



MEDNARODNA KONFERENCA
PROGRAMA EKOŠOLA
GRADIMO TRAJNOSTNO DRUŽBO - VLOGA
MENTORJEV V PROGRAMU EKOŠOLA

ZRINKA KLARIN, ANITA MUSTAČ, OŠ ŠIME BUDNIČA ZADAR

31. maj 2025 | OŠ Jožeta Gorjupa, Kostanjevica na Krki, Slovenia



TRAGOVI KOJE OSTAVLJAMO U MORU

OSNOVNA ŠKOLA ŠIME BUDINIĆA ZADAR

31. SVIBNJA 2025.

OSNOVNA ŠKOLA ŠIME BUDINIĆA ZADAR, REPUBLIKA HRVATSKA



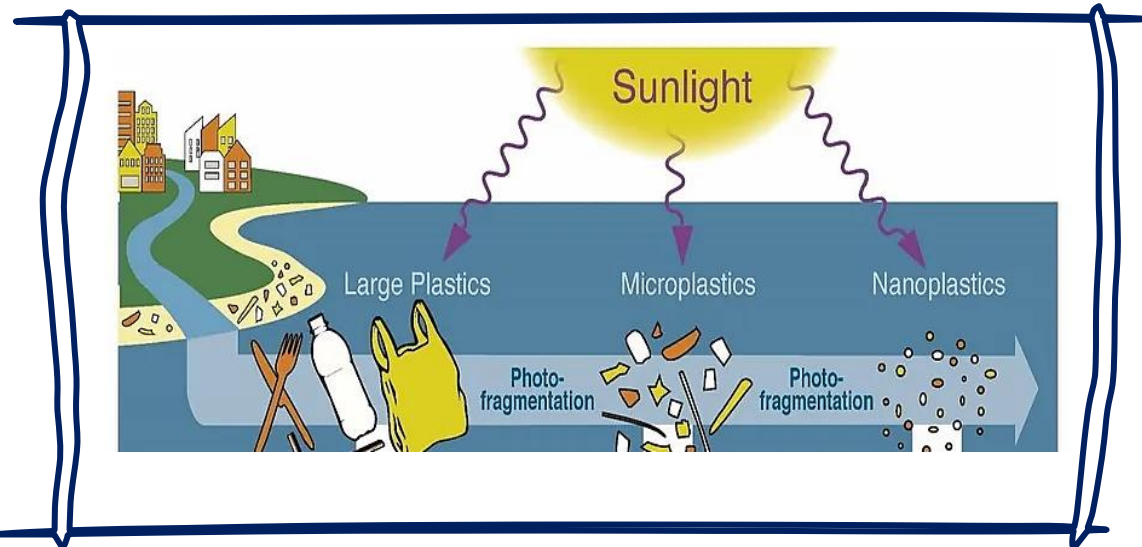
ZRINKA KLARIN, PROF. GEOGRAFIJE I SOCIOLOGIJE,
SAVJETNIK
ANITA MUSTAĆ, DIPL. ING. BIOLOGIJE,
IZVRSNI SAVJETNIK



