

# WATER NEAR US



Erasmus+



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## INTRODUCTION



This educational unit has been developed in accordance with objectives of the project "Water Around Us" within the framework of Erasmus+ programme in the EU, with participating schools from six countries: Finland, Germany, Iceland, Latvia, Portugal and Spain.

The project has lasted for three years, in each year having its particular subject matter to be studied closer. In the first year (2014/15) we studied how the topic of water is covered in the school curricula, and the water properties in experiments, which resulted in an educational unit - a booklet with descriptions of experiments. In the second year (2015/16) we aimed at studying the water cycle in the nature, as a result we developed a booklet presenting a set of experiments dealing with this topic. The topic of the third year (2016/17) was to study and present important water bodies – lakes, rivers, seas, etc., found in the project partner countries or nearby regions.

In the Transnational Meeting in Finland in May 2016, all the partner schools agreed on the general guidelines for the contents of the booklet. Each partner school chooses one body of water in the nearby location, for example, a lake, a river, a sea gulf, etc. Each school prepares information in the following 3 aspects:

Part 1 - 2 pages giving general information, name, geographical features, something about the flora and fauna of the particular body of water, with pictures.

Part 2 – 2 pages on how the body of water is used for leisure, hobbies and recreation (fishing, boating, swimming, windsurfing, under-ice fishing, etc), with pictures.



**Part 3 – 2 pages on something that is very special about the particular body of water,**  
- rare animal or fish species, industrial use, exceptional geological value, strategic geographical location, etc., with pictures.

As a result the current educational unit comprises information about seven different bodies of water from seven partner schools in six countries:

- The Deildartunguhver hot water spring by Grunnskolin i Borgarnesi.
- The Atlantic Ocean by Agrupamento de Escolas de Valongo.
- Lake Saimaa by Lauritsalan koulu.
- Los Toruños Natural Park by Instituto de Education Secundaria La Granja.
- The River Wern by Balthasar-Neumann-Verbandsschule Werneck.
- The River Main by Mittelschule Holderhecke Bergrheinfeld.
- The Gulf of Rīga by Rūjienas vidusskola.

The current educational unit comprises a lot of photos and pictures mostly taken by our students or teachers during field trips or expeditions to the particular area. All pictures should have the name, surname of the author and the place name or some commentary, or designate the source of the picture from the internet.

Especially interesting is part three about specific features of the chosen water body, for example, a thorough look back into the historical background about the River Wern in Germany, or description of a unique natural phenomenon - 30-metre-high waves at Nazare in Portugal on the coast of the Atlantic ocean, or an insight into the future of the water body which has been presented by our partners from Iceland.

Hopefully, the current booklet would turn out to be a useful source of information about various water bodies, so different in size but so meaningful for the local area, not only for pupils but also for teachers who would be able to use this educational unit as a class or outside class material, to enrich the school curricula and provide more extraordinary study aids for pupils.



## GENERAL INFORMATION

# DEILDARTUNGUHVER HOT WATER SPRING



A little north of Borgarnes there is a big body of hot

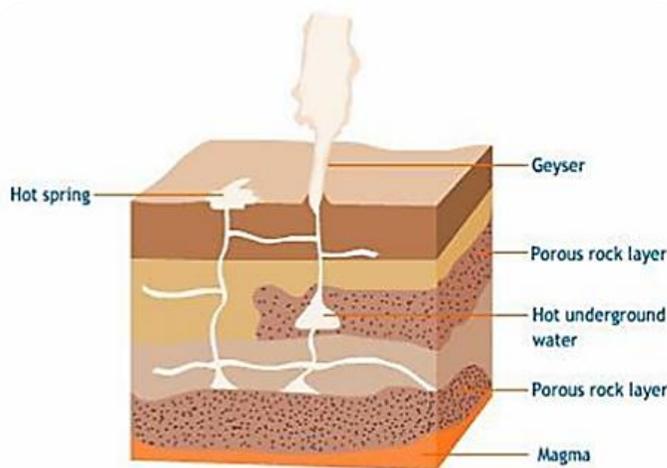


water that is used for many purposes. Here also lies one of the biggest geothermal water installations in the world. It is Europe's most powerful hot spring. Deildartunguhver is a part of the biggest geothermal systems in Borgarfjörður.

If you look at natural surface geothermal heat then the Reykholts system is indeed Europe's most powerful in Iceland, with almost 400 liters of boiling spring water flowing in one second. Deildartunguhver stands for almost half of this flow of water, 180 liters a second, so it means it is very productive. From Deildartunguhver water flow, about 130-140 liters is used. Normally that is about 75% of the total flow. The utilization is the most in the winter, where it goes up to 160 liters a second, but falls in the summertime when the hot water decreases.

Two small wells are also connected to the system and manage the heating for Akranes, Borgarnes, Hvanneyri and the countryside nearby.

The water is from a geothermal hot spring. And this is the primary source of hot water for both Borgarnes and Akranes, and it's the largest geothermal hot spring in Europe. The water travels 64 km to Akranes and when it arrives it's about 78-80 °C, the water travels to Borgarnes which is about 34 km. The spring pumps up 180 liters of 100 °C hot water, which is enough to fill up 25 swimming pools within an hour.



Geysers and Hot Springs



<http://www.visindavefur.is/svar.php?id=11117>



## HOW IT IS USED

## DEILDARTUNGUHVER HOT WATER SPRING



The usage of the Deildartunguhver was for a long time pretty small compared to the performance but in the



<http://www.islenskt.is/en/farmers/id/1947/solbyrgi>

seventies ideas about activating the hot spring to heat up houses in Akranes and Borgarnes came up. Today the water is used for heating up houses, water in swimming pools and heating up the greenhouses in the neighbourhood. For many years rye bread has been baked in the hot spring.

### Strawberries

The strawberry cultivation at Sólbyrgi began with

vigour in 2013. The houses are heated with geothermal heat from Deildartunguhver, honeybees pollinate the plants and organic defences are used. The strawberries at Sólbyrgi are picked straight into



<http://www.west.is/is/west/service/borgarnes-swimming-pool>

the boxes and the farmers place great emphasis on maintaining strict hygiene and use gloves during picking. The strawberries are delivered to the market only a few hours after having been gathered.

### Swimming Pools

The swimming pool in Borgarnes is located by the sea. The hot water in the swimming pool comes

from Deildartunguhver. It is an outside swimming pool which is 25 meters long and also an inside swimming pool which is 12,5 meters long, three hot tubs, a steam bath which is fed with steam straight from the Deildartunguhver, a children's pool and three water slides.

The swimming pool in Húsafell is one of the most popular entertainments in the area. It was originally built in 1965 but since then it has been renovated both the pool and its surroundings. There are two pools, two hot tubs and a small water slide.



<http://www.husafell.is/islenska/sundlaug/>



## SPECIAL ASPECTS

## DEILDARTUNGHVER HOT WATER SPRING



### A Rare Fern



<https://www.anniesannuals.com/plants/view/?id=3745>

A very rare species of fern, called Hard fern or Deer fern (*Blechnum spicant*) may be found at the spring. This fern is considered the only one of its kind in the world. It is critically endangered and thus it is protected.

### Krauma

Just 70 meters north of the natural hot spring Deildartunguhver KRAUMA geothermal nature baths is now under development. Groundbreaking took place on April 26th 2016, with construction beginning a couple of

days later. The 550 m<sup>2</sup> building will consist of the Main Building, with changing facilities for 140 people, a restaurant and a bar, and a souvenir shop. Outdoors on the premises you will be able to enjoy hot tubs, saunas and a unique tranquility room. The main attraction of Krauma will be its natural geothermal baths. They are all containing the completely natural geothermal water from Deildartunguhver spring.

To cool the hot water, cold water from the neighbourhood will be used. No chemicals will be added to the water, it will be pure, constant and rapid flow. Moreover, they will offer hot tubs, two distinct steam baths, each with its own aroma, and for those who want to

balance their energy, and who dare, there will be an ice cold bath to dive in. Of course, there will be a relaxing room with music and a fireplace. Hopefully Krauma will be opened in the year 2017.



<http://www.krauma.is/#home-montauk>

### History

District heating was established in 1979 and subsequently hotwater pipes were placed to both Borgarnes and Akranes. In 1981 the water came to the towns and infrastructures inaugurated early in 1982.



# GENERAL INFORMATION ATLANTIC OCEAN



## What is the origin of the name?

- Name: Atlantic Ocean
- Age: 150 million years old
- Area: 82 000 000 km<sup>2</sup>
- Geographical position (limits):
  - ✓ east: Europe and Africa
  - ✓ west: North America and South America
  - ✓ north: Arctic Ocean
  - ✓ south: Antarctic Ocean
- Surface temperature: -2°C to 29°C
- Depth:
  - ✓ 3600 m (average);
  - ✓ 8648 m (max.)

