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Policy Guidance on Tackling Riverine Plastic Pollution in the Danube River Basin

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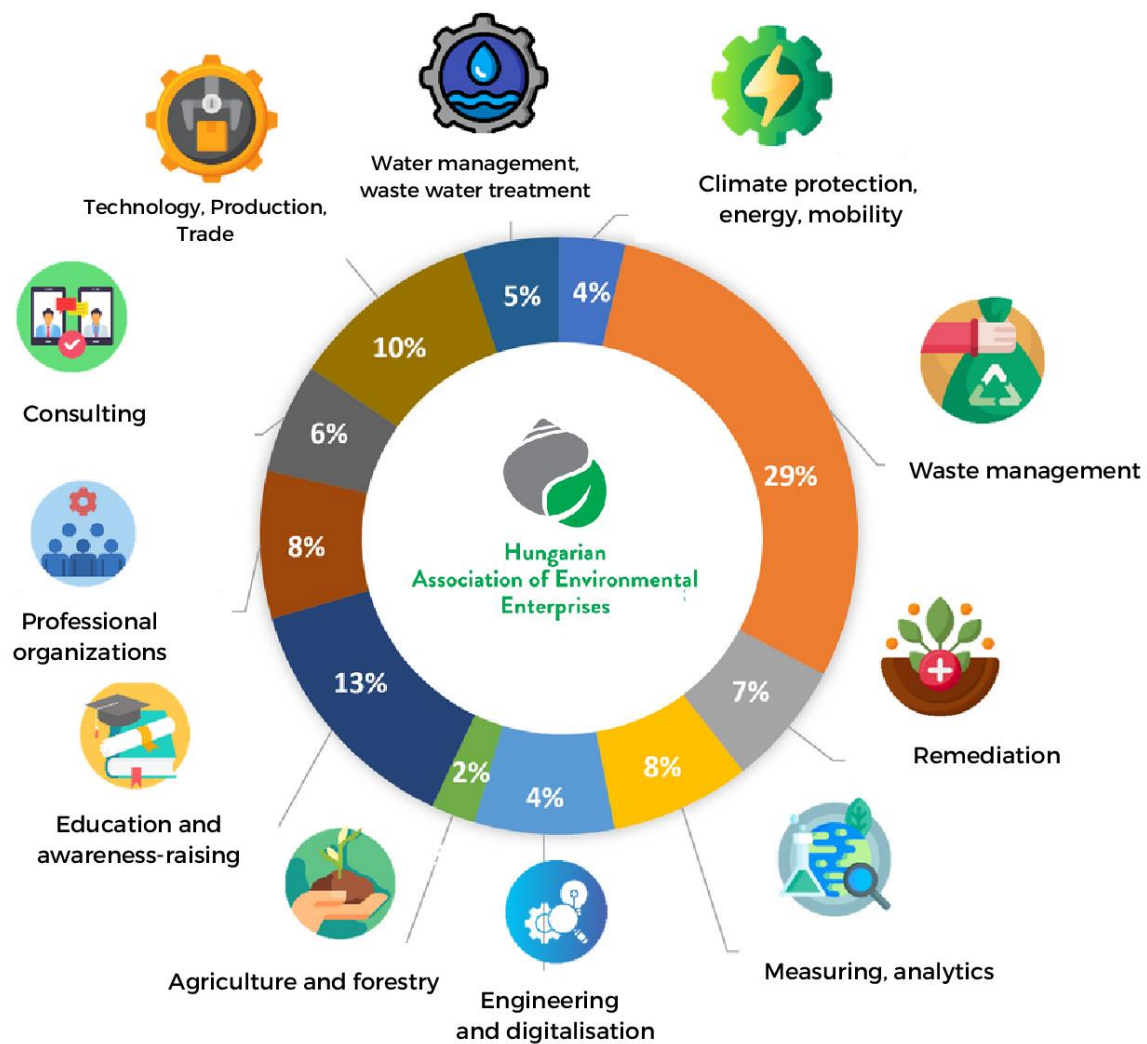
October 30th, 2023 | Muscat, Sultanate of
Oman



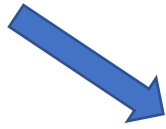
Hungarian
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Our members'
fields of activity



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I. Waste situation,
plastic math
and research

II. Key findings and policy
recommendations

III. Best practice in
Transcarpathia



ISWA 2023
WORLD CONGRESS
30 OCT - 1 NOV | MUSCAT, OMAN

Global Action Towards a
Net-zero Future



I. Waste situation, plastic math and research

2019

Plastic products
in use



460 Mt

Generated
plastics waste
353 Mt



Collected plastics waste

296 Mt



Recycling
55 Mt

Energy Recovery
67 Mt

Managed Landfill
174 Mt



Unknow
79 Mt



Improper Disposal
60 Mt

Leakage
19 Mt



2060

Plastic products
in use



1231 Mt

Generated
plastics waste
1014 Mt



Collected plastics waste

989 Mt



Recycling
302 Mt

Energy Recovery
179 Mt

Managed Landfill
507 Mt



Unknow
153 Mt



Improper Disposal
115 Mt

Leakage
44* Mt



Sharing the same problem

Accumulation point of floating waste in Mangrove of Qurum, October 2023





The Danube River Basin, along with its longest tributary, the **Tisza river**. The Tisza River Basin is shared by 5 countries: Ukraine, Romania, Hungary, Slovakia and Serbia.



PLASTIC MATH

- Danube transports about **1500 tons** of plastic per year into the Black Sea
- Tisza is responsible for **250 tons/year** (16%) – **200** settlements has no access to sanitary services
- Estimated amount of riverine litter in coastal acc. in Tisza basin: **1665 tons**
- Estimated unmanaged waste in Transcarpathia region: cca. **10.000 tons/year**
- Plastic Cup handles (PRC+CRC) around **70-100 tons/year** + prevent cca. **700 tons/year** with supporting MWM procedures (selective, reuse, education) in regions where waste collection is unresolved. Diverting waste from nature to circular economy is a notable achievement of Plastic Cup.

