KARST LANDSCAPE IN MY HOMELAND

KARS- SCHOOL OF ENVIRONMENT

In May this year, I participated in the project called „Karst- school of environment" as a part of my school team (Primary school SLUNJ). This project was organized by the public institution called „ Natura Viva" from Karlovac, along with Faculty of Mining and Technology, university of Zagreb.

The project was financed by European Union, and its main goal is to protect and to preserve the living creatures of this landscape.

The students who took part in this project „Karst- school of environment", were thrilled by the given programme. The programme was as follows:

- presentation of the film that shows how to protect the nature of the karst landscape in Slunj
- a tour round the caves, „Matošićeva caves" nearby Slunj
- workshops about nature protection, geology, hydrogeology and speleology. They took place at the source of the river Slunjčica

We learned a lot of knew and useful information and we became aware of the fact that we live in such a beautiful and valuable landscape which we have to protect, along with all living creatures that exsist here.

WHAT THE KARST LANDSCAPE, ACTUALLY IS?

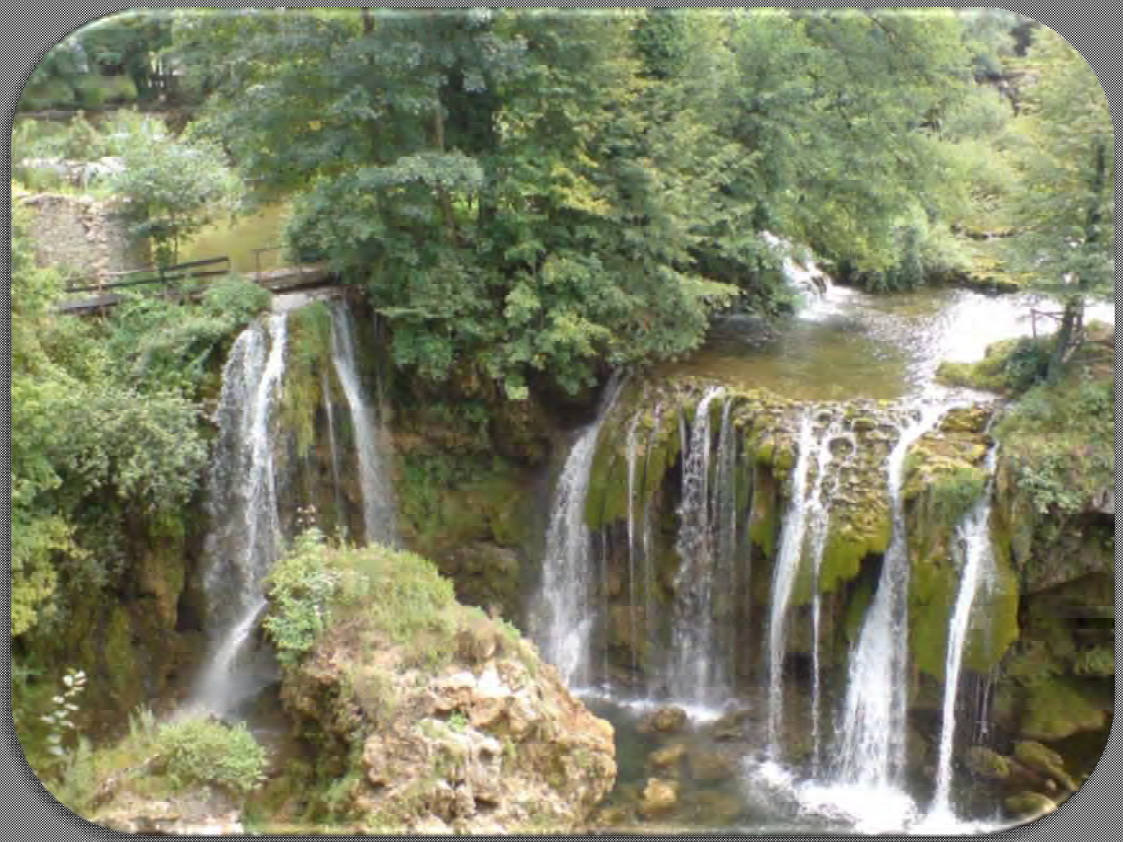
The karst landscape is a particular kind of a scenery which develops on terrains that are composed of soluble, mostly carbonate rocks- limestone and dolomite. This landscape is studied by expert and scientific disciplines such as geology, geomorphology, hydrogeology and spelology.

