Department of Environmental Sciences

Outstanding Achievements of 2022

Foreword

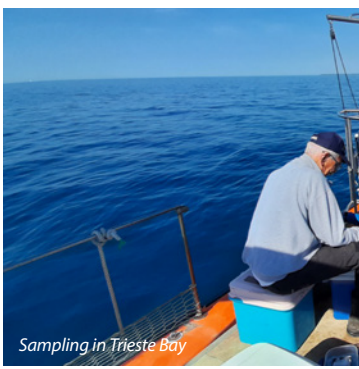
Prof. Dr. Milena Horvat
Head,
Department of Environmental Sciences

The year 2022 was truly exceptional, marked by numerous noteworthy achievements of which we can be proud. Nine candidates finished their Ph.D. studies and five accomplished a master's degree. In addition, we have had numerous regular promotions of researchers to higher scientific titles, along with their significant involvement in post-graduate education. The number of projects is constantly increasing, which in turn results in a greater number of publications, which exceeded the number of 90 this year. Over 30% of publications were in journals with the highest impact factor in the field (A" mark), which greatly exceeded the set goals. We are incredibly proud of our outstanding achievements, recognized by the research and user spheres, and formalized by prestigious awards such as the national Zois Awards for exceptional achievements and the ARRS Awards of Excellence for individual achievements.

The post-covid period also meant greater mobility, which resulted in a substantial number of foreign research visitors and fellows. The number of visits by our researchers to foreign institutions also increased. This brought new creative impetus to the exploratory creation of research ideas at the Department.

Among the most important achievements is certainly the launch of a new research infrastructure - the Orbitrap Exploris 240 mass spectrometer. With this new instrument, highly accurate determination of the mass of molecules and their components is possible, which will allow for a more detailed analysis of harmful substances present in environmental, food, and biological samples. Possessing this capability creates new opportunities for all areas of work at the department.

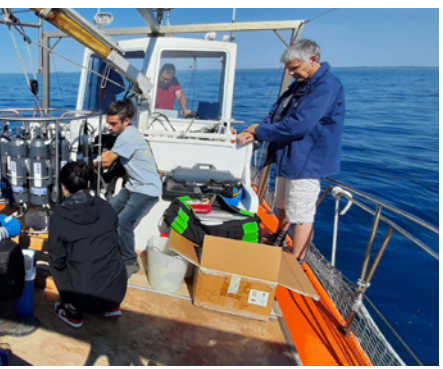
New Research Infrastructure - Orbitrap



Sampling in Trieste Bay

Celebration of Prof. Dr. Ester Heath's Zois Award

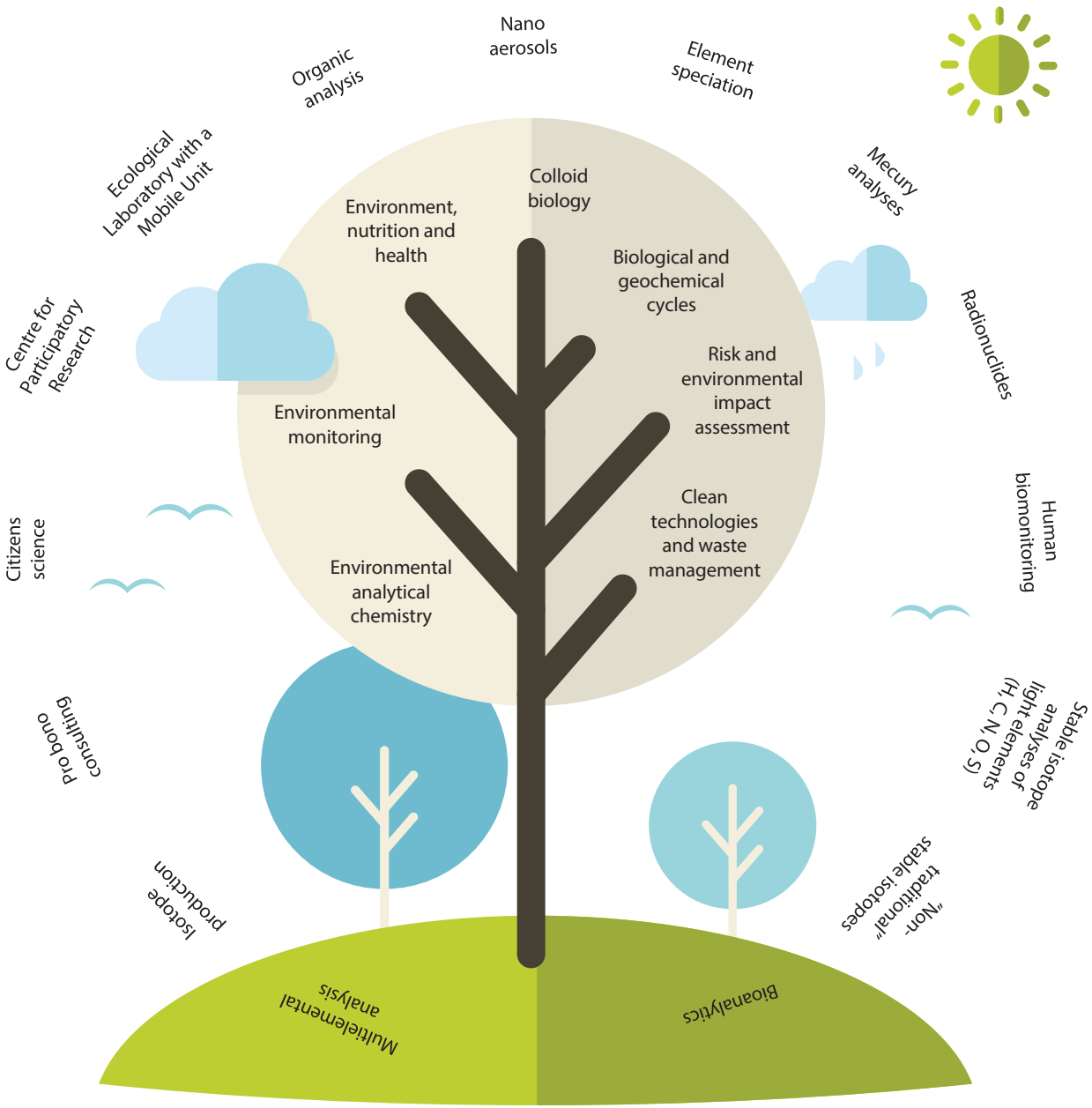
ELME at Firefighters' Olympics in Celje



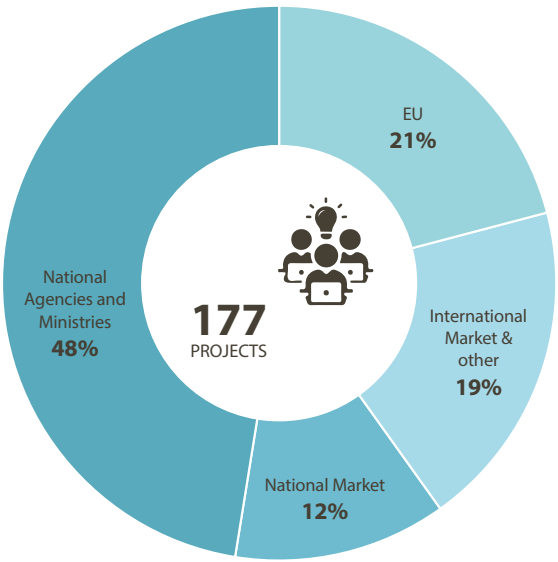
About us

The Department of Environmental Sciences (O-2) focuses on interweaving the physical, chemical, and biological processes that shape our environment. The research we perform here at the department is interdisciplinary and multidisciplinary and covers many areas, such as environmental analytical chemistry, biogeochemical cycles, microbial ecology, environment and health, environmental technologies, risk and environmental assessment, and environmental monitoring. We also focus on the development of technical solutions for environmental problems and environmental management. Currently, our Department hosts the "ISO-FOOD" ERA Chair for isotope techniques in food safety, quality, and traceability, the infrastructure Centre of Mass Spectrometry (CMS), the Mobile Ecological Laboratory Unit (ELMU), and the Center for Participatory Research. It coordinates the H2020 Marie Skłodowska-Curie Innovative Training Network FoodTraNet project and GMOS-Train project, H2020 Twinning SurfBio project, Horizon Europe project FishEUTrust and Marie Skłodowska-Curie Individual Fellowship project H2020 STROMASS. It implements a National Human Biomonitoring Program (HBM) and participates in METROFOOD-RI, EMPIR projects, and many other EU, national, and international projects. The JSI is also coordinator of the national Joint Research Unit (JRU) METROFOOD-SI composed by seven partners and has participated in the establishment of the new Eurament Metrology Network for Safe and Sustainable Food (EMN-FOOD). We also offer contract work for partners from industry, academia, public services, and other customers. Our laboratories specialize in inorganic and organic analytical chemistry, radiochemistry, and isotope ratio analysis. Besides analytical services, we also provide strategic environmental assessment, consulting, and project assistance in environmental analysis, natural resource management, eco-technologies, food safety, quality and authenticity, and public health.

O-2 at the glance



Highlights of 2022



The Department of Environmental Sciences has a long tradition of developing collaborative partnerships with industry. This collaboration helps deliver new products and services, which advances the Slovene economy, improves our quality of life, and brings real-world technologies and management issues into our research laboratories. Building international partnerships are recognized as a necessity for advancing technologies and solving global challenges.

In 2022 the Department was involved in **106** national and **34** international projects, **37** were within the EU framework projects.

Total number of projects:	**177**
EU:	**21%**
International Market & other:	**19%**
National Market:	**12%**
National Agencies and Ministries:	**48%**

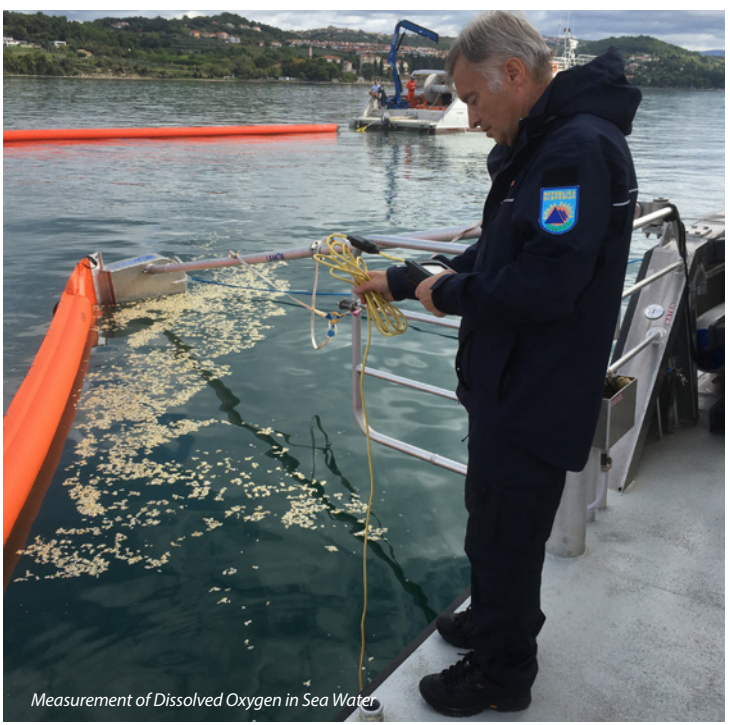
Human Biomonitoring Sampling

Colloid Biology Lab

FoodTraNet Project Presentation

The Mobile Ecological Laboratory monitored Air Pollution during the Large Forest Fire in Karst Region