Pollution at source



Standing on Latorica river (UA) - 2022

@photo: Papilio

Pollution on „road”

The 2017 plastic flood,
combined with an
unusually severe ice flood
imported an
unprecedented amount of
riverine litter into the EU by
the natural waterways of
the Tisza River Basin.

@photo: Sándor Szabó

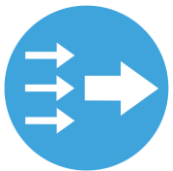


Pollution after 500 rkm

The moment of truth: The HPP of Kisköre. Thank to the waste retention capacity of the HPP effective remediation and selection is feasible.

@photo: Plastic Cup



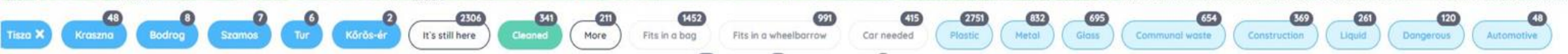
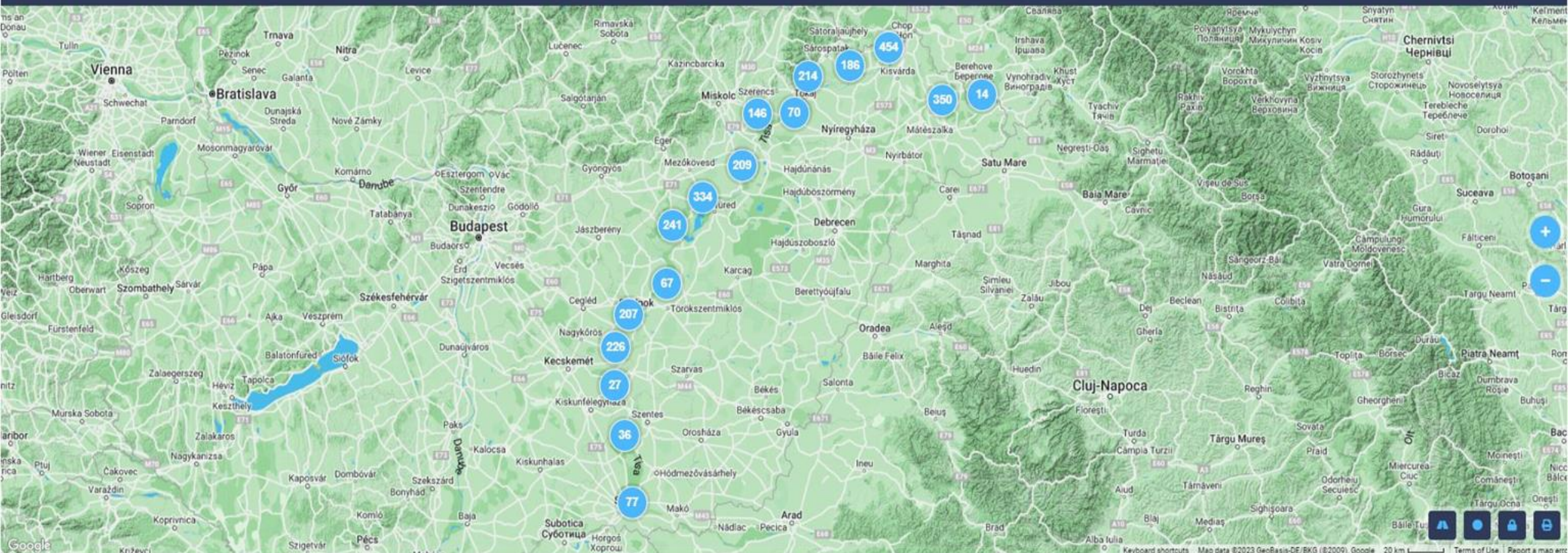


Lowland countries like Hungary face **international river pollution** events on a regular basis. The Tisza cyanide disaster in 2000 from Romania (left, photo by Zsolt Czeglédi, MTI) and the Slana river pollution wave in 2022 from Slovakia (photo by Marton Mohos) were significant. Other transnational **legacy pollution** cases affected rivers like Torna, Marcal, Rába, Danube (red mud alumina plant accident), the Somes and the Tisza river (cyanide catastrophe).

In the beginning, Plastic Cup was mostly known for its spectacular summer **plastic bottle boats**. The funny watercrafts are constructed from recycled waste and are an effective tool during **community river cleanups**. After Tisza, new boat races started on Bodrog, Mures, Danube and other rivers. @photos: Plastic Cup







The beta version of the **Clean Tisza Map**. The online riverine litter pollution map covers the entire Tisza river in all 5 countries as well as several of the major Tisza tributaries like Somes or Bodrog rivers. The beta version is available at www.tisztatiszaterkep.hu

Plastic Waste Monitoring



ELTE

FACULTY OF
INFORMATICS



LECHNER
KNOWLEDGE CENTER



DEMO - Web Application

Remote sensing hotspots, macroplastic deposits, and floating waste accumulations (jams) on Sentinel-2 and PLANETSCOPE satellite images. The initial results indicate that by analysing satellite images captured in the spring and summer months using four distinct wavelengths, it is possible to reliably detect floating plastic accumulations.

Description

The goal of our research is to develop an accurate classification method for plastic waste detection to provide a viable platform for repeatable, cost-effective and large-scale monitoring. Such a robust waste monitoring solution would speed up the detection of illegal waste hot-spots close to water flows and floating waste islands on rivers, as well as support waste collection actions with an automatic monitoring system. This application automatically searches for newly recorded satellite images and downloads them on a daily basis. After this a *Random Forest* model classifies the pictures and displays the results in the web view. You can check out the extension of polluted areas on the set locations in the previous five days when the cloud cover over them was 0%.

Features

- **Location:** You can choose from four previously set locations: *Kisköre*, *Lake Călinești*, *Pusztazámor* and *Paxie*
- **Date:** It can be changed using the swipe. You can select from the last five most recent days when the cloud cover over the areas was 0%.
- **Colors:**
 - **Classified:** **Orange**. All pixels that were classified as plastic waste.
 - **Heatmap High:** **Red**. Pixels that were classified as plastic waste with a confidence of 90% or higher.
 - **Heatmap Medium:** **Yellow**. Pixels that were classified as plastic waste with a confidence between 80% and 90%.
 - **Heatmap Low:** **Green**. Pixels that were classified as plastic waste with a confidence below 80%.



