















Background

Human impacts on natural river ecosystems have been evident in Armenia since ancient times. There are still many examples of how present day Armenians are negatively impacting river ecosystems and nearby areas but NGOs are fighting back in collaboration with the government. These issues that Armenia faces are widespread throughout the world.

Thus Balta Daba, Khazer and Youth and Environment Europe (YEE) came up with the idea to implement a project that will give European youth ideas concerning river restoration techniques and will inspire them to create their own projects. The Youth for Rivers project brought 22 young Europeans from over 9 countries together for one week to learn about river ecosystem improvements and to create a youth networking space. Armenia, being a vivid example of a country where river ecosystems are in a degraded state, was chosen to host the project.

The main aim of the project was to equip the participants with practical tools and knowledge to enable them to contribute to the development and improvement of the state of European river systems. The origins of the project lie in the objectives of its organizers and partners to put efforts into making young people aware of existing environmental problems, particularly the restoration of rivers ecosystems, as well as providing them with the knowledge and skills to properly address these issues.

The objectives of the training course included:

- 1) Improving youth workers' knowledge of methods on how to increase young people's participation in environmental activities.
- 2) Improving the quality of youth work in environmental youth projects that are related to river protection.

During the project the participants had an opportunity not only to learn about existing river restoration projects and the theory behind them, but also to see a real example of a river ecosystem restoration project. Two practical trips were organized to the Akhuryan river and Lake Sevan alongside one clean up action. The participants had a chance to see Armenia's nature, its beauty and also to make the area they visited more attractive.

The most important and interesting sessions were when the participants shared examples of river restoration projects in their home countries. During these sessions they could learn more about the reasons for and consequences of river restoration.

The training also provided the participants with a presentation on the management of volunteers which introduced them to the volunteer management cycle theory. The participants had a session on leadership in environmental NGOs, which was based on examples of the best environmental leaders throughout Europe and worldwide. The participants had an opportunity to create their own environmental games and this helped them to develop their creativity and have some fun.

The participants who came up with their own projects during the training had an opportunity to share them with everyone on the last day. They had developed their project ideas, thought of the funding, preparatory and support team and the final result which they want to achieve by implementing this project.

All in all, the week in Armenia was very interesting, informative and active. This was a week full of listening, seeing and acting.

This booklet "Youth for Rivers" was created as a direct follow-up of the training course. The participants gave their ideas as to what should be included in this publication. The idea of this booklet is to provide young people with introductory information on river restoration (what is river pollution, what is river restoration, why do we need restoration and how do we do it).





What has happened to our rivers?

Rivers provide vital functions in terms of the ecosystem and for society. Humans rely on riverine systems for a variety of goods and services¹.

They provide transportation for people and goods, resources (food and water), power (hydroelectric power, water mills), a waste disposal unit and help prevent floods.

Today, there are few river systems in the World that have not been influenced by anthropogenic forces, even those in remote places are being impacted by climate change and even acidic deposition.

River use and management has a long and complex history with planned modifications and unplanned consequences². Until the middle of the last century, rivers were to be controlled and to harness their power¹, many were heavily modified and engineered to be more 'efficient'. With increasing urbanisation stream channels were stabilised with concrete to resist flood flows (Fig.1)³.

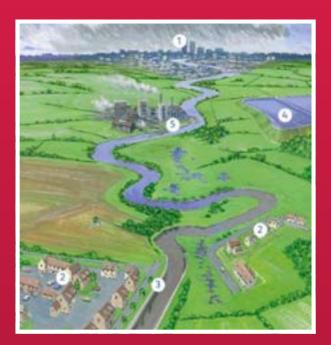


Fig.1 - Schematic to show how rivers have been modified. 1. Poor drainage, 2. Development in the floodplain, 3. River profile, 4. Water supplies, 5. Pollution. (Image from RESTORE, 2013)

175

Over the past ten years, Europe suffered more than 175 major floods, causing deaths, the displacement of people and large economic losses.ⁱ