Citizen Science in Elementary School



Measurement of Dissolved Oxygen in Sea Water

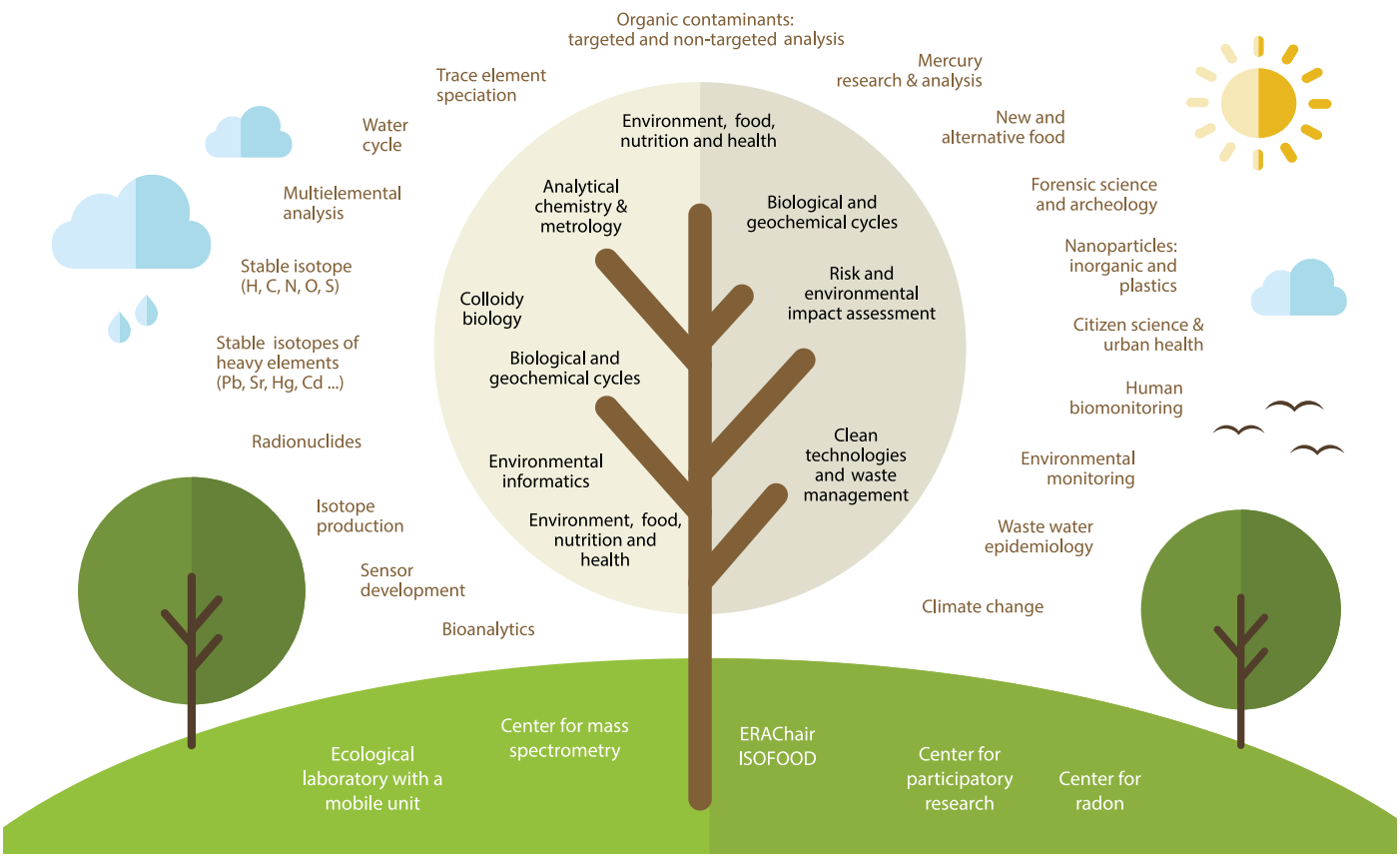
Positioning our research in time and space

UN SDGs:

- Partnerships to achieve the Goal
- Life Below Water
- Clean Water and Sanitation
- Gender Equality
- Life on Land
- Zero Hunger
- Climate Action
- Responsible Consumption and Production
- Sustainable Cities and Communities
- Good Health and Well-beeing
- Industry, Innovation and Infrastructure
- Affordable and Clean Energy
- Quality Education

Strategic goals

- Food safety, security and traceability
- Bring about transformational change in relation to the environment, climate change and health
- Climate change and biodiversity loss – reduce effects on health and the environment
- Improve health impact assessment of environmental factors and promote implementation research
- Cities and communities – promote healthy lives in sustainable and inclusive societies
- Chemical and physical stressors – prevent and eliminate harmful substances exposures to health



Authors: Davor Kontić, Milena Horvat

Between the sky, the ocean, and the bedrock

DOI: 10.1038/s41598-021-04226-3,
DOI: 10.3390/w14132127,
DOI: 10.3390/w14213372,
DOI: 10.3390/w14132064,
DOI: 10.3390/w14081213,
DOI: 10.3390/w14060959,
DOI: 10.1007/s10811-022-02745-8,
DOI: 10.1002/jqs.3461.

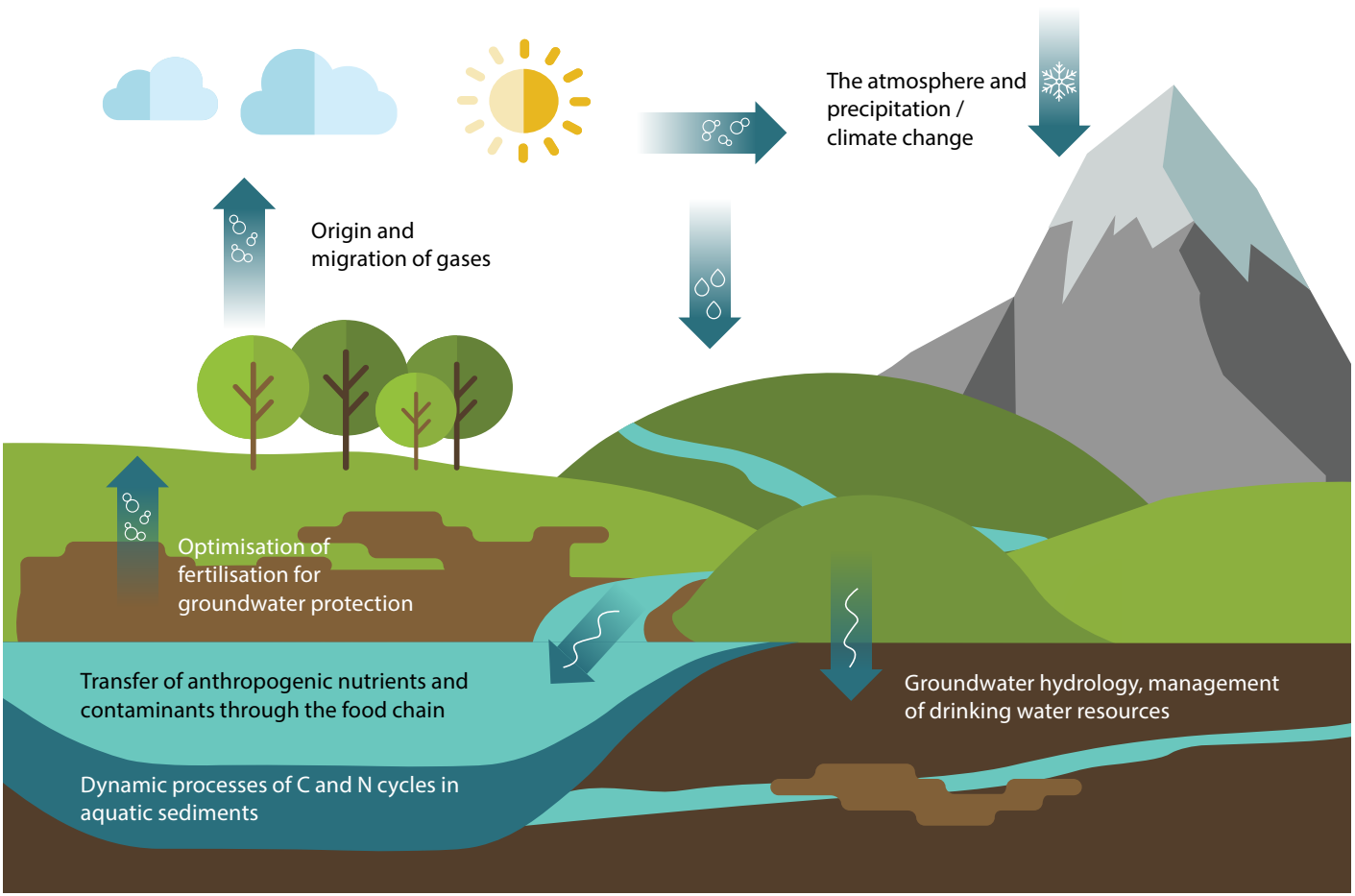
Coupled global biogeochemical cycles of water and nutrients

Water acts as an universal solvent driving the cycling of nutrients (C, N, P, S) and other elements.

The majority of elements have multiple naturally occurring isotopes and their ratios in physical, chemical, and biological reactions change in predictable ways.

This opens a myriad of possible applications for the use of isotope ratios in natural sciences, life sciences, and technology.

Isotopes allow the study of ...



Authors: Sonja Lojen, Tjaša Kanduč, Polona Vreča

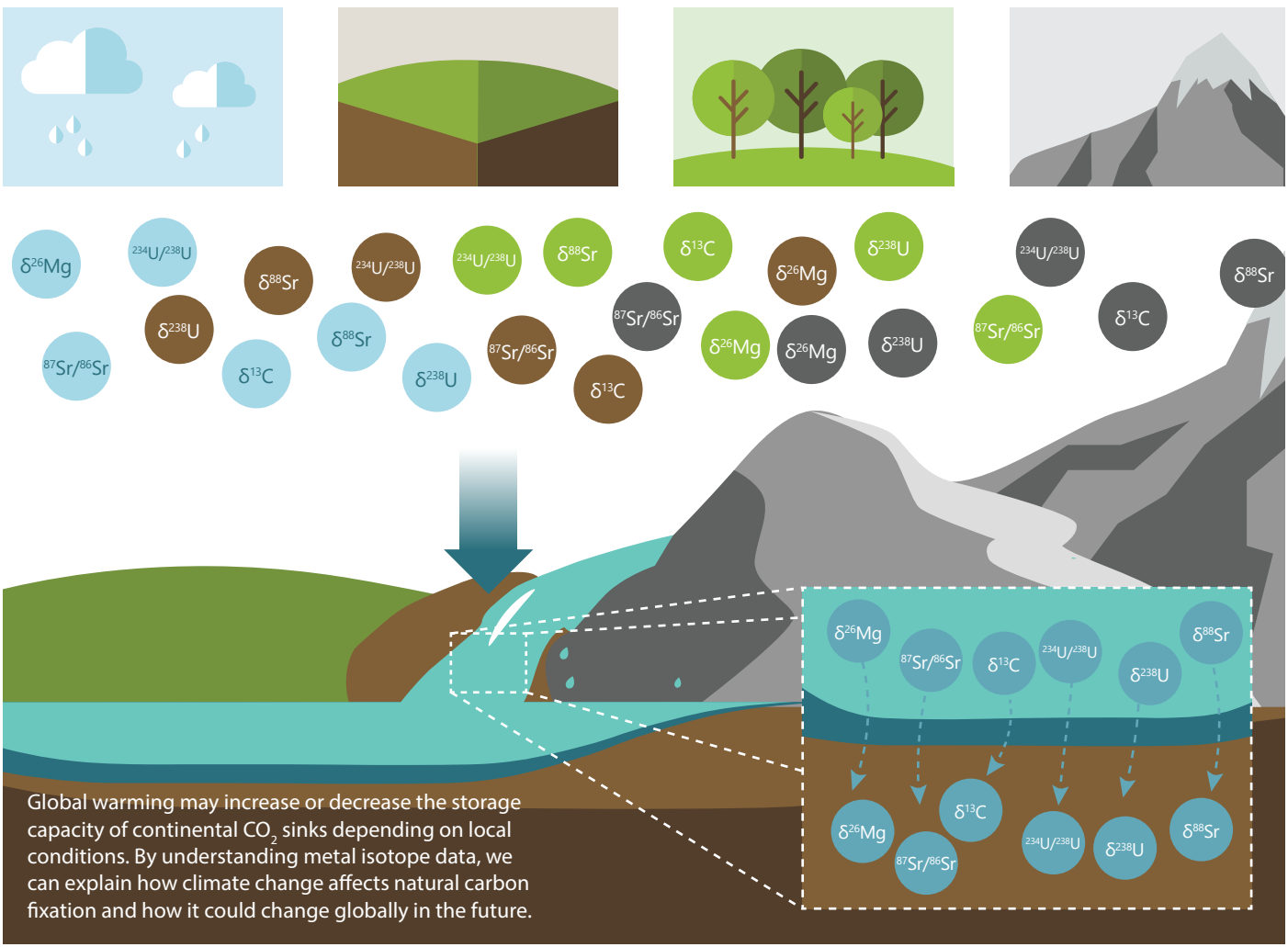
DOI: 10.1016/j.dib.2022.108686.

Non-traditional isotopes in the environment

Climate change disturbs CO_2 cycling

Metals like Mg, Sr and U are omnipresent in bedrock and soil, and co-precipitate with carbonate in water systems.

The isotopic ratios of metals and carbonate in water depend on their origins, temperature, and precipitation rate.



Global warming may increase or decrease the storage capacity of continental CO_2 sinks depending on local conditions. By understanding metal isotope data, we can explain how climate change affects natural carbon fixation and how it could change globally in the future.