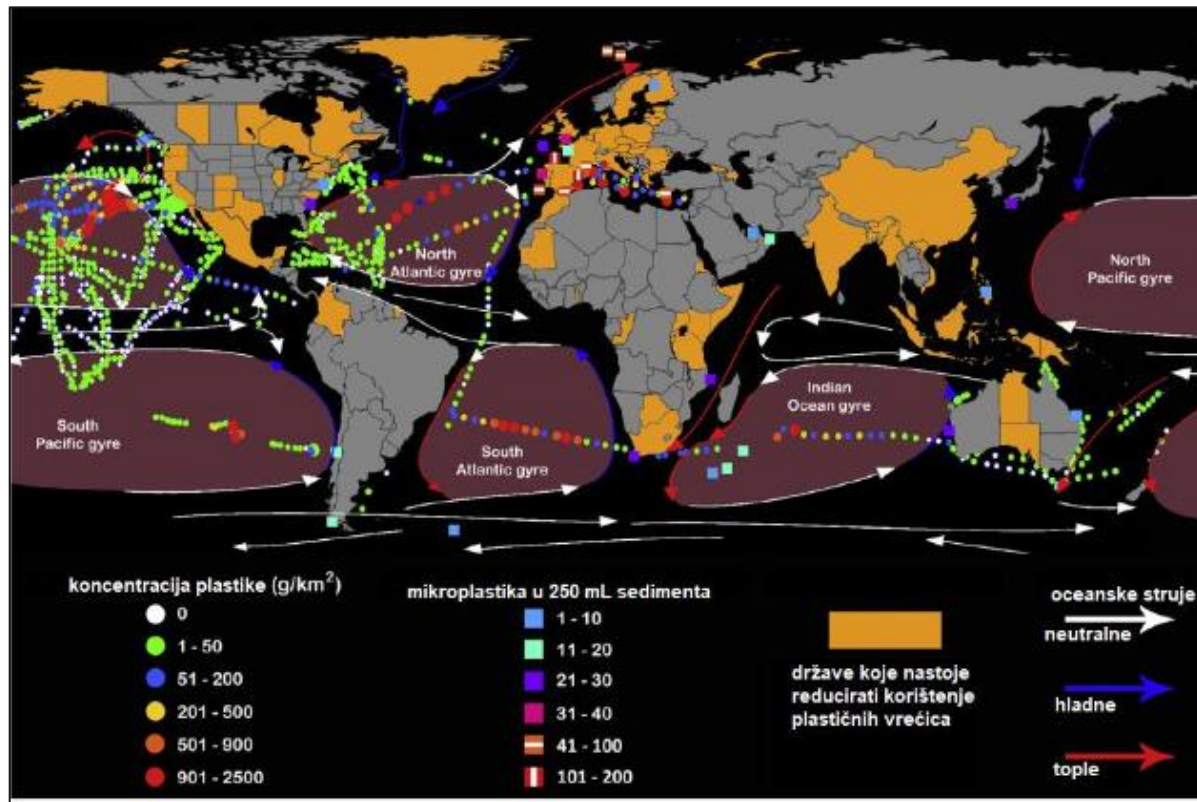
PLASTIKA → MIKROPLASTIKA

Cilj projekta:

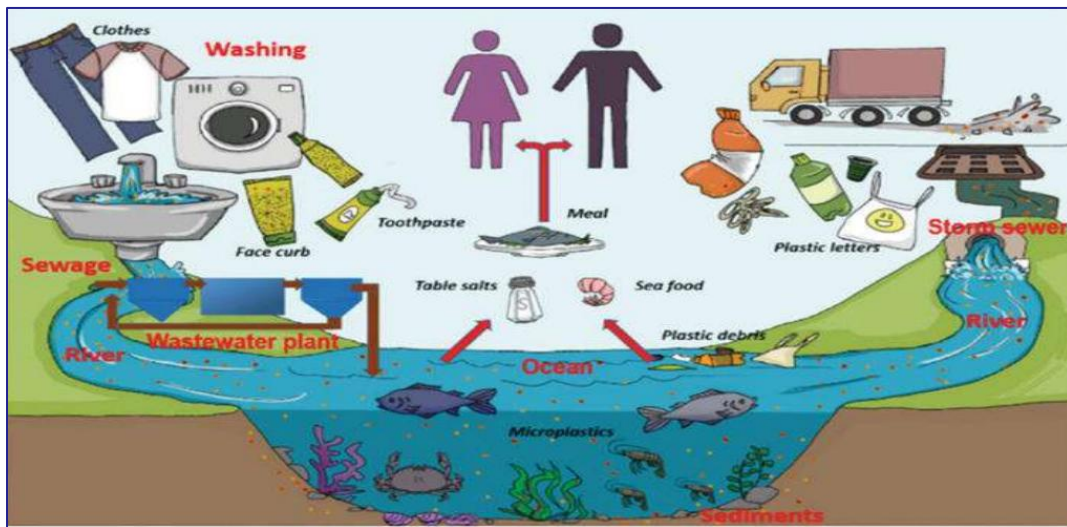
**istražiti prisutnost
mikroplastike u
zadarskom kanalu u
Jadranskom moru.**



