

FEDERATION SPELEOLOGIQUE EUROPEENNE

European Cave Protection Commission



Assessing Karst Underground Conservation Efforts Across ECPC Member States

ECPC - Summary for the World Cleanup Day on 20. September 2024

Introduction

Karst landscapes, characterized by their unique geological formations and sensitive ecosystems, are particularly vulnerable to the impacts of pollution and waste. These ecosystems are under increasing pressure from major threats, including climate change, extensive agriculture and farming and habitat

destruction through building projects. In addition, a direct pervasive and troubling issue is the misuse of caves as illegal dumping sites across many European countries. Although this is hardly the most pressing issue endangering karst underground habitats, illegal dumping is a particularly shocking and visibly evident issue. Its prominence makes it an effective entry point for initiating discussions and advocating for more ambitious, large-scale karst protection measures. This issue is critical given that roughly 25% of the European Union's water supply comes from groundwater, with karst aquifers playing a crucial role in this resource (Figure 1).

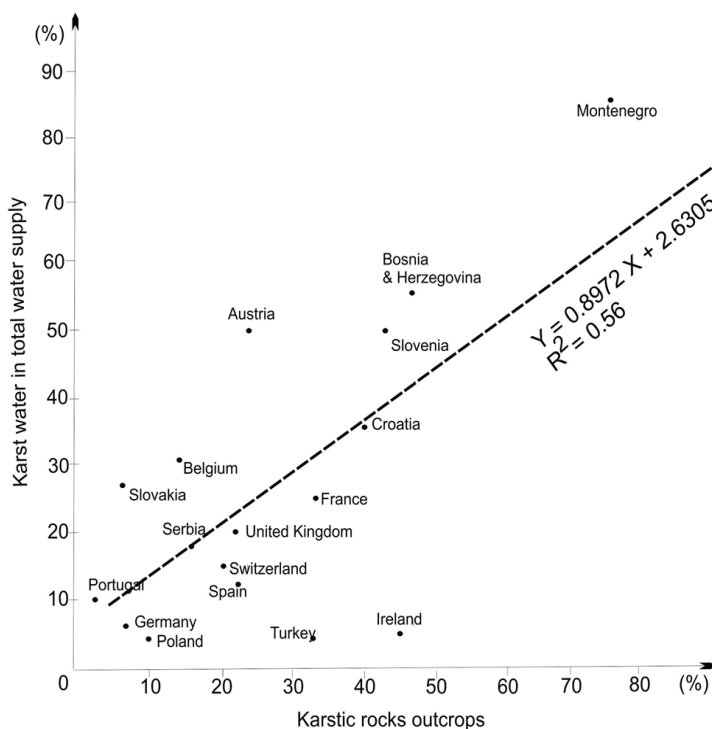


Figure. 1 Percentage of carbonate outcrops in the country area Vs the contribution of karst water to the total

Source: <https://doi.org/10.1016/j.geomorph.2010.08.010>

Addressing the issue of karst pollution demands a multifaceted approach. Effective conservation relies heavily on robust collaboration among environmental organizations, local communities, and governmental bodies. Education plays a crucial role in raising awareness about the consequences of illegal dumping and promoting sustainable practices. Additionally, fostering public awareness is essential in mobilizing collective action to protect and preserve these invaluable natural resources. By integrating these components, we can enhance our efforts to safeguard karst environments and ensure their resilience for future generations.



The European Cave Protection Commission (ECPC) has recognized the need to foster collaboration among caving groups in sharing share the knowledge on best cave protection practices across borders. Therefore we have started a data collection initiative to learn about the state of cave protection projects across pour member states. This collective effort not only enhances the effectiveness of individual protection measures but also builds a stronger front against threats to cave ecosystems. Before you is the first such integrated document on cave protection activities across ten ECPC member countries / regions (Figure 2.). Albeit drafted on a very short notice, we hope that it will provide a basis for future sharing of best practices an an annual report on the state of cave protection across our member states.