150 yrs

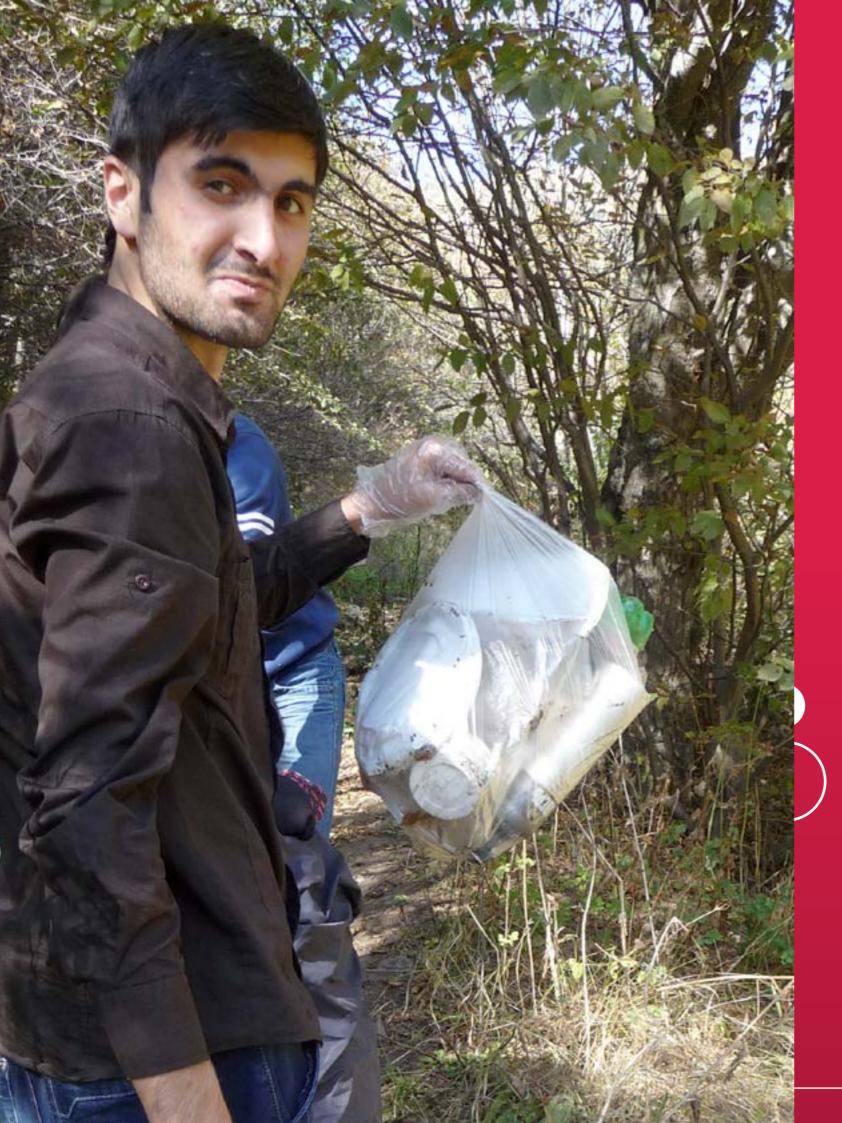
Over the past 150 years Europe's freshwaters have been affected by major modifications by dams, weirs and sluices, which reduce connectivity; straightening and canalisation; and the disconnection of floodplains. Such structures and activities have altered many European water bodies, sometimes leaving little space for natural habitats, obstructing species migration, disconnecting rivers from floodplains and wetlands, and changing the water flow.

50-80

Agriculture contributes 50-80 % of the total nitrogen load observed in Europe's freshwater, with point discharges, including from wastewater treatment plants, providing much of the remainder.

80%

In northern Europe, over 80 % of the population is connected to municipal treatment works via a sewer network while in central Europe the figure is above 95 %.



Why restore rivers?

Restoration projects occur for a variety of reasons, not only to enhance ecosystems and habitats but to improve flood prevention, gentrification of an area, education and recreational, including sports such as kayaking.

• Provisions:

food, fresh water, generic materials

Regulating:

hydrological regimes, pollution control and detoxification

Cultural:

spiritual inspirational, recreational, aesthetic

It must be recognised however, that river restoration is a new science and many restoration projects are pioneering - it is best to protect rivers in their natural form rather than letting them degrade. A pristine system is better than a restored one!

10/12

In 2008, ten of 12 waterborne disease outbreaks reported in the EU were linked to the contamination of private wells.