PROTECTION OF NATURE

Protection and preservation of nature is based on biological preservation principles,landscape diversities (indigenous species and habitats), geodiversities (landscape, rocks and soil), protection of natural values and preservation of beneficial role of nature. Indigeous species (native) and habitats are those that develop naturally in an area. Allochtaneous species are brought from another area, country or even a continent.

HOW ARE THE TRAVERTINE BARRIERS FORMED?

My homeland is recognized by numerous travertine barriers. They can be found in Rastoke or in NP Plitvica Lakes.The process of their formation is based on numerous physical, chemical and biological factors. The karst rivers represent the solution of calcium carbonate, because they flow through limestone terrain. While water flows over the barriers, carbonate from water sediments.



TRAVERTINE BARRIERS

EXPOSURE TO DANGER AND PROTECTION OF SYCOPHANT CELERY

SYCOPHANT CELERY (Apiumrepens)

Particulary significant plant breed found only in aquatic habitats.

HABITAT: It is found in cold and high speed streams and in karst rivers, too.

It forms „ underwater pillows „ and sometimes occupies even larger areas in the middle of the rivers.

APPEARANCE OF PLANTS: Its leaves are formed of large number of small, egg shaped and jagged leaves. Its flowers are formed of 5 petals in a set and 5 petals in a Corolla. It blossoms during July and August. It blossom is typical and it is called „štitac". Its laid stalk enroots in each knot.

ENDANGERED AND PROTECTED ANIMAL SPECIES (FAUNA)

BATS

HABITAT: Bats are widespread almost everywhere, and during their lifetime they use different types of habitats- cavities and shelters under the tree barks, forests and parks, meadows, rivers and lakes. In winter they hibernate in caves, pits, cracks in the rocks and in abandoned mines.

NUTRITION: All Croatian bat species feed on insects, but it is well-known that a type called Large Crepuscular sometimes hunts smaller birds,Whil the „Long-legged bat" hunts small fish.

ENDANGERED AND PROTECTED ANIMAL SPECIES (FAUNA)

OTTER (Lutra lutra)

HABITAT: It lives in rivers, lakes, swamps, along the sea coast and in estuaries.

NUTRITION: It feeds on fish, crabs and amphibians, and its prey can also be some smaller mammals and birds.

ENDANGERED AND PROTECTED ANIMAL SPECIES (FAUNA)

CREEK/ STREAM CRAB (Austorpotamiobus torrentium)

HABITATS: They settle the upper parts of streams with stony/ rocky bottom, but at higher elevations.They seek the shelter under the rocks and in the stream banks where the aquqtic vegetation is developed.

Diversity of habitats, with many potential shelters (rocks, tree roots,…) in which they can crawl in during the daily rest and in cold winter season,is substantial.

