxicity studies conducted in dogs and rodents administered oleander extracts by intramuscular injection indicated that, on an equivalent weight basis, doses of an oleander extract with glycosides 10 times those likely to be administered therapeutically to humans are still safe and without any "severe toxicity observed".

### **Almyriki-Tamarisk**

It can be found in rivers that there is not much flow in wetlands and salt. Tamarisk is a genus of flowering, dikotylon plants, belonging to the class of the violet, the family Tamaridoeidon. Its saplings are native in many coastal areas of Greece and the Mediterranean, close to beaches, riverbanks and streams the watery horizon is brackish. The tamarisk has strong root system and branching roots reaching deep. The branches are slender and the leaves are forming numerous scales. The flowers are very small pink or pale, is arranged in long inflorescences and grow at the ends of branches. Extremely resistant to drought and soil salinity already favored by spraying with seawater. Grown along the coast as an ornamental, for shelterbelts, and for his shadow on the beaches.



## Reeds

Reeds are the most characteristic plant of the river. They live in rivers and stagnant waters. They are empty inside them in order to enter the air. The reed is common name of many monocot perennial plant usually. The reeds are in ponds, swamps in the banks of lakes, rivers, creeks, streams and still waters. The term reed can also mean the reeds ear or even the reed block. All plants are generally characterized as reeds have rhizomes or stolons, leaves are long and ribbon at the top have a long inflorescence. The stem is solid or hollow, woody, bent by the wind, and it helps to spread various seeds. There are many kinds of reeds. In Greece we find the following:



- **The common reed-*Phragmites australis***

Native to Europe, perennial plant that resembles bamboo and has the scientific name *Phragmites australis*. Stems are erect, with many leaves, shrub reaching a height of 8 meters and developed by many underground rhizomes. The leaves reach a length of 60-70 cm. Extremely hardy plant is located along the coast, rivers, wetlands and generally likes to wet soils. But it may be in arid, dry and gravelly soils. It can be grown to protect the land from erosion, to create several windbreaks, protect various crops like ornamental setting up shelters and shelters. The stems are used for making woodwind instruments and fishing rods. From the leaves are made a various of matting's.



- **Reed or wild reed**

Multiannual weed of the fields, with smooth non-woody stems and a height not exceeding 2.5 meters. It is also found in various wetlands and are extremely hardy plant and resembles the common reed.

- **Straw**

Perennial plants with soft leafy shoots and height 2.5 meters. They usually are in areas with ponds and swamps.

- **Diaper or Sparganioum erektoum**

Polymorph plant with thin sprouts that reach a height of 2 meters. The leaves are sword-shaped and are upright and minutes. The inflorescences look like sea anemone. In Cyprus, the reeds used for knitting baskets or panniers which are large baskets. Such structures can be used for the storage of the production of wheat.





### **Antzoulovatos or arkoudovatos or xylovatos**

Atzoulovatos where is a soft and climbing plant that can be hooked to the other plants. It's a climbing plant of Cyprus's flora; it belongs to the family of liliidon and found in forests, shrublands, fences, and in parks. It has thin, angular sprouts with thorns. The leaves are epallassonta, sagittal or ovate, pointed, glossy, leathery and thorns in their region. The flowers are small yellow-green in axillary or apical inflorescences. The fruit is small, round, reddish rail. They have been described by Theophrastus and Dioscorides. In Greece it is known by other names, such arkovatos, xylovatos and smilagi. It's extracted for medicinal purposes is the root of European sarsaparilas. Mafritiani variety has thorns and the fruit is ink. Belongs to the same genus Smilax the medical, pharmaceutical climbing plant, native to Central America. The oblong hard and strong rhizomes used for pharmaceutical purposes (US sarsaparilas radicals), because they contain substances having diuretic, laxative, antirheumatic and antichoiraadikes properties. For the same purposes are the rhizomes similar species such as yew pharmaceutical Honduras, the yew is perikosmi Mexico, the Smilax Glafki Virginia fruit of arkoudovatou climber of the Greek flora.