89%

The quality of inland bathing waters – rivers and lakes – in the EU has improved significantly since 1990. In 2009, 89 % of inland bathing areas complied with mandatory values, while 71 % complied with the more stringent guide values.

十%

A substantial proportion of Europe's freshwaters are at risk of not achieving good status under the EU Water Framework Directive by 2015 (40 % of surface waters and 30 % of groundwaters, in 2004).

Change of attitude

Changing attitudes to the management of the natural environment and the environmental movement in the 1960s assisted the initiation of river restoration as a scientific and management practice¹.

The 1980s saw a transition from 'hard' engineering practices to a more environmental and holistic approach¹. These developments have been

strengthened by the river regulators who try to maintain and improve aquatic environments to meet environmental standards and legislation. Including:

- O EU 'Habitats Directive' (Council Directive 92/43/EEC, 1992)
- EU Water Framework Directive (WFD) (Directive 2000/60/EC, 2000).

Rivers in the 21st Century

There are:

Britain, has

1,500

ki10meters of rivers. It

has 2,700 projects

in its National River

promised

to restore

The Volga is the longest river in Europe at: 3,692km

Europe's busiest river is the Rhine, which runs from the Alps in Switzerland, through Germany and the Netherlands, and empties into the North Sea

Impact of climate change

The IPCC predicts with high confidence

Summer flows are likely to drop by up to 80% in southern Europe and some parts of central and Eastern Europe.

that water stress will increase in central and southern Europe, and that by the 2070s, the number of people affected will rise from 28 million to 44 million.





givers are 100 times more effective than coastal erosion in delivering rock debris to the sea.

Rivers drain nearly 75% of the earth's land surface.



species of fish and 250

Between 1998 and 2009, 1998 floods in Europe caused:

2009

>50% of the world's population

live near freshwater

worldwide is not collected or treated



€52 billion 1,126 in cost



deaths



500,000 displaced

Freshwater Abstraction Uses in Europe

Agriculture accounts for more than half of total national abstraction, rising to more than 80 % in some countries.

Southern Europe



Europe as a whole

Western Europe



>50% cooling in energy production

21% public water supply

22% agriculture

Restoration Inventory 1,500 of them already completed. 40 million tons of untreated sewage still goes into every year

Each European uses, on average, **100-200** litres of tap water a day, but if the amount of water mbedded in products (virtual water) such as food, paper, and water use is often

Hydroelectric power:

Sweden already gets more than 40% of its power this way, Austria 60% and Norway more than 90%

Hans Bruyninckx, director of the European Environment Agency, says his agency has counted half a million man-made barriers across rivers in Europe. "That is one every two kilometres."









LATVIA

GAUJA

The background of the river

The Gauja is the longest river in Latvia (452 km). It starts and ends in the territory of Latvia. The Gauja is the most touristic river in Latvia - people use it for fishing, swimming, boating and other activities. The Gauja river has a high level of biodiversity. It is home to salmon

(Salmo salar), grayling (Thymallus thymallus), river lamprey (Lampetra fluviatilis), bullhead sculpin (Cottus gobio), spined loach (Cobitis taenia) and other fishes. In addition, otters (Lutra lutra), beavers (Castor fiber) and other animals love it.

Why is the restoration needed?

The upper part of the Gauja river has been transformed by small hydro power stations (dams) and straightening for agricultural purposes.

In 1998, the Parliament of Latvia adopted the law that financially supported the development of building small hydro power stations on Latvian rivers. During 1998-2002 there were 9 dams built on the Gauja river. All 9 dams are built within 50 km distance of the Gauja river.

Dams have significantly changed the Gauja's water flow regime. There are frequent and sharp water level fluctuations. This has caused the

biodiversity of Gauja river to decrease and habitats destroyed. For example, grayling (Thymallus thymallus) no longer lives in the upper part of the Gauja river, as it did before the dams appeared.

Due to a mixture of factors including reduced flow and water levels, along with high levels of nutrients from neighboring agricultural land eutrophication has occurred in the river. This excessive plant growth

Tūja

Valmiera 7iemelg

Latvia

in water quality and

causes a severe reduction reduces biodiversity. lacgriva

Location

The upper part of the Gauja river. In Jaunpiebalga district near the eco farm "Lielkrūzes".

What was done

Title: "SKRIEN, GAUJA SKRIEN!" ("RUN, GAUJA, RUN!")