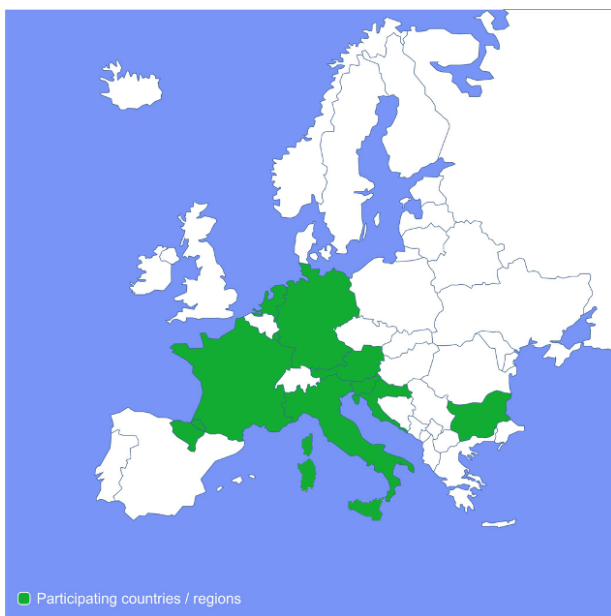


Figure 2. Countries / Regions within the ECPC that participated in the realisation of this document

HR - Croatia

Clean underground – a Croatian grassroots model of cave protection



**ČISTO
PODZEMLJE**

"[Clean Underground](#)" is a Croatian volunteer initiative dedicated to safeguarding caves from illegal waste disposal. With close to a thousand polluted sites identified through the project posing a threat to our unique underground ecosystem and vital karst aquifers supplying two thirds of our drinking water, our focus is on preserving these critical resources. By collaborating closely with the nature protection sector, we actively and successfully shape karst protection legislation in our country. With the help of our donors, we've funded the cleanup of 82 locations and donated over €100,000 to caving clubs, significantly promoting basic cave exploration. Recently, we successfully advocated for the government to assume responsibility for organizing and funding cave cleanups. This is by far our biggest achievement as we have ensured the long term financial sustainability of this work.

Having done that, we have recently shifted our focus to education. In 2023 we launched the „Ambassadors of Clean Underground“, a large-scale program with the goal to educate schoolchildren nation-wide about karst conservation. So far 242 schools and ~11,300 students have participated, spreading awareness to their families and preventing further cave devastation. This approach is rapidly becoming the primary method for stopping new karst pollution in Croatia.



Car graveyard deep within. Photo: Speleo8.



Hundreds of lectures on karst protection are held in elementary schools across Croatia (Photo E. Fućak).

IT - Italy

Puliamo il BUIO – the evolution of cave protection in ITALY



[Puliamo il Buio](#) is an initiative linked to the Italian edition of "Clean-up the World," the largest environmental voluntary event globally, organized in Italy by Legambiente. The Italian Speleological Society (SSI) has coordinated the national "Puliamo il Buio" effort since 2005, operating throughout Italy. Over the past 19 years, more than 460 caves have been cleaned of 163,166 kg of waste, thanks to the efforts of hundreds of speleologists who have contributed over 64,486 hours of voluntary work. SSI coordinates the event each September with significant collaboration from the Italian Alpine Club (CAI), speleologists, associations, companies, local authorities, and municipalities.