[Click here for interactive DEMO](#)

Publications

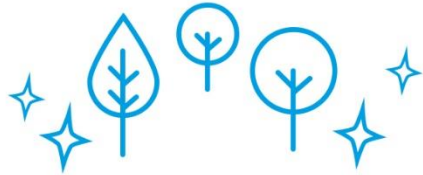
1. **Waste Detection and Change Analysis based on Multispectral Satellite Imagery**
Dávid Magyar, Máté Cserép, Zoltán Vincellér, Attila D. Molnár
In *Proceedings of KEPAF*, art. 53., p. 18., 2023. DOI: [10.48550/arXiv.2303.14521](https://doi.org/10.48550/arXiv.2303.14521)

Results of 11 years



5510

Areas monitored



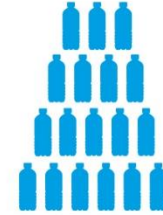
743

Polluted areas cleaned



330

Tonnes of waste removed



waste is equivalent
to the weight of
3 413 500
PET bottles



178

Vessels made of waste



40 million people/year



...and hundreds of
volunteers!



II. Key findings and policy recommendations



Objectives of the Survey

- better understanding of the complexity of the pollution problem in the DRB
- foster changes in legislation to improve river water quality
- helpful input for ICPDR and the next update of the Danube River Basin MP

INSPECT: PP country's legislative background on environmental regulations

MAP: organisational structure of water & waste management organisations

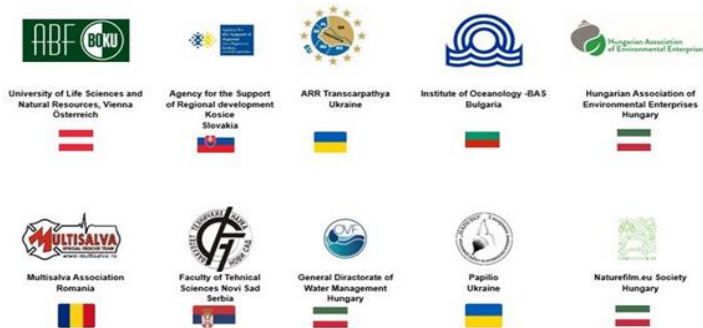
HIGHLIGHT: possible inefficient regulatory practices

EXPLORE: competent organisations' decision mechanisms, existing „chains of command”, network and cooperation

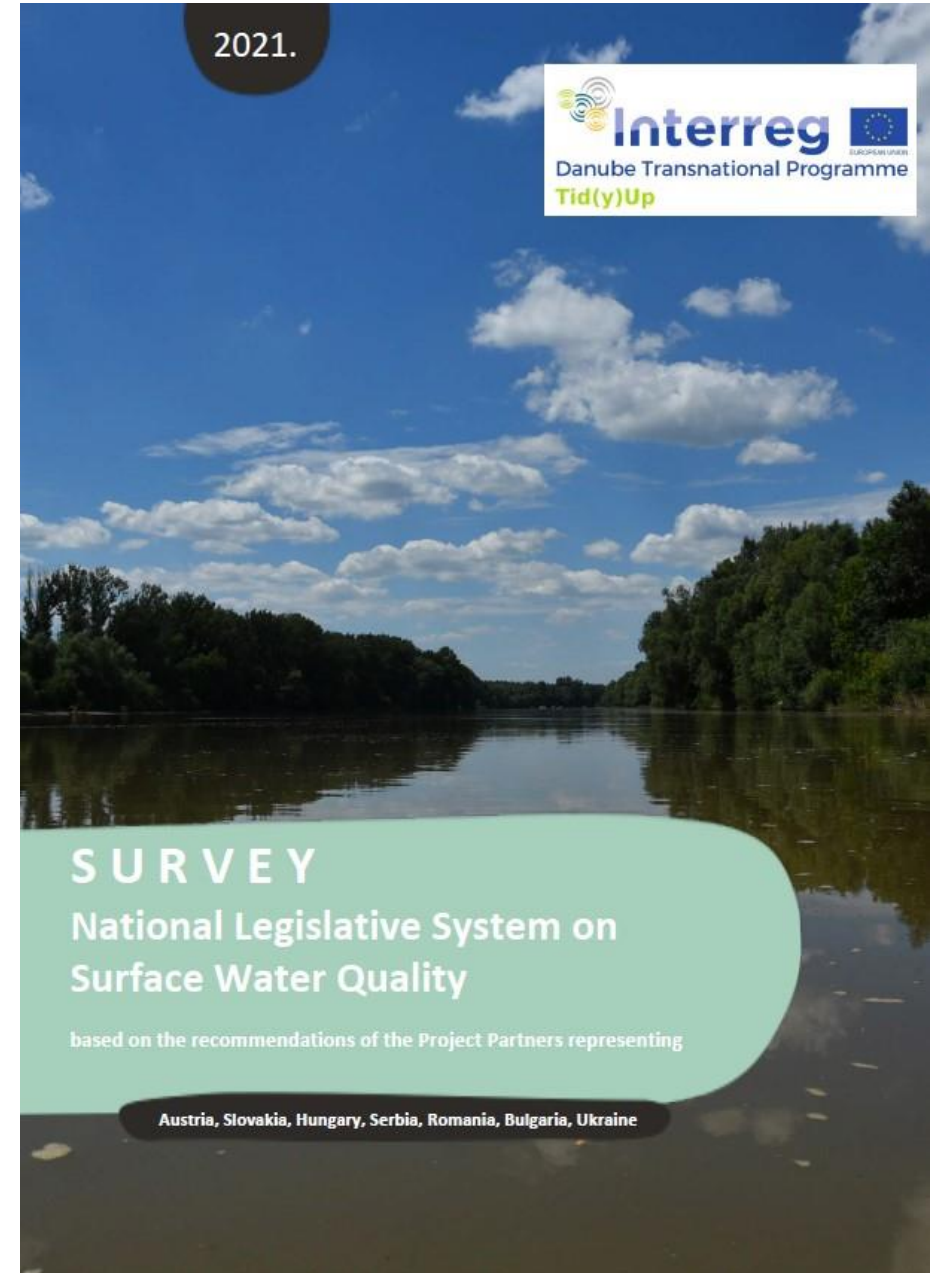
ASSESS: existing/missing industrial and communal waste collection systems