## Terebinth

Shrub terebinth is everywhere, not only near the rivers and is a Mediterranean kind. Deciduous shrub or small tree up to 6 meters. It is native to Cyprus and meet almost all over Cyprus. Its fruits are used for the preparation of local pasta,



the tremithopittes. In some areas are eaten fried with salt. In many plants grow keratomorfa zookikkidia containing yellow dye. Caused by granular insect.





In Cyprus we use the fruits of that tree to make pies which admittedly is very sweet and is one of the delights of the Cypriot cuisine.



## Thistle (Gaidouragkatho)

The common thistle (*Onopordum acanthium*) flourishes in countries with Mediterranean and continental climate in Greece, Asia Minor, Western Asia and it has been introduced in many other places around the world. It wants dry summers and sandy or loamy soils, rich in lime. It is found mainly in rural areas, mountainous and rocky areas and on pavements or on the edge of the asphalt, it's having a tendency to appear in excavated or disturbed soils. It lives two years and forming shrub up to three meters in diameter and up to one meter. The flower is round like a ball, with thorns and is food for donkeys. It is the national emblem of Scotland and displayed while the national emblem of the Order of the Thistle is the oldest and noblest knights of Scotland.



## **Inula (Konizzos)**

Inula belongs to the large genus of about 90 flowering plants in the sunflower family (Asteraceae) native to Europe, Asia and Africa. It is mostly herbaceous perennial plant that vary greatly in size, from small species a few centimeters tall to enormous perennials by more than 3 meters high. The name "Inula" comes from the beautiful Helen of Troy, as the legend says was keeping the plant in her hand when she left with Paris to live with him in Troy or that sprang from the tears that fell to earth. Inula is very effective for asthma, congestion, coughs, bronchitis and is known primarily as a respiratory stimulant, as used to facilitate breathing in asthma. The root is the part that is used primarily in the pharmaceutical and chemical components are elenalini, elenini and inulin responsible for the expectorant and antiseptic properties. Inula also contains a volatile compound, the alantolactone, with antibacterial and antifungal properties, and sterols, resins, and pectin musilage. Inula recommended herb as diuretic, expectorant and astringent properties. Inulin containing insulin provides relief from bronchial asthma and strengthens the immune system.



## Carob Tree *Ceratonia siliqua*

*Ceratonia siliqua*, commonly known as the **carob tree**, **St John's-bread**, or **locust bean** (not to be confused with the African locust bean) is a species of flowering evergreen shrub or tree in the pea family, Fabaceae. It is widely cultivated for its edible pods, and as an ornamental tree in gardens. The ripe, dried pod is often ground to carob powder which is used as a substitute for cocoa powder.

It is native to the Mediterranean region including Southern Europe, Northern Africa, the larger Mediterranean islands; to the Levant and Middle-East of Western Asia into Iran; and to the Canary Islands and Macaronesia. The word *carat*, a unit of mass for gemstones and a unit of purity for gold alloys, was possibly derived from the Greek word *kerátion* literally meaning a small horn, and refers to the carob seed as a unit of weight.

### Morphology

The *Ceratonia siliqua* tree grows up to 15 metres (49 ft) tall. The crown is broad and semi-spherical, supported by a thick trunk with brown rough bark and sturdy branches. Leaves are 10 to 20 centimetres (3.9 to 7.9 in) long, alternate, pinnate, and may or may not have a terminal leaflet. It is frost-tolerant.

Most carob trees are dioecious, some are hermaphrodite. The male trees don't produce fruit. The trees blossom in autumn. The flowers are small and numerous, spirally arranged along the inflorescence axis in catkin-like racemes borne on spurs from old wood and even on the trunk (cauliflory); they are pollinated by both wind and insects.

The fruit is a legume (also known less accurately as a pod), that can be elongated, compressed, straight or curved, and thickened at the sutures. The pods take a full year to develop and ripen. The ripe pods eventually fall to the ground and are eaten by various mammals, thereby dispersing the seed.