"Puliamo il Buio" aims to address pressures to the underground systems by identifying conservation problems and suggesting solutions. In collaboration with "Puliamo il Mondo," the initiative seeks to clean up underground illegal dumps, remove graffiti and signs, document them, assess their danger, and propose remedies to the public and local authorities. The Environmental Risk Cave Census is a key component of Puliamo il Buio, providing a reliable foundation for protecting the environment and water resources, reducing waste, enhancing natural habitats, and combating illegal dumping. Recently, the focus has shifted from cave cleaning to conservation, as there is a lack effective strategies for safeguarding these unique ecosystems for future generations. Thematic workshops organized by Tetide APS, with support from the Conservation Division of the National Speleological Society of the US and SSI. These workshops bring together experts and practitioners to discuss the preservation of cave ecosystems. They cover various aspects of cave conservation, including the impact of human activities on underground ecosystems, the philosophy of minimal impact speleology, cave cleaning techniques, graffiti and alteration removal, and the importance of respecting living organisms within caves. Through case studies and discussions, participants emphasize the need for collaboration among speleologists, conservation groups, local authorities, and cave tourism managers to ensure the long-term protection of these extraordinary environments.



Photo Group work, collection of cleaning water with sponge and funnel. Author Emanuela Derossi during the Cave Conservation Workshop



*Left: cleaning carbon black deposits can present some risks to formations, and you need to act with care.
Right. as a result of clean formation, the dirty water is collected with a funnel. Author Emanuela Derossi.*

ES / FR - The Basque Country (Spain / France)



Status of cave pollution in the Basque Country is diverse, as is the local economy and demographic pressure in rural and industrial areas. In the country - where agriculture, livestock, forestry are the main activity - the population rates are low and so it is the pollution in caves. This would be the case of the high mountain valleys of Soule and Navarre (including the famous Pierre-Saint-Martin speleo site), where only scattered points of cattle- and speleo-related waste (bones, carbide...) can be found. In medium mountains and plains, karst areas are more accessible, hence pollutable, and we find more waste related to the rural economy. This happens in the lowlands of Álava and Navarre. Finally, we have the case of coastal Basque Country, which is much more populated than the previous one, and with high industrial presence there. Nearly 90% of the contaminated caves are located in the karstic sites of this strip of land, which is almost 40 km deep and 150 km long, that runs by the Cantabrian Sea, including the cities of Bilbao, Donostia, Biarritz and Bayonne. There are many damaged caves, each of which contains a large amount of waste, and has a significant impact on the aquifers and the environment; therefore, you will see that most of the cave cleaning work carried out by Basque speleologists has been in this area.



DE - Germany

German Speleological Federation VdHK



Since 2019, the German Speleological Federation has been raising awareness about underground littering by participating in International Clean Up Day. In North Rhine-Westphalia, the Arbeitsgemeinschaft Höhle und Karst Lippe (AHKL) removed 100 kg of trash from the Schwarzloch cave. Similarly, the Arbeitsgemeinschaft Höhle und Karst Stuttgart cleared 15m³ of waste from caves in Baden-Württemberg and Franconia. A long-standing clean-up effort in the Jettenhöhle by Arbeitsgemeinschaft Karstkunde Harz e.V. has seen a steady decline in rubbish over the past decade. The Arbeitskreis Kluterthöhle e.V. was active in the Frettlöhrhöhle, dubbed Germany's "rubbish queen" is severely polluted by waste, including 200 litres of hydrochloric, chromate, and copper acid. Large-scale cleanups on the Iberg plateau removed 65m² of 1970s-era catering waste, while the Isarwinkel research group disposed of 80 metres of steel cables from Alpelwand caves. In 2020, Kahlensteiner Höhlenverein cleaned two air raid tunnels, and the youth group removed car parts from a protected sinkhole in Meierwiesen. Regular campaigns in Jettenhöhle and other caves have continued, with efforts to remove graffiti and other waste. In 2022, AHKL members cleared the Biwakstollen cave of a former homeless camp's debris. Recent activities include cleaning bat-rich caves near St. Wolfgang, removing 1.6 tonnes of old wood from Windloch by the Landesverband für Höhlen- und Karstforschung Bayern e.V., and restoring caves in the Kluterthöhle National Natural Monument. In 2023, efforts by the Landesverband für Höhlen- und Karstforschung Hessen e.V. focused on clearing waste from a sinkhole near Bad Sooden-Allendorf. These initiatives highlight the volunteer efforts to preserve Germany's subterranean environments.



cleanup. Photo: Jörg Strahlendorf



ly discovered cave sections Photo: Kluterthöhle Working Group e. V.