The name Atlantic has a Greek origin, referring to one of the ancient Titans of Greek mythology, Atlas. Atlantic Ocean roughly translates to "Sea of Atlas". Son of Iapetus and Clymene, two other Titans, Atlas was condemned to forever stand on the edge of the Earth and carry the heavens on his shoulders as punishment from Zeus for fighting against the Olympian Gods during the War of the Titans. The Atlas Mountains were

said to be the place where he stood, because Zeus told him to stand at the "western edge of the world," and the Atlas Mountains were about as far west as anyone knew about in that era. So, although the term "Atlantic" originally referred to the Atlas Mountains in Northern Africa, it eventually went on to designate the sea near the western African coast, and eventually the whole ocean.

## How and when did it form?

The birth of the Atlantic Ocean can be explained by the theories of plate tectonics and continental drift, which are deeply intertwined. The lithosphere, Earth's outermost layer, is divided into several pieces called tectonic

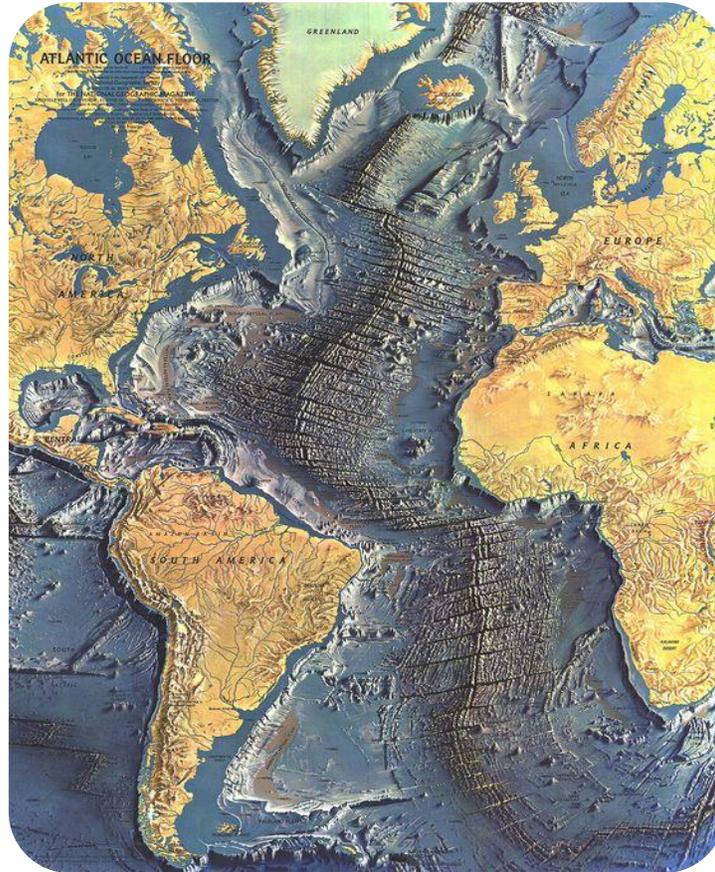
plates, which move in different directions. These movements, too slow to be perceptible to humans (about 1,5 cm per year, on average), are powered by convection currents in the asthenosphere, a more ductile layer upon which sit and move the lithospheric plates. Tectonic plates are constantly in motion – moving apart from each other at divergent plate boundaries (creation of rift valleys), colliding at convergent plate boundaries (formation of mountain ranges and subduction zones), or





simply slipping past one another along fault lines. About 180 million years ago the divergent boundaries caused the North and South American plates to move apart from the Eurasian and African plates, forming a depression, the Atlantic basin, that would eventually be filled with water. This basin, which formed approximately 150 million years ago, during the Jurassic Period, is still growing today at the Mid-Atlantic Ridge, at a rate of about 2,5 cm per year. The Mid-Atlantic Ridge is a huge submarine mountain range and divergent boundary that hides at the bottom of the Atlantic, where new oceanic crust is being formed through volcanic activity and plates are moving apart. The Portuguese archipelago of

the Azores and Iceland, for example, are part of the Mid-Atlantic Ridge.



Did you also know that...?

Covering around one fifth of the Earth's surface (82 million km<sup>2</sup>), the Atlantic Ocean is the second largest ocean

basin in the world, after the Pacific basin. Just like dry land, the bottom of the Atlantic is made up of hills, mountains and valleys. Its deepest point can be found in the Puerto Rico Trench, which reaches a maximum depth of 8648 meters. The waters of the Atlantic Ocean are moved by tides and currents that follow the paths of the winds. In the North Atlantic, the currents move clockwise, while in the South Atlantic they move counter-clockwise. These currents

are very important to climatic control, since they transport warm and cold waters to different regions.



## HOW IT IS USED

# ATLANTIC OCEAN



### Atlantic, world of fun and leisure

The Atlantic Ocean, particularly off the coast of Portugal, represents, besides a resource of extreme economic value, a source of leisure and a place for all types of recreational activities. Throughout all year, but especially during summer, thousands of Portuguese people and tourists head to the shores to enjoy all the things the Atlantic Ocean has to offer, from the pure pleasure of sunbathing in the famous beaches of our country to the countless nautical

sports and other related activities.

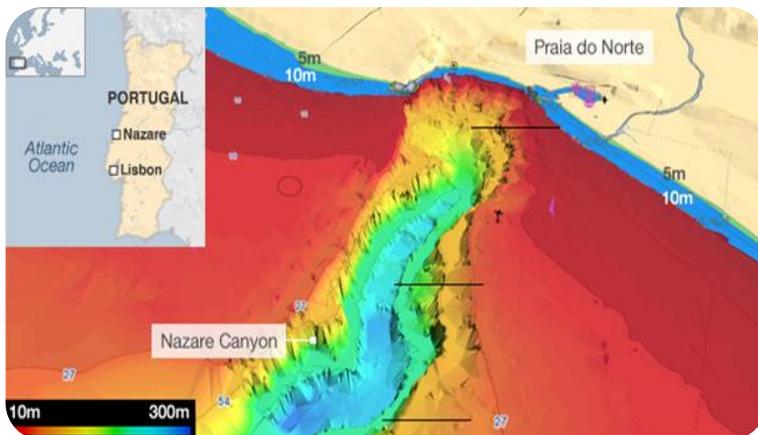
### Surfing

The Portuguese coast is a perfect place for most kinds of nautical sports, attracting people from all corners of the world. One of these sports is surfing. Portugal has a great surfing tradition and its temperate sunny climate, along with its excellent beaches and waves, make it one of the best surf destinations of Europe. In Portugal, it is possible to find a very diverse offer of waves, from the

smaller ones, more suited for beginners, to the most radical, which take surfing to a whole new level. The combination of an irregular coastline with the constant Atlantic undulation results in more than 800 km of coastline which are definitely worth exploring. For these reasons, Portugal has hosted several events of the biggest surf championships worldwide.

### Have you ever heard of the Nazaré Canyon?

The picture below was taken in Nazaré, a Portuguese coastal town



*A gigant wave at Nazaré*



known for the giant waves that form in the nearby beaches. This is caused by the Nazaré Canyon, a 170-km long submarine canyon, the biggest of Europe, that cuts through the Atlantic seafloor from the continental shelf to the abyssal plain, reaching a maximum depth of 5 km. The narrow canyon, rising as it approaches the coast, channels the Atlantic water flow towards the "Praia do Norte" beach, amplifying the size and energy of the waves, which can be 30 meters high!

### Scuba diving and snorkeling

Portugal is taking on an increasingly bigger role in the global stage of recreational diving. The abundance of shallow ocean banks teeming with life, sunken ships colonized by all kinds of sea creatures or submerged caves waiting to be explored, create the perfect environment for diving.

The Azorean islands, in the middle of the Atlantic, have a particularly great

potential for this activity, thanks to the clear warm waters that surround them (high visibility of up to 30 meters and temperatures above 20°C, in the summer), and rich biodiversity.



### Would you dare?

One of the many Azorean ocean banks is the Condor seamount, near the island of Faial, which recently became a scientific observatory, protected from fishing activities. The Condor Bank is a great place for shark diving, with a vast

number of blue sharks and shortfin mako sharks!

### Underwater photography

The picture on the left was taken in the 1st European Championship of Underwater Photography, which took place in Graciosa Island, in 2014, with teams from nine countries. It shows a school of ornate wrasses (*Thalassoma pavo*), with the typical clear and blue Azorean waters in the background.

Cetacean watching is another growing activity in Portugal, since the Atlantic waters off the Azorean coast are a true safe haven for whales and dolphins. From migratory to resident species, it is possible to find more than 20 types of cetaceans in the area around the nine islands, a third of the total number of existing species.

### The Atlantic: fauna and flora

Located at the far west of Europe, with 800 km of coast bathed by the Atlantic Ocean, mainland Portugal displays a wide variety of marine species inhabiting the nearby sea region, including species



which are typical of both the Atlantic flora and fauna and the Mediterranean flora and fauna. The Madeira and Azores archipelagos, with a very distinct geographical situation, broaden the number of available species. The Portuguese flora and fauna, extremely diversified, are one of the biggest treasures of our country.