Onečišćenje oceana mikroplastikom



Izvori onečišćenja vode mikroplastikom

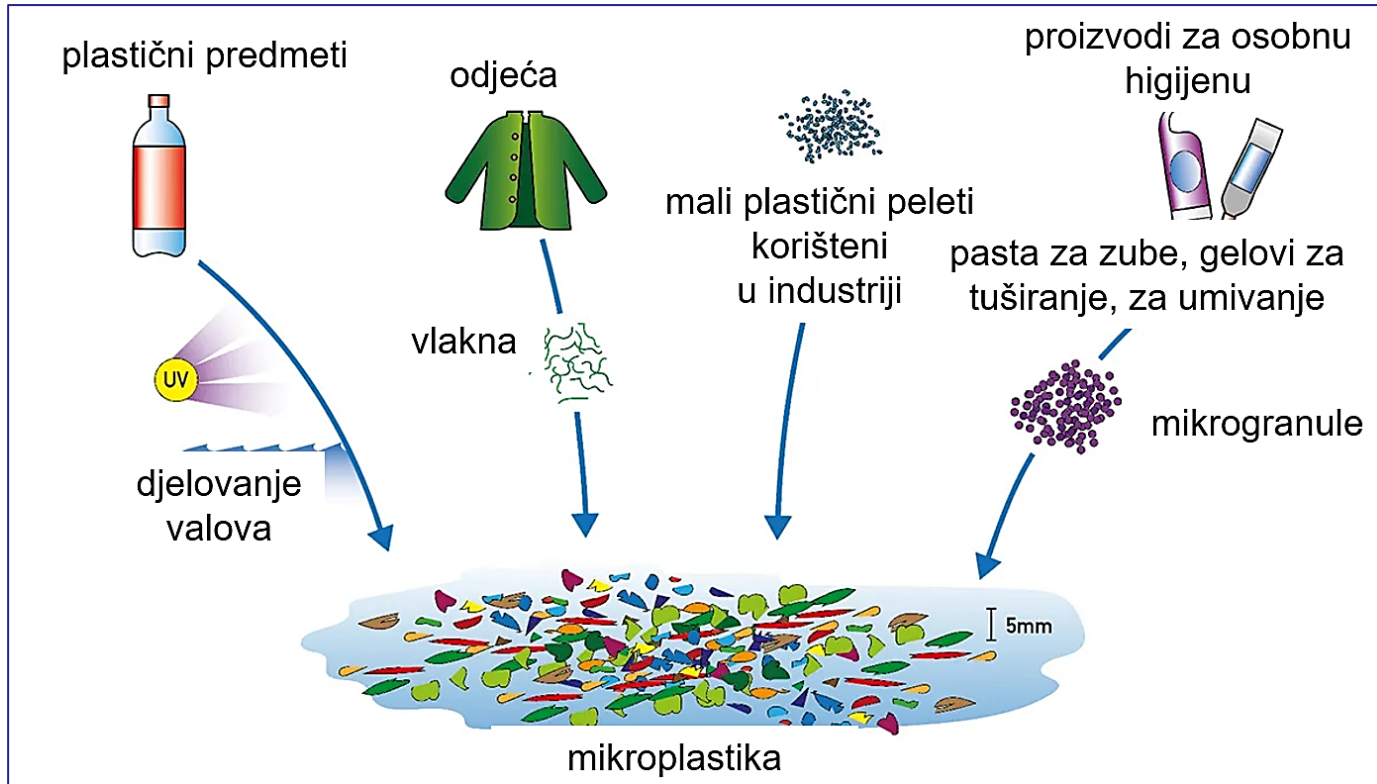


 PETE	 HDPE	 PVC	 LDPE	 PP	 PS	 OTHER
Polietilen teraftalat	Polietilen visoke gustoće	Polivinil klorid	Polietilen male gustoće	Polipropilen	Polistiren	Ostale vrste plastike
Boce za sokove, vodu, ulje	Deterdženti, sredstva za ciscenje, samponi	Folije za hranu, omoti za slatkise	Vrećice za trgovinu, omoti	Igracke, bijela tehnika	Igracke, ambalaža za cd	Ostala plastika, npr. akril, najlon, pleksiglas
						