LU - Luxembourg



Groupe Spéléologique Luxembourgeois - Cave cleaning

Even though the Groupe Spéléologique Luxembourgeois a.s.b.l. did not have a specific activity on the subject, our regular Bio-Speleology Monitoring activities allowed us to find some detritus around and inside caves, and to take it out.

In the frame of this monitoring, between January and December 2023, a total of 21 descents into 7 Luxembourgish caves, 5 mines, one subterranean archeology-site, and 1 deactivated railway-tunnel were inspected.

What we found inside the caves, besides a marginal amount of detritus, there were occasional Geo-caches.



The mines (deactivated since decennies) still show the usual exploitation equipment and stabilization material, which are both considered industry-archeological.



© all Pictures by Claude Boes

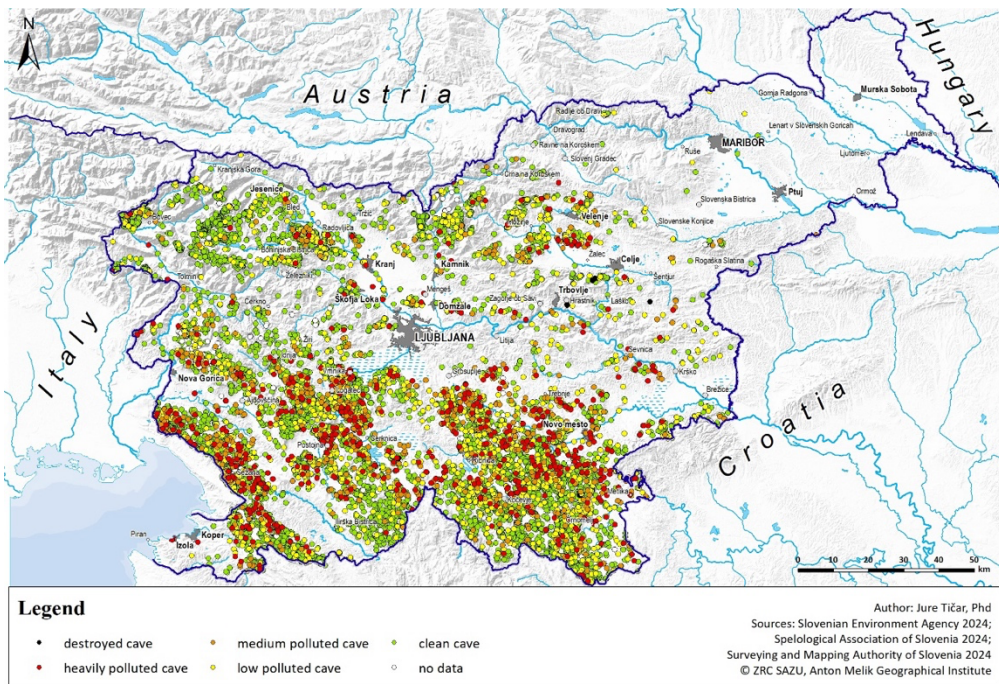
SI - Slovenia



Slovenia – a cradle of speleological research and pioneering cave pollution mitigation

Slovenia has a rich history of cave exploration and karst research, which has significantly contributed to our understanding of these unique ecosystems. However, the rapid economic growth, particularly in the latter half of the 20th century, often overshadowed environmental awareness. Slovenian cavers were among the first to notice the growing issue of cave pollution, with the earliest recorded concern dating back to 1689. Recognizing the gravity of the situation, they began organizing clean-up efforts and have successfully cleaned up to 350 caves to date. Despite these efforts, the full extent of the environmental challenges has only become apparent in the last 40 years. For a long time, it was believed that only about 20% of caves in lowland areas were affected by pollution. However, research over the past eight years has shed new light on the situation. Data from the Cave Register revealed that at least 3,032 caves—representing 19.9% of the 15,269 registered caves in Slovenia—are polluted. In some regions, up to 75% or more of caves are contaminated. In total, at least 23,000 cubic meters of waste are hidden beneath our feet, averaging 7.6 cubic meters per polluted cave.