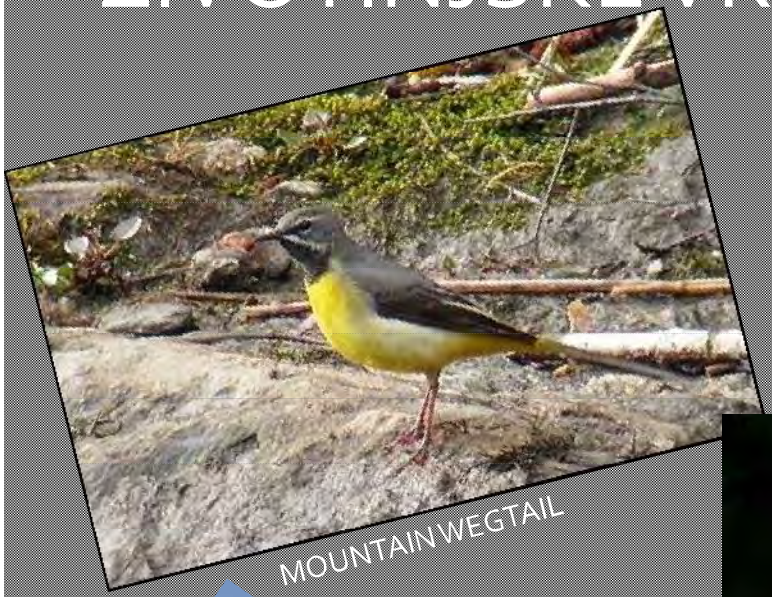
NUTRITION: They are omnivorous.

ENDANGERED AND PROTECTED ANIMAL SPECIES (FAUNA)

There are many protected and endangered animal species in Slunj and its area.Some of protected species are: PLAIN (common) GRAYLING (Thymallus thymallus),PLAIN (COMMON) TROUT (Salmo trutta), BLACKBIRD (Cinculus cinculus),MOUNTAIN WEGTAIL (Motacilla cinerea), WHITE WAGTAIL (Motacilla alba),BLACK REDSTAR (Phoenicururos ochruros).

BROOK TROUT

UGROŽENE I ZAŠTIĆENE ŽIVOTINJSKE VRSTE (FAUNA)

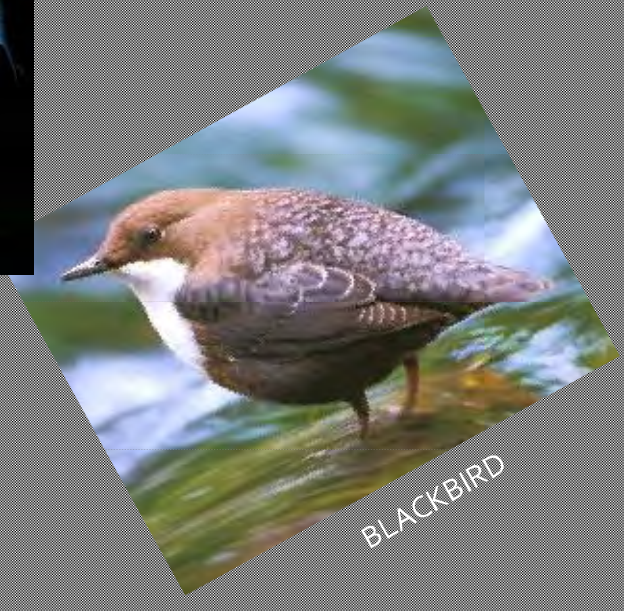


MOUNTAIN WEGTAIL

WHITE WEGTAIL

PLAIN GRAYLING

BLACK REDSTAR



BLACKBIRD

GEOLOGY

GEOLOGY is a science of the structure, dynamics and Earth evolution. The word GEOLOGY originates in Greek word yn (Gea- Earth) and loyog (logos- science,discussion).Within this discipline there are different subgroups of geology.

GEOLOGY

GEOLOGY

GENERAL GEOLOGY

STRATIGRAPHY

REGIONAL GEOLOGY

geodynamics

sedimentology

tectonics
(geotectonics)

geomorfology

mineralogy

TYPES OF ROCKS

MAGMATIC ROCKS- are formed when magma cools down and becomes solid, with or without the crystallisation process, below the surface as a plutonic rock or on the surface as a volcanic rock.