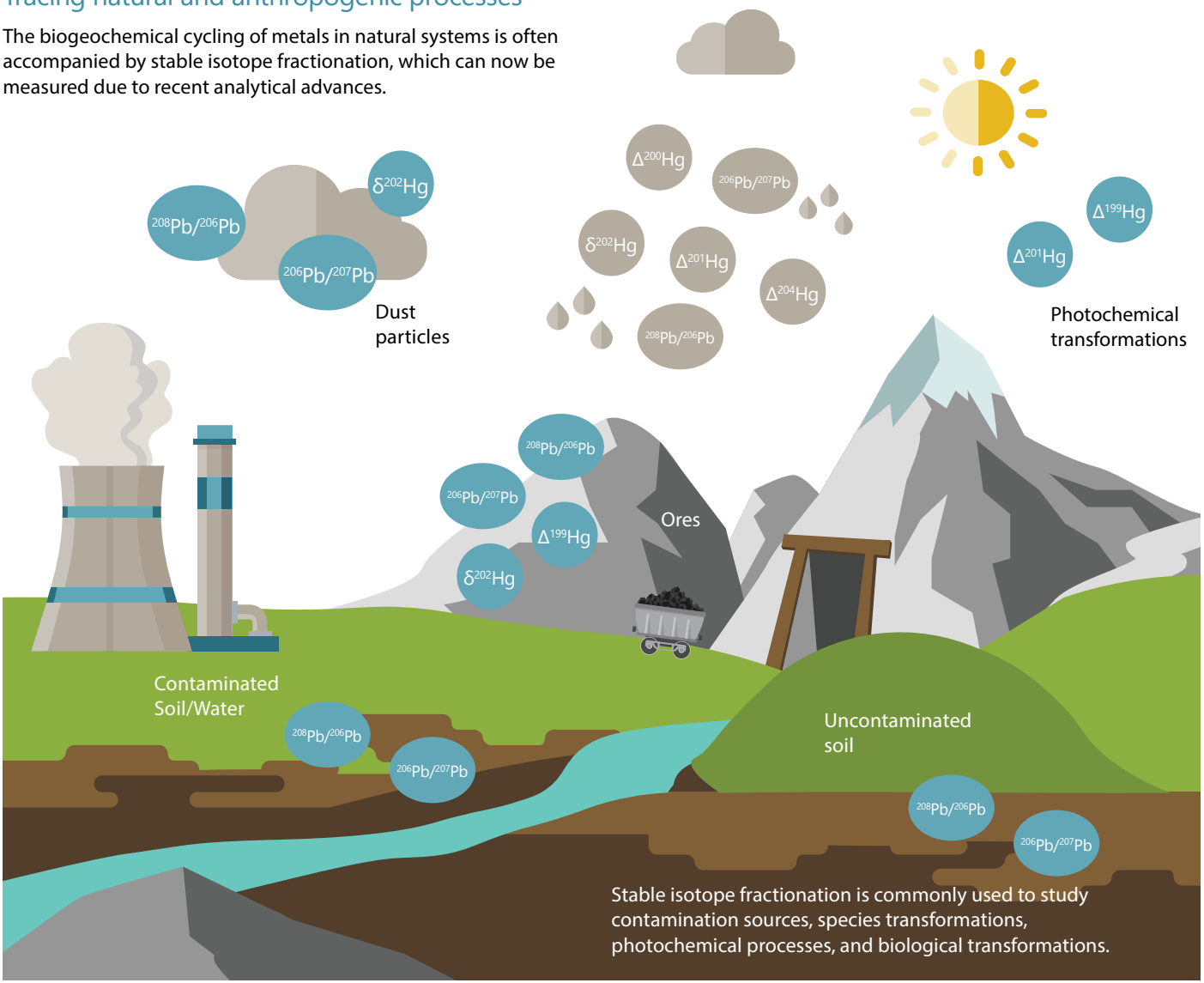
Authors: Sonja Lojen, Tea Zuliani

Non-traditional isotopes in the environment

DOI: 10.1016/j.chemosphere.2022.136592,
DOI: 10.1016/j.envpol.2022.120057,
DOI: 10.1021/acs.est.1c03044,
DOI: 10.1016/j.jfca.2022.104675,
DOI: 10.3390/jmse10040539,
DOI: 10.3390/jmse10050587,
DOI: 10.1016/j.marpolbul.2022.113644,
DOI: 10.3390/w14070998.

Tracing natural and anthropogenic processes

The biogeochemical cycling of metals in natural systems is often accompanied by stable isotope fractionation, which can now be measured due to recent analytical advances.

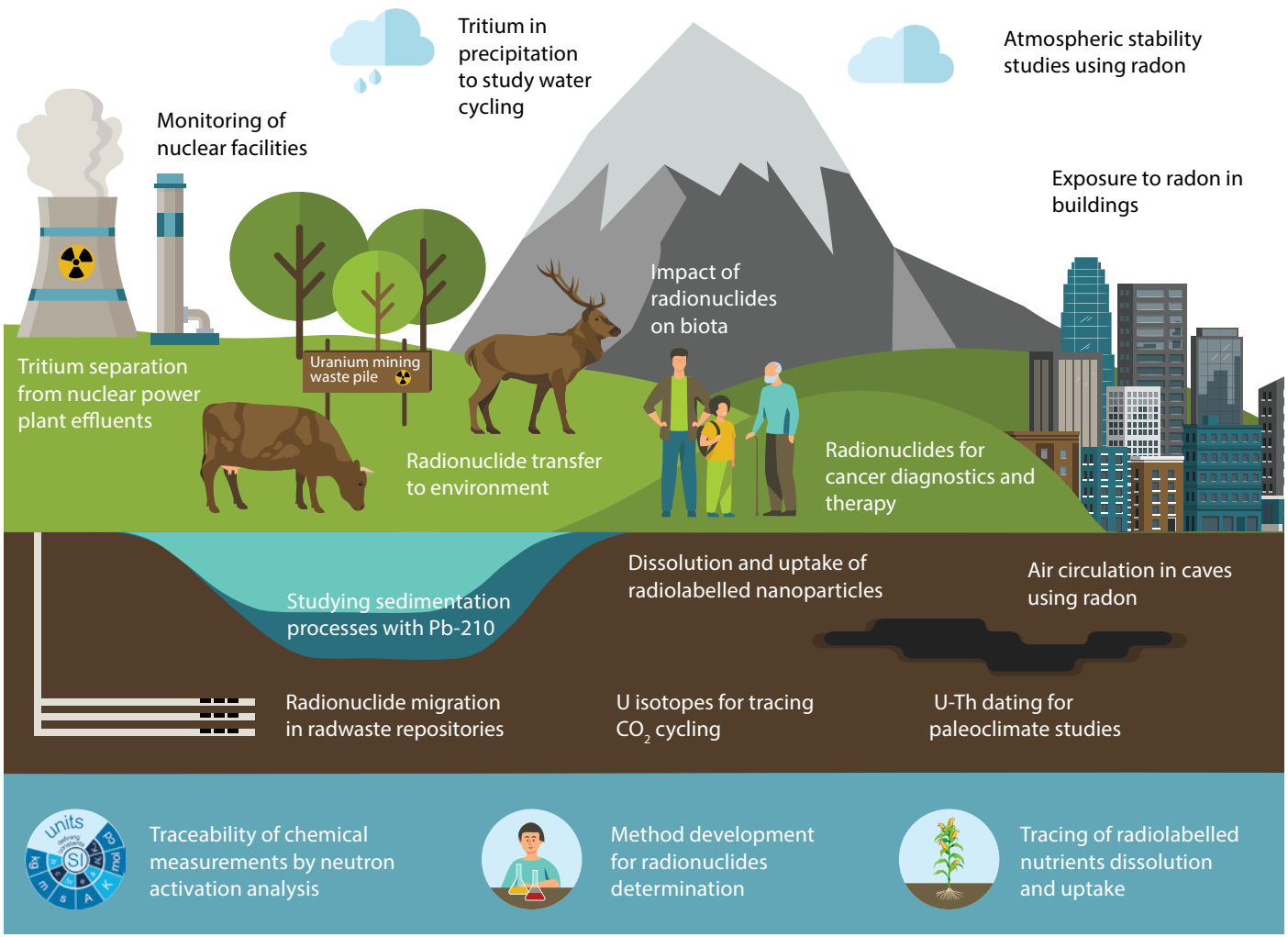


DOI: 10.1016/j.jenvrad.2022.106863,
DOI: 10.1115/1.4051249,
DOI: 10.3390/ijerph19042125.

Radionuclides in our daily lives

Natural and man-made radionuclides are perceived as highly dangerous by the public. The truth is, we use radionuclides in numerous ways to help solve problems in our society.

Our research involving radionuclides is focused on the following topics:



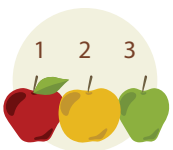
Author: Marko Štrok

Food authenticity and geographical origin

DOI: 10.1016/j.foodchem.2022.132204,
DOI: 10.3390/foods11162441,
DOI: 10.1088/0026-1394/59/1A/08004,
DOI: 10.3390/plants11020169,
DOI: 10.3390/foods11172628,
DOI: 10.3390/antiox11020216,
DOI: 10.3390/foods11101414.

Stable isotopes of light (H, C, N, O, S) and heavy (Sr) elements, elemental analysis, and chemical profiling (e.g. sugar, fatty acid, or even volatile compounds) provide a robust analytical tool to determine:

SLOVENIAN?
The region from which the product originated



VARIETY?
The species, cultivars and agricultural practices

AUTHENTIC?
The type and degree of adulteration

NATURAL?
The naturalness of flavors

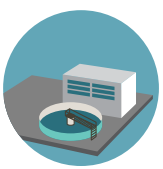
Developed analytical methods, established databases, and selected chemometric models allow insight into potential mislabelling and adulteration, preventing economic losses and enhancing consumer trust.

DOI: 10.1016/j.agwat.2021.107304,
DOI: 10.3390/antiox11020216,
DOI: 10.3390/foods11060849,
DOI: 10.1007/s10811-022-02745-8.

What we'll eat in the future

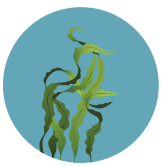
Eating farmed insects as a way of saving the planet

Farmed insects have high protein and nutritional content, high fertility and reproduction rates, high feed conversion efficiency, rapid growth rates, and a low overall ecological footprint.



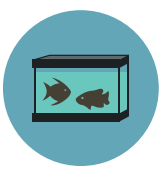
Crops irrigated with treated wastewater

Reuse of urban wastewater could be a solution for regions with water scarcity. However, monitoring is needed regarding safety (emerging contaminants, nanoplastics, potentialy toxic elements) and quality (amino acids, aromas, fatty acids, polyphenols, lipids) of crops irrigated with wastewater.



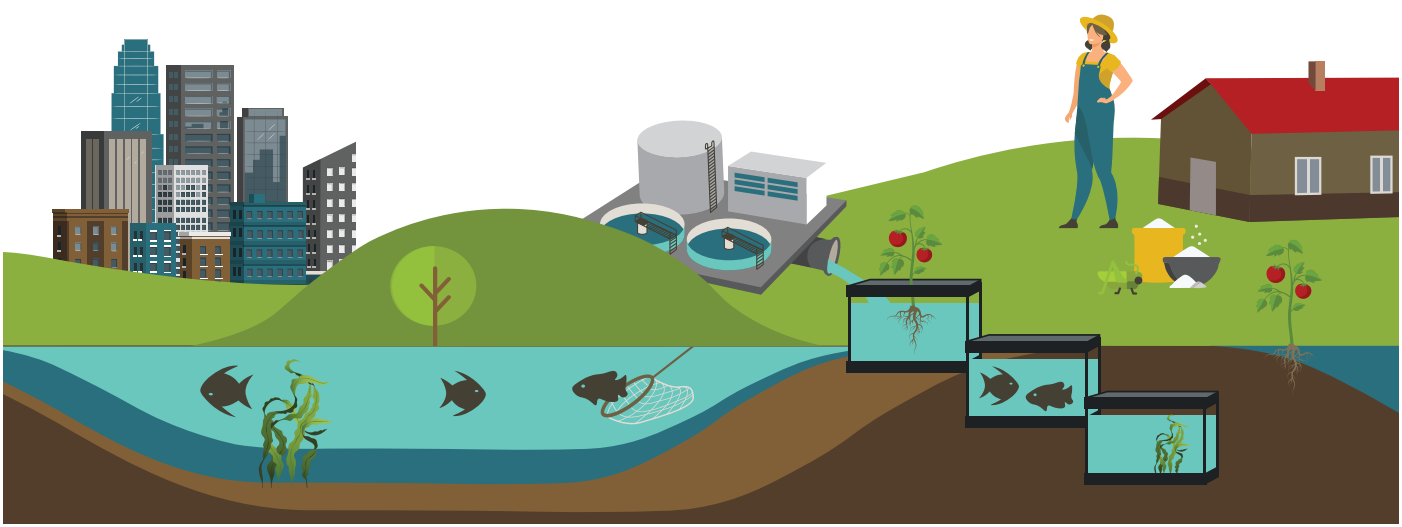
Spirulina to treat various diseases

Ethanol extracts have greater antioxidant efficiencies than water extracts when comparing fermented to non-fermented *Spirulina*. Fermented *Spirulina* lowers the cell stress response.



Aquacultured fish, shellfish and aquatic plants

These have a smaller carbon footprint, and require less land and fresh water. Alternative systems with recirculation lower water use and the environmental impact.