When: September 2013

Aims:

- O To raise young people's awareness about the issues of the Gauja river and how to increase biodiversity.
- O Despite not being able to remove the hydropower dams we attempted to make the Gauja river more diverse and increase its oxygen level.

BEFORE:



What was done:

- O Putting in boulders and stones to increase flow heterogeneity (diversity) and increase the level of oxygen in the
- Remove macrophytes (aquatic plants). Due to the high biomass of macrophytes it was reducing oxygen levels. When the vegetation rots it consumes oxygen which is needed for fish, insects and other river animals.

AFTER:









Funding + Organisation

The project was organised by: BALTA DABA in cooperation with "Vides biedrība "Krūzes".

And funded by:

- European Commission Youth in Action Programme (1.2. local youth initiatives).
- BALTA DABA

Link to the project: http://skriengauja.wordpress.com/ Our video about small dams on Gauja: www.youtube.com/watch?v=z-POSadOVe2Y

Link to ecofarm where project took place:

www.ekokruzes.lv

Links



VECPALSA



The background of the river

The Gauja is the longest river in Latvia (452 km). It starts and ends in the territory of Latvia. The Vecpalsa River is the tributary of the Gauja. This area is a part of "Ziemeļgauja protected landscape area" territory. Habitats of these rivers are very suitable for

many protected species - such as pearl mussels (Margaritifera margaritifera), thick shelled river mussels (Unio crassus Philipsson), river lamprey (Lampetra fluviatilis), trout (Salmo trutta) and others.

Why is the restoration needed?

The main problem is permanent loss of protected habitats that are important for salmon spawning.

The river bottom which naturally should be covered by small stones now is covered by mud. The river also suffers from eutrophication and is full of trees trunks due to the high population of beavers. The life cycle of mussels is related with the presence of the salmon. That means that by protecting spawning places for the salmon we also improve the conditions for the protected mussel species.

Location

The activities took place in the Vecpalsa River and the Gauja River within "Ziemeļgauja protected landscape area".



What was done

Title: "ZAĻAIS KORIDORS" ("GREEN CORRIDOR")

When: 2011-2013

What was done:

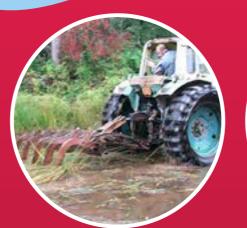
- 200 cubic meters of trees (mainly cut by beavers) were taken out of the river
- O The bottom of the river was weeded by tractor, taking out plants and their roots. As a result the river bottom that before was covered by mud is again covered by small stones.

BEFORE:



AFTER









Funding + Organisation

Links

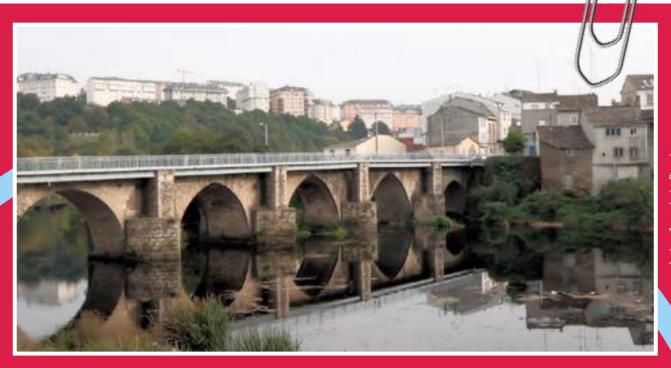
The project was organised by:

The Nature Conservation Agency. In cooperation with experts, landowners, NGO's, business sector and municipalities.

And funded by:

- The Nature Conservation Agency.
- EST-LAT programme for 2007-2013 (European Regional Development Fund)

Link to the project: http://daba.gov.lv/public/lat/projekti/interreg_iii_b/zalais_koridors/Link to photos: http://www.daba.gov.lv/public/lat/aktualitates/fotogalerijas/notikumi/2013_10_07_upju_ravesana/



RIO MIÑO



The background of the river

During the second half of the 20th Century, Lugo's meat and dairy industries developed rapidly which impacted rivers surrounding the town (the Miño, the Fervedoira, the Chanca and the Rato).