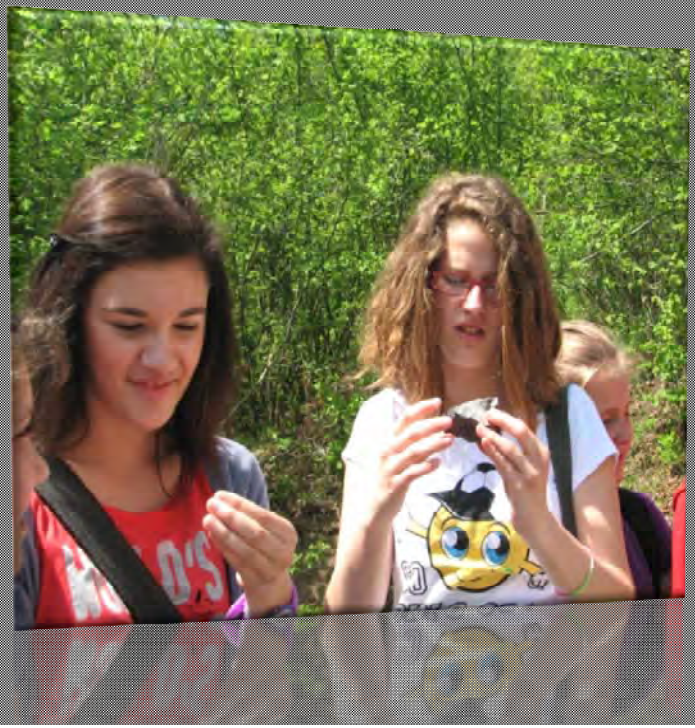
METAMORPHIC ROCKS- are formed during/ in the process of metamorphosis from any rock or some sedimentary rock. The process of metamorphosis considers the activity of/ at high temperature, pressure, water vapour and gasses.Sedimentary rocks are rocks made by sedimentation of other rockremains, and by water, ice and wind activity.

MAGMATIC ROCKS

METAMORPHIC ROCKS

SEDIMENTARY ROCKS AND KARST

More than 70% of Croatian soil is built from carbonate rocks. The types of carbonate rocks are limestones and dolomites. Limestone is a sedimentary rock made of calcite mineral ($CaCO_3$). Dolomite is a term, both for the mineral and for the sedimentary rock and both of them are made of calcium - magnesium carbonate ($CaMg(CO_3)_2$) in the solid cristal shape.



Sample of sedimentary rock

SEDIMENTARY ROCKS AND KARST

KARST is a type of relief which is formed on the ground composed of soluble rocks ,mostly of calcium carbonate ($CaCO_3$) or magnesium carbonate ($MgCO_3$). The basic characteristic of the karst relief is seen in expressed but selective solubility of the rocks. Result of this process is formation of developed relief with a lot of dents and high, elevatedterrains. Karst is usually formed in mountainous relief. Karst dents are divided into: overground (rocks, valleys, fields,...) and underground/ subterranean (caves and pits).HYDROGEOLOGY and GEOMORPHOLOGY of karst terrain. Hydrogeology is a branch of geology which studies subterranean waters in the karst terrain,their origin, regime, quality and their activity in the lithosphere.Karst is a type of terrain with special hydrological features and relief forms. Hydrogeology of the karst terrain is connected with speleology.

HYDROGEOLOGY and GEOMORPHOLOGY of the KARST TERRAIN

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HYDROGEOLOGY and GEOMORPHOLOGY of the KARST TERRAIN

HYDROGEOLOGY of LOWLAND AREAS explores the areas where primary and among grain porosity of rocks prevail.

HYDROGEOLOGY of the KARST TERRAIN is a branch geology which studies subterranean waters in the karst, their origin, regime, quality and activity in the lithosphere.

GEOMORPHOLOGY ia a scientific discipline which studies the origin, evolution and contemporary dynamics of the Earth's relief.

GEOMORPHOLOGY of the karst terrain explores the origin, evolution of the relief on the surface and underground in the karst terrain.