Species to find

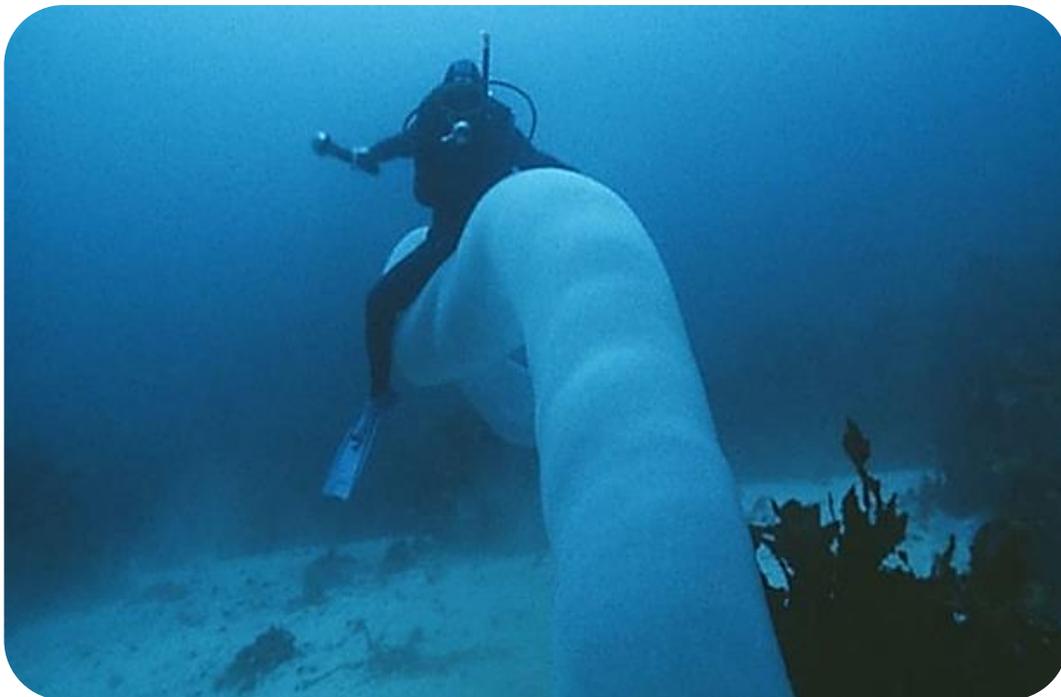
- Bottlenose dolphin
- Atlantic spotted dolphin

- Sperm whale
- Humpback whale
- Blue whale

But what exactly are pyrosomes?

No, they are not aliens. Pyrosomes, or *Pyrosoma atlanticum*, are tubular colonies made up of hundreds or thousands of tiny invertebrate organisms called zooids, which are embedded in a common gelatinous tunic that joins all the individuals. The zooids along the tube's walls draw in ocean water from the outside, filtering it

and feeding on plankton, and then expel the filtered water into the space within the tube. The water then exits the tube through its only opening, on one of two ends. This water circulation not only helps the colony to keep its shape, but it also helps it move (sort of like jet propulsion), although its movements are largely influenced by currents. Pyrosomes are found in the upper layers of the open ocean, in warm waters.



The tubular colony of Pyrosomes





## SPECIAL ASPECTS

# ATLANTIC OCEAN



### The "Black Smokers"

It is widely considered that ancestral life first emerged from the ocean waters. More specifically, some suggest that life might have originated at fissures in the ocean floor called hydrothermal vents, some of which are also known as "black smokers". These interesting formations, which are only found in volcanically active regions like divergent plate boundaries, are submarine fountains of geothermically heated water, enriched with nutrients and minerals from deep inside the Earth's crust. Around these natural chimneys, even without sunlight, life thrives, and all thanks to chemosynthetical bacteria that produce organic compounds, using the oxidation of those same minerals that are expelled by the hydrothermal vents as an energy source, and form the base of the food chain in this unique environment.

Today, deep down the Atlantic Ocean off the coast of the Azores, seven hydrothermal fields have been discovered (the most recent in 2011).

### How do they form?

These vents are created by ocean water that infiltrates the cracks on the ocean floor, in volcanically active regions with a high geothermal gradient. The infiltrating ocean water, superheated up to 350°C, also dissolves minerals present in the crust. As the hot water escapes from the vents and mixes with the cold water of the ocean bottom, the metals quickly rain out of their solution. This results in dark clouds of particle-rich water, "black smokers", which often erupt out of tall chimneys of previously deposited solidified minerals.

### Rich deposits of minerals

Many of the richest deposits of minerals found on the planet were created around

hydrothermal vents. Copper ores mined on the island of Cyprus in the Mediterranean Sea were once the site of hydrothermal vents, before they were uplifted to form the island of Cyprus.

Today, research is being conducted to see if active vents can also be mined for their rich mineral deposits. At the present time, the fields are too small and too far below sea level to make mining profitable.

### The Atlantic: economic importance

An exclusive economic zone (EEZ) is a maritime region whose economic exploration and environmental management is under the responsibility of a certain country. Portugal has the 3<sup>rd</sup> largest EEZ in Europe, and the 11<sup>th</sup> in the world. If the EEZ's area is included in our country's area, then the Atlantic waters under Portuguese jurisdiction make up 97%



of the national territory. With almost 4 million km<sup>2</sup> of ocean to explore, the Atlantic represents a wide range of opportunities for Portugal, just waiting to be grabbed. Sectors like the industries of fishing and aquaculture, maritime transport or nautical tourism (among other

examples) show great potential, yet some are still underdeveloped. Renewable energies, for instance, are taking their first steps in Portuguese waters.

Project "WaveRoller"  
Developed by a company from Finland, devices that

convert ocean waves to electricity are being tested in the Portuguese coast. Operating in near-shore areas and depths between 8 and 20 meters, a single unit (panel anchored to the seabed) may produce between 500kW and 1000kW of energy.





## GENERAL INFORMATION

# LAKE SAIMAA



### Lake Saimaa

Lake Saimaa is the largest lake in Finland and it is



Satellite picture of Saimaa  
(photo Wikipedia)

the fourth largest lake in Europe.

One special feature of Lake Saimaa is its coastline, altogether 14 850 kilometers. As you can see below Saimaa meanders a lot. The form is due to the movement of the massive glaciers during the Ice Age. There are 5 484 islands.

Lake Saimaa is well-known and a popular spot to visit. Every Finn knows the lake. For example, a summer cottage at Lake Saimaa costs more than a cottage at other lakes in Finland. There are many towns and villages by the lake shores. Among others Lappeenranta, Joensuu and Mikkeli are located by Lake Saimaa.



Saimaa ringed seal  
(photo Wikimedia commons)

### Saimaa ringed seal

Saimaa ringed seal can only be found in Lake Saimaa and it is the most endangered seal in the world. There are 360

individuals nowadays. The goal is to bring up the number up to 400 individuals. Then the Saimaa ringed seal would not be so endangered. Volunteers are helping the Saimaa ringed seals by building nests to protect the newborn cubs in winter.

### Fish stock

Saimaa fish stock is the largest in Finland. It includes 32 species of fish. Vendace and whitefish are both the most popular food fish. Other important fish species are brown trout, salmon, arctic char, pike perch and perch.



Ice fishing  
(photo Wikimedia commons)



## HOW IT IS USED LAKE SAIMAA



In summer the water is warm enough for swimming. We have clean beaches and pure, safe water, we have no dangerous animals or fishes in the water. Natural beaches usually have mud or rock bottoms, but we also have man-made beaches with white sand.



*Team Rowing  
Photo by Tea Hall*

Boating is a very popular hobby in Finland. There are about 700 000 boats in Finland. You can sleep on your boat and spend weeks boating, because there are also camping

sites on the shores of the lake open to everyone. The camping sites are well equipped and clean. Visiting camping sites is free.

Camping at archipelago, beaches, forests etc. is legal, and there is no need for permission. You just have to respect the nature and not go too close to inhabited buildings and yards. You can pick berries, mushrooms and flowers, but you can not cut trees over or make fire in forest. There are hiking routes in the archipelago.

For fishing you need to buy a fishing permit. You do not need a fishing permit for fishing with

rod, but if you go fishing with a net, spinning rod, fish trap etc. About 1.7 millions - 30% of Finns go fishing at least once a year.

Saimaa freezes in winter, so we do different things then than in summer. In winter you can walk on the ice of the lake, ski and skate. If you want to go fishing at winter, you need to do a hole to the ice. If you would like to go ice swimming you need to make a slightly bigger hole.



*Boats in a port  
Photo by Saku Laitinen*



# SPECIAL ASPECTS LAKE SAIMAA



## Connected with the Baltic Sea - The Saimaa Canal

The Saimaa Canal is a canal that connects lake



*Mälrikä Lock  
Photo by Tea Hall*

Saimaa to the Gulf of Finland, which is a part of the Baltic Sea. The canal starts in Lappeenranta in Finland and it ends in Vyborg in Russia. It was first opened in 1856. The canal is basically a water elevator with eight locks. Lake Saimaa is 75,7 meters higher than the Gulf of Finland and the canal makes it possible for boats to travel to the

gulf even though it is much lower than the lake. The canal's length is 42,9 kilometers and it is mostly used for industrial

use such as shipping wood, but it is also a tourist attraction. Also, local people like to go on mini cruises in summer to

see the landscape and enjoy the nature. The whole canal used to belong to Finland but nowadays about half of it belongs to Russia.