Waste and pollution became big problems and the Rato was used as a landfill to dispose of meat waste.

Why is the restoration needed?

Sanitation and sewage problems.

Location

Outskirts of Lugo (Region of Galicia), Spain.



What was done

Interventions:

- Renovation of the drainage system.
- O Construction of storm tanks to control the sewer overflows.
- Environmental recovery of a wide area including footpaths, footbridges and rest areas.
- O Compatible urban and environmental uses by the creation of parks compatible with the natural river flooding.
- Preservation of bank margins and vegetation from erosion.
- O Protection of the neighborhoods
 Galegos and Chanca against flooding
 (some of the buildings had no
 sanitation and discharged directly
 into the river).

- As in the section of the rivers
 Fervedoira and Chanca the buildings
 were constructed on or very close to
 the riverbed, some expropriations
 were carried out on the auxiliary
 buildings (boiler rooms, henhouses,
 etc) and the river was channeled
 between concrete walls.
- Creation of wetlands either permanent ones with fish ladders or seasonal that are flooded during winter.
- Expropriation of a natural island in the river Miño and the creation of another as a protected area for bird nesting, fauna and flora.

Particular interventions:

- Restoration of the medieval bridge A Chanca that is part of the "Camino de Santiago" (The way of Saint James).
- Creation of pedestrian walkways to different areas.







Funding + Organisation

Links

The project was organised by:

- County Council of the town,
- Northern Hydrographical Confederation (water authority)

And funded by:

- 70% Northern Hydrographical Confederation
- water authority-
- (European Regional Development Funds) 30% County Council of the town.

Link to the project: www.ciccp.es/biblio_digital/Icitema_III/ congreso/pdf/030506.pdf Northern Hydrographical Confederation: http://www.chminosil.es/



AKHURYAN



The background of the river

The Akhuryan River is located in the northeastern part of Armenia's Shirak region. The old riverbed borders farmland where fodder plants are grown. The

unprocessed lands and marshlands are used as waterlogged areas and pastures.

Why is the restoration needed?

In 1950 a dam was built in the Akhuryan inflow and it became a lake-reservoir, which as a result impaired the water quality of the river.

The old flow of the Akhuryan river was destroyed and the rich biodiversity typical for this river became endangered as water was directed straight to the channel.

Species which are in danger of disappearing here include the Candok (Nuphar lutea (L.) Smith), Eurasian otter (Lutra lutra) and Common crane (Grus grus).

mainly on the wellbeing of the river's flow regime.

Location

The restoration took place in the old riverbed in the valley that flows from lake Arpi, 2010 meters above sea level.

This biodiversity and its survival depends



What was done

- Nine visits to the Shirak Marz where the project implementers had meetings and seminars with the communities of surrounding villages, presenting the goals and objectives of the project. These communities suffered directly from the Akhuryan old riverbed marsh and agricultural land.
- Signboards were placed alongside the river flow.
- O Hydraulic structures were established and developed.
- O The artesian water output pipe, which was leaking considerably into the water stream, was repaired.

 A second dam was built on the other side of the inner stream, which rose water levels by at least 1 meter.









Funding + Organisation

Links

The project was organised by:

- Khazer Ecological
- Cultural NGO

And funded by:

- GEF Small Grant Program
- World Wildlife Foundation Armenian Branch

Link to the project:

https://sqp.undp.org/index.php?option=com sapprojects&view=projectdetail&id=18209&Itemid=205



RIVER WANDLE

- (UK

The background of the river

Located in South-West London, England the river became heavily polluted during the Industrial Revolution (1750-1850) and was deemed "the hardest worked river for its size in the world" in 1805.

Until recently natural features of the river were absent due to channelisation to maintain fast flow. Poor biodiversity resulting from pollution meant the last trout in the river was caught in 1934.

Why is the restoration needed?

The Wandle was a pollution hotspot described in the 1960s as a "sewer". Under the EU water framework the River Wandle was not reaching its full ecological potential. Heavy industry in

tobacco and textiles alongside the river and poor sewage treatment in the area increased pollution outflows; impacting biodiversity.

unbury

The Wandle Trust

The Wandle Trust was founded in 2000. It initially consisted of mainly local anglers and then the aims developed from removing rubbish to building structures which change its shape and flow, talking to industries alongside the river with

harmful outflows and reintroducing and restocking fish species.

