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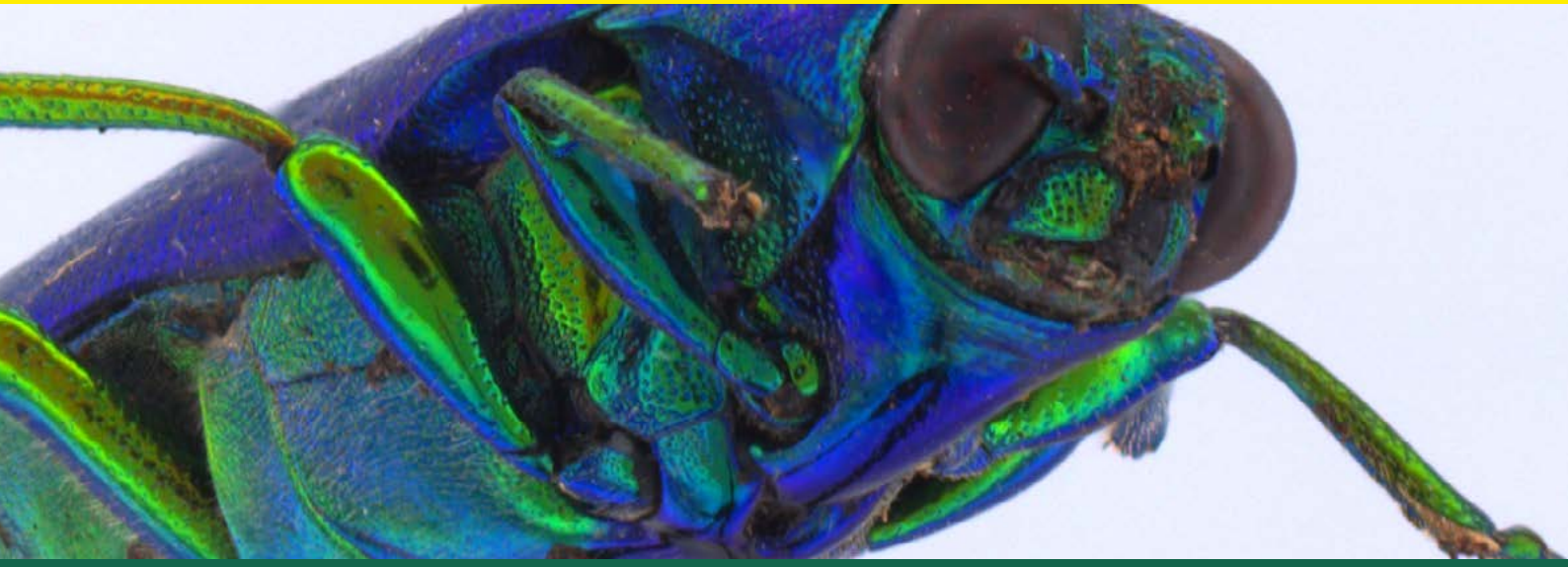
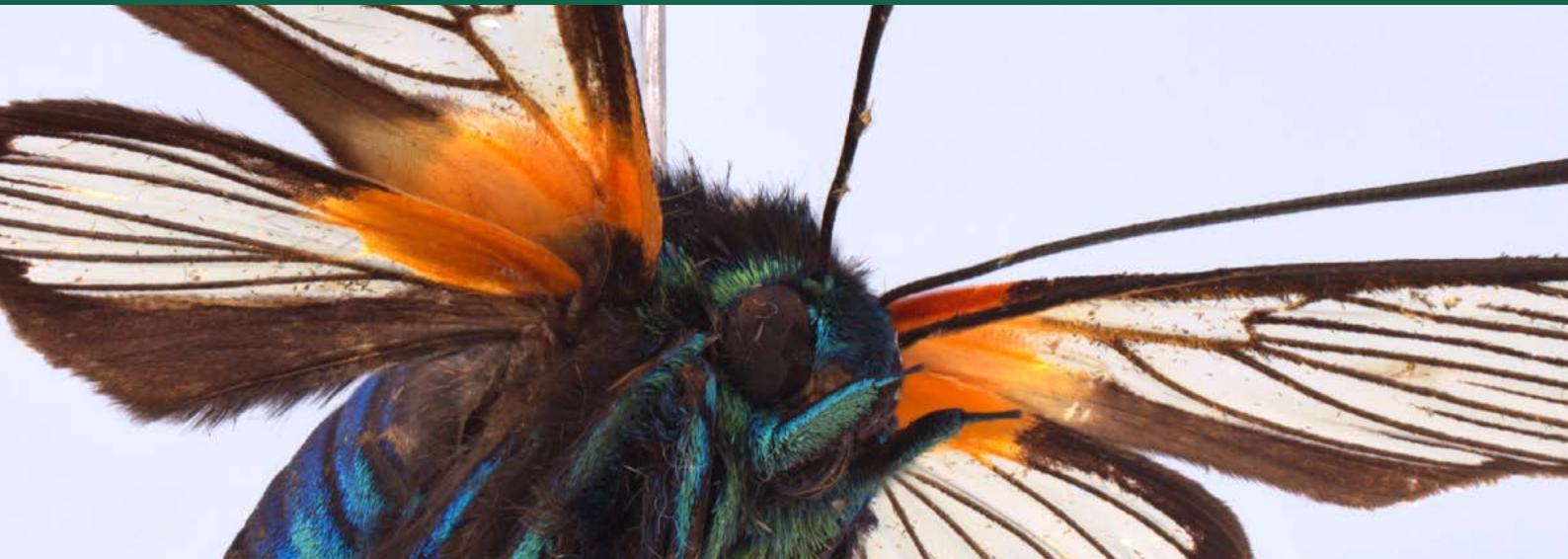
ANNUAL REPORT

2024





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ANNUAL REPORT

2024

Content

Foreword

The year 2024 was marked by contrasts for the Royal Belgian Institute of Natural Sciences. Despite structural and organisational challenges, such as the temporary halt of the research vessel Belgica, building-related issues, and an increasing staff shortage, the institute maintained its dynamism and capacity for innovation.

On the scientific front, our teams made remarkable progress, which we are pleased to share with you in this report. Their research connects us to our past and the Earth's history, from archaeology, the evolution of life and the modelling of marine and terrestrial ecosystems, to biodiversity and geodiversity. We are deeply committed to sharing our knowledge and promoting outreach. In this spirit, we worked with even more diverse audiences by organising several high-impact events: a day in May dedicated to mass extinctions, another focused on taxonomy, and in September, our "Wisenight" for researchers that was enthusiastically received. We also supported the government with our expertise and advice during the COP16 on biodiversity held in Cali, Colombia in October 2024.

Our collections, comprising 38 million specimens and ranking among the European top five, were further enriched and continue to be digitised at the Institute. They are studied by the Belgian and international scientific community, reaffirming their status as a global reference resource. As such, our Institute is part of a group of 13 major natural science institutions in Europe and North America. The directors of these institutions meet twice a year, and we were delighted to welcome them warmly when our meeting took place in Brussels in June.

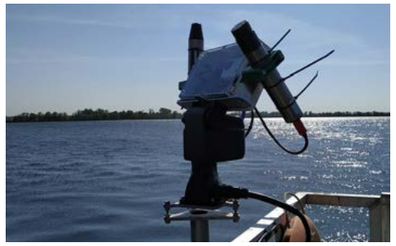
The museum continued to build on the momentum of a record-breaking 2023 in terms of visitor numbers, drawing a wide audience with the captivating exhibition *Giants*. We are proud to have transferred this in-house production to the Muséum of Toulouse in October. At our own museum, *Giants* made way for *Wild?*, an exhibition from the Swiss museum in Neuchâtel, which we adapted. These initiatives reflect our ongoing commitment to spark curiosity about science and inspire all generations. Beyond our walls, our teams helped 40,000 visitors discover prehistoric animal bones found during the construction of Metro Line 3 in Brussels. Another notable highlight was the publication of the magnificent book by palaeontologist Pascal Godefroit, which recounts the entire story of our Bernissart iguanodons.

Our coastguard aircraft continued its surveillance flights over Belgian territorial waters; an especially critical mission in today's strategically tense context. Our team responsible for aerial monitoring of the North Sea, finalists for the European Maritime Safety Agency's Greening Award, were honoured with the "Special Mention for Lasting Impact" in recognition of their crucial role in monitoring ship emissions. It is a distinction we are proud of. Similarly, our marine expertise and Geological Survey services play a key role in the study of critical raw materials, in line with the EU's Critical Raw Materials Act.

However, structural difficulties hampered some of our activities, particularly research requiring the Belgica vessel. The staff shortage has affected the support available to our researchers, leading to long delays and recruitment challenges. We hope that 2025 will bring solutions to these structural issues. In summary, 2024 was a difficult yet productive year: the achievements of the institute reflect the great dedication of our teams and volunteers who work daily to advance natural sciences in Belgium and beyond.

Michel Van Camp
General Director

2024 at a glance



08.02
NASA launches the hyperspectral satellite PACE. It uses data on water reflectivity and luminance from the WATERHYPERNET network, led by our Institute, to validate its ocean observations. See our report on page 17.

15.02
The Bright Festival lights up and animates the façades of our Institute for four days, to the great delight of visitors welcomed by our life-sized *Paraceratherium*.

01.03
A third victim of the Bois du Cazier mine fire is identified through DNA extraction and comparison with the DNA of family members. Eleven more victims are yet to be identified.

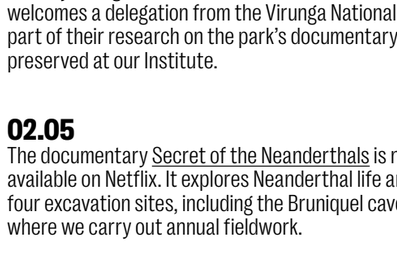
14.03
Improving border controls for invasive alien species is the focus of a conference organised by the Belgian Presidency of the Council of the EU, with scientific support from the dedicated Secretariat hosted by our Institute.

27.03
Helping insurers assess additional risk portfolios linked to soil movement in Belgium due to droughts and climate evolution is one of the direct applications of our research, discussed with a company in the sector.

29.03
The Scheldt Estuary region is officially recognised as a UNESCO Global Geopark, for its exceptional geology, history and landscape. It is the second geopark in Belgium, after Famenne-Ardenne.

05.04
Our Institute coordinates a European scientific report, freely accessible, on polar warming. This report presents 80 recommendations to inform policy decisions and all actors in polar regions.

05.04
Falcons for All, our scientific programme and 100% natural spectacle, celebrates its 20th anniversary by offering live 24/7 streaming of three peregrine falcon pairs in Brussels, from nesting to fledging.



15.04
Palaeontologist Pascal Godefroit publishes an illustrated book on the Bernissart Iguanodons, a major 1878 discovery that offered the first clear picture of dinosaurs. It retraces their story, from mining extraction to recent research on their extinction.

27.04
The first edition of BePaleo is launched: the new must-attend event of the year for palaeontology enthusiasts in Belgium. It presents current developments in palaeontology through talks, workshops and tours open to all.

29.04
The Royal Belgian Institute of Natural Sciences and CEBioS welcomes a delegation from the Virunga National Park as part of their research on the park's documentary archives, preserved at our Institute.

02.05
The documentary Secret of the Neanderthals is now available on Netflix. It explores Neanderthal life and features four excavation sites, including the Bruniquel cave (Aveyron), where we carry out annual fieldwork.

23.05
The first edition of *Taxonomy Recognition Day* is launched, organised in collaboration with CETAF. This awareness day on taxonomy is held across 15 European partners. Fifty participants meet scientists from our Institute.

23.05
Exciting natural science board games, behind-the-scenes and gallery tours, and the joyful vibes of the Boentje brass band—these were the winning ingredients of another successful Brussels Museums Nocturne at our Museum.

24.05
CITES celebrates 40 years in Belgium. The Convention aims to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species to which they belong.

30.05
The *Mass Extinction* Conference, co-organised by Belspo, brings together scientists, policymakers, and civil society to analyse the current biodiversity crisis, its causes and impacts, and to debate priorities for action. See our report on page 22.

05.06
Belgica, our research vessel, is taken out of service for legal reasons, affecting many marine monitoring and fundamental research activities.

23.06
Should we be concerned about the arrival of exotic termites in Belgium? This question arises following the identification of three exotic species, one of which is adapted to our climate and will be closely monitored.

25.06
Strategic meeting at our Institute of the Directors General and Research Directors of the 13 largest natural science institutions in Europe and North America (G13), to discuss research, collection management, and institutional leadership.

27.06
In May, our SURV team responsible for aerial surveillance of the North Sea are announced as finalists for Greening Award by the European Maritime Safety Agency. In June, they receive a *Special Mention for Lasting Impact* for their key role in monitoring ship emissions.

13.07
For two days, our park and galleries resonate with the exceptional programme of the Walden Festival, blending classical, jazz, Latin, groove, oriental, melancholic and rhythmic sounds.

27.07
Meteorite curators and conservators from around the world gather at our Institute for the 86th Meteoritical Society Annual Meeting and visit our collection—an exemplary repository for meteorites.

29.07
The North Sea monitoring team takes part in the 2024 edition of the international emission measurement campaign near the border of the North Sea Emission Control Area in Brittany, France.

20.08
After discussions with Belgian scientists about their repatriation to Congo, His Majesty Mini Kongo, traditional chief of the Suku in the Democratic Republic of the Congo, pays his respects to the human remains originating from his region.

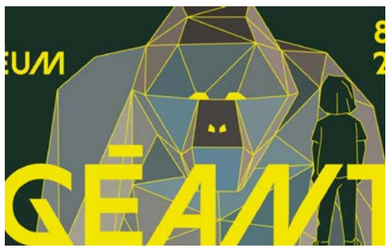
27.08
The Durbuy Anticline is selected for the second list of 100 Global Geosites by the IUGS, following an initiative by our Institute and the National Geology Committee of the Royal Academies for Science and the Arts of Belgium.

22.09
40,000 visitors discover prehistoric animal remains, from mammoth and giant deer to wild horse, found during the construction of Metro Line 3, during a visit organised by STIB and guided by urban.brussels and our teams.

28.09
Researchers' Night/WiseNight, hosted at our Institute, offers hands-on science activities and opportunities to meet our scientists, with a focus on climate change adaptation and soil research.

01.10
Our MARECO team studies the impact of offshore wind turbines on biodiversity in the North Sea. The ARTE documentary *Offshore wind farms: can they coexist with nature?*, broadcast in October 2024, features their research conducted aboard the RV Belgica.

01.10
A new volume is published on the rapid succession or cohabitation of two Early Neolithic groups found just metres apart at the *Haleurs* site (Ath), providing insights into a transition between societies.



08.10
Following its success in Brussels, the unique exhibition *Giants*, designed and produced by our teams, goes on tour and opens at the Muséum de Toulouse.

Research

The human touch

Humanity's impact on nature is often obscured by the passage of time, but every year our Institute unearths discoveries that enrich our understanding of how we relate to the environment. In 2024 our work continued to demonstrate its global significance in building an accurate picture of human health, behaviour and practices throughout history.

Prehistoric culture uncovered beneath a Namur car park

Mesolithic humans hunted wild boar, shaped antlers into tools and collected hazelnuts for food on a site at Le Grognon, Namur, which was inhabited almost continuously for over 10,000 years until a car park was built there in the early 2020s. The remarkable history of humans living at Le Grognon was brought to life after analysis of biological remains enabled the reconstruction of the site's first 5,000 years of inhabitation, as part of a partnership between our Institute and the Walloon Heritage Agency (AWaP).