There are three big paper mills by lake Saimaa and they are all really close to each other. The three paper mills are built

within a radius of 45 kilometers. One of those mills called UPM is really close to our school and it is only 400 meters away. In the mill they make different types of papers and they also produce biofuels. Wood industry has always been a big part of Finnish labour market and it has brought lots of jobs to Finland. Wood is mostly used to produce paper. These products have been exported via the Saimaa canal, and that has brought even more jobs.



*Leaving Lappeenranta harbour  
Photo by Tea Hall*



## GENERAL INFORMATION

# LOS TORUÑOS NATURAL PARK



Los Toruños is a Natural Park situated 22 kilometres from Jerez, in El Puerto de Santa María.

### General information

Surface: 1000 hectares

Municipalities: El Puerto de Santa María and Puerto Real, Cádiz

Population: 412. 115 inhabitants (metropolitan area)

- Bay of Cadiz is protected as the Nature reserve.
- 80 % of its territory is a marine - terrestrial public domain.
- It includes an important cultural, historical and ethnographic heritage.
- It has a big ecosystem diversity: virgin beach, dunes, salt marshes, coastal pine groves, salt works, pastures.
- Big wealth of protected indigenous species on a global scale: fauna and flora.
- It is used for some economic purposes, such



as: shellfishing, fishing, salt works, aquaculture, etc.

### Natural values

The Metropolitan Park is framed in a biophysical space dominated by the mouth of the river Saint Peter and the nearby area in the shape of coastal arrow, salt marsh, dunes and pine grove, which are joined in their origin and evolution.

The Park includes:

- Peninsula of the Toruños, which is practically a virgin salt marsh on a coastal arrow drained by innumerable pipes. The peninsula is provided also with the Levante Beach and with a

singular dune system, that confirms the virgin nature of the ecosystem.

- Pine grove of the Algaida: constituted by a forest tract, which develops on stabilized dunes.

- Fresh water lagoons: the area of the Pine grove

of the Algaida presents natural "islands" of fresh water in hypersaline surroundings.

- Pastures - grasslands, which complete this diverse terrestrial marine ecosystem.

### Flora

The proximity to the coast, salinity, and the force of the wind, models a very particular flora, great areas of pines or other types of trees like jaras, bufalagas, olivillas and other rare species.

Due to the proximity to the marsh, it is possible to see asparagus, small olive trees or acebuche and other salt-resistant species.



### Fauna

The Park gives shelter in their different habitats to a rich and varied fauna. The species that inhabit these ecosystems respond to the conditions of the area, presenting adaptations specific to periods of desiccation, variable physical-chemical and soil conditions, etc.

Along the Beach of Levante we find bivalves such as razor clams, cockles, clams, etc., crustaceans such as the fiddler crab and polychaetes as the miñoca, all rich delicacies for birds who use the Park during the winter or in the migration steps. The species more

abundant are the gilt-head bream (*Sparus aurata*), seabass (*Dicentrarchus labrax*), sole (*Solea senegalensis*), eel (*Anguilla anguilla*) and smooth (*Liza spp*). Within the species more important during the winter we can find the

oyster catcher, the sandpipers and the kentish plover. Other birds abundant in the area are the Hudsonian whimbrel, redshanks, black-winged stilts, herons and terns.



*The shallow water is a paradise for birds*



## HOW IT IS USED

# LOS TORUÑOS NATURAL PARK



Los Toruños natural park offers a great variety of different sports. These activities include both water sports and other kind of sports that are done on the ground. The activities are the following:



### Kayaking:

There are several guided routes. The most famous is the one where you can see the fauna, flora and marshland. It is done in the San Pedro river. People from different places go there to have new experience and to practice this marvelous sport. There are also school or scout groups that go there as an out-of-school trip to specially do this activity.

Besides kayaking, there are boat rides that people enjoy too.

### Windsurfing:

It is possible to practice windsurfing at Los Toruños, next to the beach, where some courses can be done, above all in the summer.

### Swimming:

People use to go to do swimming from spring to autumn because of the good temperature and weather, however, the Levante wind can be very strong sometimes, and although it is very good for practicing windsurfing or other wind sports, it is not very comfortable for swimming.

### Cycling:

There are two biking routes. In the first one you can learn about the salt mines and the adaptation process of the birds in the park. In the second one you can get to know about the pine wood and the stock zone.

### Train ride:

On the train ride you can see the plants and animals that live in the park. It is a small green train that drives since the start of the road (where the salt mines are) to the Levante Beach. The tour lasts 1h 30mins.

### Hiking:

The route is around 30 kilometers long, with different elements that make the park worth seeing and attractive to hikers, like wooden walkways that save some zones from flooding, lookouts and observation tower for the enjoyment of people.

With these different paths, visitors can learn about the natural habitats and the diversity of the ecosystems that coexist in the Park.



## SPECIAL ASPECTS

# LOS TORUÑOS NATURAL PARK



### Flora



The average marsh gets flooded in the tides, so the previous species start disappearing and give way to others of minor size and bigger resistance to the salinity; they are the salicornias, sapinas, verdolagas, etc.



The Nature Reserve Bay of Cádiz is called to be the green lungs of the bay because it is a place full of public services, thinking about the leisure, the culture, the nature and the sport, but especially, paying attention to the biodiversity.

The flora of this park is divided in three big parts.

### The vegetation of the marsh:

In the low marsh the espartina is outlined. As it increases the altitude and the land stabilization, we find the armajo of small leaves. The dominant alga is the pelillo.



Indian Fig tree  
(*Opuntia fiens - indica*)

Together with this tree, the undergrowth typical of the coastal pine groves are the mastic tree (*Pistacia lentiscus*), the mitnan (*Thymelaea hirsuta*) – a desert shrub, the broom, the peach palm (*Palmito*), the wild olive tree and the white asparagus. In a small zone of the marsh of the Toruños, we can find some samples of the Carrasco pine.

The high marsh flooded during the tide is practically colonized exclusively by the spartina, that nowadays is considered in danger of extinction. This part of the marsh is the most stable.

### The pine groves:

The stone pine (*pinus pinea*) located on sandy places, is the natural inhabitant of the pine groves of the Park.





**The dunes:**



The dunes cross the beach of the Levante being interrupted only by the tide tubes that they connect the river San Pedro with the sea. This system of dunes is located in the high part of the beach, with vegetable species as the Barrón (*Ammophila arenaria*) – a kind of reed, the Cuernecillo de mar (*Lotus creticus*) – a wild legume and the sea lily (*Pancreatium maritimum*). During the spring, the dunes are transformed in

a nice scene, because two species of birds make their nests and they raise their baby birds there.

**Fauna**

At Toruño´s Natural Park live a lot of animal like bivalves, crustaceans, fish, birds, etc. Some of them come there to feed like flamingos or eagles. We can also find many kinds of fish, birds and some little mammals like rabbits in the Park.

**Industrial Use**

Los Toruños Natural Park is used industrially, for example, there are salt flats, trains, aquaculture and eco-friendly vegetable gardens.



Gilt – head sea bream



Sole



Sea bass



Flamingos: they are pink or orange because of their food that contains carotene, like carrots.



Crustaceans - Crabs



Salt - flats

**Salt flats:**

There are three areas, two of them are medieval and the other is from the 18th century. Nowadays they are not usable but the structure is still there.

The water supply is from the San Pedro River, there exists a flood gate on the dam which is open or closed if you want to get water or not.

**Trains:**

The train does not work nowadays, but in 1852 it was the first train project in Spain and also the first train line in Andalusia. It went across Jerez de la Frontera, our city, El Puerto de Santa Maria, where this natural park is located and El Portal, another town.



An eco friendly vegetable garden

**Eco friendly vegetable garden:**

It was constructed to encourage vegetable growing and consumption, it is also built to facilitate pesticide free agriculture. If you want to see it you can contact its office or you can visit its website.



# GENERAL INFORMATION THE RIVER WERN



## General information



The rise of the Wern near Pfersdorf,  
Photo by Andreas Deuerling

But one R got lost somehow.

The body of water rises between Rannungen and Pfersdorf at about 320 m above sea level.

There is a difference in altitude of 133 m.

The catchment area is about 602 km<sup>2</sup>. The river Wern is a tributary of the river Main. After it has flown through several villages and big parts of nature for 74 km it runs into the river Main in



The rise of the Wern near Pfersdorf  
Photo by Andreas Deuerling

Right next to the Balthasar-Neumann-School you can find the river Wern. It does not look like a river at all, flowing very gently through Werneck. During the 8th century the name of the river was written *Werma*, around 1015 they spelled the name *Werina*. The name Wern has an Indo-Germanic root *ûer*, which can be translated as 'water' or 'rain'. This root is also included in the names Werneck, Niederwerrn, Oberwerrn and Wernfeld, which are all settlements next to the river. In earlier times the river was spelled with double R as well, Werrn.