Barnet Enfield Loughton
Edgware
Harrow Romford
Find Barnet Enfield Loughton
Edgware
Harrow Romford
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Harrow Romford
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Find Barnet Enfield Loughton
Fi

Croydon Orpington

Location

River Wandle, South London.

What was done

One scheme to educate young people on the river ecosystem and to reintroduce trout was the:

O "Trout in the Classroom" scheme (run since 2001)

Every December the trust visits some schools where special aquariums are set up to mimic natural river conditions, eggs hatch and children look after the trout eggs. Success rates can often be much higher than the natural 10% survival rate in the wild and have successfully brought back healthy trout populations.

O About the Trust

Community cleanups from local volunteers occur twice a month in order to maintain and improve the ecological conditions of the River Wandle.

The Wandle trust was formed to increase community involvement in restoration, working towards a South East Rivers Trust. Community-led initiatives are present in over 80% of UK river catchments. South East England previously had little coverage or river trust involvement.

O Problems with the Restoration

In 2008 after what was deemed to be successful restoration of the river, Thames Water spilled 1,600 litres of industrial strength bleach into the River Wandle resulting in two tonnes of dead fish having to be removed from the river. This had a massive ecological impact as the clean living trout species were once again near wiped out and many other species faced dramatic population decreases over the 5km stretch of river affected.

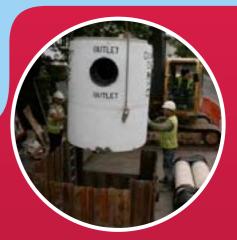
Thames Water paid a settlement of £500,000 to restore the River Wandle with a partnership set up with Thames Water to improve the river in the 5 years after the 2008 spill.

O This money went towards:

- £200,000 core funding for the Wandle Trust.
- £250,000 over 5 years for a restoration fund to support local projects to improve the river environment.







Funding Link

The project was funded by:

£2 million award from the Heritage Lottery Fund's Landscape Partnership Scheme. The Landscape Partnerships is for partnerships of local, regional and national interests which aim to conserve areas of distinctive landscape character throughout the UK. Aims of the grant are to produce a number of outcomes for heritage, people and communities.

Link to the project:
www.wandletrust.org/
The Rivers Trust:
www.theriverstrust.org/
Environment Agency:
www.environment-agency.
gov.uk/

18TH SEPTEMBER

WORLD WATER WONITORING DAY

Svetá Alžběta

Křivoklát Castle

The background

Every year the YEE office team organises a traditional trip. We go to some small town or village in the Czech Republic, find a river or a channel there and check the water quality. We organise it as part of the World Water Monitoring Day.

WWMD is a quite simple worldwide initiative: you order the water monitoring kit on the website, go to some water body, analyse the water following the steps explained in the instructions and you obtain the results of the quality of water. WWMD is an international project so you can share the results with participating communities around the world through the website.

The aim of the campaign is to raise public awareness and involvement in protecting water resources around the world by engaging people to conduct basic monitoring of their local water bodies.

We enjoy taking part in this event as it allows us to spend some time outside and close to nature, learn something about the local nature and rivers or lakes and do basic but very interesting research.

Here is the example from our trip to Krivoklat.

What was done

Using the kit, which can be ordered online we set out to measure the following:

O Air and Water temperature:

Temperature influences the aquatic life and the amount of oxygen in the water.

O Turbidity:

A measurement of the clarity of water.

O Dissolved oxygen:

This is very important to aquatic ecosystems as all animals need oxygen.

pH:

0

A measurement of the basic quality of water.

How

There is a white jar with special temperature strips and a turbidity sticker. The test kit also includes dissolved oxygen tablets, pH tablets and test tubes.

Results

Air temperature: 14-16 °C Water temperature: 11-12 °C

Turbidity: 40 JTU

Dissolved oxygen:3 ppm

pH: **8**

These results can tell us that the rivers are not in critical condition.

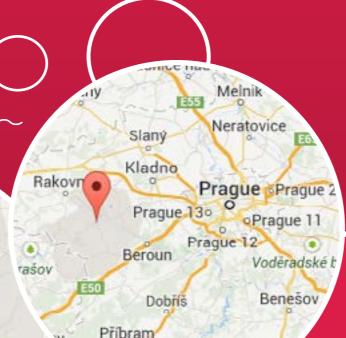
This kit can help you understand more about the terms and ways of measurements.