CLASSIFICATION of HYDROGEOLOGY

HYDROGEOLOGY

HYDROGEOLOGY of LOWLAND AREAS

HYDROGEOLOGY of the KARST TERRAINs

CHARACTERISTIC HYDROLOGICAL PHENOMENA

SPRING or WELL is a place where the subterranean water breaks out on the surface. Springs mostly appera at the places where permeable and impermeable layers touch. Considering the hydrogeological characteristics of the karst terrain, you could say that springs are the most numerous and the most accessible indicators of subterranean water regime. The problem of the karst spring protection is prominent in the existing conditions ofsubterranean waters, abyss and wells.

CHARACTERISTIC HYDROLOGICAL PHENOMENA

ABYSS are areas in the karst terrain where water constantly or periodically sinks. If any man can enter in it, we also consider it as a speleological object.

RIVERS which disappear under the earth are streams in the karst terrain which sink into the karst abyss after a short surface flow. They frequently spring from the underground as strong wells and then they continue their flow on the surface. They can also sink several times. Some of best-known such rivers in Croatia are: the river Dobra which sinks at „Julin Abyss" near Ogulin and it springs downstream again and forms the river Gojačka Dobra; then there is also the river Zagorska Mrežnica which sinks downstream and springs again near Tounjčica and Kukača; and finally there are rivers Lika and Gacka which feed the waters at Saint George.

ABYSS

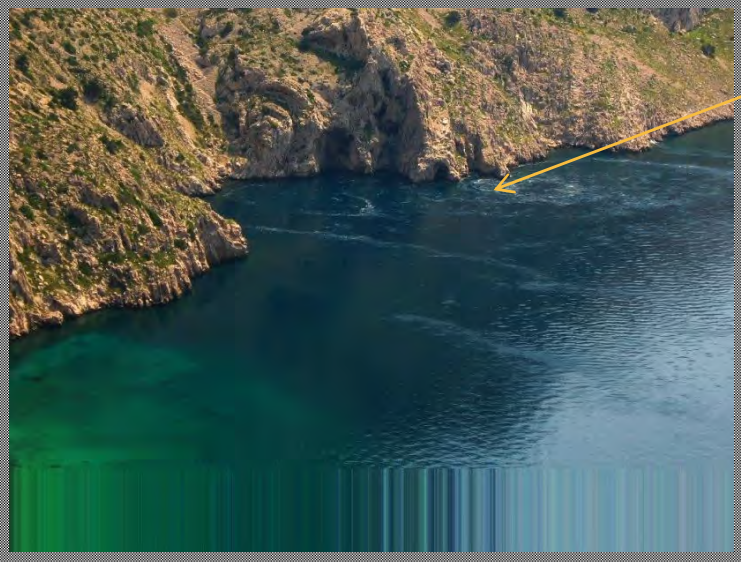
RIVERS

CHARACTERISTIC HIDROLOGYCAL PHENOMENON IN KARST

Flow Speleological objects in karst are caves or holes throught which water passes, but they aren't abysses or sources. Amount of water can oscillate, but the entire flow is in the object. The free- flowing objects include some well-known caves in Croatia, as Veternica, Jopic's caves, Rokina's abysmal etc.

Springs are intermittent or permanent sources below sea level. Sea springs are such sources of freshwater or brackish water below sea level, where during of mixing salt and fresh water, sea seems like boiling.

ESTAVELLES are specific objects in karst and their function is when sources of water flowing from them (as a result of raising the level of underground water). During the withdrawal of water wave, water sinks into the same holes and then they have a sink function (the level of



Surface forms in karst
Karst formations

Grikes are karst formations, ranging from millimeters to decametres dimensions, although they sometimes can be larger. They emerge by dissolution of meltable rocks where arise various shapes (eg, furrows, grooves, slots, channels). We know morphologically differentiation of various types of cracks in limestone (fissured, meshy), grooves (ribbed, meanders, etc.), oysters, etc. They can develop at bald or inclined surface rock, but also at the rocks who are partially or completely covered by soil or dense vegetation. Then their edges and surfaces are rounded and less sharp. The special types are cost grikes.