RESEARCH: legislative regulations reflecting the criminalisation level of public and industrial littering

COLLECT: best practices listed for possible adoption and recommendations formulated for improvement



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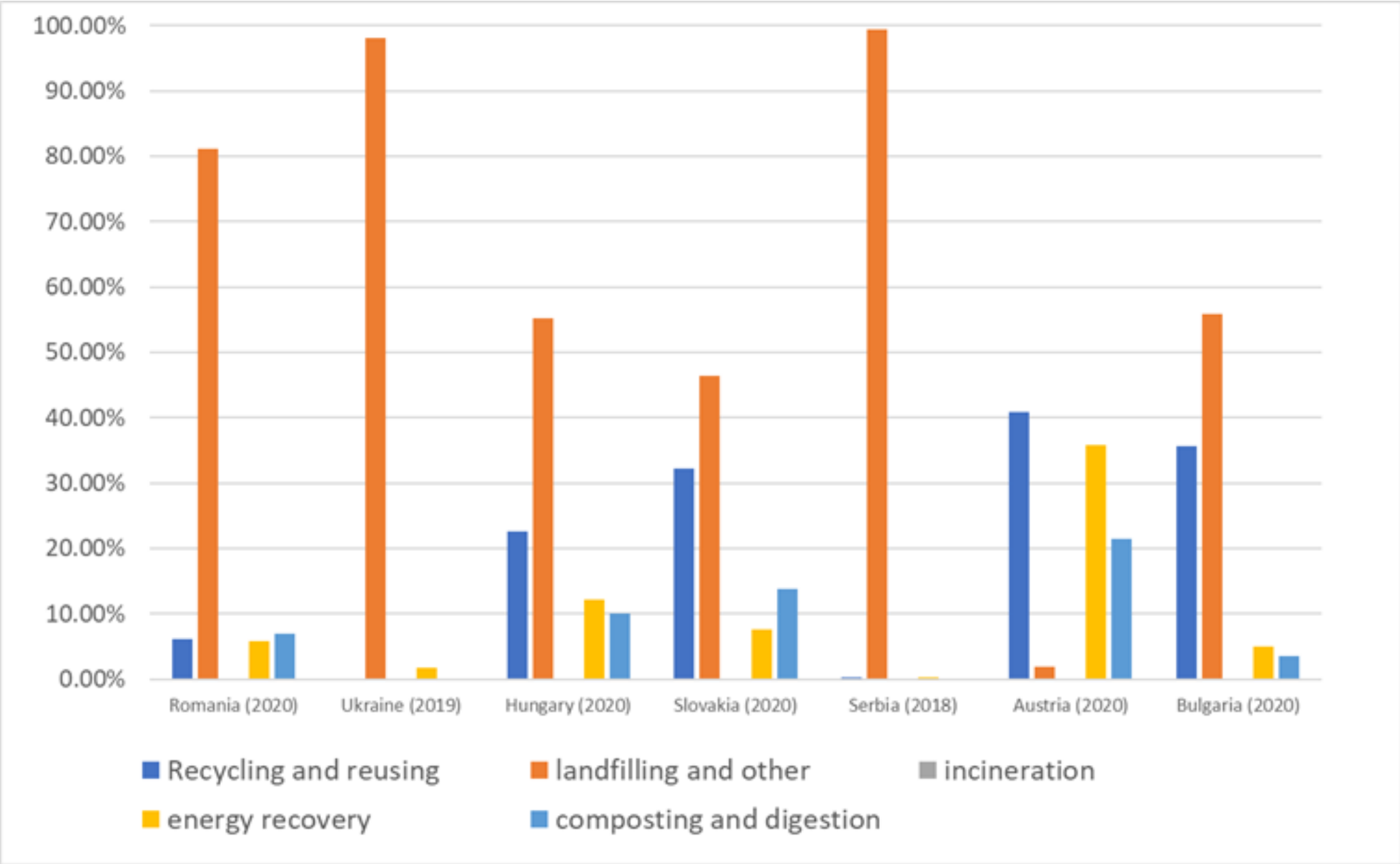
KEY FINDINGS OF THE SURVEY:

- **issue of plastic/municipal waste is not considered water pollution, as it does not affect the chemical status of water bodies**
- too complex institutional structures
- **lack of transnational cooperation**
- waste management vs water management -
 - > symbiosis
- existing water management infrastructure: the opportunity to interact
- **weak civil sphere**
- knowledge transfer (AND USE) is crucial
- we can give valuable data, info and field experience for the ICPDR

@photo: Hungarian Water Directorate



Percentage distribution of waste processing methods in relation to the total amount of treated waste in the Tisza Countries (+AU, +BG)



COMPLEX

- harmonised actions
- transboundary cooperations
- standard measurements
- prevention is a priority
- sound waste management
- strictly enforced regulation
- awareness-raising

Problem
Solution



Policy Guidance on Tackling Riverine Plastic Pollution in the DRB

This document is primarily intended to:

- **provide** strategic and legislative recommendations to all levels of legislation
- **offer** guidance on reducing plastic pollution
- **raise** awareness among key actors
- **facilitate** harmonised actions of water management authorities/directorates, and encourage communities and decision-makers to organise transnational actions
- **assist** non-EU members with knowledge and technology transfer
- **serve** ICPDR and ISWA a comprehensive recommendation in the plastic treaty process



Part A: Context

Part B: Strategy

Part C: Implementation

Policy tools and recommendations

- Tr.boundary negotiations and intergovernmental treaties
- dev. of the enforcement infrastructure (licences, permits, standards, certifications)
- ecodesign: determines a product's lifecycle environmental impact (80%)
- regular review of legal regime to adapt (SUP)

Financial tools

- environmental liability insurance for ind. activities
- dedicated state support and tenders: e.g. SUPERFUND (US)
- positive and negative incentives: taxes, fees, credits, refunds, bonds
- EU Taxonomy, ESG Directive → future support