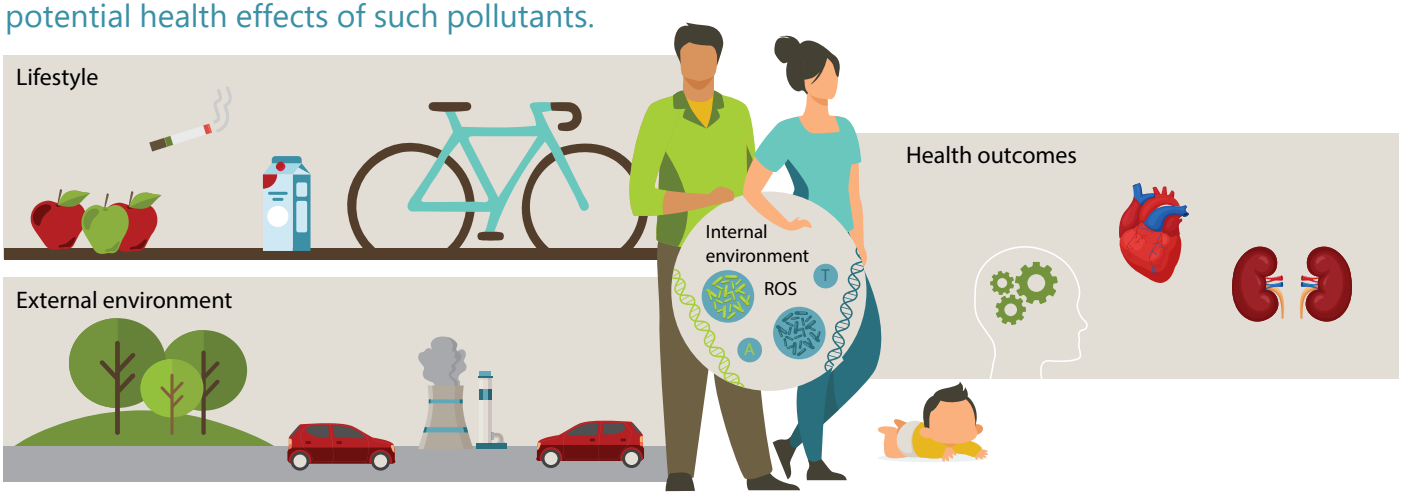


Authors: Lidija Strojnik, Anja Vehar

Human biomonitoring

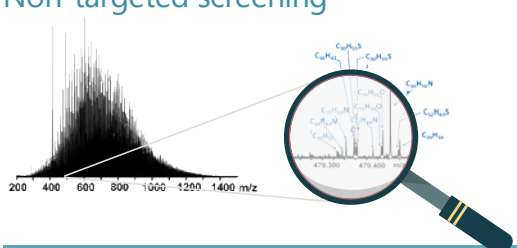
DOI: 10.1007/s00216-022-04408-6,
DOI: 10.1016/j.chemosphere.2022.134550,
DOI: 10.1016/j.dib.2022.107991,
DOI: 10.1016/j.envres.2022.113122,
DOI: 10.1016/j.envint.2021.107046,
DOI: 10.1016/j.envpol.2022.120566,
DOI: 10.3390/ijerph19063643,
DOI: 10.3390/ijerph19116787,
DOI: 10.3390/ijerph19074200,
DOI: 10.1016/j.ijheh.2022.113943,
DOI: 10.1016/j.ijheh.2022.114050,
DOI: 10.1016/j.ijheh.2022.114052,
DOI: 10.3390/nu14214667,
DOI: 10.3390/toxics10080451,
DOI: 10.3390/ijerph19063362,
DOI: 10.1080/10807039.2022.2143319.

Human biomonitoring (HBM) is an efficient tool to assess human exposure to environmental pollutants from various sources and potential health effects of such pollutants.

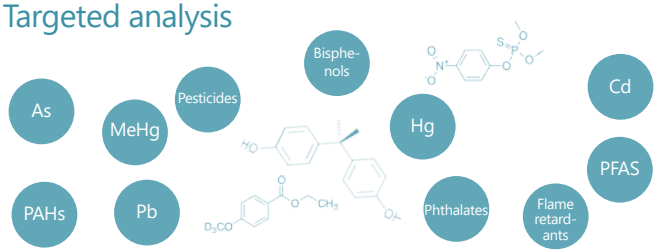


HBM starts with recruitment of volunteers, collection of biological samples, and continues with the determination of chemical substances and biochemical and mulecular changes in the collected samples,

Non-targeted screening



Targeted analysis

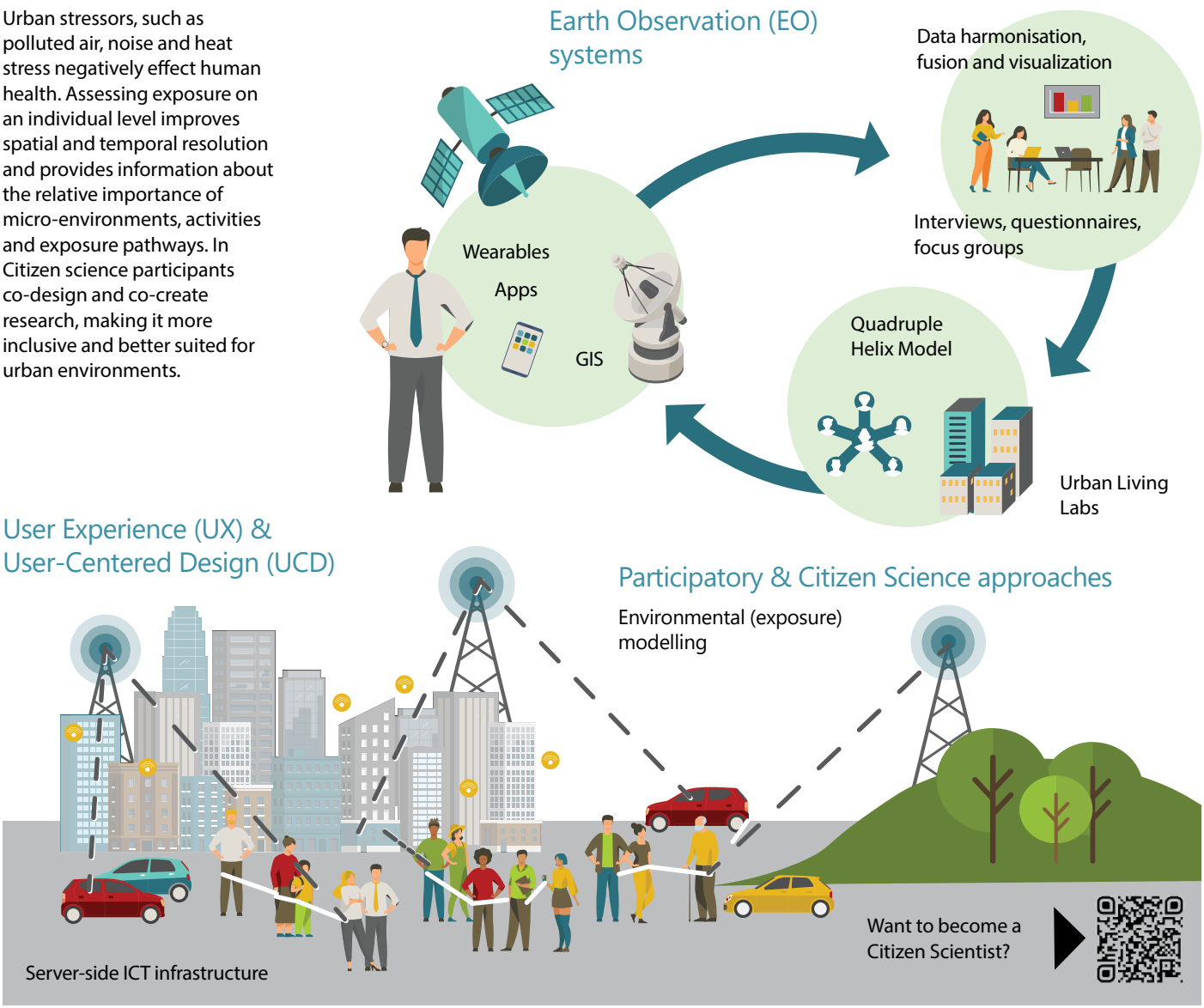


... and provides comparison of exposure levels between different population groups, analyse time and spatial trends, identify exposure sources, identify substances of concern, establish a link between exposure and health, and to support risk assessment and policy decisions for risk reduction and evaluation of their effectiveness.

DOI: 10.1016/j.envsci.2022.02.033,
DOI: 10.1016/j.envsci.2022.02.030,
DOI: 10.3390/ijerph19042125,
DOI: 10.3390/s22197116.

Citizen Science, urban environment & health

Urban stressors, such as polluted air, noise and heat stress negatively effect human health. Assessing exposure on an individual level improves spatial and temporal resolution and provides information about the relative importance of micro-environments, activities and exposure pathways. In Citizen science participants co-design and co-create research, making it more inclusive and better suited for urban environments.

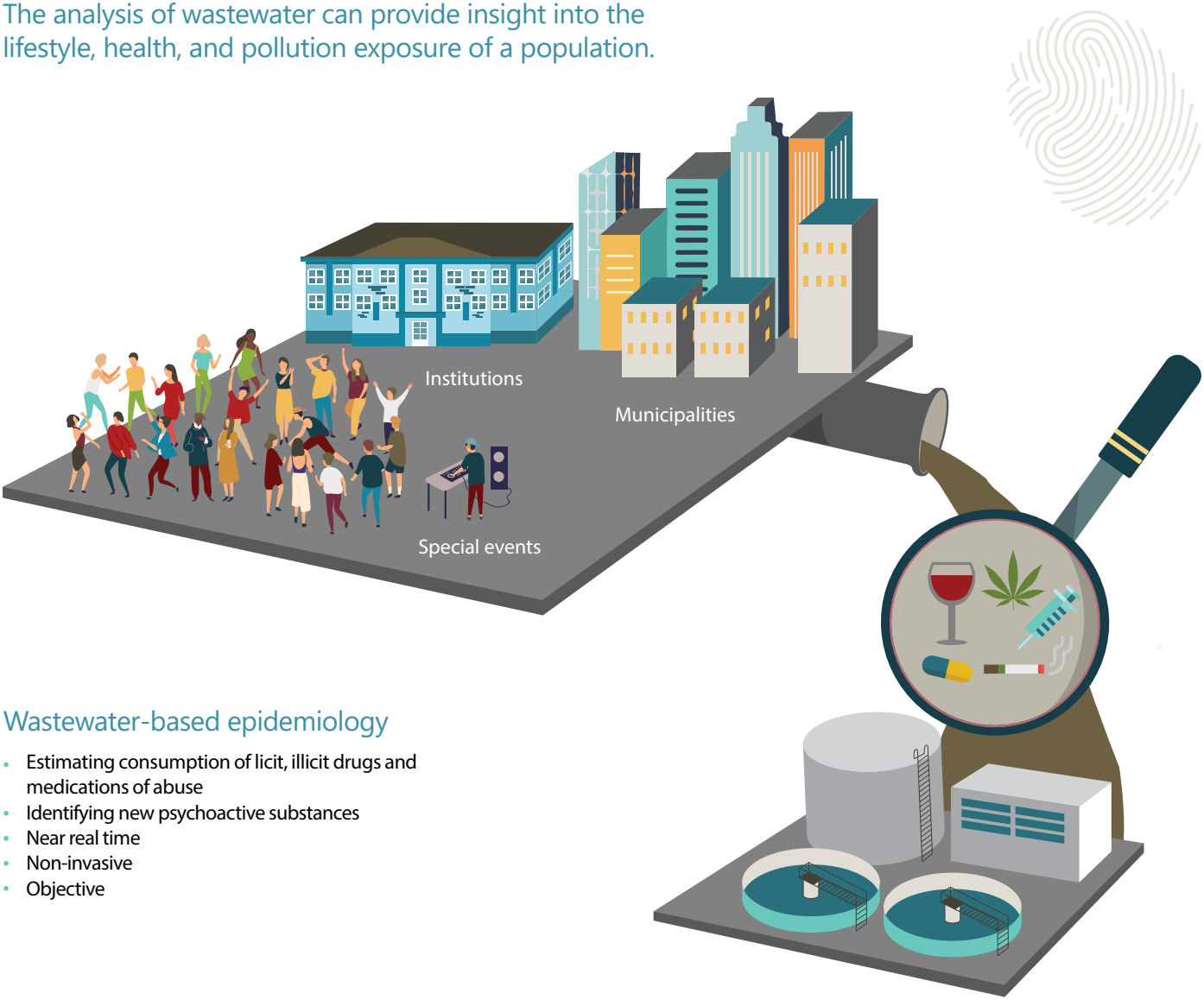


Authors: David Kocman, Rok Novak, Janja Snoj Tratnik

Wastewater - A fingerprint of human activity

DOI: 10.1016/j.scitotenv.2022.155594.

The analysis of wastewater can provide insight into the lifestyle, health, and pollution exposure of a population.



Wastewater-based epidemiology

- Estimating consumption of licit, illicit drugs and medications of abuse
- Identifying new psychoactive substances
- Near real time
- Non-invasive
- Objective

DOI: 10.1016/j.dib.2022.107991,
DOI: 10.1002/dta.3392,
DOI: 10.3390/ijms23158447,
DOI: 10.1080/01904167.2022.2071732,
DOI: 10.3390/molecules27238634,
DOI: 10.1016/j.scitotenv.2022.155707,
DOI: 10.1016/j.scitotenv.2022.155594,
DOI: 10.1016/j.scitotenv.2021.149878,
DOI: 10.1016/j.teac.2022.e00164.

The journey of emerging contaminants

Sources of emerging contaminants

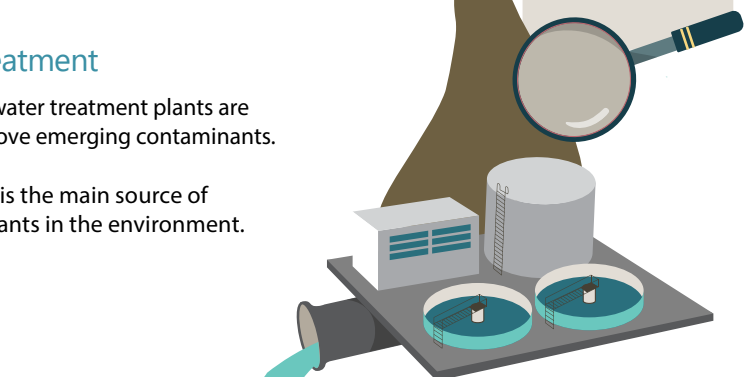
Municipal and industrial waste

Estrogens, bisphenols, pharmaceuticals, licit & illicit drugs, micro & nanoplastics, potentialy toxic elements

Wastewater treatment

Conventional wastewater treatment plants are not designed to remove emerging contaminants.