### Habitat and ecology

The carob genus, *Ceratonia*, belongs to the Fabaceae (legume) family, and is believed to be an archaic remnant of a part of this family now generally considered extinct. It grows well in warm temperate and subtropical areas, and tolerates hot and humid coastal areas. As a xerophytic (drought-resistant) species, carob is well adapted to the ecological conditions of the Mediterranean region. Trees prefer well-drained loam and are intolerant of waterlogging, but the deep root systems can adapt to a wide variety of soil conditions and are fairly salt-tolerant.

While previously not believed to form nitrogen fixation nodules typical of the legume family,<sup>[7]</sup> trees have been identified more recently with nodules containing bacteria believed to be from the *Rhizobium* genus.



Although used extensively for agriculture, carob can still be found growing wild in eastern Mediterranean regions, and has become naturalized in the west. The carob tree is typical in the southern Portuguese region of the Algarve, where it has the name *alfarrobeira* (for the tree), and *alfarroba* (for the fruit), as well as in southern Spain (Spanish: *algarrobo*, *algarroba*), Catalonia and Valencia (Catalan: *garrofer*, *garrofa*), Malta (Maltese: *Farruba*), on the Italian islands of Sicily and Sardinia (Italian: *carrubo*, *carruba*), and in Southern Greece, Cyprus as well as many Greek islands such as Crete and Samos. The common Greek name is (Greek: χαρουπιά, charoupia), or (Greek: ξυλοκερατιά, ksilokeratia), meaning "wooden horn". In Turkey, it is known as "keçiboynuzu", meaning "goat's horn". In Israel it's called "Haroov", known as "life saving tree - kav kharoovin". The various trees known as *algarrobo* in Latin America (*Albizia saman* in Cuba and four species of *Prosopis* in Argentina and Paraguay) belong to a different subfamily, Mimosoideae.



### **Etymology, history and cultural significance**

The word carob comes from Middle French carobe, which was taken from Arabic (kharrūb, "locust bean pod"), which derives from Akkadian language kharubu. *Ceratonia siliqua*, the scientific name of the carob tree, derives from the Greek kerátion (κεράτιον), "fruit of the carob" (from *keras* [κέρας] "horn"), and Latin *siliqua* "pod, carob." The term "carat", the unit by which precious metal and stone weight is measured, is also derived from the Greek word kerátion (κεράτιον), alluding to an ancient practice of weighing gold and gemstones against the seeds of the carob tree by people in the Middle East. The system was eventually standardized, and one carat was fixed at 0.2 grams.

In late Roman times, the pure gold coin known as the solidus weighed 24 carat seeds (about 4.5 grams). As a result, the carat also became a

measure of purity for gold. Thus 24-carat gold means 100% pure, 12-carat gold means the alloy contains 50% gold, etc.

Subsistence on carob pods is mentioned in the Talmud: Berakhot reports that Rabbi Haninah subsisted on carob pods. It is probably also mentioned in the New Testament, in which Matthew 3:4 reports that John the Baptist subsisted on "locusts and wild honey"; the Greek word translated "locusts" may refer to carob pods, rather than to grasshoppers. Again, in Luke 15:16, in the Parable of the Prodigal Son, when the Prodigal Son is in the field in spiritual and social poverty, he desires to eat the pods that he is feeding to the swine because he is suffering from starvation. The use of the carob during a famine is likely a result of the carob tree's resilience to the harsh climate and drought. During a famine, the swine were given carob pods so that they would not be a burden on the farmer's limited resources. Use of the carob plant dates back to Mesopotamian culture (modern day Iraq). The carob pods were used to create juices,

sweets, and were highly prized due to their many uses. The carob tree is mentioned frequently in texts dating back thousands of years, outlining its growth and cultivation in the Middle East and North Africa. The carob tree is mentioned with reverence in "The Epic of Gilgamesh", one of the earliest works of literature in existence.