The rivers

Berounka and Rakovnicky. They are very popular among local canoeists as they are located in a very picturesque place. Every year there are thousands of people visiting these rivers.

Location

We took the measurements close to castle Krivoklat and the village Roztoky.





How to take part

- Go the the website www.worldwatermonitoringday.org
- register there and order the kit with the needed materials and instructions on how to take measurements.
- After taking your measurements, don't forget to share them on the website.





LINKS

If you are concerned about the state of the local river, you can plan your own restoration project. **The most important thing is to get informed and prepared.**

However, before embarking on a restoration project it is important to get advise from a professional as rivers are dynamic systems and restoration projects can cause more harm than good if implemented incorrectly

Here are some tips or examples which can help you with organising a project:

Get educated!

There are a lot of useful websites and publications online which explain the river restoration theory in detail and provide various templates for projects:

- O The River Restoration Centre
- O Restoring Europe's rivers
- O European Centre for River Restoration
- O Manual of River Restoration techniques by RRC
- O Rivers by design.
 Rethinking development and river restoration
- O Beginner's guide to river restoration
- O The EU Water Framework Directive

Get inspired!

You can check some case studies in our booklet or look for more examples and videos on the internet.

O River restoration case studies

Find partners...

...or join an NGO working on river restoration.

- **O** YEE Member Organisations
- Restoring Europe's Rivers network
- O The River Restoration Centre's Members

Know the basics...

...of organizing a project! These links can be very useful for any kind of project.

- O Project management T-Kit
- O Making waves. Creating impact with your youth project

Find a funder!

To organise a project, you need funding. You can either look for some local sponsors or supporters, or apply for bigger international grants.

- O Erasmus Plus –
 The EU programme
- O European Youth Foundation by the Council of Europe

Don't forget to share the results of your river restoration project with us!



VIDEOS

For further examples on river restoration and river management in general, please follow the links below:

- River restoration on the Hampshire Avon
- o Small dams on the Gauja river
- Restoring the Atleo River
- Lower Derwent River Restoration timelapse
- River voices of the next generation (Kids talk about rivers)
- River restoration and Flood Risk Management: The River Orbigo example
- Restoration revolution: The River Irwell
- Ogden River Restoration Story
- Rob Harmon: How the market can keep streams flowing
- O Dan Barber: How I fell in love with the fish





Information about participating organisations and the Youth in Action programme



Balta Daba [WHITE NATURE]

was established on March 4 2010. The aim of the organization is to promote public engagement in the preservation and renewal of culture and nature, especially focusing on youth initiatives and vouth participation in decisionmaking and public life. BALTA DABA is a youth oriented environmental organization which serves young people aged 18-30. The board is also made up of young people. The organisation's main activity is environmental and sustainable development. One of its main areas of development is in promoting direct youth participation in environment protection, renewal and clean up activities.

www.baltadaba.lv



Khazer Ecological and Cultural NGO

was established in 1991. Its aim is to protect the natural and cultural heritage of Armenia. The NGO has implemented a number of local and international projects in the area of nature protection and the environment. Khazer's main activities focus on ecosystem restoration and raising public awareness, often through the preparation, publication and distribution of environmental publications. The NGO has organized a number of conferences on climate change and public participation and submitted suggestions to the Armenian government on improvement of legislation in the field of nature protection.

www.khazer.org



Youth and Environment Europe (YEE)

is a network of 45 youth non-governmental organizations coming from 26 European countries. YEE's activites aim to promote sustainable development, environmental protection and nature conservation. All our activities are organized and carried out by and with the involvement of young people under the age of 30. YEE encourages all activities that can increase the knowledge, understanding and appreciation of nature and the awareness of environmental problems amongst young people in Europe.

www.yeenet.eu

Funder



Youth in Action is a program the European Commission has set up for young people. It aims to inspire a sense of active European citizenship, solidarity and tolerance among young Europeans and to involve them in shaping the European Union's future. It promotes mobility within and beyond the EU's borders, non-formal learning and intercultural dialogue, and encourages the inclusion of all young people, regardless of their educational, social and cultural background. http://ec.europa.eu/youth

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The publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