Treated wastewater is the main source of emerging contaminants in the environment.



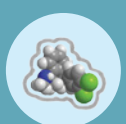
Residual contaminants & their degradation / transformation products

Environment

New alternative wastewater treatment technologies

Algal ponds lab-scale —> pilot-scale

Photocatalysis



Molecularly imprinted polymers

Cavitation

Plasma

Nanoremediation with Fe nanoparticles

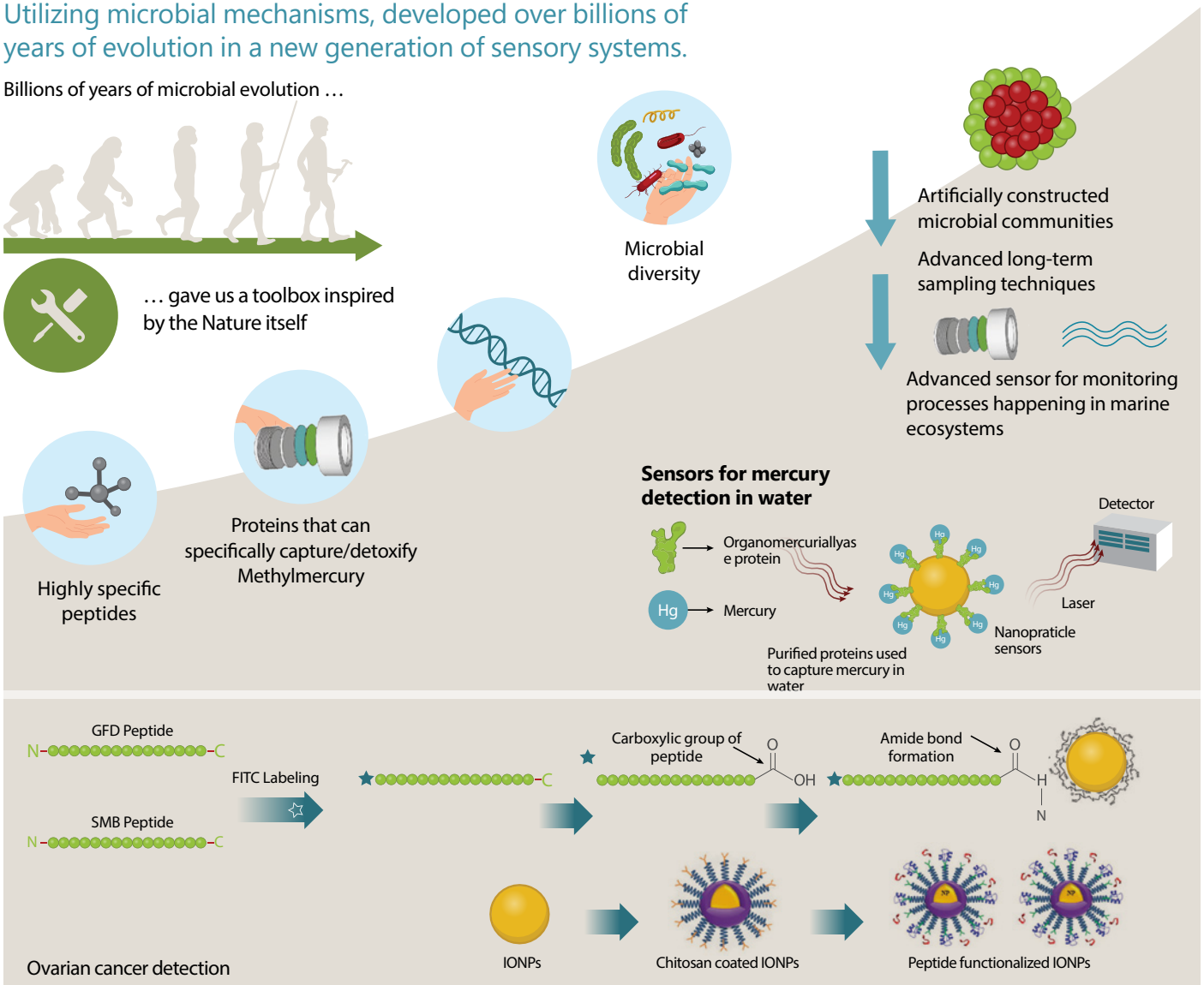
These technologies improve the removal efficiency of persistent emerging contaminants, and can be used before or after conventional treatment.

Authors: Anja Vehar, Janja Vidmar, Ana Kovačič

Sensing the impossible using nature-inspired tools

doi: 10.3390/coatings12020190,
doi: 10.1042/BSR20212622,
doi: 10.1016/j.mtbio.2022.100463.

Utilizing microbial mechanisms, developed over billions of years of evolution in a new generation of sensory systems.



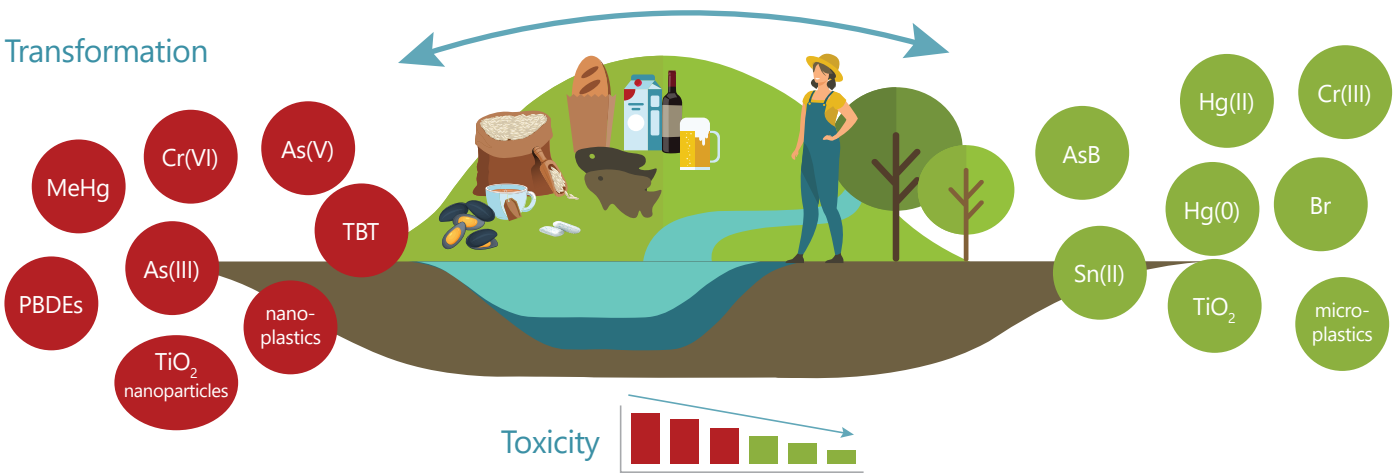
 Authors: Aleš Lapanje, Tomaž Rijavec, Dmitrii Deev, Allwin Mabes Raj, Maja Zugan

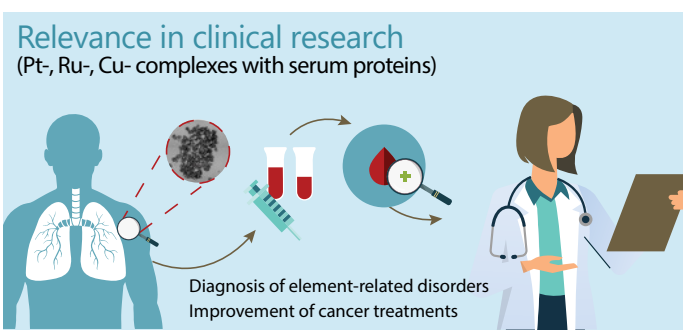
DOI: 10.1007/s00216-022-04321-y,
DOI: 10.3390/antiox11010063,
DOI: 10.1016/j.cemconres.2022.106970,
DOI: 10.1016/j.etap.2022.103939,
DOI: 10.3389/fchem.2022.86338,
DOI: 10.1007/s10800-022-01696-9,
DOI: 10.1039/D2JA00161F,
DOI: 10.1016/j.jfca.2022.104422,
DOI: 10.1038/s41598-022-19600-y,
DOI: 10.1038/s41598-022-24797-z,
DOI: 10.3389/fchem.2022.863387,
DOI: 10.3390/w14060959.

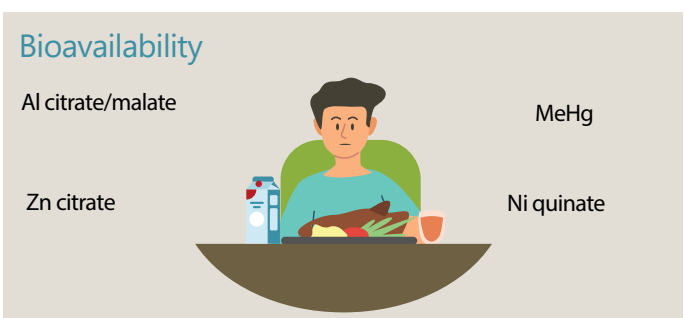
Challenges of analytical chemistry

The role of element speciation

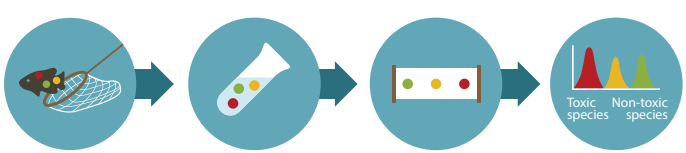
An element's properties, including it's mobility, reactivity, and toxicity, depends on the chemical species in which the element is present in the environment. Identification and quantification of chemical species – element speciation – provides a powerful analytical tool to study their transformation, toxicity, relevance in clinical research, and bioavailability.







Element speciation analysis requires reliable, sensitive, and selective analytical procedures that must be able to preserve species integrity during all analytical steps.



Authors: Janja Vidmar, Tea Zuliani

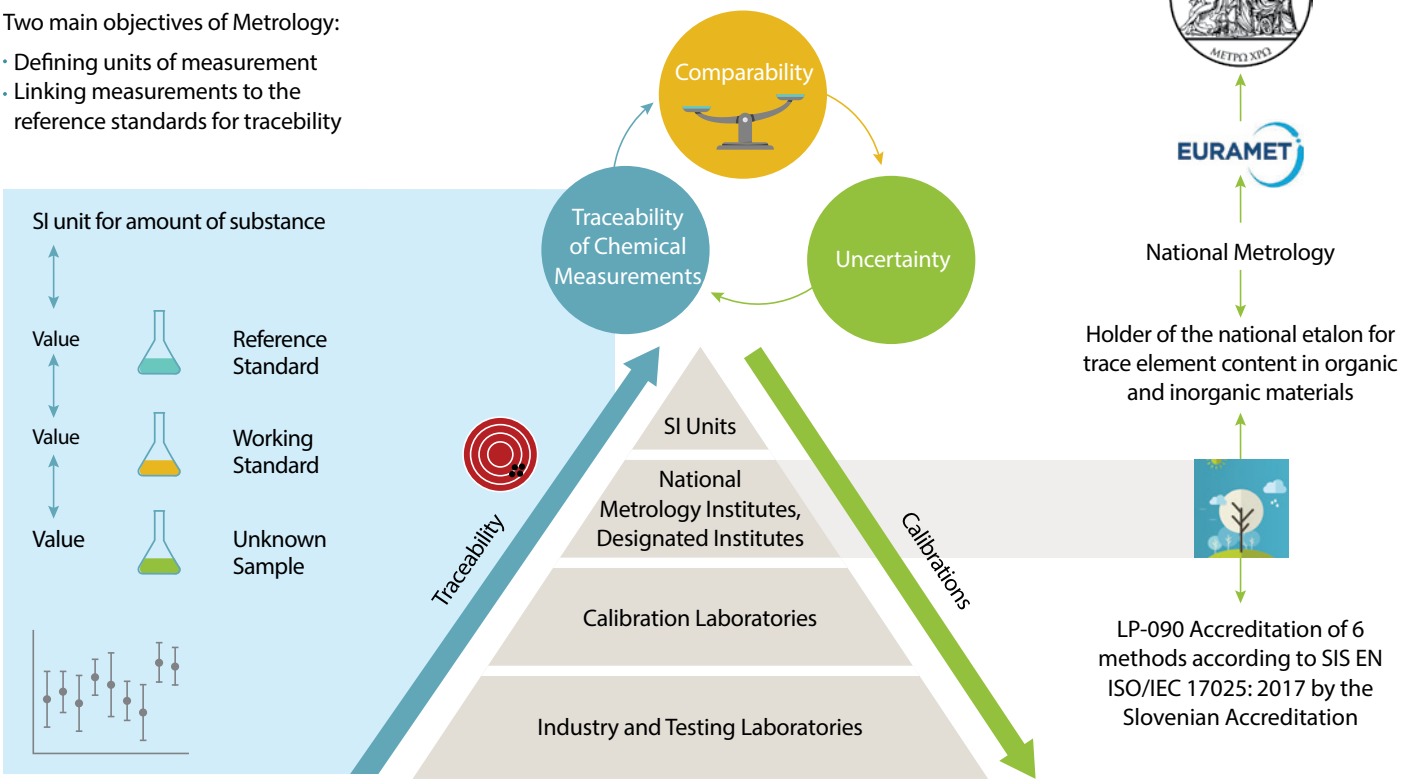
Comparability of measurement results

DOI: 10.1021/acs.analchem.2c00260,
DOI: 10.1016/j.jtemb.2021.126912,
DOI: 10.1007/s10967-022-08626-1,
DOI: 10.1088/0026-1394/59/1A/08004,
DOI: 10.1016/j.net.2021.07.016,
DOI: 10.1515/pac-2021-1108.