Grikes

KARST FORMATIONS

Sinkholes or karst valleys are the main landforms in the karst, which give distinctive look. These are isolated and closed recesses of diameter and depth from several hundreds of meters. Towards of the view of the ground-plan sink-holes can be oval, elliptical and elongated. Sink-holes are mainly caused by dissolving rocks.

Coves are larger, closed and often elongated forms in karst.. The origin of them is related by expressed fissured zones and corrosive activity of water. One of the most important characteristic of the bay is the lack of water flow on their bottom.

Mountain hip- karst limestoned blocks that stand out on the field as a naked rock towers in a row. There are known many moutain hips on Velebit (*Rožanski, Hajdučki, Dabarski*)

Sinkholes or karst valleys

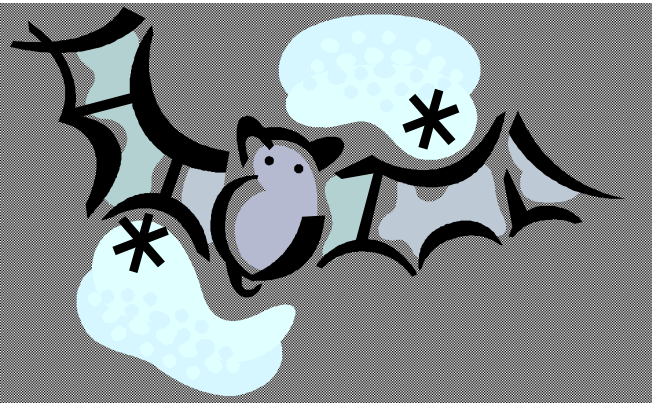
KARST FORMATIONS

Dry valey

Valleys in the karst

Blind valley

Source pebbles



SPELEOLOGY

SPELEOLOGYis a group of activities which main goal is to explore caves, abyss, dugouts and the other subterranean rocky phenomenons.

CAVING STRUCTURE

CAVE – caving structure which average inclination of channel is less than 45^0

ABYSS – is a caving structure which average inclination of a channel is more than 45^0. You can also find a combine caving structure – caves with abyss entrance and abyss with cave entrance.

DIGOUT – is a caving structure without entrance although a natural subterranean channels were discovered during the perforation of tunnels, explortation in a stone-pit etc.

CAVE

SPELEOTHEMS

MINERALS AND CRYSTALS

CALCITE (Greek =kallos-beautiful) is the most frequent limestone cave mineral.It is one of the crystal forms of the calcium – carbonate ($CaCO_3$). A density of kalcit is 2,6-2,8, according to the Mohs's scale a compactness is 3.

ARAGONITE is a rhombic polymorfhic modification of the calcium – carbonate ($CaCO_3$). Their surface is glassy and broken one has an adipose shine. A compactness is 3,5-4 and a density is 2,95.

GYPSUM is a mineral which chemical formula is $CaSO_4x2H20$. It is wide spread mineral and a crystals can be more than meter high. They look like a thick-bord. The second mineral oft he Mohs's scale compactness, you can even scratch it with your nail.

MINERALS AND CRYSTALS

BIVOUACING, CAVE CAMPS AND EXPEDITIONS

BIVOUACING is a longer break or spending the night outdoor mountain house, shelter and the other building objects.