While new pollution has largely been curbed, the remnants of past practices still pose a significant threat to clean drinking water and the habitats of endemic species. To tackle this issue, a standardized methodology for assessing cave pollution has been developed, generating millions of data points to guide future clean-up efforts. A priority remediation plan and protocol for implementing cave clean-ups have also been established. Additionally, a model has been created to detect cave pollution based on various influential factors. Currently, we are refining the protocols for data collection by cavers and developing new monitoring methodologies. Our recent efforts have been recognized by the Ministry of Environment and Spatial Planning, which is working on securing stable funding for these clean-up activities. This support will not only facilitate the restoration of heavily polluted caves but also enhance public understanding and engagement in our mission for a cleaner, more sustainable future.



Map of inventory of cave pollution in Slovenia (author: Jure Tičar).



Extent of pollution in Nuca Cave as a typical village dump (author: Matej Zalokar).

AT - Austria



Mission Possible: 'Austrian Clean Caves' – one answer to cave protection

All around the world water is one of our most important resource. In Austria 100% of our drinking water derives from ground water. Therefor more than 40 years ago cavers started an initiative: volunteers from the caving clubs are cleaning up the dark from illegal waste desposal, touristic waste and relict bivacs. Illegal waste basically derives from mountain huts, construction works (infrastructure in the mountains as cable railways, ...) or neighborhood. A black hole in the ground seemed to be perfect for getting rid of all the trash. With polluted sites located close to civilisation but also in the mountains posing a threat to our unique underground ecosystem and vital karst aquifer, our focus is on preserving these critical resources.

The Austrian Speleological Association financially supports their members organizing cave cleanups, ensuring the long term sustainability of this initiative. In the last 13 years more than 400 volunteers cleaned up 90 caves.

Additional educational programmms are part of our caving club initiatives. Every year we are partizipating in the summerschool „children's universtiy” in Vienna to educate children about the fascinating and fragile unknown underground, caving itself and underground ecosystem and conservation.



Clean Up The Zwettlerhoehle. It took us three days to get all waste from an household out of the cave in Lower Austria (c) Gerhard Winkler



2023_Clean Up The Kluftschtach close to Mariazell, Styria. (c) Herwig Korb



Clean Up The Lurgrotte in Styria. Full Team. (c) Katharina Buerger

BG - Bulgaria

Cleaning caves in Bulgaria



The garbage in cave in Sboryanovo, cleaned by volunteers

Bulgarian cavers took initiative to clean caves several times during the years, mostly motivated by their own sense of duty and aesthetics and rarely receiving any funding. Some examples are given here. In 2012, during speleological exploration, cavers from Targovishte found out chemical waste – expired herbicides at the bottom of a vertical shaft^[1]. The waste was safely removed. In 2016 the show cave Ledenika was cleaned by the initiative of the Bulgarian Speleological Society and the Directorate of the Vrachanski Balkan Nature park^[2]. In 2019 during a Speleo competition, organized by Cherni Vrah Speleo Club, the participants had a task to take garbage out from a cave to score more points^[3]. Around 2.5 tons of garbage, including some dangerous chemicals, were taken out of several caves in the famous Karlukovo karst area in 2020^[4, 5]. In 2022 volunteers from Targovishte, Ruse, Ispereh and cavers from the Bulgarian Speleological Society cleaned a large amount of garbage from a small cave, located in an archeological reserve^[6].