The Jewish Talmud features a parable of altruism, commonly known as "Honi and the Carob Tree", which mentions that a carob tree takes 70 years to bear fruit; meaning that the planter will not benefit from his work, but works in the interest of future generations. In reality, the fruiting age of carob trees varies (see under Cultivation).

During the Second World War, it was common for the people of Malta to eat dried carob pods and prickly pears as a supplement to rationed food.



## Uses



Carob consumed by humans is the dried (and sometimes roasted) pod, and not the 'nuts' or seeds. Carob is mildly sweet and is used in powdered, chip, or syrup form as an ingredient in cakes and cookies, and in chocolate substitute. Carob is rich in sugars - Sucrose =  $531\text{g} \pm 93\text{ g/kg}$  dry weight for cultivated varieties and  $437 \pm 77\text{ g/kg}$  in wild type varieties. Fructose and glucose levels do not differ between cultivated and wild type carob. Chocolate contains theobromine, which is poisonous to some mammals, but carob does not, and is used to make chocolate-flavored treats for dogs.



Carob was eaten in Ancient Egypt. Carob juice drinks are traditionally drunk during the Islamic month of Ramadan. It was also a common sweetener and was used in the hieroglyph for "sweet" (*nedjem*). Dried carob fruit is traditionally eaten on the Jewish holiday of Tu Bishvat. Also it is believed to be an aphrodisiac.





**In Cyprus, carob syrup is known as Cyprus's black gold, and is widely exported.**

In Malta, a syrup (*gulepp tal-ħarrub*) is made out of carob pods. This is a traditional medicine for coughs and sore throat. A traditional sweet, eaten during Lent and Good Friday, is also made from carob pods in Malta. However, carob pods were mainly used as animal fodder in the Maltese Islands, apart from times of famine or war when they formed part of the diet of many Maltese.

In the Iberian Peninsula, carob pods were used mainly as animal fodder, especially to feed donkeys.

Carob pods were an important source of sugar before sugarcane and sugar beets became widely available.

Carob syrup is also used in Crete, Greece as a natural sweetener and considered a natural source of calcium. It contains three times more calcium than milk. It is also rich in iron, phosphorus and natural fibers (Due to its strong taste, it can be found mixed with orange or chocolate).

Carob pod meal is used as an energy-rich and palatable feed for livestock, particularly for ruminants, though its high tannin content may limit its use. Crushed pods may be used to make a beverage; compote, liqueur, and syrup are made from carob in Turkey,



Malta, Portugal, Spain and Sicily. Several studies suggest that carob may aid in treating diarrhea in infants. In Libya, carob syrup (there called *rub*) is used as a complement to Asida. The so-called carob syrup made in Peru is actually from the fruit of the *Prosopis nigra* tree.

The seeds, also known as *locust beans* are the source of locust bean gum — a food thickening agent.

*Ceratonia siliqua* is widely cultivated in the horticultural nursery industry as an ornamental plant for planting in Mediterranean climate and other temperate regions around the world, as its popularity in California and Hawaii shows. The plant develops a sculpted trunk and ornamental tree form when 'limbed up' as it matures, otherwise it is used as a dense and large screening hedge. When not grown for legume harvests the plant is very drought tolerant and part of 'xeriscape' landscape design for gardens, parks, and public municipal and commercial landscapes.



## **Studying rivers**

The rivers are very dynamic systems that change in time and space so to achieve a stand-perception of the situation of a river requires long-term observation and the quantitative and qualitative assessment parameters eg chemical, microbiological and ecological status .Also is required constant research, the adoption and development of tools for monitoring the quality of the state and the placement of satellite photographs, geography information systems and hydrologic models.

To improve the situation of the rivers of Cyprus is a prerequisite understanding of their significance and to cultivate a sense of respect for the environment.

The best way to achieve this is through education. For example would be for schools to organize educational trips to various rivers so that the student can come into contact with the liquid element and the environment, have the opportunity to get some water samples and various organizations and observe the vegetation there.

So we did our turn to our own measurements because it was an important step to better understand some things to aquatic organisms and rivers.