Service and infrastructure

- sound waste management is a **critical prerequisite**
- expansion of collection infrastructure
- optimisation of Extended Producer Responsibility (EPR) and DRS
- monitoring facility performances: Makkosjános (out of order since 2018)



Capacity building

- necessary skills, knowledge and resources (mentoring experts, NGOs, ...)
- collaborations and partnerships among different sectors: symbiosis = shared capacities and services
- encourage and support eco-innovation start-ups (pool of knowledge, labour market supply - **green jobs, blue jobs**)
- **NGOs: filling capacity gaps**
- **Tisza Roundtable: Roundtable discussions and Co-Creation for Policy processes (CfPs)**
 - periodic meetings became an international best practice
 - democratic advocacy
 - world café and opera method; trained facilitators
 - policy and strategy co-creation with multiple stakeholders

Knowledge-based development for measuring prioritisation (country-by-country)

Part A: Context

Part B: Strategy

Part C: Implementation

Water-management

- water and waste-water networks are in poor conditions
- artificial overheads cuts (HU): the cuts have made the development and maintenance of water infrastructure impossible
- missing wastewater treatment



National waste management practices

- Serbia: higher littering rates than recycling; wastewater development
- Slovakia: illegal landfills → comprehensive legislation, enforcement; EPR
- Romania: river poll; progress in control through local government
- Ukraine: missing infrastructure, no law enforcement; appropriate legal framework
- Hungary: Reorg: licensor, EPR, DRS

Improper waste disposal

- insufficient data due to lack of monitoring and control mechanisms

Organisational structure

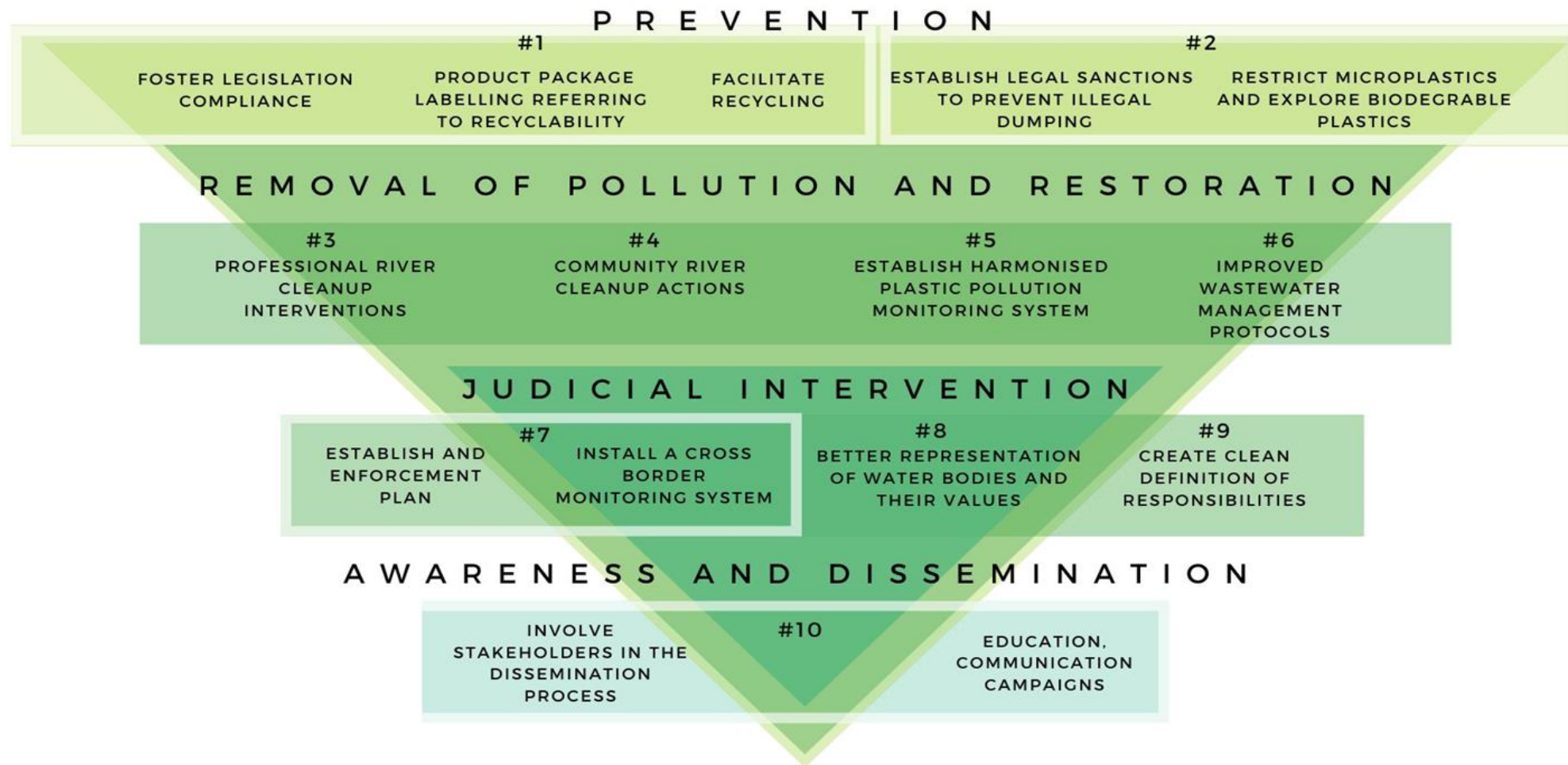
- too complex institutional structures → uncertainty about involvement and responsibilities
- no dedicated ministry for environment (HU)
- weak NGOs: no capacity for advocacy or participating in European campaigns (EWWR, Zero Waste Day)

Monitoring Microplastics & Macroplastics

- pollution map
- tagging and tracking
- retention potential (HPP)
- remote sensing
- standardised MP sampling and analysis

TOP 10 Recommendations

Part A: Context
Part B: Strategy
Part C: Implementation



Recommendations proposed regarding prevention

1. Foster compliance with existing legislation

- preventing the release of macro- and microplastics into the environment (regarding (EU) 2019/904): develop plastic/other waste collection
- **standardisation of packaging should be a priority**
- setting additional requirements for product design (eco-design, reuse, right to repair)
- **stricter penalties AND ENFORCEMENT for improper disposal/littering (e.g. make police responsible to interact)**
- updating and improving sectoral policies to ban single-use plastics
- **implementing and introduce a deposit scheme for PET bottles (EPR-systems also) to meet the EU's 90% collection target by 2029 (without derogation)**
- **mandatory labelling of product packaging designating the type of plastic to promote selective collection and recycling**

Recommendations for Proper Treatment of Plastic Waste

2. Enhancing a legal framework for environmental violations

- sanction mechanisms and instruments to identify, sanction and prevent illegal landfills
- restricting the release of microplastics and exploring the use of biodegradable plastics in product segments where releases to the environment cannot be avoided.