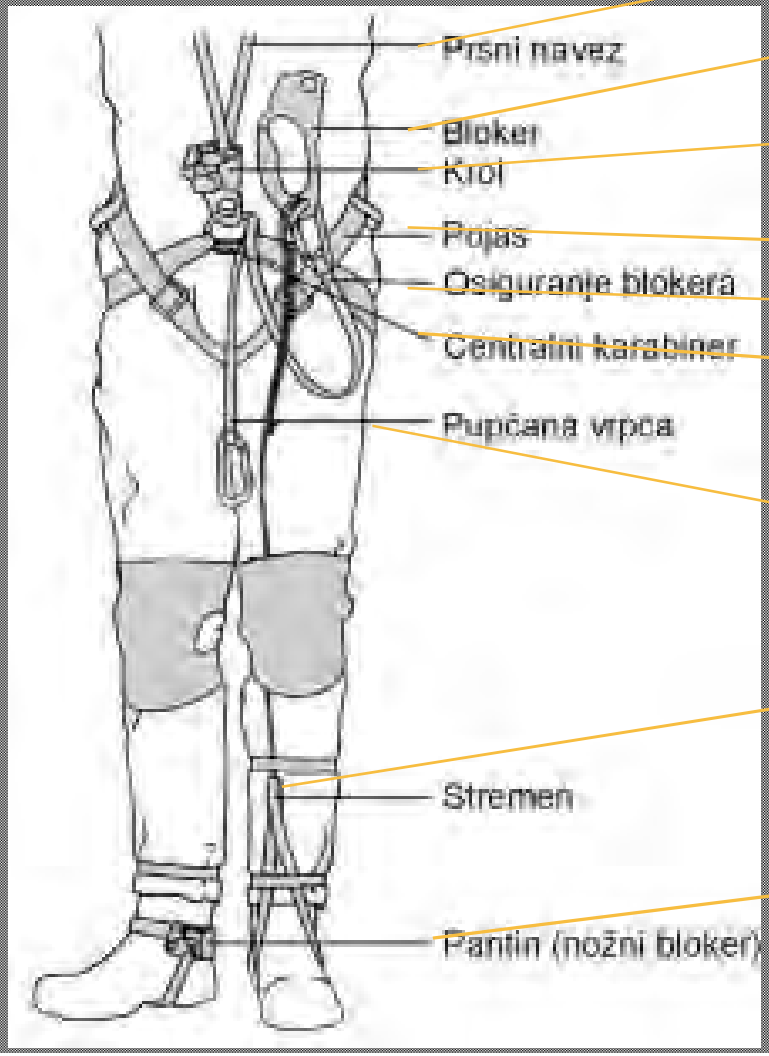
CAVE CAMPS AND EXPEDITIONS are organised in a few days or week actions, or which participate a lot of speleologists.

CAVING EQUIPMENT

It consists of: lightning, helmet, petticoat, clothes under the petticoat, foot-wear, gloves, cave belt, an equipment necessary for asdent and lowering down. An acetylenic lightning is divided into two parts- water tank and carbide that is put on a belt, connected on a helmet with the aid of a plastic tube.

Speleološka oprema

An equipment necessary for asdent and lowering down:



Chest rope

Blocker

Krol

Belt (band)

Security blockers

The central carabiner

A navel tape

Stirrup

Foot blocker

BIOSPELEOLOGY AND ANIMAL DIVISION IN SUBTERRANEAN

BIOSPELEOLOGY OR SPELEOBIOLOGY is a scientific discipline that studies the living world of subterranean.

TROGLOXENES are animals which got lost in subterranean or better say accidentally entered into the caves.

TROGLOPHILES are animals which live and reproduce in subterranean but they can also live outside it.

TERRESTRIAL TROGLOBIONTS are animals which are connected with an area of karst caves where they are born, live, reproduce and die. These are: bacteria, mushrooms, sponge, shellfish, snails, leech, amphibians (the olm), mammals (bats) etc.

CONCLUSION

After karst school I realized the value of my homeland. It is really nice to live in the karst area which is characterized by rivers, waterfalls, travertine barriers, rare plants, endangered animals, caves that adorn in the overhead and subterranean.

In this occasion I invite you to visit my homeland – Slunj, Rastoke and the Plitvice lakes.

Thank you for your attention!

The end

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