Gemünden-Wernfeld. It was characteristic for the little river, that it meandered through the nature in thousands of little bends.



(Source: Mainpost 23.04.2014, homepage)



The river Wern near Mühlhausen  
Photo by Petra Weingart

Water supply or how much water runs through the river each year

The area in which you find the river Wern, the Main-triangle, is one of the regions in Germany with the lowest rainfall. Only about 600 mm of rain falls during one year. That is the reason why the river Wern has so little water most of the year. Also the quality of the water is not the best, it has only quality grade II to III. But since there was built a new sewage treatment plant in 2010 and because of measures of restoring the river to nature the quality of the water has improved.

**Fauna and Flora**  
In the river Wern you can find all kind of fresh water fish. For example grayling, brown trout, „Bachschmerle“, barbel, bream, minnow, gudgeon, rainbow trout, roach, eel and tench are found.

There is also a great variety of insects, snails, little crayfish and worms found in the water and next to it. Beautiful dragon flies need the water for their eggs. Frogs and other little amphibian hide in the water and eat the

water insects, worms and snails.  
Rare birds are found in special areas of the river, for example, marsh harrier and bluethroat. They need the special



The river Wern near Mühlhausen  
Photo by Petra Weingart

plants that grow near the river to hide and brood. Especially reed is important for them. But also the meadows, fields,



The Wern between Werneck and Mühlhausen  
Photo by Christian Spindler

trees and other plants like willows, fern, dandelion and many others, make the river a beautiful place for humans and animals.



# HOW IT IS USED THE RIVER WERN



## Recreational activities along the river Wern

The best way to enjoy the river Wern is on a bike tour along the 78 kilometres long "Werntal Radweg". You can have a romantic trip through Franconia on your bike along this charming little river. You start your tour near Poppenhausen, pass Schweinfurt and Werneck and go on until you reach the mouth of the Wern near Gemünden. The whole trip is 78 kilometres long and you can make it in two to three days. For a very fit cyclist it would just be a day's tour. On your trip you will visit many interesting and

beautiful places while riding your bike through a great and impressive landscape. It is a family-friendly route since there



Mill at Eussenheim  
<https://upload.wikimedia.org/wikipedia/commons/thumb/0/02/>

are no hills or mountains, which makes it suitable for people who are not in the best physical shape, as well. You will find rest in nature but also small

town charm. The route consists of flat, separate and paved bike paths mostly away from road traffic. If you decide you do not want to ride all the way back or just do not have the time, then you can always take the train back to Poppenhausen. An e-bike is a good alternative for older people who want to enjoy the beautiful scenery. So it is a great tour for everybody and you will explore the river Wern on your way.



Cyclists on the „Werntal Radweg“  
<http://www.fahrradreisen.de/css/img/banner.jpg>



*Kirchgaden in Arnstein*

[http://www.wernradweg.de/tn\\_img/2042948\\_kirchengaden-geldersheim.jpg](http://www.wernradweg.de/tn_img/2042948_kirchengaden-geldersheim.jpg)

Along the way you will see picturesque little villages built in a typical Franconian style and embedded in a beautiful landscape. One of the first stops along the trip is Gelderheim where you can visit the "Gaden" and an archaeological museum. It's also great to make a detour to Schweinfurt which has many museums, churches and a nice animal park for children. In Bergrheinfeld you should take a look at the old town hall, and one of the most modern libraries of Bavaria. In the town of Werneck you can visit the castle with its chapel, a beautiful park and a nice café with lovely cakes. You will find many marks

of the famous artist Balthasar Neumann there. Your next stop should be in the town of Arnstein with its Gothic church Maria Sondheim. On a hot day it is great to have a break and cool

down in the beautiful natural lake near Arnstein. Now you pass the villages of Thüngen and Stetten, where great Franconian vine is grown. And finally reach Karlstadt with its historical town wall and its beautiful domestic architecture. If you go on you can have a nice glass of wine in Eussenheim and will see Germany's second largest castle ruins in Gössenheim. You pass Wernfeld where the Wern flows into the river Main and finally reach Gemünden with its beautiful old town where the rivers Main, Sinn and Wern

meet. There you can visit a festival on the castle Scherenburg in July and August.

This is surely the best way to enjoy the Wern and spend your free time there. Besides you can do many other recreational activities near or on it, like swimming, kayaking, fishing or Nordic walking. You can also take part in hiking tours near the river. Paddling is possible between Arnstein and Wernfeld, too. You must enjoy the fantastic Franconian food and wine along the river and have a great time. So you should come to Germany and visit our beautiful river Wern.



*Beautiful nature along the river*

[http://images.google.de/images/branding/googlelogo/1x/googlelogo\\_color\\_92x36dp.png](http://images.google.de/images/branding/googlelogo/1x/googlelogo_color_92x36dp.png)



## SPECIAL ASPECTS THE RIVER WERN



### River straightening of the Wern (1935 - 1936)

Nazi ideology. It was the official state labour

service, divided into separate sections for men and women. From June 1935 onwards, men aged between 18 and 25 had to serve six months before their military service.

The mission of that squad near Werneck was to regulate the river Wern by artificially straightening its bed. High water sometimes occurred several times a year so this enterprise was considered to prevent flooding.



*Men of the Reichsarbeitsdienst 1935  
Photo by Hans-Micheal Tappen*

During 1934 and 1936 around 200 young men of the *Reichsarbeitsdienst* were ordered to start working near Werneck on a new project. The *Reichsarbeitsdienst* (RAD, "Reich Labour Service") was a major organisation established by Nazi Germany as an agency to help mitigate the effects of unemployment on German economy, militarise the workforce and indoctrinate it with



*RAD draining a field. Photo 1 by Liselotte Orgel-Köhne, 1938*



Swamps and existing natural inundation areas were drained. The old meandering shape of the Wern was turned into straight sections wherever possible. The (then popular) idea behind those measures was to accomplish a faster drainage of the water during times of flooding. The opposite is true – as we all know by now. Creating additional farmland was the second main reason. Existing and newly gained farmland

could be cultivated easier. The sides of the fields often reached the Wern riverbanks after the regulation. But even back then, some ecological compensatory measures were initiated to restore a minimum of ecological balance. Quite a number of non-indigenous poplar trees were planted along the new straightened Wern. A nearby spruce forest was enlarged. Nevertheless, biodiversity (flora & fauna) was significantly reduced.

Between the villages of Geldersheim and Mühlhausen a stretch of 17 km was straightened. Smaller creeks, all tributaries of the Wern were also regulated the same way. The Wern regulation altered substantially the river's appearance. Workers used mostly spades and shovels. It was very hard labour. The Bishop of Würzburg Matthias Ehrenfried attended the solemn inauguration ceremony in 1936.



*Young workers of the Reichsarbeitsdienst posing in their cabin during free time 1935*  
Photo: B.Arch (Bundesarchiv = Federal Picture archive of Germany) R77/2b



### Re-naturalization of the Wern (1995 – 2006)



*Building a new river bed for the Wern  
(www-kg-bayern.de)*

In 1995 the regional water authority in Bad Kissingen started a re-naturalization project along a 17 km long section of the Wern near Geldersheim. Objectives were to slow down the river water; flood, erosion and sediment control, increase infiltration and/or groundwater recharge, increase evapotranspiration, create an aquatic, riparian and terrestrial habitat, prevention of biodiversity loss, furthermore biodiversity preservation, groundwater/aquifer recharge, better protection for the regional ecosystems and more use of Green infrastructure, improving the water quality, improving

recreational opportunities and aesthetic/cultural value, just to name the most important. The riverbed re-naturalization consisted of removing artificially built constructions in the riverbed and on riverbanks, replacing them with vegetation structures and re-shaping meanders in order to create natural flood retention basin areas. The remodeling was done based on old cadastral maps wherever



*Aerial photography of the Wern  
(www-kg-bayern.de)*

possible. A seven hectare corridor was built at one location with a 30.000 m<sup>3</sup> river meadow retention basin. All phases of the project were regularly and scientifically monitored. The re-naturalization of the stream bed and banks had also a high impact on better

biodiversity and increased the recreational value of the Wern a lot. 20 years after the re-naturalization started, most anticipated effects were successfully



*Natural flood retention basin  
(www-kg-bayern.de)*

reached. Some long term effects needed more time than expected (e.g. fish biodiversity). In contrast to the straightening of the Wern, re-naturalization took only a few men, though equipped with modern construction machinery and elaborated techniques.