The International Bureau of Weights and Measures (BIPM) defines Metrology as "the science of measurement".

Two main objectives of Metrology:

- Defining units of measurement
- Linking measurements to the reference standards for tracebility



EURAMET

National Metrology

Holder of the national etalon for trace element content in organic and inorganic materials

LP-090 Accreditation of 6 methods according to SIS EN ISO/IEC 17025: 2017 by the Slovenian Accreditation

Traditional approach	My 'correct' results; the smaller the '±' the better; no need for traceability
Metrological approach	Establish and demonstrate traceability; standard assessment of uncertainty; 'true' result is theoretical; critical review of imperfect methods

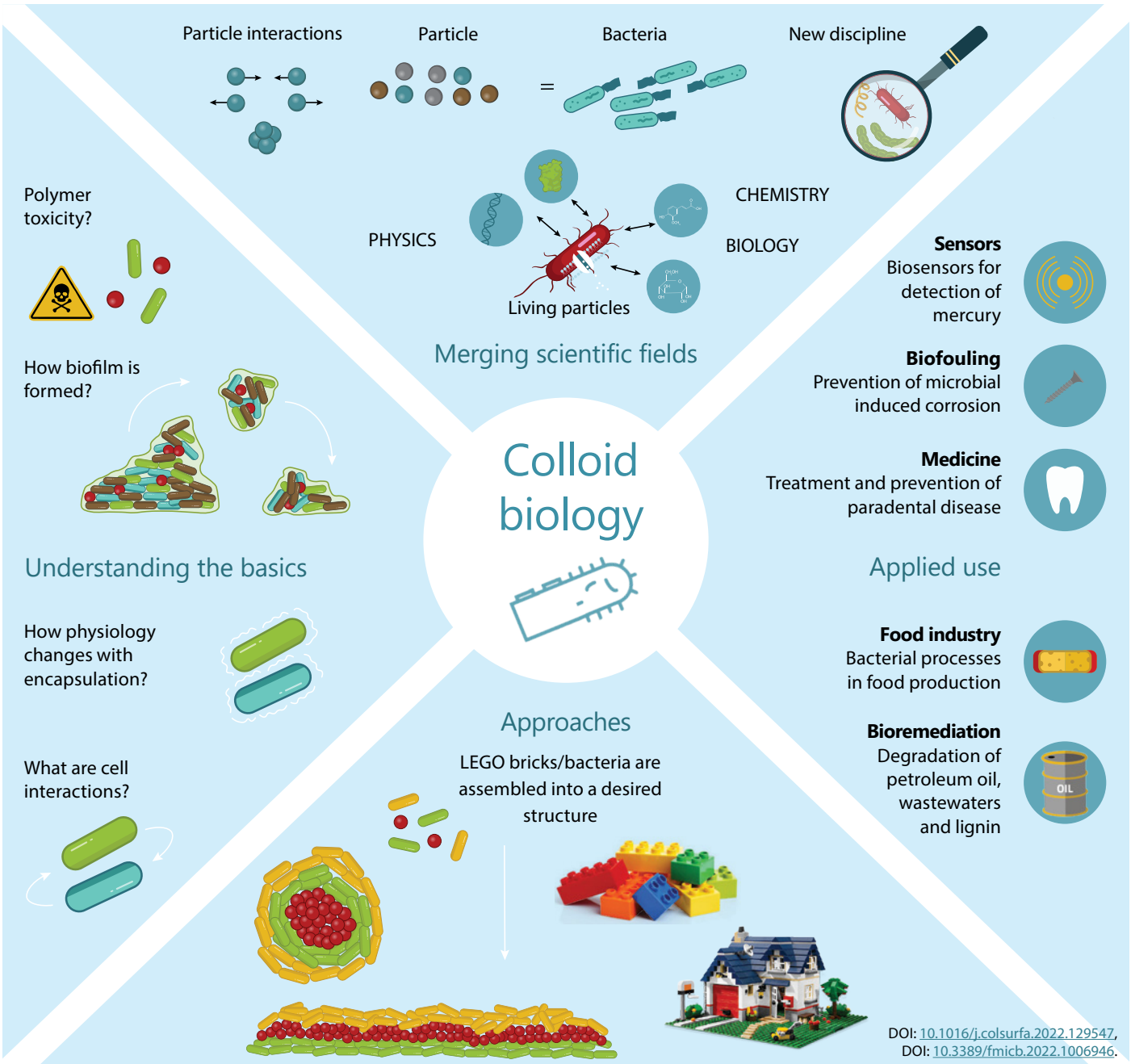
Our Calibration and Measurement Capability (CMC) through key intercomparisons resulted in 25 CMCs in the BIPM Key Comparison Database (KCDB).

BIPM KCDB for CMC's of O2
25 CMCs in four categories (updated 2022-11-18):

Category 10:	Biological fluids and materials; (5 CMCs)
Category 11:	Food; (14 CMCs)
Category 13:	Sediments, soils, ores and particulates; (4 CMCs)
Category 14:	Other materials; (14 CMCs)

CIPM MRA

 Authors: Igor Živković, Milena Horvat, Polona Vreča, Radojko Jaćimović



DOI: 10.1016/j.colsurfa.2022.129547,
DOI: 10.3389/fmicb.2022.1006946.

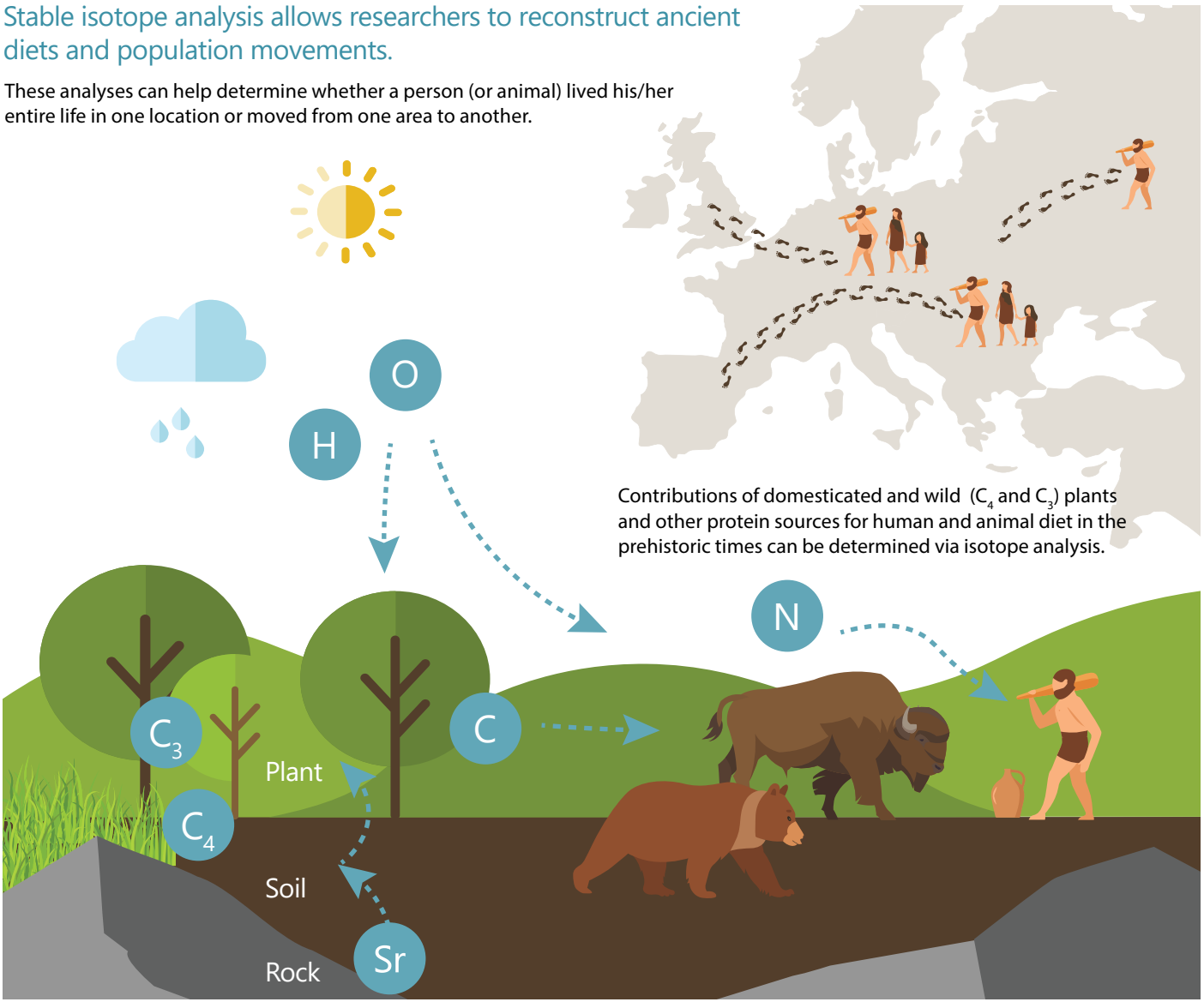
Authors: Aleš Lapanje, Tomaž Rijavec, Maja Zugan, Dmitrii Deev

The archaeology of bones, teeth and vessels

DOI: 10.1002/jqs.3461.

Stable isotope analysis allows researchers to reconstruct ancient diets and population movements.

These analyses can help determine whether a person (or animal) lived his/her entire life in one location or moved from one area to another.



Contributions of domesticated and wild (C_4 and C_3) plants and other protein sources for human and animal diet in the prehistoric times can be determined via isotope analysis.

Erasmus+ student Matteo Nigro with Dr. Polona Vreča and Klara Žagar


Zdenka Tkov, Prof. Dr. Ester Heath and Barbara Svetek


Dr. Doris Potočnik in the Organic Biogeochemistry Lab


Citizen Science projects carried out by Rok Novak from Environmental Informatics team

Prestigious Awards

Zois Award for outstanding achievements

☆ The Republic of Slovenia awarded Prof. Dr. Ester Heath with the Zois Award for outstanding scientific research and development achievements in the use of organic analysis in the field of environment, food, and health. The excellence of the research work of Prof. Dr. Ester Heath is in the integration of chemistry, environment and cleaning technologies, and health and food in the field of research on the circulation and effects of residues of new priority organic pollutants.

Excellent in Science Awards

☆ In the field of interdisciplinary sciences, The Public Research Agency of the Republic of Slovenia (ARRS) gave special recognition to Dr. Anja Stajnko and her colleagues from the Department of Environmental Sciences, for the article *Assessment of susceptibility to phthalate and DINCH exposure through CYP and UGT single nucleotide polymorphisms*, which was published in the journal Environment International. The article summarizes the results of research on the influence of genetic variations in the human genome on the metabolism of phthalates. This is the first study in humans to identify gene polymorphisms as biomarkers of susceptibility to phthalate exposure.

☆ The achievement entitled *New-age organic pollutants - how can we control them with algae?* was awarded ARRS Excellent in Science 2022 in the field of medicine. Prof Dr. Ester Heath, Dr. David Heath, and Dr. Ana Kovačič from the Department of Environmental Sciences are a part of the team, whose research led to an awarded article. They earned the award by developing an analytical method for determining modern pollutants in the water phase and in algal biomass, which helped to understand the mechanisms of their removal in algal cultures.