Several months of study by an archaeosciences team analysed pollen, spores, and the remains of plants and animals. The resulting data formed a window into the Mesolithic and Neolithic periods, presented across the two Archaeology Days in Wallonia, on November 27 and 28. Around 200 participants had an opportunity to learn not only about the living environment of people who inhabited Le Grognon between 10,000 and 5000 BC, but also their daily activities.

The study itself involved a team of 30 archaeologists excavating the site. A strong shared understanding of the site's specific challenges ensured specialists were able to establish a complete plan of the site and sample enough material to put together a meaningful timeline of the area.

The technical challenges of excavating the site were considerable, given the need to create horizontal work platforms amongst steep slopes. Beneath the concrete pillars and slabs of the car park, organic remains unearthed across 3,000 square metres told us stories of humans hunting for boars, deer, and the ancient ancestors of cattle, the auroch. The findings enabled the archaeosciences team to link the evolution of the landscape to the presence of human populations that lived in the area during the Mesolithic period between 9400 and 6200 BC, and in the Middle Neolithic period between 4500 and 2700 BC – two periods of Wallonia's Prehistory that have been poorly understood until now.

As the landscape and water levels changed over the centuries, the prehistoric populations of Le Grognon adapted their activities, and the study found evidence of developments in toolmaking and ceramic craftsmanship. Tiny traces of wear evident in the unearthed flint tools were studied in the framework of the ROAM project at the University of Ghent to help piece together a nuanced timeline of shifts in human behaviour and an accurate document of the way land and resources were exploited.

Le Grognon is now among the key sites offering a detailed understanding of prehistoric life in Wallonia during the first two thirds of the Holocene.

Colourful discoveries in ancient riverbeds

Three of the most important medieval dye plants have been discovered in Belgium during archaeobotanical studies in Brussels and Mechelen. Excavations of medieval river deposits revealed traces of weld, madder and woad – plants that were crucial to textile production during the Middle Ages, which have never been found together in Belgium before. Brussels and Mechelen were already known to be important locations for textile production from the mid-13th century onwards but the excavations of medieval riverbeds of the Senne and Melaan revealed rare archaeological evidence for the use of the three dye plants that suggested specialised techniques were practised by medieval dyers working along the rivers in both cities for several centuries. Weld and madder, the dye plants that were used to produce yellow and red, respectively, had been found in Belgium before but the discovery of woad, which produced blue, was a Belgian first.

Our Institute worked with colleagues from the Royal Institute for Cultural Heritage, urban.brussels, the Art & History Museum, the Hof van Busleyden Museum and the VUB to produce a study detailing the archaeological findings, published in *Vegetation History and Archaeobotany*. The functional parts of the medieval dye plants, consisting mainly of soft tissues, do not preserve well, making the discovery of weld seeds, madder root fragments and woad fruits in both Brussels and Mechelen truly outstanding.

Malaria's history traced in Mechelen cemetery

A cemetery in Mechelen might not be the first place you'd expect to conduct a study into the global spread of malaria, but that's exactly where our anthropologists have made important discoveries about humanity's role in the history of the disease. St. Rombout's Cemetery in Mechelen is located alongside the site where a Spanish permanent military hospital, Europe's first, stood from 1567 to 1715, giving the site a key role in a malaria study that has been published in the prestigious journal *Nature*.

Our Institute joined a research team led by the Max Planck Institute for Evolutionary Anthropology in Leipzig, alongside the former department of archaeology of the city of Mechelen. The team explored how and when malaria parasites emerged as human pathogens and spread around the globe, focussing on the role that trade, war and colonialism played in the history of the disease.

DNA analyses of the teeth of 10 skeletons found in the cemetery's graves, many of which contained the remains of several people buried around the same time, revealed pathogens preserved in root canals. Ancient DNA analyses were used to show that eight of the malaria cases discovered were a virulent southern variant, which population genetics showed had an origin in the Mediterranean area, demonstrating the impact that troop movements had on the spread of the disease.

Setting the story straight about the horns of ancient Egyptian sheep

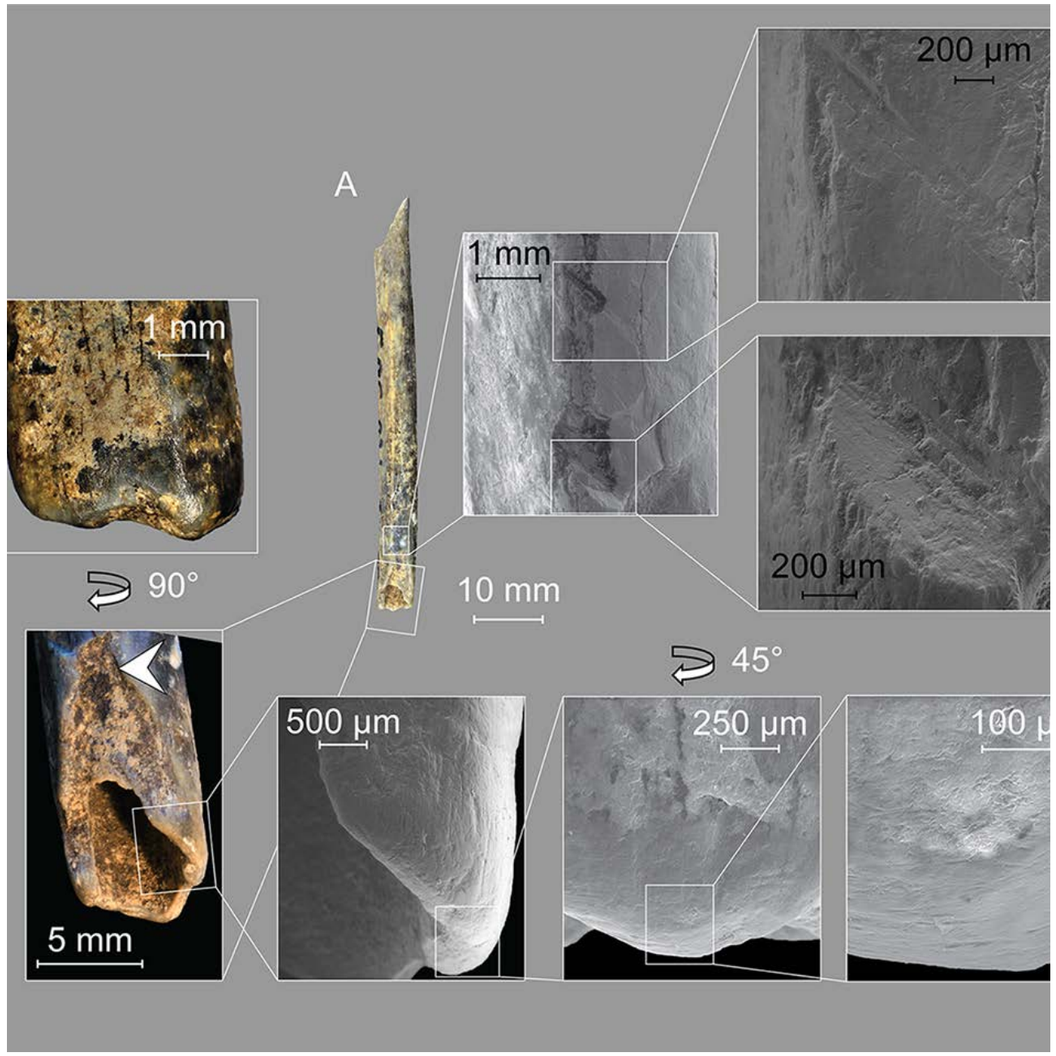
Evidence has been found that proves the mysterious practice of livestock horn modification dates back to the fourth millennium BC, but the meaning behind it remains unclear.

Archaeologists from our Institute and the University of Oxford found the oldest evidence of horn modification at the elite cemetery of Hierakonpolis in Egypt, where the remains of sheep buried in a grave dated to around 3700 BC included sheep skulls with horns growing into an unnatural, upright position.

This particular species of sheep normally has horns that spiral out sideways, but notches were found in the excavated horns that suggested ancient Egyptians had fractured the horns at their base and used ropes to bind them together so that they would grow straight upwards in parallel.

While practices like this have been seen in African cattle through both modern ethnographic observations and archaeozoological studies of material from third millennium BC Nubia (in Kerma, Sudan), the Hierakonpolis sheep provide the oldest evidence for horn modification of livestock, and the first demonstration of the practice applied to sheep. The results were published in the *Journal of Archaeological Science*.

Archaeologists believe the practice may have been a demonstration of status by elites who wanted to show their power by displaying rare and exotic animals, or that the animals may have been involved in ancient rituals.



Birds on the menu for Neanderthals in Scladina Cave

Hunting birds was long thought to be a skill confined to modern humans, but a study at Scladina Cave in Belgium has produced evidence that Neanderthals were capable of exploiting small creatures for their meat and bones.

The behavioural gap between Neanderthals and anatomically modern humans has been narrowing in recent decades, thanks to studies carried out almost exclusively in southern Europe. But in 2024, colleagues from our Institute and the University of Liège demonstrated that Neanderthals made use of small fauna in northern Europe too, publishing the findings in *Frontiers in Environmental Archaeology*.

The analysis of 119 bird remains from the cave, which is located in the Meuse river valley close to Andenne, verified the presence of modifications such as cut marks that were made by humans. The study provided the first evidence of the exploitation of birds for meat and bone craft by Neanderthal in Belgium and constitutes the only detailed zooarchaeological analysis of Middle Paleolithic bird material in northwestern Europe, adding to the picture of the Neanderthal environment in southern Belgium over 80,000 years ago.

New advances illuminate the distant past

As new technologies develop, our history is brought to life from perspectives that have never been seen before, breaking new ground in our studies of the Earth's history. In 2024, three key insights from our Institute demonstrated the power of modern research.

One of these insights came from the analysis of exceptionally rare fossil shells dating back 350 million years. These fossils, preserved in our collections, still bear intricate colour patterns. Researchers set out to determine whether metals were associated with these ancient pigments. Using the SOLEIL synchrotron in France, they applied a non-destructive technique called SR-µXRF, which employs high-energy X-rays to detect chemical elements at a microscopic scale. This research, part of the BRAIN-be 2.0 project ColourInPalaeo, funded by Belspo, confirms the presence of multiple pigments in the shells, offering unprecedented insights into the role of colour in prehistoric marine life. It further highlights that Belgium has proven to be a hotspot for exceptional colour preservation.

Another key area of progress this year was in Belgian Devonian lithostratigraphy. Ever strolled through Dinant and admired the spectacular rock formations along the Meuse? Wallonia's rock formations have long been crucial for understanding Earth's history, as the region is the historic cradle of three internationally recognised Devonian stages. Stratigraphy—the study of rock layers—provides valuable records of past environments, and a comprehensive revision of Belgium's Devonian lithostratigraphy was long overdue. Thanks to two decades of geological surveys, scientists have now updated the Geological Map of Wallonia, significantly refining our knowledge of ancient rock formations, published in *Geologica Belgica*. These Devonian deposits, also partly recognised in boreholes drilled in the Campine Basin, have not only yielded important fossils but have also been a source of ornamental stones and construction materials, showcasing their cultural and scientific importance.

A third breakthrough focused on the environments where early vertebrates lived during the Devonian period, particularly as they transitioned from water to land. Studying these habitats has been challenging due to difficulties in determining whether these aquatic environments were saltwater, freshwater or something in between. However, our scientists' new study used a new tool, oxygen and sulphur isotope analysis, to trace relative salinity levels with unprecedented precision. This research, published in the *GSA Bulletin*, produced the first definitive evidence that some early tetrapods inhabited freshwater environments as early as 362–360 million years ago. By unlocking clues hidden in ancient rocks, scientists are now able to reconstruct the conditions that shaped the evolution of vertebrates, and how they moved from one environment to the next.

Research tools at the cutting edge

From satellite-based instruments that detect the precise colour of the ocean to ecochemistry experts in the analysis of pollutants, our Institute is at the very forefront of developing powerful new tools and approaches to research.

Partnering with NASA on remote sensing

Imagine you're looking at Earth from space. Satellites capture stunning images of land and water, tracking environmental changes in real-time. But how do we know these images are accurate? That's where radiometric validation comes in: sensors that ensure that what satellites "see" truly reflects reality. Our Institute coordinates the international HYPERNETS network that manages these sensors, designed to enhance the accuracy of satellite data and provide a clearer picture of our planet's health - and 2024 has seen some major achievements.

In the port of Zeebrugge, sediment is constantly being dredged away from the port to ensure it remains accessible to ships. Thanks to European satellite imagery, we can see its effects on phytoplankton, the "grass of the sea," an essential part of the ecosystem there. And in January 2024, in cooperation with the Flemish Ministry for Mobility and Public Works, we launched our measuring station in the North Sea to collect data to verify the satellite images. If our results don't match, we can signal to the European Space Agency that there could be an issue with their satellite.

This year also saw the first results of a high-profile partnership with the US space agency NASA. Their new satellite PACE was launched in February, measuring key variables on cloud formation, particles and pollutants in the air, and microscopic, floating marine life. Its data is validated by another of our instruments in Chesapeake Bay, USA.

Unlike previous networks that focused on either land or water, our HYPERNETS sensors do both—providing a common approach to validation across environments. Our cutting-edge instruments measure the full spectrum of light reflected from Earth's surface, ensuring more precise data for tracking water quality, vegetation health, and other environmental indicators. These automated sensors work across multiple satellite missions, offering a seamless way to validate data and improve our understanding of the planet.

But HYPERNETS doesn't work alone. It connects with existing networks like AERONET, FLUXNET, ICOS, and RadCalNet, creating a powerful web of environmental monitoring. It also brings in additional data—such as water turbidity, fluorescence, land temperature, and soil moisture—painting a more complete picture of Earth's systems. Results from HYPERNETS were published in a special issue of the journal *Frontiers*.

New certification for our ecochemistry team

Beneath the North Sea waves, hidden beneath layers of sediment, remnants of past conflicts still linger. TNT from old ammunition dumping sites can remain undetected for decades, gradually breaking down and potentially leaching harmful compounds into marine ecosystems. Detecting such threats requires not only cutting-edge analytical techniques but also the ability to identify explosives buried deep beneath the seabed. Now, thanks to its latest accreditation, our ecochemistry team ECOCHEM has enhanced its ability to do just that, and much more.

In 2024, ECOCHEM passed the national BELAC audit and reestablished accreditation for the analysis of polycyclic aromatic hydrocarbons in sediment. This further strengthens ECOCHEM's reputation as an internationally recognised authority in environmental pollutant analysis and our ability to contribute to environmental research, risk assessment, and remediation efforts.

What is more, 2024 marks 20 years across which it has maintained its BELAC accreditation. This achievement underscores ECOCHEM's commitment to maintaining the highest scientific standards while embracing continuous innovation. Achieving and maintaining accreditation is no small feat—it requires rigorous quality control, adherence to evolving methodologies, and an unwavering focus on precision and reliability.

One of the key challenges in maintaining accreditation is ensuring that all factors influencing results are meticulously documented and evaluated. A change in procedures, suppliers, or materials can introduce unexpected challenges. For example, when the team switched to a new solvent for one of its chemical procedures, initial tests showed improved performance. However, further investigation revealed that the solvent reacted with moisture, forming an acid that corroded the laboratory equipment. Such experiences highlight the importance of continuous monitoring, documentation, and adaptation.