*Detail current state  
(www-kg-bayern.de)*



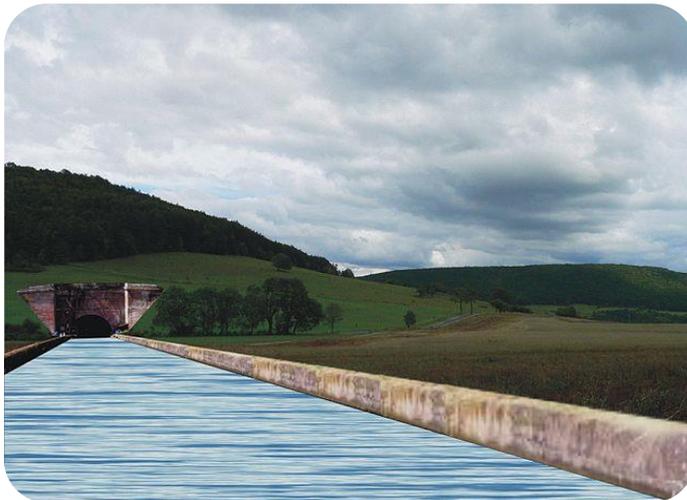
**A crazy, megalomaniac  
idea: The Wern-Canal**

Believe it or not. Before the straightening of the Wern was ordered in the early 30s, another, by far more challenging plan was cancelled. It was planned to dig a straight

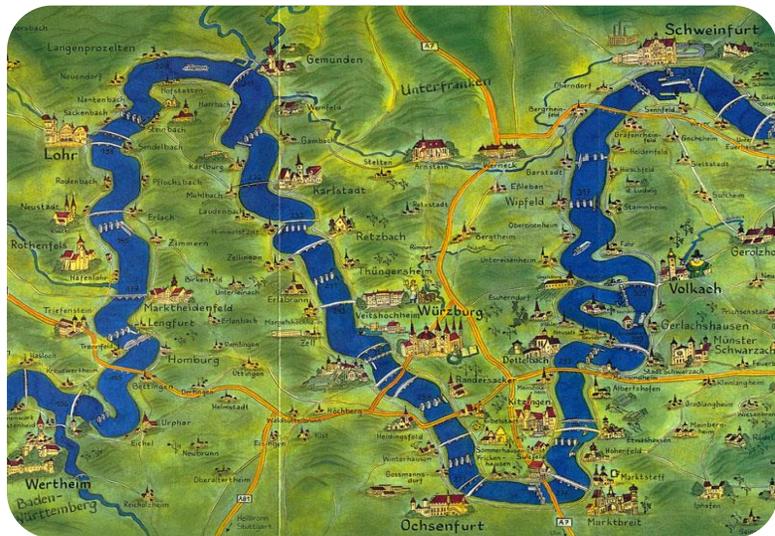
horizontally East-West canal through lower Frankonia passing Werneck, partly using the Wern's natural bed. The planned major waterway for larger ships (up to 1000 tons) started in Garstadt near Bergtheinfeld and ended

in

Gemünden where the Wern still joins the Main today. They even considered building a river-tunnel to cut through a mountain. It would have saved quite some time for ships to travel the Main river getting down or upstream. The cities of Würzburg and Kitzingen protested heavily against this canal. It would have cut them off the major waterway completely, causing enormous financial loss and influence. The economical damage would have been immeasurable. Thus the plan was abolished quickly. A very wise decision!



*Simulation of a possible river tunnel.  
Landscape real, canal & tunnel animated  
photo: <http://creativecommons.org/licenses/by-sa/3.0>*



*Main river triangle, map by Martin Dörr Verlag, Würzburg, FPS,  
Mainschiffahrt.info*





## GENERAL INFORMATION

# THE RIVER MAIN



Mittelschule Holderhecke in Bergrheinfeld is situated very close to the river Main and a lot of our students come from villages adjacent to the river. Students coming from Grafenrheinfeld, Hirschfeld, Heidenfeld and Rötthlein have to cross the river over the bridge in Grafenrheinfeld every day, others coming from Garstadt and Wipfeld for example pass alongside the Main every day. Thus the river is part of most of our students' everyday life.

### General information

The Main as such does not have a proper source but it is formed by the confluence of the Weißer Main (White Main) and the Roter Main (Red Main) close to the town of Kulmbach. The White Main has its source in the Fichtel mountains, the Red Main's source is in the Franconian Jura. As the Main does not have just one source it is difficult to tell its length: it is 527 km long from the source of the Red

Main and 518 km form the source of the White Main. Some people also say that the Franconian Rezat is the most important one of its headwater streams which would make the Main 553 km long.

The river flows from east to west and passes several Franconian mountain ranges, for example Steigerwald, Spessart and Odenwald, and the Franconian vine-growing region and, after passing the cities of Aschaffenburg and Frankfurt, flows into the river Rhine close to the city of Mainz.

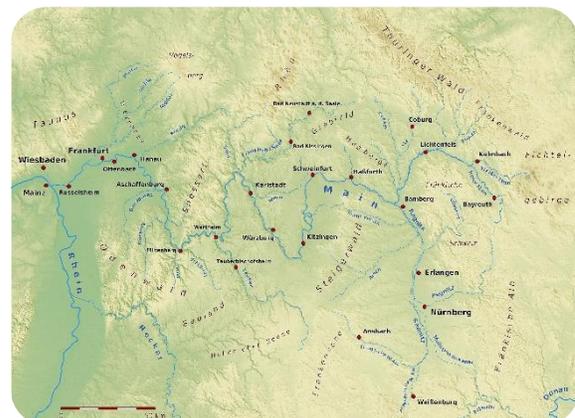
The Main is navigable from Bamberg to its mouth into the river Rhine (388 km). Since 1992 the Main has been connected to the Danube by the Main-Danube Canal, creating a 3500km waterway from the

North Sea to the Black Sea.

Before the German unification the Main was called the longest only German river, it is still the fourth biggest affluence of the river Rhine, and the biggest affluence on the right shore of the Rhine.

### The name

The name of the river is probably of celtic origin (river:moin), the Romans then changed the name to Moenus. The name might also come from Latvian or Lithuanian (maina:swamp). The name Meyn was first used in the 14<sup>th</sup> century.



<https://upload.wikimedia.org/wikipedia/commons/f/f7/Main-Karte-160710.jpg>



**Regimen**

The average regimen of the river is about 112m<sup>3</sup>/s in Schweinfurt and 211m<sup>3</sup>/s at its mouth. The regimen varies a lot during the year and is highest in spring.

**Floods and ice drift**

Melting snow in early spring often causes the Main to rise and areas at the shore to be flooded causing damages to bridges and buildings close to the river. But floods were much worse during the Middle Ages. Due to the banked-up water level and by making the Main deeper for shipping the floods have become less damaging. Until the 19<sup>th</sup> century the river was frozen every winter but by building industrial plants the water was heated up and now the river only freezes in

very cold winters, the last time in 2009. Shipping had to be stopped then because of floating ice sheets. Some of our older colleagues still tell us about going for a walk on the frozen river which is too dangerous nowadays.

**Quality of water**

Up until the 20<sup>th</sup> century the Main was very rich in fish, but due to industrialization the water got very dirty and after World War II a lot of beaches at the river had to be closed as the water was so dirty that bathing was very dangerous to your health. With sewage plants ameliorating and industry becoming more environmentally conscious the quality of water has improved immensely and in our area it has become popular again to swim in the river.

**Flora and Fauna**

There used to be about 35 kinds of fish in the river but due to pollution that number went back to four. Nowadays a lot of fish can live in the river again, the most popular species are eel,

barbel, bream, perch, pike, carp, wels catfish and zander. Because the Main is connected to the Danube some Danube species have now started to live in the Main too.



*The river Main with Bergheinfeld and Grafenheinfeld and Schweinfurt in the back  
Photo by Petra Weingart*

Salmon could not be rehomed in the river so far but there is a project dedicated to bring it back until 2020.

Bird sanctuaries have been created at the shores of the river, animals living there are kingfishers, damselflies and marsh harrier.

The meadows of the river between Schweinfurt and Dettelbach are a special Flora-Fauna Habitat (EU guidelines): there are meadowwoods and sandheath. The old branches of the river (Altmain) are a sanctuary for birds like red kite, collared flycatcher and medium spotted woodpecker.



*Garstadt lock  
Photo by Petra Weingart*



## HOW IT IS USED

# THE RIVER MAIN



### Leisure and Recreation at the river Main

People living close to the river "use" the river in different ways to spend their free-time and a lot of tourists also come to the river to spend their free time there.



Photo by Emily Walls

close to the river and are connected to the Main or are part of the old river. There are fishing competitions and most villages where the clubs are organise fish festivals selling regional fish.

Fish that you can catch in the river are:  
whitefish, eel, trout, carp, zander, sheatfish, bream and pike.

The aim of most clubs is not to catch fish in order to eat them. A lot of the fish are thrown back in after getting caught and the clubs are also making sure fish have enough room to spawn. They want to save many

species in the river. There are a lot of regulations



Photo by Emily Walls

concerning fishing in the river e.g. close season and they are strictly watched.

### Fishing

Quite a few of our students like to go fishing. Mostly they are members of fishing clubs because if you are not a member you have to buy a permit in order to be allowed to fish in the river.