3. Professional river cleanup interventions (PRC)

- source: fundamental waste management problems
- **allocated budgets for interventions**
- mobile, versatile and temporary litter traps: considerate the environmental impact of the construction of permanent, large concrete structures. -it is recommended to carry out cost-benefit and environmental impact assessment before implementing physical barriers
- using existing water engineering structures (HPP)
- green jobs



4. Community River Cleanup actions (CRC)

- reach a broad range of stakeholders and involve them in CRC
- highlighting the importance of CRC: it's not a one-day-show... (read: Aquatic Plastic Handguide)
- 743 coastal riverine litter accumulations cleaned, manage 300 tonnes, 60% recycled
- volunteering, mentoring, greenjobs

5. Establish a harmonised monitoring system for macro- and micro-pollution

- standardisation of definitions and sampling, testing and assessment procedures
- monitoring system for emitters
- shared and comparable data
- Clean Tisza Map: www.tisztatiszaterkep.hu

6. Improved wastewater management protocols

- wastewater treatment plants: ensure reliable, safe disposal and proper treatment of wastewater
- using innovations, new technologies to remove and treat micro and macro-pollutants
- financial tools to implement plants in the Balkans

Recommendation regarding legal consequences

7. Cross-border monitoring and alert system

- enforcement plan and cross-border monitoring system (early warning system) for river water pollution (plastic, municipal, hazardous, etc.).
- existing: Ukrainian-Hungarian system, Missing: Romanian-Hungarian system

8. Legal representation of natural entities

- to ensure adequate legal protection, water bodies (rivers, large lakes) and their natural values need better representation: „Rights of the rivers”
- by granting legal status to water bodies, these natural values and resources could be represented before public authorities and their legal status could help to enforce environmental protection better: e.g. Whanganui River in New Zealand, Mar Menor Lagoon in Spain.

9. Defining the problem

- a more precise definition of responsibilities for eliminating water pollution and managing collected waste is essential. Who is responsible for collection, recycling or disposal? And who bears the costs?
- budgets and resources must be allocated to clean up pollution and manage waste.

Awareness-raising and dissemination

10. Environmental education programmes

Enhanced awareness-raising, education and communication campaigns involving stakeholders (decision makers, manufacturers, the general public, NGOs, etc.) and dissemination of methods, results and existing infrastructure (community compost points, reuse centers, repair network, recycling points, cleanups, etc).

Detailed in ISWA WGCSI Curated Session

@photo: Plastic Cup



tensive types of
their way into
this book will f
form of water
creasing infl
mers, also k



1.1 The migration of marine litter

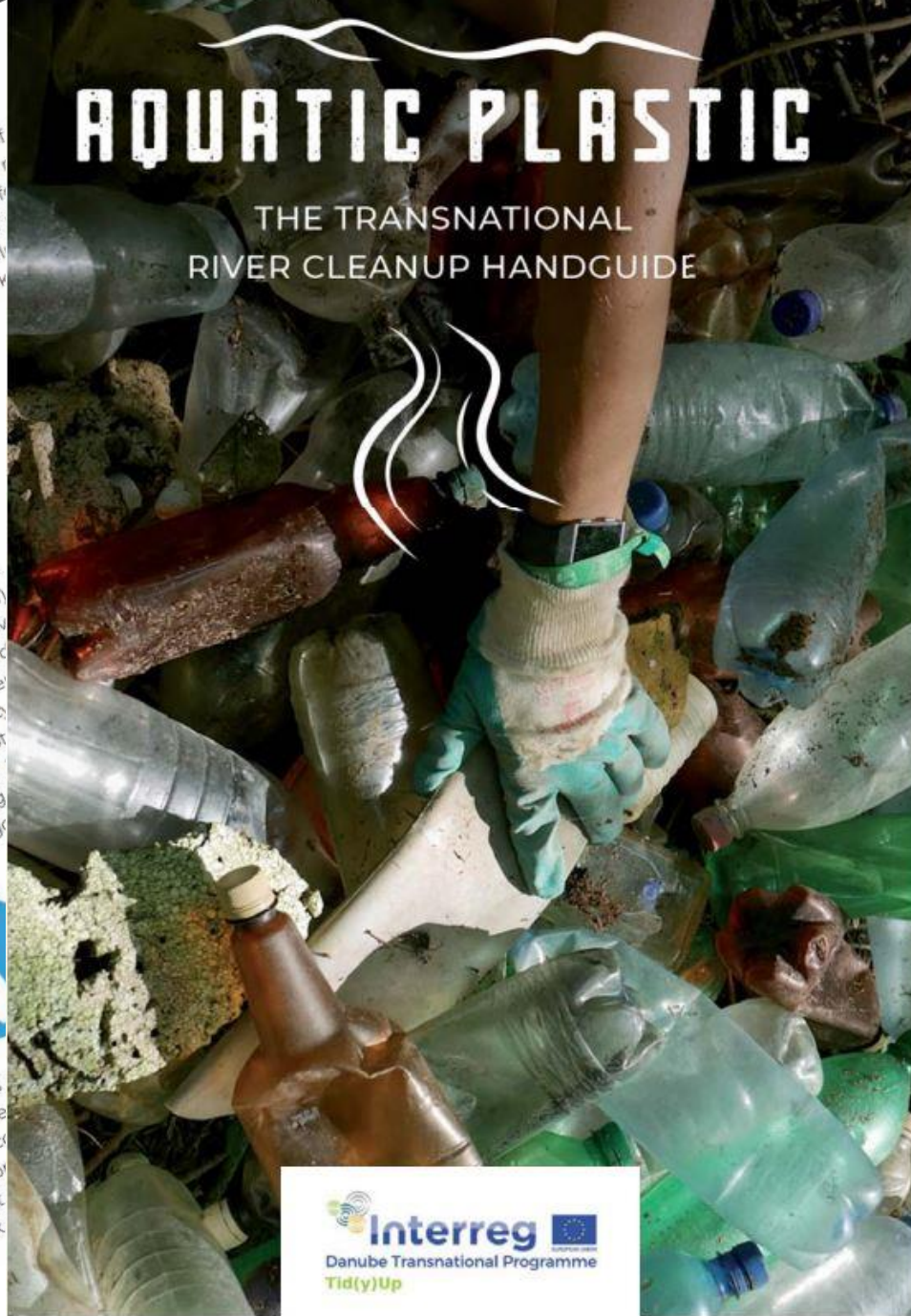
Given that more than half of the human body (approx. 60%) is made up of water, sufficient freshwater resources are crucial to our survival. We depend on seas and oceans at least as much as still they are getting more and more polluted. The authors of this book are citizens of the European Union (EU) where the Water Framework Directive has been in force since 2000. It declares that **water** is not a commodity, but a universal legacy as such we have a duty to protect. According to this directive, member states must bring surface water bodies into 'good' by 2027...