Organic Analyses Team

Other awards and special recognitions

☆ Young researcher Žan Rekar won the Mikro+Polo 2023 Promoter of Science award

☆ Dr. Lidija Strojnik won the prize for the RAFA 2022 poster entitled Tracing the geographical origin of fruits and vegetables; the Slovenian model

☆ Dmitrii Deev's poster was selected by the editor of FEMS Ecology Journal as the best poster in the field

☆ Taja Verovšek won the prize for the best oral presentation by young researchers at the ISSS 2022, 26th International Symposium on Separation Sciences

☆ Ana Kovačič won the 52. Krka prize for research paper Bisphenol residues in the aqueous environment: occurrence and fate

☆ Anja Vehar won the 52. Krka acknowledgment for research paper Monitoring of bisphenols removal efficiency in municipal wastewater treatment plant

☆ Anja Vehar was awarded as the best science communicator of 14th Jožef Stefan IPSSC Conference

Dmitrii and His Colleagues from Colloid Biology Lab at FEMS Conference in Serbia

Zois Award Ceremony, STA

Lidija with the FAFA 2022 Poster Award

Dr. Anja Stajnko and dr. Agneta Runkel, STA


Dr. David J. Heath and Anja Vehar with visitors on the JSI Open Days


Žan Rekar

Theses and Mentoring

Doctoral Dissertations

- ☆ STROJNIK, Lidija. Authenticity and traceability of food and food flavorings using a stable isotope approach, doctoral dissertation, Ljubljana, 2022
- ☆ TKALEC, Žiga. Development and application of a non-targeted screening workflow for chemical exposure assessment in human biomonitoring and related studies, doctoral dissertation, Ljubljana, 2022
- ☆ GAČNIK, Jan. Metrology of mercury measurements in the air, doctoral dissertation, Ljubljana, 2022
- ☆ MARKOVIĆ, Katarina. Speciation of ruthenium-based candidate drugs for cancer treatment and copper as a potential biomarker for cancer diagnosis in human serum, doctoral dissertation, Ljubljana, 2022
- ☆ LJONCHEVA, Milka. Annotation of semi-polar organic contaminants by using gas chromatography coupled to mass spectrometry and machine learning, doctoral dissertation, Ljubljana, 2022
- ☆ MARKOVIĆ, Stefan. Quantitative imaging of cisplatin in tumor samples by laser ablation inductively coupled plasma mass spectrometry, doctoral dissertation, Ljubljana, 2022
- ☆ RUNKEL, Agneta Annika. Targeted analysis of organic contaminants, exposure assessment, and vulnerability of populations to hazardous compounds, doctoral dissertation, Ljubljana, 2022
- ☆ ROBINSON, Johanna A. User experience evaluation of novel air quality sensing technologies for citizen engagement in environmental health studies, doctoral dissertation, Ljubljana, 2022
- ☆ GORNIK, Tjaša. Development and application of molecularly imprinted polymers for selected antidepressants and studies of their environmental fate, Ljubljana, 2022

Master Theses

- ☆ KLEMENČIČ, Polona. Exposure to cadmium in Slovenian population, master thesis, Ljubljana, 2022
- ☆ LEVSTEK, Lucija. Speciation of chromium in plants using high-performance liquid chromatography and mass spectrometry techniques, master thesis, Ljubljana, 2022
- ☆ ŠUŠTARIČ, Ariana. Določanje ostankov dovoljenih in nedovoljenih drog v površinskih in podzemnih vodah ter njihov vpliv na zelene alge Chlamydomonas reinhardtii, master thesis, Ljubljana, 2022
- ☆ BUH, Tanja. Optimizacija naravnega prezračevanja v enodružinski hiši s povišano koncentracijo radona, master thesis, Nova Gorica, 2022
- ☆ VADNJAL, Nina. Tveganje za izpostavljenost radonu v domovih starejših občanov, master thesis, Ljubljana, 2022

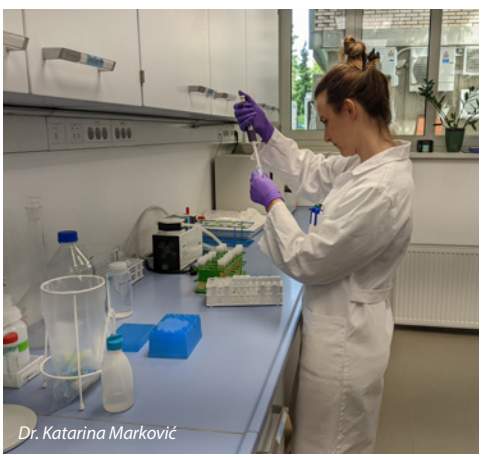
Dr. Stefan Marković with his Colleagues

Dr. Tjaša Gornik, Dr. Milka Ljoncheva and their mentor Dr. Tina Kosjek

Dr. Lidija Strojnik

Dr. Agneta A. Runkel

Polona Klemenčič, MsC


Dr. Katarina Marković

Dr. Johanna A. Robinson

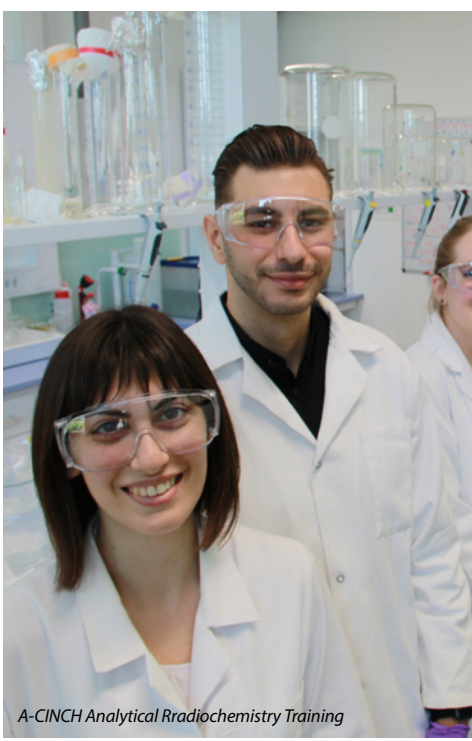

Dr. Jan Gačnik

You are invited to become part of our team!

Would you like to conduct research in an international environment alongside exceptional researchers? Are you interested in working with state-of-the-art research equipment and expanding your knowledge of advanced scientific methods? The Department of Environmental Sciences brings together students and professionals with a drive to develop both personally and professionally in an innovative research setting. We are currently offering graduates who wish to pursue a master's degree in Environmental Sciences the opportunity to work with top researchers in the field and become part of a dynamic, productive, and highly efficient team.

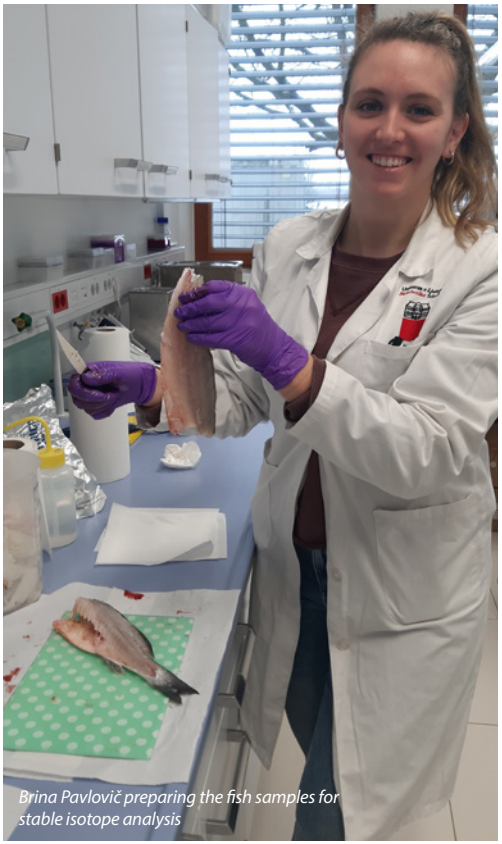
For more information, visit www.environment.si.

Majda and Dominik doing Lab Work

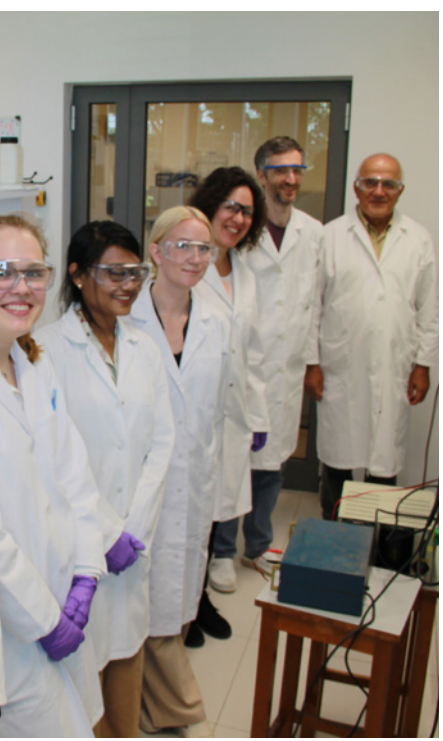


A-CINCH Analytical Rradiochemistry Training

Dr. Lidija Strojnik capturing VOC of the Tree to synthetisize them into Perfume



Brina Pavlovič preparing the fish samples for stable isotope analysis



Making Icecream at Stefan's Open Days

Bring cutting edge research in real life!

We aim to understand better the relationship between natural processes and human activities and the influence that these activities have on human health and the environment. Our research groups cooperate with leading re- search institutions and universities worldwide. Our goal is to provide our students with the highest quality post-graduate studies at the master's and doctoral levels through joint research and education within a dynamic research and development environment and contribute to the strengthening of science and technology to better society. We cooperate closely with the Jožef Stefan International Postgraduate School (IPS), an independent higher education institution, that is strongly supported by industry (including Gorenje, Kolektor, and Salonit) and an international network of cooperating universities and research institutions from the European Union, the USA, and Japan.

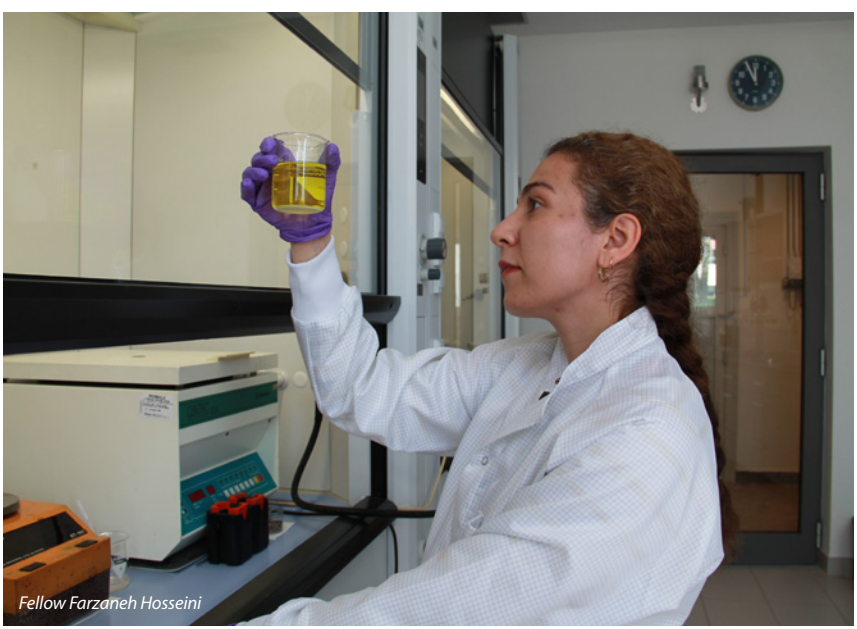
12 SCHOLARSHIP HOLDERS in 2022/23

5 MAGISTRANDS in 2022

9 DOCTORANDS in 2022

92 RESEARCH ARTICLES

Growing Tomatoes for the UPTAKE project



Fellow Farzaneh Hosseini

Visiting Domžale-Kamnik Central Wastewater Treatment Plant

Dr. Jaćimović at Reactor hot cell

Dr. Tina Kosjek proud to have received the Shipment with Orbitrap

Enjoying Orbitrap Opening Ceremony

Part of the Research Group for the Trace Element Speciation


Prof. Dr. Boštjan Zalar, Director of JSI and
Prof. Dr. Milena Horvat, Head of the Department of Environmental Sciences

Research visitors in 2022

1. Dr. Božena Skoko, Institut za medicinska istraživanja, Zagreb, Croatia, 31. 1.–11. 2. 2022
2. Ayesha Al Shouq, FANR, Abu Dhabi, United Arab Emirates, 14. 2.–1. 4. 2022
3. Hamzeh El Jeaid, LAEC, CNRS, Beirut, Lebanon, 14. 2.–1. 4. 2022
4. Hanadi Al Shammari, Kuwait Institute for Scientific Research, Shuwaikh, Kuwait, 14. 2.–1. 4. 2022
5. Nurgul Nursapina, Al-Farabi Kazakh National University, Almaty, Kazakhstan, 14. 2.–29. 4. 2022
6. Salah Alnajadat, EMRC, Aman, Jordan, 14. 2.–1. 4. 2022
7. Cealan Henry, Ulster University, Belfast, Northern Ireland, 28. 3.–1 .4. 2022
8. Sandra Curiel Alegra, Universidad de Burgos, Burgos, Spain, 1. 4.–30. 6. 2022
9. Maria Beatriz Lapuente de Ojeda, Universidad de Burgos, Burgos, Spain, 1. 4.–30. 6. 2022
10. Nayyer Rehman, WRG Europe, London, Great Britain, 5. 4.–28. 6. 2022
11. Sholpan Nazarkulova, Al-Farabi Kazakh National University, Almaty, Kazakhstan, 14.–23. 4. 2022
12. Tianui Ma, Vrije Universitet Brussel, Brussels, Belgium, 21. 4.–21. 7. 2022
13. Vincent Perrot, Vrije Universitet Brussel, Brussels, Belgium, 21. 4.–21. 7. 2022
14. Dr. So Fujiyoshi, Hiroshima University, Hiroshima, Japan, 14.–21. 5. 2022
15. Ons Kasraoui, INRAP, Ariana Medina, Tunis, 29. 5.–12. 6 .2022
16. Ines Ben Amour, INRAP, Ariana Medina, Tunis, 29. 5.–12 .6. 2022
17. Dr. Maria Angela Menezes, CDTN/CNEN, Belo Horizonte, Brasil, 6. 6.–1. 7. 2022
18. Matteo Nigro, University of, Pisa, Pisa, Italy, 21. 6.–4. 10. 2022
19. Veronika Tursunova, Osh State University, Osh, Kyrgyz Republic, 1. 9.–14. 12. 2022
20. Kasiet Salymbekova, Centre for Environmental Medicine and Human Ecology of the Scientific and Production Centre for Preventive Medicine of the Ministry of Health of the Kyrgyz Republic, Bishkek, Kyrgyz Republic, 15. 9.–14. 12. 2022
21. Dr. Davide Vione, Universita di Torino, Torino, Italy, 21.–30. 9. 2022
22. Wided Ben Lazareg ep Chahdura, Institut National de Recherche et d'Analyse Physico-Chimique, Ariana, Tunis, 25. 9.–9. 10. 2022
23. Samira Bejaoui ep Jelassi, Institut National de Recherche et d'Analyse Physico-Chimique, Ariana, Tunis, 25. 9.–9. 10. 2022
24. Hayato Uwashitomi, Graduate School of Science and Engineering, Kagoshima University, Kagoshima, Japan, 3.–9. 10. 2022
25. Hitoshi Kodamatani, Graduate School of Science and Engineering, Kagoshima University, Kagoshima, Japan, 3.–9. 10. 2022
26. Taiju Wakimaru, Graduate School of Science and Engineering, Kagoshima University, Kagoshima, Japan, 3.–9. 10. 2022
27. Dr. Takashi Tomiyasu, Graduate School of Science and Engineering, Kagoshima University, Kagoshima, Japan, 3.–9. 10. 2022
28. Danko Cvitan in Dominik Anđelini, Institut for Agriculture an Tourism, Institute for Agriculture and Food, Department of Agriculture and Nutrition, Poreč, Croatia, 14.–5. 11. 2022
29. Klaudia Block, University of Gdansk, Poland, 1. 9. 2022–31. 1. 2023
30. Kathryn VanderEspt, University of Louisville, Louisville, Kentucky, USA, 1. 10. 2022–30. 6. 2023