Most clubs also own lakes or dredging lakes which are very



Photo by Florian Gehring

### Swimming

These days the Main is clean enough to swim in it and some of our students do it. It is not forbidden to swim inside the river as long as you stay away from bridges, locks and ships. It is also not advisable to cross the river as the current in the middle



Photo by Laura Büttner

of the river is very dangerous. There are old arms of the river which are not navigable anymore and there is hardly any current in them. One of those old arms is next to Hirschfeld one of our school's villages and it's very popular to go swimming there. The water is quite shallow and warm in summer and a swim there is really enjoyable.

Walks

A lot of people like to walk at the shores of the river or they take their dogs and horses for walks there- dogs also like to swim in the river. Sitting on the bank of the river just talking or watching ships go by is considered very relaxing.

Young people also go there at night and have a few drinks and a barbecue.

Other water sports

Canoeing and rowing

Canoeing on the river is very popular and there are now signs with a yellow wave at the shores of the river between Bamberg and Wipfeld pointing out particular places of interest for people who hike on the river by canoe. Apart from that the only marina in the area for sport boats is in Garstadt, a small village belonging to Bergrheinfeld.

There is also a club offering canoeing and kayaking in Schweinfurt and there are a lot of places where you can hire a canoe. If you want to go rowing we have a club for that in Schweinfurt too.

Cycling

Cycling along the banks of the river is popular among our students but a lot of tourists cross our villages by bike too. One of the most popular German cycling tracks called "Main Radweg" leads through most of our schools villages. This cycling track is almost

600 km long. It was the first cycling track to be awarded a five star cycling track by the German bicycle club in 2008. More than 90% of the track is scenically appealing, most of it is sealed and more than 77% of the track are wider than 2,50 m.



Photo by Sarah Heuler

The signs of the track always appear on only one side of the river but often you can ride your bikes on both sides as in Bergrheinfeld and Grafenrheinfeld. A lot of hotels and guest houses cater for the cycling tourists and there are some accommodations called "bed and bike" in our villages too.



## SPECIAL ASPECTS

# THE RIVER MAIN



Something special about the river Main in our area. Close to our school, near the small village of Garstadt, there is a bird sanctuary, called Garstadter Vogelschutzgebiet. The sanctuary is located on the left side of the Main and you can best reach it from the village of Heidenfeld.

The sanctuary came into existence in the 1970s when the nuclear power plant was built and an ecological compensation area had to be found. That means that because the building site of the

nuclear power plant destroyed a piece of land had to be renatured. Before that area close to the river was used to dig sand and gravel which is very common close to the river Main. So the digging lakes were left to themselves more or less and lots of different species of birds came to live here. All together there are eight lakes of different sizes and the area is more than 200 ha wide. The area is not only a bird sanctuary but also a European Flora and Fauna Habitat and part of the Natura 2000

programme which aims at saving rare species. Now 278 different species of birds have been counted here, 102 of them are on the list of endangered species. 107 different kinds use the area for breeding. There are some very rare species living here for example purple herons, different kinds of ducks, woodpeckers, cormorants, kingfishers and many more. You can also find different kinds of dragonflies (demoiselles). In the woods surrounding the lakes you can also find racoons and boars. The area is so attractive for birds because the lakes have different depth so there is all kinds of food for the birds. It is also very safe for breeding. The water is also still so that is a good compensation for the waters of the river which has a strong current. The sanctuary is very attractive for visitors because of the quietness and the diversity of birds





that you can watch. Bird lovers and photographers come to the place from very far because you can take brilliant photos of very rare species. In 2006 a watchtower was built at the side of the sanctuary which is very popular with visitors.

The area is very well watched by bird and nature lovers and you are not allowed to bring dogs or mountain bikes. But once a year something strange happens in the place: pilgrims from



Garstadt cross the Main over the dam at the Garstadt lock and walk through the sanctuary with their marching band singing church songs in order to get to the monastery in Heidenfeld.



Photo by Barbara Feldmann



Garstadt marina  
Photo by Petra Weingart





## GENERAL INFORMATION

# THE GULF OF RĪGA



### Geographical characteristics of the Gulf of Rīga:

- The Gulf of Rīga is between Latvia and Estonia
- The area is 16,300 km<sup>2</sup>
- The Gulf of Rīga is non-freezing, but rarely in very severe winters it freezes
- Salinity: 5-6 per-mille
- Depth up to 67m

The Gulf's seabed is flat. The Gulf of Rīga is connected with the Baltic Sea in the west by the Irbe Strait, but in the north by the Veinameri Strait. There are several islands in the Gulf. The major islands in the Gulf include Saaremaa, Kihnu and Ruhnu, which are all controlled by Estonia. Kihnu covers an area of 16.4 square kilometres. Saaremaa island is

responsible for the brackish water of the Gulf of Rīga, as it is partially "shielded" from the Baltic Sea.

The coasts of Rīga Gulf are low, sandy, overgrown with forest. In the eastern part near Salacgrīva the coast has steep sandstone cliffs. The major cities and towns on the coast of the Gulf of Rīga: Jūrmala, Rīga, Saulkrasti, Salacgrīva, Ainaži.

The major rivers flowing into the Gulf of Rīga: the Daugava (1005 km), the Lielupe (119 km), the Gauja (452 km), the Salaca (96km).

The Baltic sea fauna:  
There are different mussels or Baltic sea shell-fish. For example, the blue mussel and the

sand gaper. The sand gaper is the largest sea mussel in the Latvian coastal waters. They can be found in the Gulf of Rīga. Another species found there is the Baltic clam or Baltic macoma.



Blue mussel - *Mytilus edulis*



The salmon

The clams can be pink, blue pink or almost white. And there are also Cardium shells.



Common jellyfish - *Aurelia aurita*



Geographical characteristics of the Gulf of Rīga



Erasmus+



Rūjienas vidusskola



Wintering and migrating birds (gulls, geese, ducks, swans)

The typical fish include marine species like cod (*Gadus morhua*), sprat (*Sprattus sprattus*) and herring (*Clupea harengus*), freshwater species like perch (*Perca fluviatilis*), and species that live part of their lives in the sea and part in freshwater like Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), European eel (*Anguilla anguilla*) and lamprey (*Lampetra fluviatilis*). Most species living in the shallow parts of the Baltic sea, like the Gulf of Rīga, have adapted to the environment in various ways and differ from fish of the same species living in, for example, the North Sea or in freshwater. About 30 species of birds use the Gulf of Rīga as a wintering area. The most important areas are the shallow lagoons, estuaries and sandy bottoms. Characteristic species along the Baltic coasts are red-breasted merganser (*Mergus serrator*), tufted duck

(*Aythya fuligula*), common eider (*Somateria mollissima*), sandpiper (*Actitis hypoleucos*), herring gull (*Larus argentatus*), common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*), and waders such as redshank (*Tringa totanus*). Needless to mention that we can see a large variety of beach birds and sea gulls there. There are also some mammals – such as seals, minks, otters and sometimes bears. The grey seal (*Halichoerus grypus*), is among endangered animals and is on the list of protected species in the Red Data Book.



The grey seal

### The Flora of the Gulf of Rīga:

There are several important species of algae or sea weeds. First, the bladder wrack is one of the most wide-spread and most important algae species in the Baltic Sea. Unfortunately, the Baltic sea is very polluted and the bladder wrack is threatened. There are also brown, red, green

seaweeds in the Gulf of Rīga.



Algae

In the dunes there are several beautiful flowering



Biting Stonecrop - *Sedum acre*

plants. Dark red helleborine is an orchid, which is really rare, the sand pink – this plant is included in the list of protected flowers, the sea-rocket is a widespread species. The biting stonecrop is a plant that is widespread in Europe and in the Baltics. Of course, there are many grasses in the dunes: lyme-grass,



Pine

marram grass and others. The typical trees and shrubs in the dunes are pines, osiers and junipers.



## HOW IT IS USED

# THE GULF OF RĪGA



### Industrial use and major ports.



In the Gulf of Rīga there are several major ports: Freeport of Rīga, port of Salacgrīva, port of Jūrmala, port of Mērsrags. In the Freeport of Rīga they offer passenger transport, there is a passenger port for cruise ships. There work some icebreakers in winter, and there is a large cargo transfer. The port of Salacgrīva on the north-eastern coast of the Gulf is mostly used by fishing ships. The port of Jūrmala offers pier rental, yachting piers, water territory rental. In

the Port of Mērsrags there are cargo transfers, fishing ships, fishing industry and yachting harbor and service. The Gulf of Rīga is also used for passenger routes. From Latvia you can travel to different places, for

example to Sweden, Poland, Germany and other countries. Latvia has a long history of fishing in the Gulf of Riga. Fish processing and trade in fishery products has been a very important industry for Latvia for many decades. There are many private fishing companies and fish processing factories nowadays. They go for fishing in the Baltic mainly for marine species,

- cod, which is the most important commercial species, herring, sprat and salmon are the major species in the sea fisheries. Some freshwater species and those which migrate between the sea and rivers are caught in coastal areas. Other important target species are sea trout (*Salmo trutta*), pike-perch (*Stizostedion lucioperca*), eel (*Anguilla anguilla*), bream (*Abramis brama*), perch (*Perca fluviatilis*), lamprey (*Lampetra fluviatilis*) and pike (*Esox lucius*). High catch rates of cod since the early



Freeport Riga



Erasmus+



Rūjienas vidusskola

1980s have resulted in a decline in abundance and the cod is now outside its safe biological limit.