Accreditation is not just about following procedures—it's about critically assessing and refining them. The entire management team, alongside our highly qualified and trained staff, plays an essential role in upholding these standards. Every step, from sample collection to final reporting, must be rigorously checked, validated, and adjusted as needed to ensure the integrity of results.

Seeing the unseeable with DNA research

Our Institute's advances in the use of DNA are helping researchers to make crucial distinctions between species that were previously shrouded in mystery, strengthening our understanding of the evolution of the natural world.

Ancient DNA reveals hidden lives in Peru

For centuries, the ancient burial grounds of Pachacamac, Peru, have held the secrets of a lost civilisation. Among the tombs, archaeologists have uncovered the remains of countless individuals, many of them infants, children, and adolescents. Who were they? What role did they play in their society? And why were so many of them buried together? Now, thanks to our Institute's specialised ancient DNA (aDNA) infrastructure, scientists from ULB and our institute are beginning to answer these questions, shedding new light on the lives—and deaths—of Pachacamac's youngest inhabitants.

Since 2021, aDNA from a Late Intermediate Period (900–1470 AD) burial site in Pachacamac has been analysed. The context, a multiple tomb containing the remains of 89 individuals of various ages, is of particular interest due to the high proportion of infants, children, and adolescents. Traditional methods fail to determine the sex of younger individuals, making genetic analysis a game-changer in the field of bioarchaeology. By examining the relative ratios of X and Y chromosome markers, scientists can now accurately assign sex to subadult remains, providing invaluable insights into funerary recruitment, societal structures, and cultural practices of the Ychsma civilisation.

Around 60% of the individuals in this tomb are children whose sex could not be determined through skeletal examination. Despite challenges such as modern contamination and DNA degradation, our researchers have successfully assigned sex genetically in over 95% of cases. These results mark a significant advancement in the study of ancient human remains and are part of the larger Ychsma project, led by Peter Eeckhout from the Université Libre de Bruxelles. This interdisciplinary initiative integrates bioarchaeology and molecular archaeology to create a more comprehensive demographic and health profile of the people buried at Pachacamac. Results were presented at three conferences in 2024, including at the first *South American Archaeogenetic Workshop* in San Rafael, Argentina.

The findings also contribute to ongoing debates about funerary customs at the site. Were these young individuals victims of sacrificial practices, or did they die of natural causes before being ritually buried? Some researchers propose that infants and young children, sometimes found in funerary jars, may have been offerings to the gods or the ancestors rather than victims of violence. These insights challenge previous interpretations of mass burials and deepen our understanding of pre-Columbian spiritual and ritualistic practices.

DNA as a tool for sorting “taxonomic wastebasket”

The taxonomic wastebasket refers to a category of species or groups of animals with similar morphologies but very diverse evolutionary origins, grouped together due to lack of a more precise classification. For example, invertebrate animals that are not arthropods often find themselves lumped into the wastebasket category of “worms” along with a plethora of poorly understood or poorly defined creatures.

A case in point is the family of aquatic oligochaetes (“earthworms”) known as the Haplotaxidae, which was created to contain the genus *Haplotaxis*. This aquatic worm, which lives in groundwater, is a predator, unlike the majority of terrestrial and aquatic “earthworms”, which feed on decaying organic matter. Several other oligochaete genera were also classified among the Haplotaxidae, in the absence of a more appropriate place to put them.

But taxonomy is dynamic and constantly evolving with the latest technologies. Recent advances in the use of DNA data at our Institute helped to prove that the Haplotaxidae were a very heterogeneous group of species, deserving of four new families to reflect their uniqueness. Four new orders were created so that these species could be placed in a classification system that illustrates their evolutionary relationships, published in the *Zoological Journal of the Linnean Society*.

Looking beyond morphology to find hidden diversity

DNA analysis is also revolutionising the way taxonomists define where one species ends and a new one begins. Cryptic species are species which may appear morphologically similar but are genetically distinct. Previously considered a single species, these cryptic species can actually differ in key ecological and physiological aspects, despite their nearly identical external appearance.

However, due to the lack of obvious morphological differences, most of these species remain undescribed and have no official recognition. In a study on the molecular diversity of *Chaetogaster* species in Switzerland - an aquatic “earthworm” just a few millimetres long - our team used DNA sequencing to describe cryptic species, now published in the journal *Biology*. With this method, we identified five new species among the six previously known in Switzerland, bringing the total number of *Chaetogaster* species to eleven. Now officially described, these species can be recognised and accounted for as part of biodiversity by the scientific community.

This work shows that taxonomy, the science of classifying species, is a modern discipline in constant evolution. It remains essential to fully understand the diversity of the living world that surrounds us and to be able to preserve it with full knowledge of the facts.

People power: citizen science

The contribution of volunteers, interns and members of the public to the Institute’s work remains as valuable and significant as ever. Citizen scientists help us map and monitor species populations, organise our collections and even defend against predators!

Belgium’s soil dwelling biodiversity is under threat from an influx of voracious flatworms. And citizen scientists are playing a vital role in the country’s response, by identifying and mapping the movements of these invasive species.

Flatworms, which are entirely smooth, covered in mucus, and often arrive in Europe via the potted plant trade, can harm biodiversity and soil fertility as they feed on snails, earthworms, woodlice and other soil organisms. Through the citizen science project FlatwormWatch, members of the public are keeping a lookout for flatworms in their gardens, potted plants and in terraria. On 3 November 2024 many of these “FlatwormWatchers” attended a successful FlatwormWatch event at Meise Botanical Garden, which was organised by the National Scientific Secretariat on Invasive Alien Species (NSSIAS).

Citizen scientists don’t just contribute from their homes, and in 2024 students came - even from France - to work with our paleontology collections team to help showcase several collections of vertebrates, invertebrates and fossil plants that in some cases had been dormant in conservatories for years.

The students helped the team with transportation, packaging, inventory, storage, restoration and digitisation of specimens. In a little over a year, this collaboration has made it possible to arrange four collections, now distributed across 65 drawers and including nearly 3,500 specimens.

Meanwhile, out in the heathlands of the Bruges area, volunteer citizen scientists have helped to create an inventory of insects and arachnids, enabling policymakers to protect wildlife. The Entomology collections group receives the help of a small group of volunteers who empty insect traps, sort and identify specimens every two weeks. More than 250 different species of spiders, more than 150 species of ground beetles, and more than 20 species of ants have been found during the inventory, a number of which were extinct in Flanders.

It is important that the work of citizen scientists is given the recognition it deserves, and in 2024 a crab species that lived in Belgium 85 million years ago was named after Institute volunteer Patrick De Saegher, in recognition of his work in digitising our paleontological archives.

Patrick, a former laboratory technician, was scanning archives along with our paleontology team when a unique crab carapace was spotted amongst a haul of lobster claws excavated 585 metres below surface at the Houthalen coal mine in Limburg, Belgium. The crab shell was confirmed to be from a previously unknown species, which has now been given the name *Binkhorstia desaegheri*, in Patrick’s honour.

Our Institute is proud of its longstanding tradition of citizen science. For example, our BeBirds service has been dedicated to the individual monitoring of bird populations since 1927, and its members all complete a minimum of four years’ training and pass two exams, guaranteeing their competence and the quality of their hugely valuable work.

Facing the sixth wave: Mass Extinction Conference

As we confront a new wave of mass extinction, linking natural history collections with contemporary monitoring has never been more critical in understanding biodiversity loss. Our Institute's Mass Extinction Conference explored how a wide array of human activities led to the large-scale loss of species, calling for urgent action.

The causes and consequences of the current biodiversity crisis were explored at a Mass Extinction Conference organised by our Institute and Belspo on May 30th, 2024. Keynote speakers helped attendees to examine the current loss of biodiversity that humankind is experiencing, and compare it to five other extinction waves that have hit our planet throughout history, asking the questions: are we experiencing a sixth mass extinction, and why should we care?

The conference heard how currently more than 150,300 species are on the International Union for the Conservation of Nature's Red List, of which more than 42,100 are threatened with extinction. The conference heard how more than 42,100 species are currently threatened with extinction (IUCN) and more than 150,300 species are on the International Union for the Conservation of Nature's Red List, Alongside these startling figures came a detailed explanation on the ways in which human activity is affecting the cycles of elements such as carbon, nitrogen and phosphorus, leading to changing climate and marine oxygenation, among others.

Habitat degradation and fragmentation, overexploitation, pollution and invasive species also received extensive attention as main causes of biodiversity loss, and the issue was approached from economic, instrumental and moral angles, informing a final discussion on the tangible priorities for action. In the afternoon of the conference, a presentation highlighted the value of natural history collections as a baseline for understanding biodiversity loss.

Around 100 participants attended the conference, mainly representing science, policy and civil society as important stakeholders. The event was relayed in the media on social networks and in the press, and the keynote speakers were interviewed by the Belgian television channel RTL, and a detailed report was published with the outcomes.

The event offered a powerful reminder of the fragility and subtle equilibrium of the environment we live in and of which we are a part, demonstrating how previous mass extinctions can help us better understand and estimate the level and rapidity of change. Delegates heard how urgent it is that we combine our efforts to find solutions, to profoundly rethink our use of natural resources, and map out a path towards the protection and restoration of our planet.

From research to policy to action

Good policy advice needs to be backed up by good data. And our Institute produces both, supporting big policy decisions on topics from maritime ecosystems and wetland birdlife to global biodiversity. Find out how our expertise shaped political decision making in 2024.

The impact of the world's first artificial energy island

Belgium made waves in 2024 with the launch of the construction of Princess Elisabeth Island, the first artificial energy island of its type in the world. Located about 45 km off the Belgian coast, this groundbreaking project will integrate offshore wind energy into Europe's electricity grid. But with such a large development in the North Sea, one big question arises: what about the environment? That's where our Institute's marine management team stepped in. We played a pivotal role in assessing the environmental impact of this major infrastructure and setting up mitigation measures, ensuring that nature has a voice in the planning and execution of the project.

Before construction could begin, a comprehensive environmental impact assessment was necessary. The goal was to identify potential effects on marine life and define conditions that would protect the North Sea's ecosystem. Our scientists contributed detailed studies, mapping out sensitive marine habitats and assessing how the island might influence seabirds, fish populations, and underwater ecosystems. We assessed the proposed locations, ensuring that the construction of the island and the cables to land avoided, as much as possible, vulnerable habitats such as gravel beds.

All major human activities at sea in Belgium undergo a public consultation process, and Princess Elisabeth Island was no exception. Feedback from key stakeholders, like maritime industries and environmental NGOs, helped refine project conditions to ensure a balance between development and conservation. Environmental activists were largely supportive of the impact assessment, which took their concerns into account.

The island will not only serve as the location for transformer stations for the still to construct wind farms, but in future will serve as a critical energy hub, linking Belgium to Denmark and the UK. This means surplus green energy can be transferred between countries—if Belgium produces too much wind power, it can be sent to the UK, and vice versa. This cross-border energy exchange strengthens Europe's shift towards a cleaner, more resilient power grid.

And Princess Elisabeth Island isn't just about generating power. Working with industry partners, our marine ecology and management team helped develop nature-inclusive design features. Special platforms will provide resting and nesting spots for seabirds, including the struggling Black-legged kittiwake. The island's base structures will encourage the settlement of marine organisms, creating new underwater ecosystems.

Our work doesn't end with the assessment. Our experts will continue to monitor environmental impacts and guide future adjustments to protect marine ecosystems. This project sets an example for combining renewable energy infrastructure with ecological responsibility, proving that large-scale offshore developments can coexist with nature. Belgium's Princess Elisabeth Island is a first of its kind, but with responsible planning and a commitment to sustainability, it certainly won't be the last. The lessons learned here will help shape the future of marine energy projects worldwide.

Belgium takes the lead on Europe's position: the CBD COP16

Big decisions were made in 2024 about the future of our planet's biodiversity, and our Institute played an important role. The Convention on Biological Diversity (CBD) COP16, held in Cali, Colombia, in 2024, was a pivotal event in international efforts to halt biodiversity loss. As the primary decision-making body of the CBD, the COP sets global strategies for conservation, sustainable use, and the fair sharing of benefits from genetic resources. It is critical for implementing the Kunming-Montreal Global Biodiversity Framework, which aims to restore ecosystems, protect species, and integrate biodiversity into economic and policy decisions worldwide.

Our Institute is the Belgian National Focal Point to the CBD, which means we always make a crucial contribution, shaping discussions at COPs and their preparatory meetings. But this year, with Belgium's presidency of the Council of the European Union, the role took on a new significance. As part of the Belgian EU Presidency, our team led negotiations on several major biodiversity policies and coordinated the European Union's positions to ensure a unified and ambitious stance. In May, two preparatory meetings in Nairobi laid the groundwork for critical COP decisions. Our role even extended to assisting the Hungarian EU Presidency in preparing for their future role.

And our hard work paid off. Major achievements of COP16 included the establishment of a formal advisory body for Indigenous Peoples, recognising their importance for biodiversity conservation. Another breakthrough was the adoption of a global framework for benefit-sharing of digital sequence information, which will impact how biodiversity-related genetic data is accessed and used in research. This decision is particularly relevant for research institutions like ours, which will have to follow the laws that the EU and Belgium develop in accordance with the agreement, to ensure fair and equitable access.

Beyond negotiations, Belgium contributed to several capacity-building initiatives in 2024. In June, our Institute hosted a workshop to support biodiversity data managers in implementing guidelines more effectively. A training event in Mexico City in September strengthened international knowledge-sharing on biodiversity governance. The team also facilitated global collaboration through the CO-OP4CBD network, fostering stronger ties between countries and organisations working on biodiversity policy.

The outcomes of COP16 reaffirm the importance of international cooperation in tackling biodiversity loss. And our Institute's policy work helps to ensure that as a small country, we continue to punch well above our weight in these global efforts.

Tracking sediment in the North Sea

The way we use the North Sea stirs up sediment - from fishing to sand extraction. And in 2024, our Suspended Matter and Seabed Monitoring and Modelling team, SUMO, part of our OD Nature, made major breakthroughs in understanding how suspended particulate matter moves in the southern North Sea. Using advanced models, we can now determine different types of organic matter, as well as mineral particles, from suspended particle concentration data. This classification integrates in situ sensor measurements, water samples, and satellite data. These new tools are already helping us study the impacts of human activities at sea. Our SUMO team has analysed sediment plumes from the construction of the Princess Elisabeth Island and investigated the effects of deep-sea mining and dredged material disposal.

One key piece of research this year focused on how particles move between coastal and offshore waters in the southern North Sea and English Channel. By analysing both organic and inorganic suspended particles, our researchers identified a key transition zone where suspended particles settle more rapidly. By mapping these areas, we can now track how particle composition changes seasonally and how it affects carbon storage and nutrient cycling. This research was supported by Belspo through the BRAIN-be programme and the Maritime Access Division of the Flemish Ministry of Mobility and Public Works and published in *Science of the Total Environment*.

Shaping global biodiversity policy in Bruges

Nature-inclusive agriculture is transforming the Belgian countryside, reconnecting farming practices with biodiversity. And it was against this backdrop in autumn 2024 that Bruges welcomed 450 conservationists, policymakers and experts for a key international event: the Regional Conservation Forum for Europe, North and Central Asia of the International Union for Conservation of Nature (IUCN). Participants addressed biodiversity loss, climate change and social justice, preparing regional strategies for the 2025 World Congress in Abu Dhabi.