An ambitious
when multiple
all aquatic ec
change along
threat, but
other risk

AQUATIC PLASTIC

THE TRANSNATIONAL RIVER CLEANUP HANDGUIDE



Coastal hotspot near Rakhiv, Transcarpathia, Ukraine. At locations like this, litter and waste is deposited by its owners and so avoids the legal waste management system and enters the natural environment.

Coastal hotspot near Rakhiv, Transcarpathia, Ukraine.

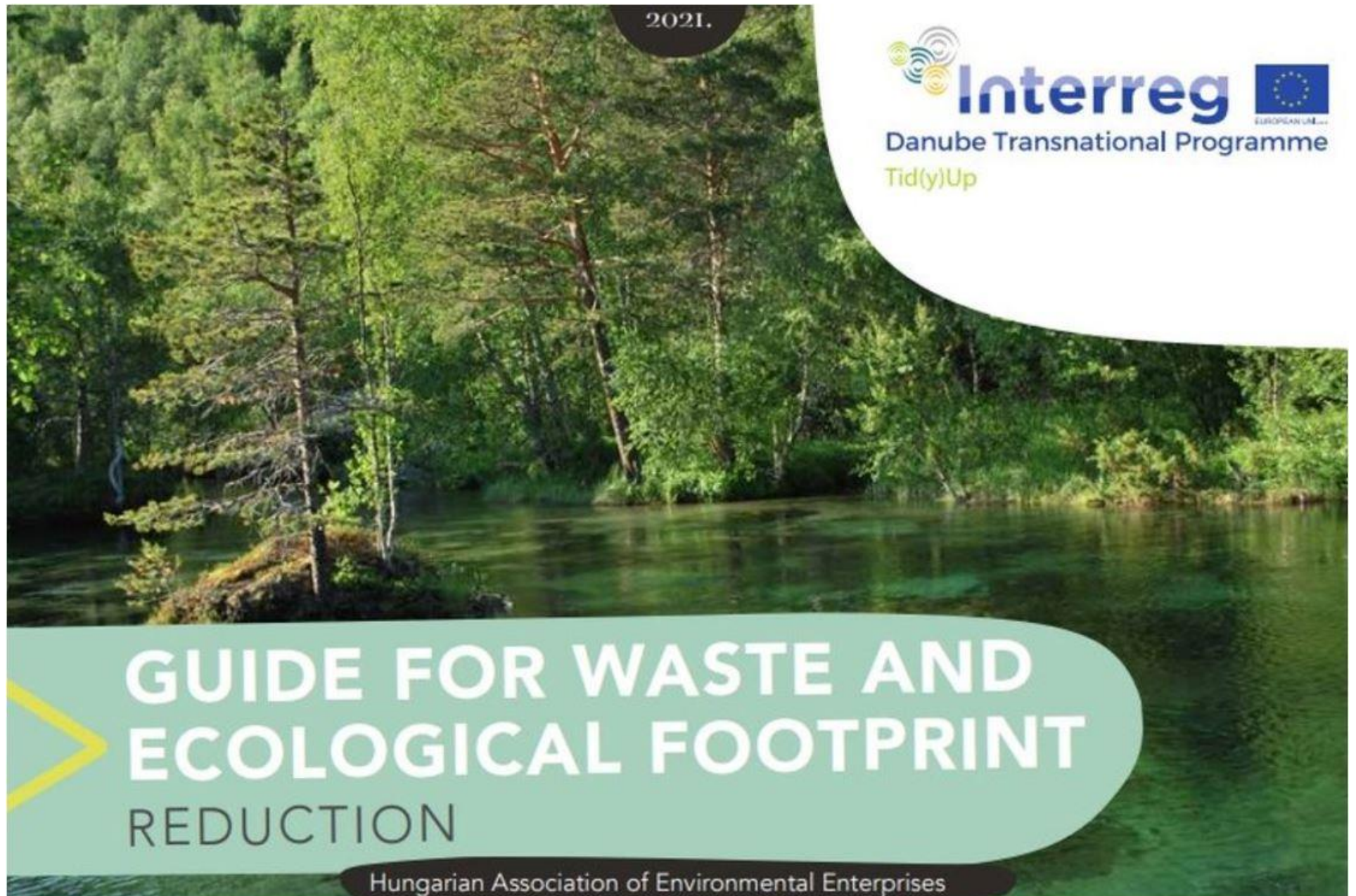


In the first volume of the book series 'Aquatic Plastic' Tid(y)Up partners collected their knowledge about how best to implement river cleanup actions.





The Waste Reduction Toolkit and the recommendations to plastic free riversides is among the main outputs of the project.