Port of Salacgrīva

Sunset Trail that stretches alongside the sea coast from the White Dune to the centre of Saulkrasti town. You can also visit Cape Kolka. It is the most pronounced horn or cape on the shores of Latvia, and it is where the waves from two seas clash – the open Baltic Sea and the Gulf of Rīga. It is the place where you

can watch the sunset and wait for the sunrise. During the bird migration season, thousands of birds fly over the cape, and you can visit the Slītere National Park, which covers the Cape of Kolka with a territory of 16,000 hectares. There are many camping sites, restaurants, SPA

resorts and hotels all along the coast of the Gulf Of Rīga.

For example, the Baltic Beach Hotel. The Baltic Beach Hotel is only one of the many hotels. It is a five-star SPA and conference hotel in Jūrmala area, on the coast of the Gulf Of Rīga. The hotel has a large conference centre with a wide variety of premises for seminars, conferences and events, as well a famous restaurant "Caviar Club".

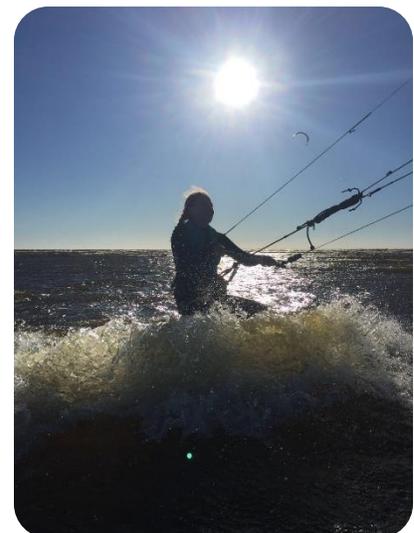
**Activities, relaxation and hobbies near the Gulf of Rīga**

There are many activities to do and many beautiful places to visit near the Gulf of Rīga. If you wish to enjoy the benefits of a healthy walk and the fresh sea air there is a 3.6 kilometers long

Of course, there are many hobbies you can enjoy by the Gulf Of Rīga like fishing, riding water bikes, doing wind surfing, SUP boarding, kiteboarding, wakeboarding, waterskiing, and others.



Doing windsurfing



Kiteboarding  
Photo by Anda Dekšne



## SPECIAL ASPECTS

# THE GULF OF RĪGA



### Kemeri National Park



*Kemeri National Park from the bird's-eye view*

On the south coast of the Gulf of Rīga there is the Kemeri National Park, which like a fragile jewel, contains natural values which have already become rare in Latvia and Europe – intact high moss marshes, damp black alder forests, floodplain meadows and seaside lakes rich in birds. It is a shelter and place of residence for many rare and protected plant and animal species



*The wild horses in Dunduri meadows.*

– glorious and easily observable, and subtle and hardly visible. Kemeri National Park was established in 1997 with a view to preserve nature and cultural and historical values, and the health resort resources of the territory, as well as to promote nature education. The area of the National Park is 38 165 ha. Kemeri National Park is a wetland park and its symbol is a white-backed woodpecker – a rare species of woodpeckers for whose survival very humid, deciduous forests untouched by human activity are necessary.



A very special feature of the Kemeri National Park is its sulphur springs. More than 30 sulphur springs run out on the surface in the vicinity of Kemeri. It is not only a

rare natural phenomenon; spring water has also healing qualities. Thanks to sulphur springs, resort traditions have existed more than 160 years in Kemeri.

The Kemeri national park is famous for its biodiversity. There are altogether 47 animal species inhabiting the territory of the Park including wolves, lynxes, roes, elks, deer, otters, beavers, nine species of bats, martens, ermines, dormice and others. Altogether more than 250 bird species, 67 of them protected, have been observed in the territory of KNP. There are 97 rare plants, untouched raised peat bogs, virgin moorland, meadows and others.



*Large Kemeri Moorland*



**Veczemji red-sand cliffs**



*WAU project meeting, March 2015  
Photo by Anda Deksnė*

It is a 480 m wide, up to 3,8 m high sandstone cliff wall on the eastern coast of the Gulf of Rīga, situated between the seaside towns Saulkrasti and Salacgrīva. Its sandstone comprises deposits from middle Devonian period. The cliffs

have got many reliefs, notches, alcoves and caves. In some places the sandstone is light coloured, in the northern part of the cliffs you can spot pink and bluish clay. These red-sand cliffs are the

most impressive natural sea wall on the Vidzeme sea coast. Before the storms of January 2005 the width of the cliffs was 160 m only. The waves and the wind have created a high wall of cliffs which extends for

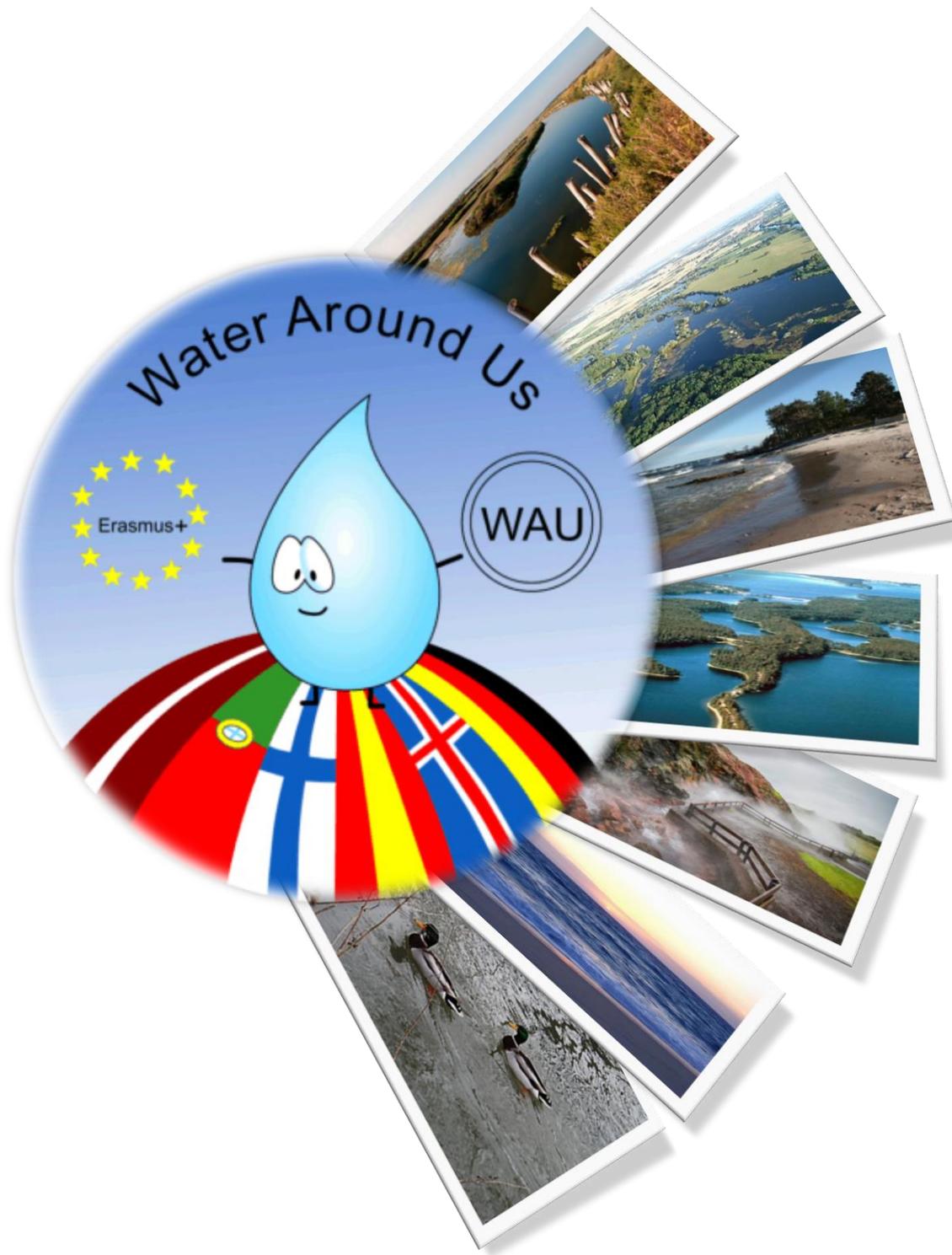
more than 4 hundred metres now showing a variety of outcrops and caves. Hikers and other holiday makers truly enjoy the beautiful landscape and the peace and calm of the rocky



seashore. At the beautiful Veczemju cliffs you will find a facilitated camping site where you can rest and spend an unforgettable weekend.



*WAU project meeting, March 2015  
Photo by Anda Deksnė*





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