Our team played a pivotal role as co-organiser, working with lead organisers the Flemish Research Institute for Nature and Forest (INBO), together with the City of Bruges and IUCN regional offices, with support from the Flemish government. Through interactive sessions and inspiring field visits across the region, the event explored sustainable farming methods, ecosystem restoration, and pathways towards a nature-positive economy.

Our Platform also organised a successful 'Best Practice of National Red Listing' workshop beforehand, attended by 120 international experts. Participants exchanged updated guidelines, with local approaches presented as an inspiring case study, highlighting our strong contribution to international biodiversity conservation.

Protecting species on the move: the CMS COP14

When animals migrate, there is no border control. Birds, marine animals, and terrestrial species cross multiple countries during their life cycles, making international cooperation essential for their conservation. The Convention on the Conservation of Migratory Species of Wild Animals (CMS) provides a global framework for governments to coordinate efforts to protect these species and their habitats.

In February 2024, a group from our Institute supported the Belgian delegation at the 14th Meeting of the Conference of the Parties to the CMS (COP14) took place in Samarkand, Uzbekistan. The event highlighted the need for cross-border collaboration to tackle habitat loss, climate change, and overexploitation.

For the first time, researchers from our MARECO team joined the Belgian delegation, marking a greater integration of scientific expertise into policymaking. Representatives from our Institute and the Belgian Biodiversity Platform helped secure ambitious outcomes. Belgium continues to play a strong role in international biodiversity policy. The agreements reached at CMS COP14 highlight the importance of research in shaping global conservation efforts.

BIRDIE takes flight to support biodiversity in South Africa

Wetlands and waterbirds are vital indicators of ecosystem health, yet decision makers often struggle to access clear, reliable information on their biodiversity. Addressing this need, the BIRDIE platform transforms data into actionable knowledge for conservation management in South Africa and to report on international agreements. As partners, our Institute contributed crucial expertise in database management, open access to data, web development and data visualisation. Our team worked closely with the South African National Biodiversity Institute, the Centre for Statistics in Ecology, the Environment and Conservation, University of Cape Town and partners to ensure smooth integration of extensive and long-standing citizen science data from initiatives like the Southern African Bird Atlas Project and the Coordinated Waterbird Counts into a powerful, intuitive online dashboard.

Funded by the JRS Biodiversity Foundation, the BIRDIE platform went fully operational in 2024, providing accessible insights into waterbird abundance at wetland sites and species distribution and richness in South Africa. It translates complex data into clear indicators, facilitating informed decision-making in conservation planning, management, and research. BIRDIE now serves as a global model, demonstrating how effective citizen science and statistical modelling can empower conservation actions, protect wetland habitats, and guide sustainable policy development.

What lies beneath: critical raw materials

Raw materials are an essential resource for energy production, new technology, and energy storage. Our work on these vital minerals in 2024 includes a key role in implementing new European policy to ensure environmental preservation and sustainability.

Europe takes action to secure geological resources

Lithium, cobalt, graphite - these critical raw materials hidden beneath Belgian soil are essential building blocks for Europe's sustainable and digital future. And with growing instabilities in other regions of the world, Europe is keen to become more self-sufficient for its resource supply. The Geological Survey of Belgium at our Institute plays a central role in securing these strategic resources through the implementation of the EU's new Critical Raw Materials Act (CRM Act), which entered into force in 2024.

This new legislation offers a comprehensive response to the growing risks of CRM supply disruption, ensuring Europe's industrial competitiveness, strengthening supply chains, and supporting climate and digital ambitions. And with its launch came a new mandate for our Institute. The Belgian government is represented on a new European Critical Raw Materials Board by our Federal Public Service Economy, and the Geological Survey of Belgium represents Belgium within the EU subgroup on Exploration. It is an opportunity for our experts to collaborate closely with the ministry and regional authorities, demonstrating again that our geological expertise is another key resource for Europe's sustainable future.

Putting Belgium's raw materials on the map

When it comes to these vital raw materials, what do we know about exactly what can be found in the Belgian subsoil, and where? Our geologists collaborated closely with researchers at the Universities of Ghent, Liège and Mons to produce a detailed Critical Raw Materials Atlas of Belgium, published this year in a special edition of the *Memoirs of the Geological Survey of Belgium*. Using historical records, drill-core analyses, and geophysical measurements, our team mapped promising areas, such as large phosphate reserves in Flanders, crucial for fertilisers and lithium-ion batteries, and significant zinc deposits in eastern Belgium, potentially containing economically strategic metals like gallium and indium. The Atlas also highlights lesser-known opportunities, such as lithium from deep geothermal waters and valuable metals hidden within former mining waste.

The Atlas has received significant coverage in Belgium, from EOS Wetenschap to Le Soir and Daily Science. Yet existing information remains incomplete. Historical sources and current geological data provide valuable insights, but significant gaps persist. This underlines the need for expanded exploration to accurately map Belgium's subsoil - a need that our geologists can help to fulfil.

Much-needed metals in Europe and the world

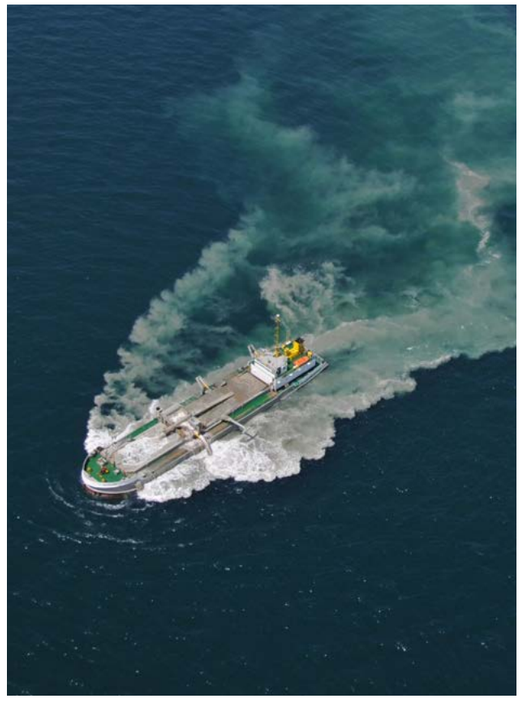
Of Europe's 34 critical raw materials, 21 are metals. And these metals are shaping our future: powering the energy transition, enabling innovative technologies, and crucially supporting green energy production and storage. This year the Geological Survey of Belgium coordinated two major new volumes titled *Metallic Resources*, published by Wiley, which examine notable mineral-rich regions across Europe - and in the second volume, the world - providing insights into uncovering new deposits. These publications explore some of the most significant regions where metals can be found, highlighting the geological processes responsible for forming metallic deposits.

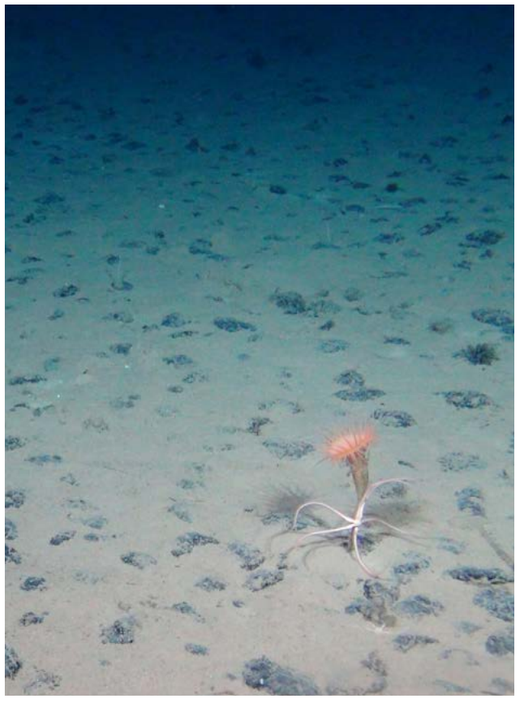
From detailed field observations to precise microanalyses, these books present advanced methodological approaches vital for discovering and evaluating mineral resources. They also tackle the crucial links between geology, politics, and economics, emphasising the need for comprehensive strategies that balance resource extraction with sustainability and geopolitical considerations. The publications offer essential guidance for policymakers, industry stakeholders and scientists, helping to ensure informed decision-making around our growing demand for critical metals.

Mining potential beyond our coastline

As demand for critical minerals rises, deep-seabed mining is emerging as a potential industry for some metals - but what are the environmental consequences? This is the question at the heart of the MiningImpact3 project, approved for funding in 2024. Financed in part by Belspo through JPI Oceans, this European research initiative brings together institutes from nine countries to study the effects of deep-sea polymetallic nodule mining and contribute to international policy discussions. Building on two previous project phases, MiningImpact 3 will investigate six key areas, from deep-sea ecosystem health to governance tools like digital twin technology.

Our Institute plays a crucial role in two research streams. First, our MARECO team will contribute to the assessment of metals and potential bioaccumulation and toxicity in amphipods while engaging stakeholders to integrate societal concerns into decision-making. Second, our SUMO team will study the chemistry of the water column at a depth of 4-5 kilometres and monitor sediment plume dispersal, one of the biggest environmental concerns. We also bring in our expertise in multi-stakeholder dialogue: working with industry, NGOs, and policymakers, we aim to bridge science and policy, ensuring informed and balanced discussions on the future of deep-seabed mining.





Powerful partnerships in Central Africa

The Democratic Republic of the Congo, Burundi and Gabon are home to unique ecosystems under threat. And they are also hotspots for scientific research where local knowledge is key. Our Institute's CEBioS programme 'Capacities for Biodiversity and Sustainable Development' works together with local institutions and international partners to support conservation and sustainable development in the region.

The Congo Basin's Yangambi Biosphere Reserve hosts a mindblowing wealth of biodiversity. In 2024, the UNESCO project *Lifting Yangambi Biosphere Reserve into a Climate-Biodiversity Centre of Excellence*, financed by the Belgian Development Cooperation, entered a new phase. Our team works hand in hand with local and international institutions with a focus on institutional governance, climate-biodiversity research, training, awareness-raising, and sustainable development. CEBioS works closely with the Centre de Surveillance de la Biodiversité at the University of Kisangani on stakeholder engagement and sustainable development. Our team works to mainstream the concept of social ecological resilience into the Belgian Development Cooperation through participation in the joint strategic network on ecosystem resilience SECORES.

In neighbouring Burundi, the Rusizi and Kibira National Parks are home to a wide array of animal and plant species. But managing these protected areas is not easy, with challenges like deforestation, soil degradation and human-wildlife conflicts. Building on a long-term partnership with the Burundian Office for the Protection of the Environment is a new initiative, PACECOR, led by the United Nations Development Programme alongside Enabel, the Belgian Development Agency, to promote biodiversity conservation and sustainable socio-economic development in both parks. CEBioS provided training on the bird species of the parks, as well as a state of the art on scientific knowledge, and research programmes for both parks.

The relationship between hippopotamus and humans in Burundi is a tense one. Hippo habitats are under threat from urbanisation, poaching, agricultural expansion and flooding. The hippo is important to the food chain, water quality and plant biodiversity, but can also be involved in direct confrontations with humans, leading to injuries. To explore this conflict, and how it can affect ecosystem health, 2024 saw the launch of RUBICOM. This initiative is run by the University of Antwerp and the University of Burundi and financed by VLIR-UOS, the Flemish Interuniversity Council for Development Cooperation. Through several workshops, our team contributed expertise in stakeholder engagement and assessing local perceptions of biodiversity. The project now continues to explore these complex connections between water quality, the national park and the environment, working towards a more peaceful future between human and hippo.

Unlocking hidden biodiversity in the DR Congo

The Congo Basin, home to the world's second-largest tropical rainforest, plays a crucial role in stabilising our planet's climate. Yet, much of its biodiversity remains a mystery. Taxonomists from our Institute are working to change that, in close cooperation with the Centre de Surveillance de la Biodiversité at the University of Kisangani, and other partners from the DR Congo and Europe. Through the Green Heart of Africa Initiative, researchers are setting up a monitoring programme in this vast region and identifying new species of reptiles, amphibians and even fish parasites, as published this year in *Acta Parasitologica*. In 2024, we were invited by local authorities to Lomami National Park—a barely explored region—to help set up a management plan. By joining forces with local experts, the project strengthens biodiversity monitoring and helps shape conservation strategies.

At the same time, a groundbreaking effort is underway to catalogue one of the most ecologically significant yet understudied insect groups: the ants of the Democratic Republic of Congo (DRC). Ants play vital roles in ecosystems, from soil aeration to pest control, yet no comprehensive species list existed for the DRC. Our researchers, led by a Congolese PhD student, compiled a checklist of 736 species across 64 genera, published in the *Biodiversity Data Journal*. By integrating local expertise, this effort paves the way for further discoveries and strengthens scientific networks between Europe and Africa.

Mapping biodiversity hotspots in Gabon

Gabon's vast rainforests, savannas, mangroves, and rivers are home to an extraordinary range of species, from gorillas and forest elephants to rare orchids and amphibians. While the country's 13 national parks—established two decades ago—have played a crucial role in conservation, many species remain vulnerable outside these protected zones.

A new book from our Institute, *Les Zones Clés pour la Biodiversité du Gabon*, maps 35 key biodiversity areas that require protection to safeguard Gabon's unique ecosystems. The study, involving our scientists alongside researchers from Gabon's Institut de Recherches Agronomiques et Forestières, the Missouri Botanical Garden and Université Libre de Bruxelles, identifies 188 rare and threatened species not adequately covered by existing parks. It highlights threats such as habitat destruction, illegal hunting, and unsustainable agriculture and provides tailored recommendations to mitigate these risks. By pinpointing priority areas for conservation, this research offers a roadmap for the next phase of Gabon's environmental strategy. With continued international cooperation and sustainable management, Gabon can protect its biodiversity for generations to come.

Strengthening knowledge sharing around the globe

Understanding and protecting biodiversity means researchers across the world need to work as a team. Through scholarships, grants and policy implementation, our Institute partners with scientists worldwide to turn scientific knowledge into action for biodiversity conservation.

Empowering researchers worldwide with the Global Taxonomy Initiative

Across the globe, researchers are working to understand and protect biodiversity—but access to training and resources can be a challenge. Our Institute is the Belgian National Focal Point to the Global Taxonomy Initiative (GTI), allowing our team to support students and researchers from partner countries of the Belgian Development Cooperation through scholarships and grants, focused on taxonomy, classification, and collection management, in the framework of our CEBioS programme.

GTI scholarships fund up to five-week research stays under the supervision of researchers from our Institute or other centres of expertise in taxonomy, for researchers from countries including the Ivory Coast, Benin and the Democratic Republic of the Congo. They study plants, animals, fungi, or bacteria relevant to ecosystem management and sustainable development, with hands-on training and access to scientific resources. In 2024, CEBioS prioritised gender diversity, and half the selected candidates were female. Since 2004, 161 interns from 34 countries have benefited from this programme. The GTI grants also support capacity development and taxonomic research projects led by Belgian scientists across the globe. Research must include partnerships to strengthen local expertise. Since 2004, 85 grants have been awarded across 16 countries. These scholarships and grants not only build capacity to advance research - they also build crucial global bridges, opening up a wealth of opportunities for further cooperation.