Sources:

1. <https://news.bg/society/chistyat-yarovata-peshtera-ot-izhvarleni-otrovni-herbitsidi.html>
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3. <https://www.facebook.com/events/s/%D1%81%D1%8A%D1%81%D1%82%D0%B5%D0%B7%D0%B0%D0%BD%D0%B8%D0%B5-%D0%BF%D0%BE-%D0%BF%D0%B5%D1%89%D0%B5%D1%80%D0%BD%D0%BE-%D0%BF%D1%80%D0%B8%D0%BB%D0%BE%D0%B6%D0%BD%D0%B8/282431872653231/>
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FR - France

The French Speleological Federation (FFS) and its members, active in protecting the underground



Fédération Française
de Spéléologie

For more than 30 years, the FFS and its clubs have been implementing numerous cave protection actions: training sessions, conservatory of underground milieu, participatory inventories of karst pollution, actions to save threatened caves (quarries, ...), protection measures from closure with quotas of visits to management of visiting periods, cleaning caves, ...

Cave cleaning is now an integral part of the FFS's cave preservation and restoration strategy. This is carried out in the following way:

- In order to record damage to the underground environment, the FFS is developing a participatory, citizen-based inventory of pollution on karstic sites: the Pok-Spéléo tool (<https://pok-speleo.fr/>) This tool is currently operational in the Occitanie region and will be soon available on a national scale. We would like to develop relations and data sharing with Clean Up the Dark (www.cleanupthedark.org).
- As part of its conservatory of underground milieu (Conservatoire du Milieu Souterrain, (www.ffspeleo.fr/CMS.html) the FFS is currently writing an operational guide to cave cleaning techniques and processes: waste removal, graffiti and speleothems alterations elimination, regulatory and safety aspects, communication and public participation, etc.
- Finally, every year, volunteers from the FFS clean a number of caves throughout France. Here are two recent examples: the Gouffre de l'Escalette, and the Phosphatières du Quercy.

Clean up the dark in France in 2005: a short souvenir [video](#) with English subtitles

Le Gouffre de l'Escalette

On 25 May 2024, cavers from the Association Spéléologique du Cagire and the Spéléo Club du Comminges, clubs affiliated to the FFS, cleaned the Escalette cave in the commune of Boutx in Haute-Garonne. The initiative was supported by Occitanie Regional Speleology Committee and Adour Garonne Water Agency. The site contained around twenty barrels of hydrocarbons. These deposits had been notified the POK website, which provides a participatory inventory of pollution in karstic areas. This action has also an educational objective, as the environmental impact of such discharges was explained to the public.



Hydrocarbons barrels eliminated from the Escalette cave

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Les Phosphatières du Quercy



For several years now, the Ratural Regional Park des Causses du Quercy, which manages the National Natural Reserve of Geological Interest in the Lot département, and the FFS have been working in partnership to clean up the phosphatières.

Phosphatières are former phosphate mines dating from the late 19th century, the exploitation of which has led to the discovery of fossils. Thanks to these discoveries, the Quercy is the only region in the world where the evolution of climatic fauna over more than 30 million years is known. Until the 80s and 90s, the phosphatières were often used as dumping grounds, endangering their exceptional palaeontological heritage as well as the underground water resources of the Causse.

Some of these phosphatières are now filled with rubbish and volunteers, including cavers, are working to restore them to their

original appearance. The last operation took place on 20 January 2024 and the next one is scheduled for 19 October 2024.



Waste removal at a phosphatière in Quercy

NL - The Netherlands



As you will know there are no caves in The Netherlands, so for ones this isn't a problem. Normally it is. That doesn't mean that the Dutch cavers are indifferent on the subject. Given the chance they participate in cleaning-ups in foreign caves and it is our policy to keep the cave and surroundings clean while caving abroad.

Further Speleo Nederland will dedicate in the coming newsletter of September given the fact that mentioned cleanup day takes place in this month a little article on the subject. It will emphasis ones more how important it is to keep caves and karst regions as clean as possible.

data provided by Speleo Nederland

European Cave Protection Commission

20 September 2024