FLEX on the road. The mobile and modular exhibition visited Bulgaria, Slovakia, Serbia, Romania and doing so reached thousands of kids teaching them to the basics of River Lit(t)eracy.



Part C: Implementation

Part A: Context

Part B: Strategy

Part C: Implementation

Policy making

- Austria: rapid and consistent implementation of EU law (Landfill Directive: expensive landfilling): 71% plastic incinerated, 28% recycling, 1% landfill (2015)
- Hungary: strict sanction system, no enforcement. Budget allocation for PRC and CRC. DRS start in 2024
- Slovakia: 2022: introducing Deposit Return System (DRS)
- Romania, Serbia, Hungary: DRS under preparation

Measure implementation

Cleanup actions and reuse/recycling

Awareness-raising, workshops and capacity-building events

- Austria: Waste Watchers are empowered to issue warnings and fines to violators, and they have been submitting reports to the Water Law Department since 2017.
- Slovakia: free, and open-source smartphone application TrashOut provides a platform for mapping illegal dumpsites. Since its launch in 2021, over 8,731 illegal sites have been reported through the app
- Romania: residents of 65 cities could ride public transport for free in exchange for waste in the "Romania Change PET" campaign, a noteworthy initiative that took place in September 2022.
- Tisza Roundtable

Follow-up activities

- **The Aquatic Plastic submission under the Interreg programme builds upon the successful experience of Tid(y)Up. And it's coming! The project is approved and start 1 January 2024 (30 months).**
- The **Styx Initiative** was a promising project application in the Horizon Europe programme. Its main strategic objectives were to prevent the formation of riverine litter accumulations through effective monitoring of macroplastics and microplastics in European rivers.
- The **DALIA (Danube Region Water Lighthouse Action)** project is a collaboration of 22 expert organisations. The project aims to bring an integrated DALIA tool to the DRB, which will be integrated into the Danube Mission Hub for better decision-making and to improve the restoration of fresh and transitional water ecosystems.
- **Plastic CUP** is a grassroots social innovation led by Plastic Cup Society, which organises annual international river cleanup events, team-building activities, and awareness-raising initiatives. The active involvement of volunteers has been instrumental in the success of the Plastic CUP initiative and the sustained motivation of regional communities.
- **River Lit(t)eracy** is a continuation of the 5 countries 1 river Erasmus+ project that was implemented in the Tisza River Basin. The project's goal is to adopt best practices from around the world, such as the Ocean Literacy principles, to educate and raise awareness among the public about river and plastic pollution.

ISWA Regional Chapter for Southeast Europe



Bosnia and Herzegovina

BASWA – Bosnian Solid Waste Association



Croatia

CROWMA – Croatian Waste Management Association



Greece

HSWMA – Hellenic Solid Waste Management Association



Hungary

FKF Nonprofit Zrt



Israel

DRAT – The Dan Region of Association of Towns, Sanitation and Waste Disposal



North Macedonia

MaSWA – Macedonian Solid Waste Association



Romania

ARMD- Romanian Association of Waste



Turkey

Turkish National Committee on Solid Wastes



SERBIA

SeSWA – Serbian Solid Waste Association



III. Best practice in Transcarpathia

- 2022: The first year when prevention surpassed cleanups and end-of-pipe solutions
- tech-support is a gamechanger
- recovery fund, tax income
- population growth by 10-15%
- 400 companies settled



Win election with selection
Turia Bystra (Turjasebes)



<https://youtu.be/Tx1kSjq4OIQ>



<https://youtu.be/TRzCWhHTICc?si=F8AJjLZITc0dkl6j>





CALL-ACTION RESULTS 2022



MAY - DECEMBER 2022.

MORE THAN 500 TONS OF COLLECTED AND MORE THAN 200 TONS OF TREATED WASTE



BALING MACHINES: 3 pcs (UZHHOROD)
1 pc (BEREGOVO)



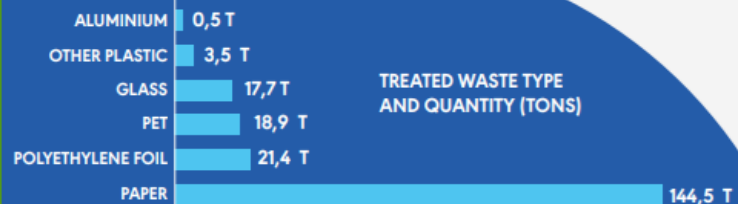
FORKLIFT: 1 pc (BEREGOVO)



WASTE COLLECTION MINIBUS: 1 pc (UZHHOROD)



TRUCK ENGINE: 1 pc (UZHHOROD)



**TARGET VALUE FOR THE 2-YEAR PERIOD:
690 TONS OF WASTE**

**TOTAL AMOUNT OF COLLECTED
AND PROCESSED WASTE: 724 TONS**

**RESIDENTIAL WASTE COLLECTION
(EVERY SATURDAY)**



25-40 PEOPLE



400-500 KG

The **Call-Action** project, funded by Diageo company in 2022, aims to support separate waste collection and improve waste management in Transcarpathia, Ukraine. The 2-year initiative seeks to improve the living conditions of at least 120,000 people living along the Tisza by bringing tonnes of valuable separate waste back into the recycle loop and creating employment opportunities in the region. **The project has collected and managed 1182 tonnes of waste.** The initiative has increased waste collection capacity in Uzhhorod and Beregovo. Furthermore, more waste collection points will be installed in schools and community institutions, involving over 21 municipalities, 29 schools, and 61,800 residents and students: <https://callaction.com.ua/en>

In 2019, Coca-Cola Foundation began supporting the cleaning of the Tisza River, as they view reducing, collecting, and recycling packaging materials as a matter of great concern. The **Zero Waste Tisza Project** allowed them to expand their participation and spread their activities to other areas. Their financial support provides an opportunity for Plastic CUP and water authority experts to organise more frequent and diverse actions. Due to the project's remarkable success, the third phase of the Zero Waste Tisza Project will be launched at the beginning of 2023.

Thank you for your attention!



Gary Hanko

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Managing Director, Hungarian Association of

Environmental Enterprises

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www.interreg-danube.eu/tid-y-up

<https://kszgysz.hu/en/>

<https://petkupa.hu/eng/>