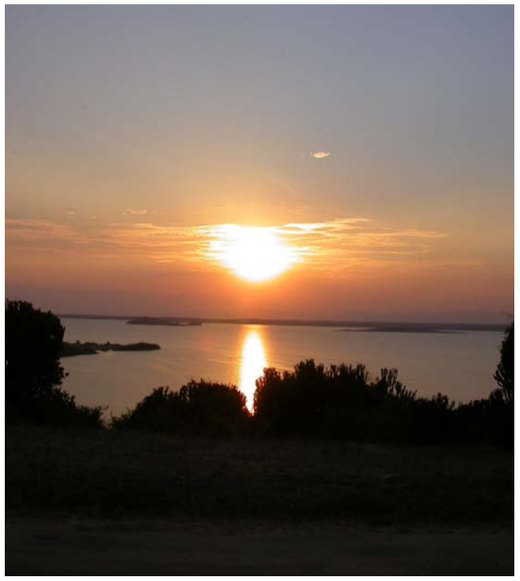
Awards for knowledge sharing on biodiversity

A well-connected world is key to protecting biodiversity, and knowledge sharing plays an important role in making policy for the conservation of the wealth of species across our planet. It was the Convention on Biological Diversity that established the Clearing-House Mechanism (CHM) - a structure that makes it easier to share biodiversity information across national borders. Since then, countries across the world have been working to develop their own CHM to share data, policies, and best practices. Through our CEBioS programme, our Institute, as Belgium's national CHM focal point, has been working closely with many countries internationally to help build and strengthen their platforms through funding opportunities and regional workshops.

In 2024 many of these countries' hard work was recognised in the 4th CHM Awards at the CBD COP 16 in Cali, Colombia, where our Institute was also represented on the jury. From our partner countries, Burundi came joint second and Morocco joint third in the CHM Awards, while Kenya and Palestine received Certificates of Recognition. These achievements highlight the power of international cooperation. By strengthening biodiversity information networks, we work together to ensure that vital environmental data remains accessible, helping nations meet their global conservation commitments.

Troubled waters: aquatic ecosystems under threat

Across the world, rivers, lakes and seas face growing pressure from pollution, overfishing, and climate change. Our Institute collaborates internationally to protect these vital waters, from Vietnam's Ha Long Bay to Africa's Lake Edward. We work with local experts on cutting-edge models to safeguard these ecosystems for the future.



An eye on coastal waters in Vietnam

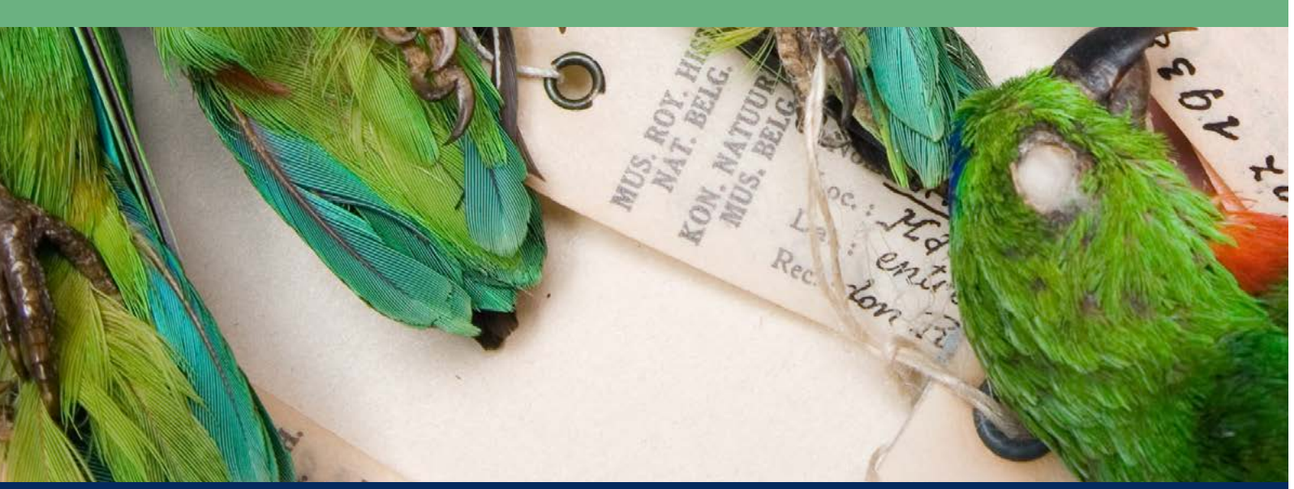
Ha Long Bay, a UNESCO World Heritage Site, is famous for its breathtaking limestone islands and emerald waters. But beneath its beauty, the bay is facing an urgent challenge. Pollution from tourism, industry, and climate change is degrading water quality, threatening marine life and local livelihoods. To address this, our researchers partnered with the Vietnamese Institute of Marine Environment and Resources and the Ha Long Bay Management Department in a project funded by Belspo and the Vietnamese Ministry of Science and Technology. The result was CLIMDIS, a cutting-edge tool which simulates the dynamics of pollutants in the water. Using 3D hydrodynamic modelling, CLIMDIS helps decision makers manage water quality more effectively. It was built on our Institute's COHERENS modelling system, originally developed for the North Sea and provides a crucial management tool for environmental threats.

Local experts were trained to use the tool independently, equipping them to advocate for sustainable policies. By strengthening expertise in Vietnam, CLIMDIS helps counterbalance industrial and mass-tourism pressures. A final policy brief will be published in English and Vietnamese to bring scientific insights to key stakeholders, working towards Ha Long Bay's sustainable development for future generations.

Troubled waters in Lake Edward

At dawn, the surface of Lake Edward ripples gently as wooden fishing boats glide across the water. This vast rift lake, straddling the border between Uganda and the DR Congo, has sustained local communities for generations. Yet, beneath its waves, an ecological crisis is unfolding. Our 2024 study published in *Aquaculture, Fish and Fisheries* has revealed a troubling decline in fish stocks, particularly species that once formed the backbone of local fisheries. Using data from surveys, historical records, and advanced modelling, scientists found that overfishing has dramatically reduced the populations of key species—except for one: a predatory catfish. With fewer large-bodied fish in the lake, this opportunistic species has thrived, feeding on an abundance of smaller prey.

The study highlights a larger issue: inland fisheries, despite their importance, are often overlooked in global conservation and development policies. To address this, the CEBioS programme has supported Uganda's National Fisheries Resources Research Institute (NaFIRRI) in improving access to data through the Freshwater Biodiversity Portal for Uganda and raising awareness on fisheries management through policy briefs, species atlases, and stakeholder engagement. Important data on these fisheries is now part of FishBase, a global database helping shape conservation strategies worldwide.



Collections

Digitising detail: our new tool Sphaeroptica

By making 3D images of specimens from our vast collections, our scientists help speed up research, share discoveries worldwide, and preserve these treasures for future generations. And our new tool just made it easier to capture some incredible details.

Scientists are now able to analyse 3D images of insects and other arthropods more precisely than ever before thanks to Sphaeroptica, a new software tool. Working alongside the Royal Museum for Central Africa, the UCLouvain and the School of Engineering and Management Vaud in Switzerland, our team developed a breakthrough solution that enables the measurement of body parts that cannot be properly rendered in 3D, such as transparent wings and hair-like structures.

The challenge of capturing tiny arthropods has long frustrated zoologists due to the lack of detail captured by traditional 3D digitisation techniques, such as structured light scanners. They tend to struggle to capture intricate details such as antennae and scales, transparent parts like wings, or areas which are too dark, too bright or too hairy. In contrast, Sphaeroptica uses photos taken from multiple angles to create a detailed, pseudo-3D view of each specimen that includes 3D “landmarks” and the creature’s coloured texture with all details visible.

One of Sphaeroptica’s strong suits is that it does not need a true 3D model, which is what traditionally leads to details of fine structures being lost. Users of the software can choose a point on two different images of the same specimen to create a landmark. Sphaeroptica then determines the point’s exact 3D position. It means users can take precise measurements.

Species classification is also made easier by Sphaeroptica, which allows entomologists to study the natural texture of arthropods, including miniscule features such as fine hairs that can be vital in species identification. While technologies such as micro-CT and structured light scanning can be prohibitively expensive, Sphaeroptica is an open-source software that is readily available for use by researchers and institutions seeking to digitise their collections for preservation, analysis or educational purposes.

Measurements derived from Sphaeroptica are almost as accurate as those taken using the gold standard micro-CT models, with a deviation of less than 1%, while offering the considerable benefit of high resolution colour-stacked pictures including details such as hairs, bristles, scales, and other small or complex structures. Sphaeroptica was developed for the digitisation of small arthropods but it can be used with a wide range of images resulting from the digitisation of objects or specimens with complex surfaces and textures. The outcomes were published in the journal *PLOS ONE*.

Dazzling donations

Our Institute has been fortunate enough to receive some wonderful donations in 2024, including remarkable collections that have enriched our library, and the largest donation of insects that we have received in the last 10 years.

Our collections are constantly expanding, and not only through our own research and fieldwork. When individuals, researchers, and institutions choose to donate their specimens to us, they open up a valuable resource to research, helping our understanding of biodiversity, evolution, and environmental changes. One of the most significant 2024 donations was the spectacular butterfly collection of Robert Ducarme, comprising 1,050 boxes and 45,000 specimens. Ducarme dedicated decades to meticulously documenting the butterflies of Eastern Congo and beyond. His collection, now one of the most comprehensive of its kind, contains species that are nearly impossible to collect today due to political instability in the region. Ducarme’s work has greatly contributed to the study of African *Lepidoptera*, with numerous new species and even a genus named in his honour.

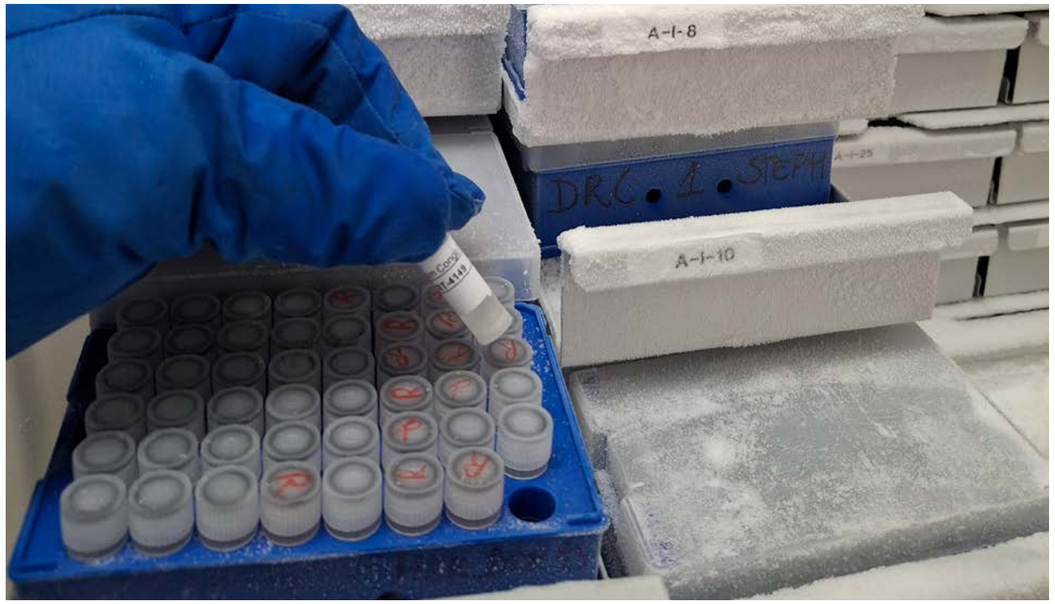
This year our library was also enriched by notable literary donations. The family of Rik Nulens, an amateur researcher devoted to coelacanths, known as the sea’s “living fossils”, donated his entire collection of 177 publications, as well as several objects related to this fish, offering an unparalleled insight into these ancient fish. Similarly, Jacques Fairon, a retired Belgian naturalist and speleologist, contributed 143 publications related to bat research, continuing his legacy of pioneering work in chiroptera monitoring. Our library also received a digital donation this year. A collaboration with Maurice Maeck of Meise Botanic Garden will lead to the full digitisation of the journal *Les Naturalistes Belges*, ensuring that this scientific journal remains accessible to researchers worldwide.

Meanwhile, our taxonomists received a donation of several hundred specimens of *Labeobarbus* from Leo Nagelkerke of Wageningen University, the Netherlands. These specimens, sourced from Ethiopia’s Lake Tana - part of the Blue Nile system - will be crucial in studying the effects of overfishing. Scientists believe that intense fishing pressure may be causing species to lose their distinct identities, potentially leading to their gradual merging—a process known as despeciation. To investigate this, our researchers will work with researchers from UHasselt and Bahir Dar University in Ethiopia to analyse their DNA. The results could be crucial for developing conservation strategies to protect biodiversity in this heavily fished lake.

Lastly, one of the most astonishing donations this year was a fragment of the world’s largest black diamond, a 2,000-carat Carbonado diamond from Central Africa. Its owner has entrusted our researchers with the study of the stone, which is suspected to have origins beyond our planet. Alongside this rare piece, a replica of the diamond has been donated, preserving its likeness for public display in the future.

Opening up our DNA collections

A collaborative framework has been put in place to improve our Institute's DNA collections, bringing together tens of thousands of biological tissues and DNA extracts gathered and analysed since the 1990s, with an open science approach.



For years, our researchers have been working behind the scenes to collect, extract and assemble one of the most valuable scientific resources: our DNA and tissue collections. These collections, built over decades, contain tens of thousands of biological tissue samples and DNA extracts from species across the world. But gathering samples is just the beginning—the real challenge lies in organising, maintaining, and sharing them in a way that benefits science and society.

In 2024, to tackle this, we joined forces with other Belgian institutions managing similar DNA collections, including Antwerp Zoo, Meise Botanic Garden, and the Flemish Research Institute for Nature and Forest, INBO. Each partner has its own focus - some collect blood and tissue, others specialise in plants, and some work only with DNA. Despite these differences, we all share a common goal: to make DNA collections more structured, accessible, and useful for researchers everywhere.

Through collaboration and discussion, the team developed a standardised framework - a practical guide to help institutions improve how they manage DNA collections. This process covers everything from quality management and legal compliance to digital organisation and long-term preservation. It also ensures that every sample is properly identified, securely stored, and shared responsibly. Legal challenges are a major focus: every specimen must be collected and used within legal frameworks, a step that is often overlooked but essential for ethical research.

One of the biggest challenges is simply knowing what's inside these collections. Many researchers contact curators about rare species, not realising that DNA samples might already exist for their study. Take, for example, a unique collection of bird specimens from eastern Congo—an area that has become difficult to access due to conflict in the region. Instead of sending out entire physical specimens, researchers may soon be able to study the DNA directly. This not only protects valuable specimens but also makes rare biodiversity data available to scientists worldwide.

A key part of this effort is integrating data into DaRWiN, our collection management platform, to make DNA collection information publicly accessible. By working with DiSSCo Belgium, and in particular, the DNA working group of DiSSCo Flanders, we ensure we are in line with the broader European open science movement. The vision is clear: to create a pipeline that allows researchers to find and request the DNA they need, just as they would with physical specimens. By following international standards and starting with Belgian institutions, we aim to expand our accessibility beyond national borders, connecting researchers across the globe.

New secrets emerge from our collections

Among the millions of specimens within our walls, there are still endless new discoveries to be made about the history of the natural world around us, and what it can tell us about our planet today. In 2024 our researchers have been returning to them to make exciting finds.