Publications in 2022

Original peer-reviewed articles

1. ZAMLJEN, Tilen, LOJEN, Sonja, SLATNAR, Ana, ZUPANC, Vesna. Effect of deficit irrigation on nitrogen accumulation and capsaicinoid content in Capsicum plants using the isotope 15N15N. Agricultural water management, ISSN 0378-3774. [Print ed.], 2022, vol. 260, str. 107304-1-107304-9, ilustr., doi: 10.1016/j.agwat.2021.107304.

2. LOESCHNER, Katrin, VIDMAR, Janja, HARTMANN, Nanna B., BIENFAIT, André Marcel, VELIMIROVIC, Milica. Finding the tiny plastic needle in the haystack: how field flow fractionation can help to analyze nano plastics in food. Analytical and bioanalytical chemistry, ISSN 1618-2642, [in press] 2022, 10 str., doi: 10.1007/s00216-022-04321-y.

3. ŠLEJKOVEC, Zdenka, STAJNKO, Ana, MAZEJ, Darja, JAGODIC HUDOBIVNIK, Marta, MESTEK, Oto, LAJIN, Bassam, GÖSSLER, Walter, ELTEREN, Johannes Teun van, FALNOGA, Ingrid. Trimethylselenonium ion determination in human urine by high-performance liquid chromatography%hydride generation%atomic fluorescence spectrometry optimization of the hydride generation step. Analytical and bioanalytical chemistry, ISSN 1618-2642, [in press] 2022, 10 str., doi: 10.1007/s00216-022-04408-6.

4. GAČNIK, Jan, ŽIVKOVIĆ, Igor, RIBEIRO GUEVARA, Sergio, KOTNIK, Jože, BERISHA, Sabina, NAIR, Sreekanth Vijayakumaran, JUROV, Andrea, CVELBAR, Uroš, HORVAT, Milena. Calibration approach for gaseous oxidized mercury based on nonthermal plasma oxidation of elemental mercury. Analytical chemistry, ISSN 0003-2700. [Print ed.], 2022, vol. 94, iss. 23, str. 8234-8240, ilustr., doi: 10.1021/acs.analchem.2c00260.

5. PAVLICA, Matic, KRŽAN, Mojca, NEMEC, Ana, KOSJEK, Tina, BAŠ, Anže (umetnik), SELIŠKAR, Alenka. Cardiopulmonary effects and pharmacokinetics of dexmedetomidine used as an adjunctive analgesic to regional anesthesia of the oral cavity with levobupivacaine in dogs. Animals, ISSN 2076-2615, 2022, vol. 12, no. 9, art. 1217, str. 1-18, ilustr. https://www.mdpi.com/2076-2615/12/9/1217, doi: 10.3390/ani12091217.

6. KOVAČ, Vito, BERGANT, Matic, ŠČANČAR, Janez, PRIMOŽIČ, Jasmina, JAMNIK, Polona, POLJŠAK, Borut. Causation of oxidative stress and defense response of a yeast cell model after treatment with orthodontic alloys consisting of metal ions. Antioxidants, ISSN 2076-3921, 2022, vol. 11, iss. 1, str. 1-24, art. 63, ilustr. https://www.mdpi.com/2076-3921/11/1/63, doi: 10.3390/antiox11010063.

7. JAMNIK, Polona, MAHNIČ, Nik, MRAK, Aleksandra, POGAČNIK, Lea, JERŠEK, Barbara, NICCOLAI, Alberto, MASTEN, Jasmina, OGRINC, Nives, DUŠAK, Larisa, FERJANČIČ, Blaž, KOROŠEC, Mojca, CERAR, Ana, LAZAR, Borut, LOVŠE, Urša, PUNGERT, Tjaša, FABJAN, Primož, POKLAR ULRIH, Nataša. Fermented biomass of arthrospira platensis as a potential food ingredient. Antioxidants, ISSN 2076-3921, 2022, vol. 11, iss. 2, str. 1-15, art. 216, ilustr. https://www.mdpi.com/2076-3921/11/2/216, doi: 10.3390/antiox11020216.

8. SHAHDEO, Deepshikha, ROBERTS, Akanksha, KESARWANI, Veerbhan, HORVAT, Milena, CHOUHAN, Raghuraj S., GANDHI, Sonu. Polymeric biocompatible iron oxide nanoparticles labeled with peptides for imaging in ovarian cancer. Bioscience reports, ISSN 0144-8463, [in press] 2022, 15 str., doi: 10.1042/BSR20212622.

9. BERISHA, Sabina, ŽIVKOVIĆ, Igor, KOTNIK, Jože, LJUBIČ-MLAKAR, Tanja, HORVAT, Milena. Temperature fractionation of mercury in the cement production process using quadrupole mass spectrometry. Cement and concrete research, ISSN 0008-8846. [Print ed.], 2022, vol. 162, str. 106970-1-106970-8, doi: 10.1016/j.cemconres.2022.106970.

10. TKALEC, Žiga, CODLING, Garry, KLÁNOVÁ, Jana, HORVAT, Milena, KOSJEK, Tina. LC-HRMS based method for suspect/non-targeted screening for biomarkers of chemical exposure in human urine. Chemosphere, ISSN 0045-6535. [Print ed.], [in press] 2022, str. 134550-1-134550-30, doi: 10.1016/j.chemosphere.2022.134550.

11. BOŽIČ, Dominik, ŽIVKOVIĆ, Igor, JAGODIC HUDOBIVNIK, Marta, KOTNIK, Jože, AMOUROUX, David, ŠTROK, Marko, HORVAT, Milena. Fractionation of mercury stable isotopes in lichens. Chemosphere, ISSN 1879-1298. [Online ed.], 2022, vol. 309, part 1, str. 136592-1-136592-9, doi: 10.1016/j.chemosphere.2022.136592.

12. KOVAČ, Vito, POLJŠAK, Borut, BERGANT, Matic, ŠČANČAR, Janez, MEZEG, Uroš, PRIMOŽIČ, Jasmina. Differences in metal ions released from orthodontic appliances in an in vitro and in vivo setting. Coatings, ISSN 2079-6412, 2022, vol. 12, no. 2, str. 190-1-190-10, doi: 10.3390/coatings12020190.

13. LI, Jie, KHALENKOW, Dmitry, VOLODKIN, Dmitry, LAPANJE, Aleš, SKIRTACH, Andre G., PARAKHONSKIY, Bogdan V. Surface enhanced Raman scattering (SERS)-active bacterial detection by Layer-by-Layer (LbL) assembly all-nanoparticle microcapsules. Colloids and surfaces. A, Physicochemical and Engineering Aspects, ISSN 0927-7757. [Print ed.], 2022, vol. 650, str. 129547-1-129547-8, doi: 10.1016/j.colsurfa.2022.129547.

14. TKALEC, Žiga, NEGREIRA, Noelia, LOPEZ DE ALDA, Miren, BARCELÓ, Damià, KOSJEK, Tina. UHPLC-HRMS data from non-targeted screening for biotransformation products of cytostatic drug imatinib. Data in brief, ISSN 2352-3409, [in press] 2022, vol. 41, str. 107991-1-107991-6, doi: 10.1016/j.dib.2022.107991.

15. KARLOVITS, Igor, MARKOVIĆ, Tamara, SMITH, Andrew, KANDUČ, Tjaša. Data on stable isotopic composition of δ18Oδ18O and δ15Nδ15N in nitrate in groundwater, and δ15Nδ15N in solid matter in the Varaždin area, NW Croatia. Data in brief, ISSN 2352-3409, 2022, vol. 45, str. 108686-1-108686-6, doi: 10.1016/j.dib.2022.108686.

16. BOOGAERTS, Tim, HEATH, Ester, et al. Optimization, validation and application of a high-throughput 96-well elution protocol for the quantification of psychoactive substances in influent wastewater. Drug testing and analysis, ISSN 1942-7611, [in press] 2022, 15 str., doi: 10.1002/dta.3392.

17. STAJNKO, Anja, RUNKEL, Agneta Annika, KOSJEK, Tina, SNOJ TRATNIK, Janja, MAZEJ, Darja, FALNOGA, Ingrid, HORVAT, Milena. Assessment of susceptibility to phthalate and DINCH exposure through CYP and UGT single nucleotide polymorphisms. Environment international, ISSN 0160-4120. [Print ed.], 2022, vol. 59, str. 107046-1-107046-13, doi: 10.1016/j.envint.2021.107046.

18. SCHILLEMANS, Tessa, KOSJEK, Tina, TKALEC, Žiga, VOGEL, Nina, et al. Cross-sectional associations between exposure to per- and polyfluoroalkyl substances and body mass index among European teenagers in the HBM4EU aligned studies. Environmental pollution, ISSN 0269-7491. [Print ed.], [in press] 2022, 37 str., doi: 10.1016/j.envpol.2022.120566.

19. NAIR, Sreekanth Vijayakumaran, KOTNIK, Jože, GAČNIK, Jan, ŽIVKOVIĆ, Igor, KOENIG, Alkuin Maximilian, LJUBIČ-MLAKAR, Tanja, HORVAT, Milena. Dispersion of airborne mercury species emitted from the cement plant. Environmental pollution, ISSN 0269-7491. [Print ed.], 2022, vol. 312, str. 120057-1-120057-9, doi: 10.1016/j.envpol.2022.120057.

20. TKALEC, Žiga, CODLING, Garry, SNOJ TRATNIK, Janja, MAZEJ, Darja, KLÁNOVÁ, Jana, HORVAT, Milena, KOSJEK, Tina. Suspect and non-targeted screening-based human biomonitoring identified 74 biomarkers of exposure in urine of Slovenian children. Environmental pollution, ISSN 0269-7491. [Print ed.], 2022, vol. 313, str. 120091-1-12009-11, doi: 10.1016/j.envpol.2022.120091.

21. ABASS, Khaled, UNGURYANU, Tatiana, JUNQUÉ, Eva, MAZEJ, Darja, SNOJ TRATNIK, Janja, HORVAT, Milena, GRIMALT, Joan O., MYLLYNEN, Päivi, RAUTIO, Arja. Pilot study on the concentrations of organochlorine compounds and potentially toxic elements in pregnant women and local food items from the Finnish Lapland. Environmental research: multidisciplinary journal of environmental sciences, ecology, and public health, ISSN 0013-9351, 2022, vol. 211, str. 113122-1-113122-9, ilustr., doi: 10.1016/j.envres.2022.113122.

22. GERASOPOULOS, Evangelos, KOCMAN, David, et al. Earth observation: an integral part of a smart and sustainable city. Environmental science & policy, ISSN 1462-9011, 2022, vol. 132, str. 296-307, doi: 10.1016/j.envsci.2022.02.033.

23. GERASOPOULOS, Evangelos, KOCMAN, David, et al. State-of-play in addressing urban environmental pressures: mind the gaps. Environmental science & policy, ISSN 1462-9011, 2022, vol. 132, str. 308-322, doi: 10.1016/j.envsci.2022.02.030.

24. COSSA, Daniel, HORVAT, Milena, et al. Mediterranean mercury assessment 2022: An Updated budget, health consequences, and research perspectives. Environmental science & technology, ISSN 0013-936X. [Print ed.], [in press] 2022, 23 str., doi: 10.1021/acs.est.1c03044.

25. LUČIĆ, Mavro, MIKAC, Nevenka, VDOVIĆ, Neda, BAČIĆ, Nikola, NAVA, Veronica, VIDMAR, Janja, MILAČIČ, Radmila. Spatial and temporal variability and sources of dissolved trace elements in the Sava River (Slovenia, Croatia). Environmental science and pollution research, ISSN 0944-1344. [Print ed.], 2022, vol. 29, no. 21, str. 31734%31748, doi: 10.1007/s11356-021-17769-9.

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