Solving a sea cucumber puzzle

For decades, a taxonomic puzzle remained unsolved—a mystery of sea cucumbers that spans three oceans. This study, finally completed in 2024, is not just a scientific achievement but also a tribute to Dr. Claude Massin, a respected marine biologist at our Institute who played a crucial role in shaping this research before he passed away in 2021. The focus is the species *Holothuria (Thymiosycia) arenicola* Semper, 1868, a widespread tropical sea cucumber recognisable by its distinctive dark dorsal blotches and burrowing behaviour.

To untangle this taxonomic web, our team examined specimens from natural history museums in the US, France, UK, Germany, Belgium, Mexico, and Russia. Using meticulous morphological analysis, the team discovered that many of these specimens previously identified as *H. arenicola* were in fact different species, making it less widespread than was thought. The study, published in *Zootaxa*, formally distinguishes several species within the *H. arenicola* complex, including a newly identified species: *Holothuria (Thymiosycia) kerriensis*. Understanding the true diversity of sea cucumbers isn't just a taxonomic exercise—it's essential for conservation and sustainable fisheries of this highly commercial group of animals, but also for ecosystem health.

Revisiting Belgium's Carboniferous insects

Tucked away in the vast collections of the Institute lie rare and delicate fossils that reveal secrets from 300 million years ago. Among them are fossilised insect wings from the Carboniferous period - some of the largest of their time - measuring up to 10 centimetres wide. These specimens were first described in the 1958 thesis of the French researcher Daniel Laurentiaux but were never formally published until now, in the journal *Palaeoentomology*.

At a time when Belgium's coal industry was thriving, miners and geologists occasionally uncovered these ancient remains in the galleries of the Borinage coal mines in the Hainaut Province, south west of Mons. But with the last Belgian colliery closing in 1992 the chances of discovering new fossil insects there are slim. Today, researchers must turn to our thousands of drawers of fossil collections gathered during the coal mining era. By re-examining Laurentiaux's finds, scientists are uncovering new details about Carboniferous insects, their evolution, and their place in prehistoric ecosystems. While the mines may be lost to history, their secrets live on in the Institute's collections.

Public

Our museum gets *WILD?*

What does it mean to be wild? Our 2024 temporary exhibition is a true team effort: our Museum worked with our collections, researchers and policy experts, challenging visitors to rethink their relationship with the natural world.

When bringing the *WILD?* exhibition to our Museum, our exhibition team knocked on almost every door in our Institute. This enthralling exhibition was developed by the Natural History Museum of Neuchâtel in Switzerland but the adaptation process involved colleagues across our team, from the selection of specimens in our collection to the latest research on biodiversity threats - even our library contributed postcards about the old Zoo of Brussels. And it was our scenographer that brought the whole experience to life, setting up the captivating atmosphere that leads you through this immersive experience.

WILD? explores what it means to be wild from every angle. And one of the major additions by our exhibition team is a section on domestication, drawing on the expertise of our vertebrate specialists. Eye-catching specimens from our extensive collection illustrate how domestic species evolved alongside humans. A playful quiz invites you to guess whether certain animal behaviours are natural or shaped by human influence. Did you know that for a dog, fetching sticks is rooted in a wolf's instinct to carry its young to safety?

A striking highlight of the exhibition is the red zone: a dramatic visual and emotional turning point that explores humanity's effect on biodiversity. Our researchers, including experts from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services IPBES, hosted at the Institute, worked with our Museum team to ensure its accuracy and impact. The major threats to biodiversity were redefined using real-world examples from our scientific collections. Visitors see plastic waste collected from Belgian beaches, invasive species like the muntjac deer and coral specimens from our invertebrate collections, demonstrating the global crisis through tangible, locally relevant examples.

The final section of the exhibition brings visitors back to the wild, right here in Belgium. Wildlife cameras, curated with input from the Flemish Agentschap Natuur en Bos, our education team and our projects like Falcons For Everyone, showcase unfiltered footage of foxes, hedgehogs, boars, and birds in their natural habitats. This initiative reconnects visitors with the biodiversity on their doorstep, reinforcing the Institute's role in monitoring and promoting local wildlife conservation.

With *WILD?* we see our Museum's ability to translate our Institute's work into powerful, engaging storytelling, offering visitors an experience that sparks curiosity, emotion, and reflection on our place in the wild world around us.

Wednesdays: the peak of the week!

Playing sport on a Wednesday afternoon? That's so 2023! 2024 was the year that Wednesday afternoons became the time to visit our Museum, with a whole range of new vibrant educational activities for kids and families, en français and in het Nederlands!

In 2024, our creative educational team dedicated their efforts to making Wednesday afternoons a key moment for families to explore and learn. By expanding our offerings throughout the year—and especially after the summer holidays—we created a space where children and their parents could engage with science, nature, and language in interactive ways.

Our long-standing *Raconte-moi* workshop remained a cornerstone of our programming, continuing to attract young children and their families. This beloved activity combines storytelling, a short guided tour, and hands-on crafting to introduce nature and wildlife in a playful and engaging way. Designed for our French-speaking audience, *Raconte-moi* has been a consistent favorite, proving that stories remain a powerful way to spark curiosity in young minds.

Building on the success of our *Giants* activity, we introduced *Later, I Will Be...*, a new monthly workshop focused on paleontology. In this session, children and their parents become paleontologists for an afternoon, learning the steps of fossil excavation before embarking on a tour to connect their discoveries with real specimens. The response has been overwhelmingly positive, with dozens of families—both French and Dutch-speaking—enthusiastically taking part. The interactive, hands-on approach has made it a highlight of our Wednesday programming.

To make our collections even more accessible, we launched *Mini Guided Tours* on Wednesday afternoons, offering bite-sized explorations of different museum halls. These 45-minute sessions take place three times a month, focusing on different galleries such as Living Planet, Dinosaurs, and Evolution. It offers families a more flexible and engaging way to experience our exhibitions.

Our final addition of 2024, launched in October, was *Taalavontuur au Pays des Vivants*. This unique bilingual experience takes children on an exploration of the animal kingdom while introducing them to both French and Dutch vocabulary. Led by two guides - one French-speaking and one Dutch-speaking - the activity fosters language immersion in a natural and engaging way. Since its launch, participation has been steadily increasing, reflecting a growing interest in bilingual education in Brussels. The initiative was driven by our guides, who saw an opportunity to collaborate across linguistic boundaries, creating a meaningful and interactive learning experience. With 2024 marking a significant expansion of our Wednesday offerings, we look forward to continuing this momentum into the coming years.

Researchers, live!

In 2024 it was not just our annual participation in the Nerdland festival that brought our researchers face to face with the public. Many other highlights of the year involved moments where our visitors were invited into dialogue with palaeontologists, archaeologists and anthropologists.

Prehistoric adventures for all

In April 2024, our education service brought prehistory to life with a new concept: the Prehistory Day, a full day of hands-on activities, guided tours, and expert lectures. Visitors of all ages had the chance to step back in time and experience the daily lives of our ancient ancestors. And nearly 300 took part, testing their survival skills by throwing spears, making fire, and uncovering the secrets of prehistoric giants. Others joined guided tours, where our passionate guides - some in full prehistoric disguise - explained the fascinating evolution of humankind.

Workshops offered visitors a chance to try ancient crafts, from cave paintings and engravings to creating jewelry just like early humans did. Meanwhile, for those eager to dive deeper, our lecture series featured renowned experts from our team and Ghent University exploring the Man of Spy, the prehistoric Bruniquel caves and human evolution. The idea for this immersive event came from our own guides, showing that if you want to learn about prehistory, there is nothing like experiencing it firsthand.

Questioning the past: our workshop series *Saviez-vous...?*

Did you know that what lies beneath our feet can tell us a lot about who we were, what we ate and how we lived in the past? In 2024, we continued our mission to bring scientific discovery to the public through our lively *Saviez-vous...?* workshop series: interactive sessions that allow visitors to engage directly with our passionate scientists in their own workspaces, offering a deeper understanding of specialised research fields, behind the scenes.

In April we took visitors on a journey into the microscopic world of pollen and spores. Participants explored how fossilised pollen and spores trapped in sediments can help reconstruct ancient landscapes and climate variations, revealing human impact on the environment. In November, our session on biological anthropology examined skeletal remains for stories of ancient diseases, trauma, surgical interventions, and even dietary habits. And in December it was ancient diets on the menu: how starch grains and tiny phytolith structures in plant tissues can reveal eating habits that are otherwise lost to time. A microscopy session and lab visit brought participants face-to-face with the invisible clues that help reconstruct ancient culinary practices.

Working wonders to tackle infrastructural challenges

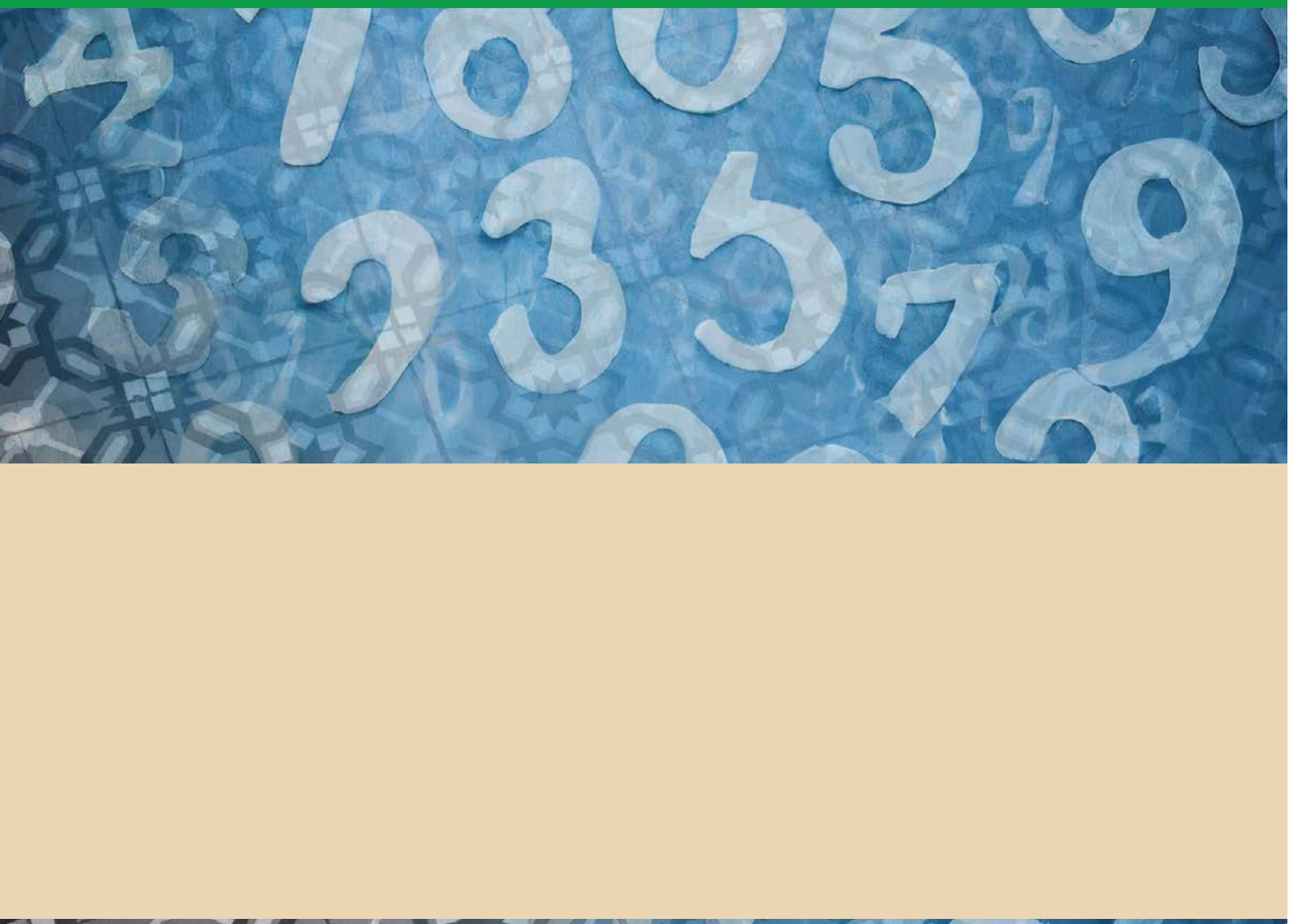
The past few years have presented significant degradation to the infrastructure of the Institute of Natural Sciences. Through creativity, teamwork, and dedication, our maintenance, museum staff and technical teams have increasingly had to find ways to adapt, ensuring that visitors can continue to enjoy all that the Museum has to offer.

Ageing buildings, budget cuts and delays in planned works: the challenges we face are vast. As a federal institute, our buildings are managed by the Régie des Bâtiments - our relationship is a little like tenant and landlord. It means that for all key decisions, we are dependent on the Régie des Bâtiments, and when their workload is high, delays can really start to have an effect on the state of our buildings. And while becoming a protected monument in 2024 reinforced the importance of preserving our historic spaces, it also introduced new administrative complexities.

And yet in 2024, as in every year, our teams have had to step up to keep the Museum running smoothly. When two of our modern classrooms became unusable due to humidity and mould, our team quickly found alternative spaces, allowing as many workshops as possible to continue. While we unfortunately had to cancel sessions for 350 students, we still welcomed around twelve thousand, proving the adaptability of our educational service. The Museum's technical staff worked tirelessly to save a third classroom from plumbing damage, ensuring that learning could continue.

Across the Museum, our commitment to problem-solving has been just as necessary. When rainfall caused temporary leaks, our team acted swiftly to secure the galleries, keeping disruptions to a minimum. When public restrooms faced plumbing issues, our staff managed rapid repairs, ensuring visitor comfort. And when our spaces showed signs of wear, our experts took the lead - revitalising the museum shop, upgrading the cloakroom and picnic area, and enhancing public spaces to improve the overall visitor experience. While much-needed large-scale repairs take time, our internal teams have gone above and beyond—fixing key areas like the museum's main staircase, which sees hundreds of schoolchildren passing through daily. Technological updates have also been a priority. In 2024, our technical team replaced ageing headphones in the Gallery of Humankind with an innovative sound system, enhancing accessibility for all.

Through all of these challenges, one thing remains clear: the dedication of our staff is the driving force behind the museum's success. With over 350,000 visitors per year, wear and tear are inevitable, but thanks to our team's expertise, quick thinking, and unwavering commitment, our Institute of Natural Sciences continues to be a place of discovery, learning, and inspiration.



Figures

Finances

The Institute concluded the 2024 financial year with revenues amounting to €48,731,397 and expenditures of €44,097,956, resulting in a positive balance of €4,633,441 – an all-time record. Although this balance is relatively substantial compared with 2023, both revenues and expenditures show a decrease.

1.Expenditures
The 2024 budget execution shows a decrease in expenditures across all categories of €6,446,873. This reduction is mainly due to the decommissioning of the research vessel Belgica, which led to a decrease in expenditure commitments. This is further compounded by the caretaker period, which significantly slowed down operations, notably causing delays in the implementation of the 2024 personnel plan.

The only categories that showed a slight increase were personnel credits from own revenues and transfers to partners.

Personnel credits: these increased by €253,386, but this rise should be put into perspective. It is worth noting that meal voucher expenses amounted to €335,874.15 – a cost not present in previous years. Since the increase in personnel credits is less than the cost of meal vouchers, we can conclude that overall personnel spending remained in line with 2023 levels.

Transfers to partners: these rose by €149,472. This category varies from year to year depending on the number of research projects for which the Institute is the lead partner.

2. Revenues
Revenues decreased by €2,008,389 across all categories. The specific grants fell by €673,000, which is explained by the absence of use of the interdepartmental provision in 2024.

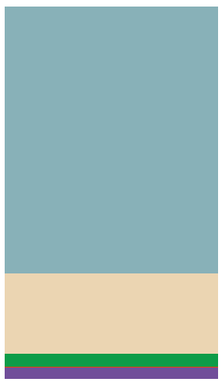
Museum revenues fell by €560,530, a 13% drop compared to 2023. This is partly due to a decrease in visitor numbers, as well as a decline in revenues from travelling exhibitions. The drop in attendance also led to lower shop sales (-€67,066). Furthermore, the educational service saw a reduction in revenue of €75,753.80 compared to 2023.

Own-source revenues linked to scientific research also decreased by €878,176, or 4% compared to the previous year. This drop is partly explained by a decrease in the number of active research projects, from 196 in 2023 to 184 in 2024.

Nevertheless, considering the trend of the past four years, the 2024 result remains relatively high.

Breakdown of expenses (in €)

	2022	2023	2024
Staff	24,141,778	31,414,405	31,667,791
Ordinary operational expenses	13,659,311	16,244,683	9,508,832
Investment	1,581,410	1,625,954	1,534,523
Scientific	880,016	898,256	965,630
Museum	109,908	84,266	8,212
Others	591,486	643,432	561,681
Library and collections	158,146	128,828	106,439
Transfers to research partners	675,424	1,130,899	1,280,371
Other transfer	134,351	0	0
Total	40,350,421	50,544,769	44,097,956



2024

Sources of income (in €)

	2022	2023	2024
General grant	18,706,351	19,620,173	19,613,477
Specific grant	4,672,046	4,816,000	4,143,000
Museum: own income	3,505,589	4,216,748	3,656,218
Research: own income	13,610,455	22,028,048	21,149,872
Various: own income	113,458	58,817	168,830
Total	40,607,899	50,739,786	48,731,397

2024

Breakdown of specific grants (in €)

	2022	2023	2024
Belgica	3,060,000	3,293,000	3,683,000
JEMU	284,362	357,197	307,409
Public Observatory (all federal Museums)	141,287	179,305	152,591
Interdepartemental provision	1,186,397	986,498	0
Total	4,672,046	4,816,000	4,143,000

2024

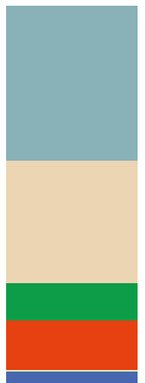
Breakdown of income of the Museum (in €)

	2022	2023	2024
Ticket sales	2,341,992	2,648,318	2,439,656
Exhibition hire and sales	64,388	125,000	84,450
MuseumShop	506,818	525,184	458,117
Donations - sponsorship - grants	29,225	163,500	30,054
Education	216,789	260,513	184,759
Events	296,276	403,109	404,937
Dinocafé	50,100	91,124	54,245
Total	3,505,589	4,216,748	3,656,218

2024

Breakdown of research income (in €)

	2022	2023	2024
Belspo	3,255,160	4,617,248	6,757,653
Federal administrations (excl. Belspo)	2,226,130	5,299,469	5,327,893
European Union	1,800,911	2,548,349	1,609,788
Belgian federated entities	1,530,705	1,807,589	2,169,370
Private sector	0	41,877	67,419
Outside the EU	749,730	995,184	1,681,648
Services			
Public sector	1,594,087	4,315,441	1,742,394
Private sector	2,392,712	2,300,073	1,620,930
Outside the EU	61,021	102,818	172,779
Total	13,610,455	22,028,048	21,149,872



2024

Staff

Most personnel data remained broadly stable compared with the previous year. The main exceptions were absenteeism, which, as in the federal sector as a whole, showed a decreasing percentage, and the number of volunteers, which continued the increase seen in recent years.

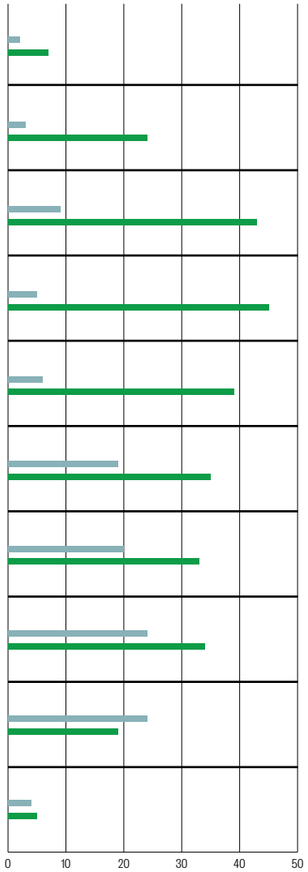
Statutory scientific personnel continue to decline, essentially for budgetary reasons. There is no marked change in the number of contracted (non-statutory) scientific staff, as these figures are closely linked to external funding, which remains relatively stable.

In terms of administrative and technical staff, several contracted employees became statutory during 2024, which has the positive effect of developing the careers of staff already in service. The marked decline in contracted administrative and technical staff in 2023 did not improve in 2024. This can be partially explained by difficulties in recruiting certain required profiles in the support services.

Overall, the gender distribution largely follows observed trends. The significant drop in the percentage of women in A-level contractual functions is explained by the departure of several female employees between 2023 and 2024.

Age distribution of the staff

		Statutory	Contractual
18-25	SW	0	1
	A	0	0
	BCD	2	6
26-29	SW	0	14
	A	0	1
	BCD	3	9
30-34	SW	0	32
	A	1	4
	BCD	8	7
35-39	SW	0	39
	A	1	2
	BCD	4	4
40-44	SW	1	25
	A	2	4
	BCD	3	10
45-49	SW	5	21
	A	3	1
	BCD	11	13
50-54	SW	8	16
	A	4	2
	BCD	8	15
55-59	SW	7	11
	A	5	1
	BCD	12	22
60-64	SW	11	6
	A	2	0
	BCD	11	13
65+	SW	2	2
	A	1	0
	BCD	1	3

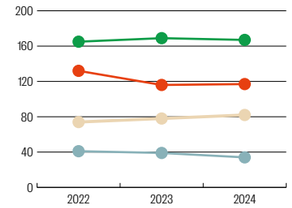


SW = Scientists | **A** = Level A (Master) | **BCD** = Levels B (Bachelor), C (secondary education) and D (no degree)

Staff breakdown by statute

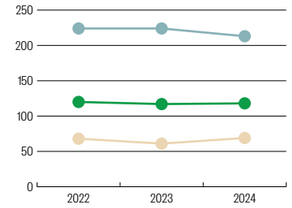
	2022	2023	2024
Statutory Scientists	41 / 38.1	39 / 36.3	34 / 32.5
Statutory administrative and technical staff	74 / 69.1	78 / 75.1	82 / 77.7
Contractual scientists	165 / 151.63	169 / 156.44	167 / 149.34
Contractual administrative and technical staff	132 / 118.05	116 / 105.82	117 / 106.32
Total	412 / 376.88	402 / 373.66	400 / 365.86

The first number refers to the number of employees, the second to the number of full-time equivalents (FTE).



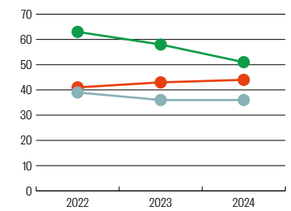
Sources of staff financing (number of persons / in FTE)

	2022	2023	2024
General grant	224 / 210.55	224 / 210.36	213 / 199.19
Ordinary income	68 / 61.90	61 / 56.1	69 / 63.27
External projects	120 / 109.80	117 / 107.2	118 / 103.4
Total	412 / 382.25	402 / 373.66	400 / 365.86



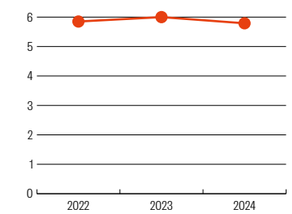
Percentage of female staff (%)

	2022	2023	2024
Statutory staff	31.30	31.62	31.00
Scientists	26.83	25.64	26.50
Level A	56.25	43.75	42.10
Levels B, C and D	27.59	32.26	30.20
Contractual staff	53.54	50.88	50.78
Scientists	50.91	47.34	45.50
Level A	68.75	71.43	60.00
Levels B, C and D	55.17	53.92	57.80
Total	47.33	45.27	45.00



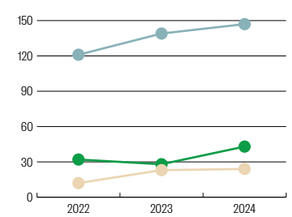
Absenteeism and work accidents

	2022	2023	2024
Work accidents	3	6	9
Accidents on the way to work	7	3	4
Absenteeism RBINS	5.85%	6.01%	5.79%
Absenteeism federal level	6.92%	6.81%	6.66%



Volunteers

	2022	2023	2024
Research volunteers	121	139	147
Collections volunteers	12	23	24
Museum volunteers	32	28	43
Total	165	190	214

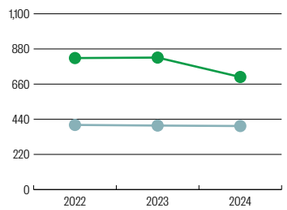


Environment

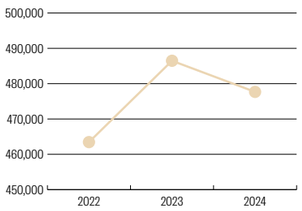
Electricity consumption shows a slow but steady decline over the years, probably due to the replacement of energy-intensive electrical devices with more economical alternatives, such as energy-saving lamps. Gas consumption was significantly lower than in previous years, mainly due to issues with the heating system. Paper consumption is comparable to previous years. Following extensive digitisation and centralisation of printers a decade ago, there was a sharp decline in paper use, which has now stabilised over several years. Finally, public transport use remains fairly consistent, with a 3% increase compared to the previous survey falling within the margin of error. Notably, the survey indicates a significant increase in bicycle use.

Environmental indicators

	2022	2023	2024
Electricity consumption in equivalent tonnes of CO_2 emissions	404.50	400.55	397.65
Electricity consumption in kWh	1,789,793	1,772,363	1,759,496
Gas consumption in equivalent tonnes of CO_2 emissions	823.20	825.99	704.48



	2022	2023	2024
Pages of paper printed	463,456	486,478	477,667



	2022	2023	2024
Percentage of commutes using public transport	63%	Not Available	66%

Research

In 2024, several notable changes occurred compared to 2023. The total number of funded projects dropped from 196 to 184, and we also observed a further decrease in the number of projects where the Institute is coordinator, from 30 to 24.

In general, the number of publications continues to increase, gradually approaching the situation prior to the Covid period. However, we see a shift from publications with impact factor to more Open Access publications. The number of popular works has slightly decreased this year, while communications at conferences and meetings have increased.

The average publication output per researcher rose from 3.8 to 4.6. The calculation method for this figure was adjusted to ensure a more logical and transparent count by using only one category (researchers = scientists).

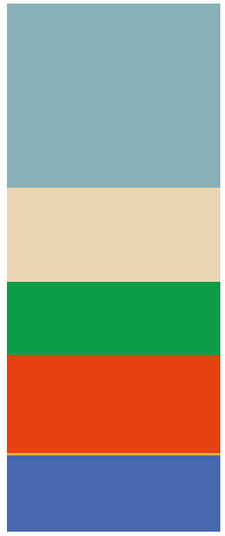
Supervision of students remained fairly stable, with a slight increase in the number of PhD students.

The Biblio4Plone database, which compiles all publications by the institute is a living database. Researchers can update it at any time and add publications years later, since some papers take time to be processed and officially published. This explains why publication numbers from previous years may differ from past reports.

Even though the number of publications increased this year, further efforts are needed to reach pre-Covid publication levels. However, our number of publications in journals with an impact factor remains fairly high, even post-Covid. It is also worth noting that the number of Open Access publications continues to grow, in line with the Institute's overall strategy.

Funding of current scientific projects

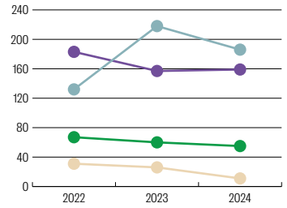
	2022	2023	2024	2024
	Number	Number	Number	Amount (in €)
Belspo	88	96	89	6,757,653
Number of projects coordinated by RBINS	27	22	21	
Federal funding from other sources	16	17	22	2,104,857
Number of projects coordinated by RBINS	4	4	0	
European Union	38	39	34	1,609,788
Number of projects coordinated by RBINS	3	4	3	
Federated entities	19	25	24	2,169,370
Number of projects coordinated by RBINS	2	0	0	
Private sector	0	4	6	67,419
Number of projects coordinated by RBINS	0	0	0	
Outside the EU	13	15	9	1,681,648
Number of projects coordinated by RBINS	2	0	0	
Total	174	196	184	14,390,734
projects coordinated by RBINS	38	30	24	



2024

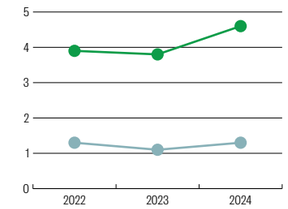
Publications

	2022	2023	2024
Scientific publications	543	541	560
in Open Access	132	218	186
in journals with impact factor	183	157	159
Popular works	31	26	11
Expert reports	67	60	55



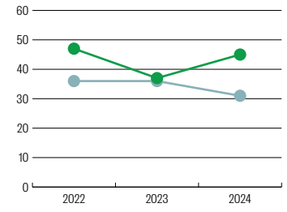
Average number of publications per scientist (in FTE)

	2022	2023	2024
All publications per scientist	3.9	3.8	4.6
All publications with impact factor per researcher	1.3	1.1	1.3



Supervision of students

	2022	2023	2024
PhD	47	37	45
Master	36	36	31
Total	83	73	76



Library and Collections

The 2024 annual report for the Library and Collections section highlights several key trends.

The library's size grew from 474,997 items in 2023 to 485,498 in 2024, a growth rate of 2.2%. This is slightly lower than the 3.7% growth seen the previous year, reflecting a reduced acquisitions budget. The number of paper document consultations rose significantly from 1,654 in 2023 to 3,777 in 2024. Electronic document consultations also increased notably, from 10,180 in 2022, 12,100 in 2023 to 15,275 in 2024. This is likely due to the Elsevier Governmental Edition, which provides access to a wide range of scientific journals.

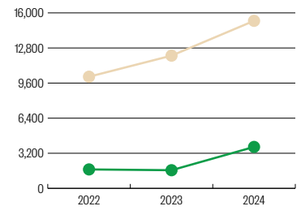
The number of scientist visits and visiting days to the collections remained stable. Scientific visits decreased from 658 in 2023 to 577 in 2024, but their duration increased slightly, from 726 to 766 days. Collection loans decreased from 381 in 2023 to 288 in 2024, but the number of specimens loaned saw a dramatic rise, from 23,178 to 70,964, thanks to large scientific loans from the entomology collection.

In terms of digitisation, back-cataloguing increased from 11,792 entries in 2023 to 14,576 in 2024. New inventory entries remained stable: 3,688 in 2023 and 3,675 in 2024. The number of digitised pages of institute publications decreased significantly because most have now been digitised. However, 12,546 maps were digitised in 2024: a significant increase compared to previous years.

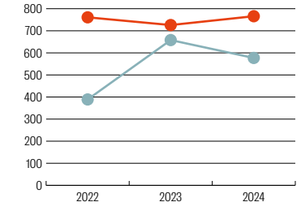
As for the collections, the total number of digitised type specimens increased from 156,896 in 2023 to 160,492 in 2024, representing about 80% of the estimated total. The total number of digitised specimens (metadata) rose from 3,750,085 to 3,888,494, which is about 10% of the entire collection.

Consultations

Library	2022	2023	2024
Paper documents	1,726	1,654	3,777
Electronic documents	10,180	12,100	15,275



Collections	2022	2023	2024
Number of scientist visits	389	658	577
Duration of scientific visits (days)	761	726	766
Number of loans from the collections	299	381	288
Number of loaned specimens	19,026	23,178	70,964



Size

Library	2022	2023	2024
Size of the library	462,505 items *	474,997 items *	485,498 items *
Growth of the library	Total growth of 3.5%	Total growth of 3.7%	Total growth of 2.2%

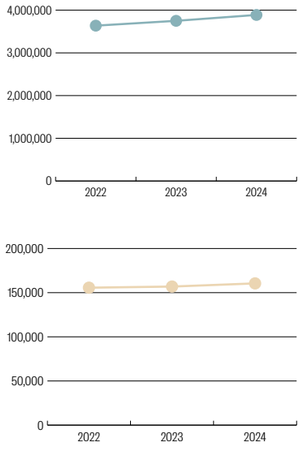
*item=physical unit

Collections	2022	2023	2024
Number of collections acquisitions	+200,562	+183,254	+116,045

Digitisation

Library	2022	2023	2024
Back-cataloguing	17,268	11,792	14,576
New inventory entries	2,275	3,688	3,675
Number of digitised pages	43,257	25,512	12,546 maps

Collections	2022	2023	2024
Type specimens	2,980	4,724	4,934
Non-type specimens	628	26,810	4,965
Boxes & drawers	9,931	1,782	2,010
The new registrations in the databases	106,620	111,192	147,701
The number of new types	3,744	1,271	3,944
The total of digitised specimens (metadata)	3,636,534	3,750,085	3,888,494
The total of digitised type specimens	155,625	156,896	160,492
The total of digitised species (all specimens)	139,556	142,912	144,240
Scientific archives	36,285	52,826	57,161
Pictures	6,908	0	0



Museum

In 2024, we recorded a 9.03% drop in visitor numbers, with 361,993 visitors. Despite this, it was still the second-best year ever for the Museum, following a record in 2023.

Group visits remained stable, showing that schools and other organised groups remain loyal. The real decrease came from individual and family visits, likely due to renewed enthusiasm for international travel. In other words, we lost the post-Covid attendance bonus.

The Museum's audience profile remained largely unchanged, with slight shifts across categories. Overall, it is clear that we continue to be a family-oriented museum. A notable increase in senior citizens may indicate that post-Covid life has returned to normal, with grandparents once again accompanying children.

The number of participants in activities remained stable (+0.7%). However, there were shifts in how the Education service achieved these results.

For schools and other groups, there was a clear shift from workshops to guided tours. This can be partly explained by a sharp rise in guided tours for events (from 11 to 37). An increase in guided tours was also seen among school and group visitors.

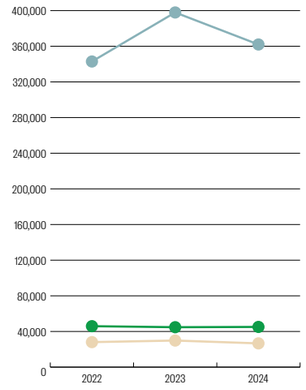
Workshop participation fell by 5.82%, largely due to the reduced number of classrooms available to the Education Service as several became unusable due to damp. The availability of classrooms remains the main limiting factor in organising workshops, more so than the availability of guides.

The biggest drop in participation occurred in the category 'other activities for individuals' (down 11.19%). Most individual activities drew similar numbers to 2023, except for PaleoLABs where attendance fell sharply, especially in the summer. This correlates with the lower overall visitor numbers in July and August.

Off-site activities, particularly the Xperilab.be truck, saw a 13.19% increase compared to 2023. While school-based activities remained at the same level, the rise was due to an increase in public events where the truck was present.

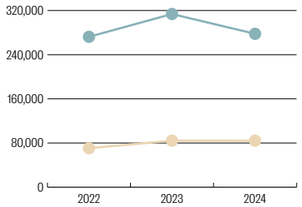
Museum visitor activities

	2022	2023	2024
Total museum visitors	342,908	397,923	361,993
MuseumShop customers	28,057	29,823	26,647
Expenses per customer	18.06 €	17.60 €	17.08 €
Participants in educational and cultural activities	45,936	44,783	45,095
Participant per activity (global)	18.7	19.9	18.9
Guided tours	12,150	12,276	13,302
Workshops	11,187	12,945	12,191
Other indoor activities	8,463	10,419	9,253
Outdoor activities	14,136	9,143	10,349



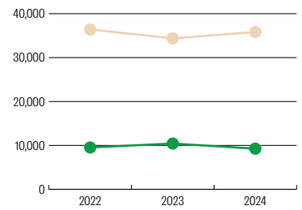
Profile of the Museum user

By type	2022	2023	2024
Visitors in groups	70,537	84,234	84,152
Individuals and families	272,371	313,689	277,841
Total	342,908	397,923	361,993



By age	2022	2023	2024
Small children (0-5 years)	6.46%	6.31%	5.95%
Young people (6-17 years)	40.86%	40.16%	39.67%
Adults (18-59 years)	46.30%	46.97%	44.90%
Senoir citizens (60+)	2.38%	2.50%	2.97%
Not known	3.99%	4.06%	6.50%

Participants in educational and cultural activities	2022	2023	2024
Total of participants	45,396	44,783	45,095
Visitors in groups	36,405	34,364	35,842
Individuals and families	9,531	10,419	9,253
Average participants per activity	18.7	19.9	19.4



Press and Internet

With 1,216 reports or articles – one-sixth covering Museum activities and five-sixths focusing on the work of our institute – we were cited nearly 200 times less than in previous years (1,000 fewer than in 2023, which was exceptional). This drop can be explained in part by the institute's rebranding at the end of 2023, which included a name change and updated keywords in our media monitoring. In 2024, we appeared in the media an average of three times per day. Both regional and national, as well as international, audiovisual media followed our updates.

At the national level, two scientific themes attracted significant media attention: the marine environment (presence of rare species in the North Sea and strandings) and the challenging situation of the research vessel Belgica. At the Museum, the new exhibition *Wild?* drew considerable interest from both French- and Dutch-speaking press.

Internationally, the COP16 on Biodiversity attracted strong media coverage, as did the discovery of mammoth remains at a metro construction site in Brussels, and the repatriation of human remains. The international media's interest in our scientific research underlines the importance of communicating not only about our Museum activities but also about our research.

Our staff were cited in half of all radio and TV reports and in a quarter of print articles.

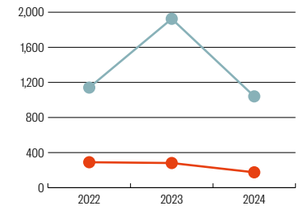
Our new general website, launched on 18 October 2023, received 629,487 visits in 2024. The number of page views reached 2,069,329.

The number and frequency of posts and stories, as well as the production of videos and Reels on our social media platforms, increased significantly. This led to strong growth in our communities: +27.61% on Instagram and +24.78% on LinkedIn. Our Threads account, launched on 16 January 2024, already has 1,234 followers – most of them from our Instagram community. The privatisation of access to statistics on X makes analysis difficult. Initial reports suggested an increase in followers, but the crisis on X at the end of the year has already had an effect, with a 2% drop in users.

Finally, Facebook saw a decline in new followers, with 630 added in 2024. However, reach, impressions, clicks, shares, and page visits have all increased.

In the media

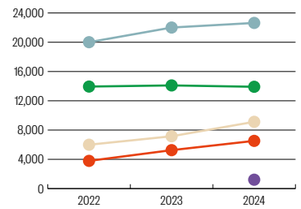
	2022	2023	2024
Printed press	1,141	1,925	1,041
Of which research	945	1,670	914
Of which Museum	196	255	127
Radio and TV	290	281	175
Of which research	205	209	135
Of which Museum	85	72	40
Total	1,431	2,206	1,216



Online and social media

Websites	2022	2023	2024
Website visitors	710,399	665,164	Not Available
Website visits	1,359,301	1,116,777	629,487
Visited pages	3,063,695	2,814,773	2,069,329

Social media	2022	2023	2024
Facebook followers	20,009	22,010	22,640
Twitter followers	13,944	14,100	13,914
Instagram followers	5,996	7,152	9,125
LinkedIn followers	3,789	5,254	6,521
Threads followers	0	0	1,215



Note: These are the website figures without the streaming of Falcons for Everyone, because the streaming numbers appeared to be difficult to compare over de last few years. Just to give an idea: the streaming normally accounts for a million to several millions of visited pages.

The RBINS in brief

Missions
RBINS has been entrusted with four major missions:
– Scientific research into natural sciences;
– Scientific expertise at the service of the public authorities;
– Conservation and management of scientific and heritage collections;
– Dissemination of scientific knowledge in society.

Research & expertise
One out of every three people at the RBINS is a scientist. The scientific personnel includes mainly biologists, palaeontologists and geologists, but also oceanographers, anthropologists, prehistorians and archaeologists, as well as geographers, physicists, bio-engineers and mathematicians, which enables it to conduct multidisciplinary research.

Lines of Research;
– Biodiversity and geodiversity;
– Biological evolution and the history of life;
– Marine and freshwater ecosystems' management
– History of the human/environment relationship
– Applied geology.

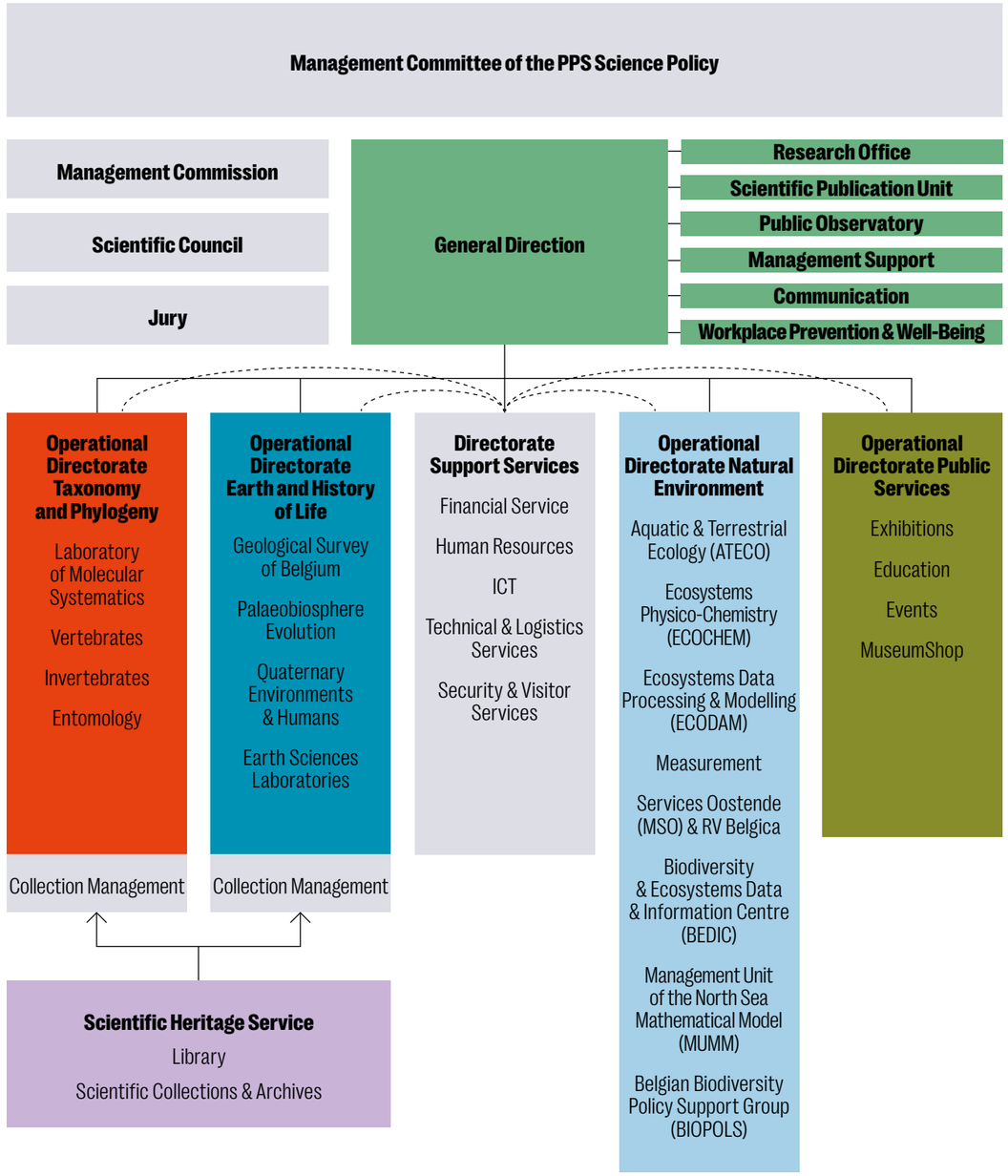
Service Provision;
– The RBINS provides scientific expertise under Belgium's international commitments in relation to environmental protection.
– It develops tools and methods for monitoring natural land or marine environments.
– It also offers useful advice for the development of national and European policies for the protection and conservation of biotopes and biodiversity and the use of natural resources.

Collections
With their 38 million specimens conserved as Belgian heritage of universal significance, the RBINS's collections come just after London and Paris in the European classification, and belong to the top 10 largest collection in the world. They serve above all as reference and research tools and as such belong to the European 'major research infrastructure'. In this respect they are constantly being visited and studied by researchers from around the world. For several years now, the RBINS has been committed to an ambitious programme to digitise its collections and to do so has developed an open-source software, DaRWIN, which has made it possible to encode all the data on any collection of specimens, whatever their taxonomic group.

Museum
For the general public, the Natural Science Museum is the visible part of the RBINS. It has 16,000 m2 of permanent galleries, temporary exhibition rooms and educational workshops, public spaces of all kind, enabling it to welcome more than 340,000 visitors each year, approximately 25 % of whom are school groups. Its Dinosaur Gallery is world famous and the largest in Europe.

It plays a leading role in the promotion and dissemination of scientific culture, both within and beyond its walls, notably through travelling exhibitions and events. The RBINS is pursuing ambitious efforts to gradually renovate the premises, to make the Museum more convivial and better adapted to people's expectations. The Museum also takes a resolute position promoting a more respectful approach to nature.

Organisation



The Royal Belgian Institute of Natural Sciences is one of the ten federal scientific institutions that are governed by the Belgian Science Policy Office (Belspo).

The RBINS is a State service.
It is managed by three independent entities:
– The Scientific Council offers advice on issues of a scientific nature that have an impact on the accomplishment of the tasks of the Institute.
– The Management Commission is responsible for the financial and administrative management of the institution.
– The General Director is responsible for the day-to-day Institute's management. She/he is assisted by the Management Board.

Moreover the Jury for recruitment and promotion is responsible for recruiting the permanent scientific employees and monitoring their carreers.

The Institute's General Director is also a full member of the Management Committee of the Belgian Science Policy Office.

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Websites and publications
All websites and publications mentioned in this report can be accessed via links within the PDF version of the document, available on our website:
www.naturalsciences.be/en/about-us/missions-vision/annual-reports

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