Prikaz najznačajnih vrsta polimernih materijala, njihovi simboli i upotreba
<https://www.arochoa.org/en/plastics-toolbox/>

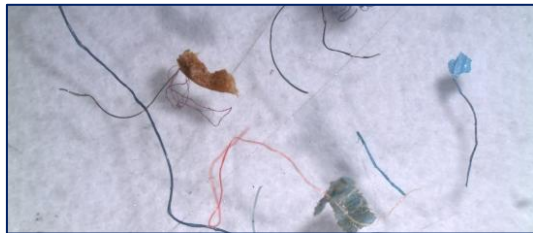
Podjela mikroplastike prema nastanku:

- primarna
- sekundarna



OBLICI MIKROPLASTIKE

vlakna



peleti



filmovi



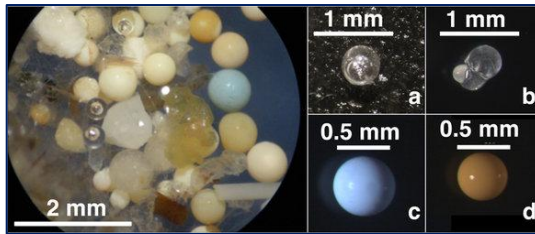
fragmenti



pjena



mikrozrna



PRIMARNA MIKROPLASTIKA

- ulaze u okoliš u mikro veličini
- nastaju od većih plastičnih predmeta tijekom proizvodnje ili uporabe

SEKUNDARNA MIKROPLASTIKA

- potječe od većih plastičnih predmeta koji se razgrađuju u morskom okolišu

Podjela plastike prema veličini

<https://www.arocha.org/en/plastics-toolbox/>



Macro



 $\geq 25\text{mm}$

Meso



$< 25 - 5\text{mm}$

Micro

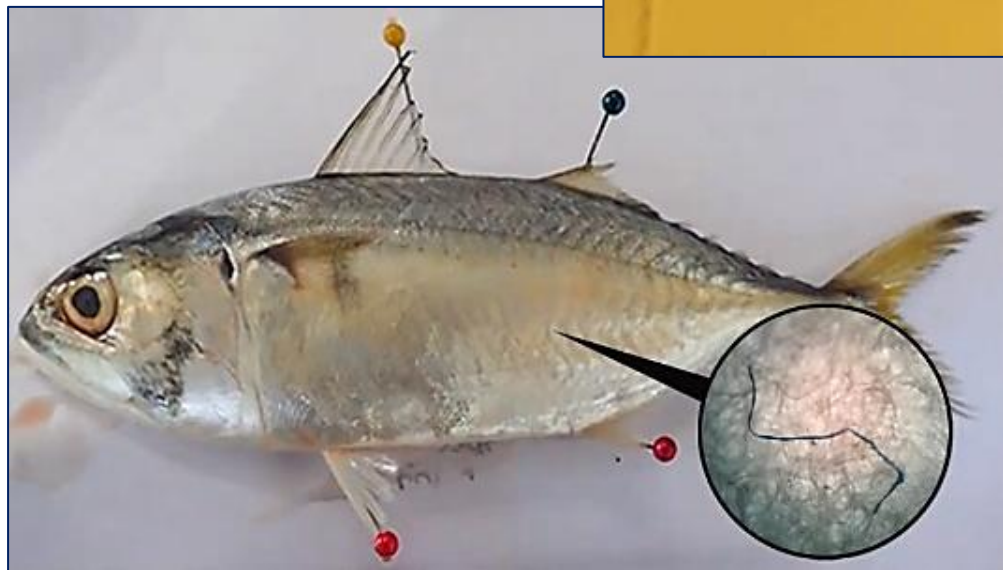


$< 5 - 1\text{mm}$

Mini-micro

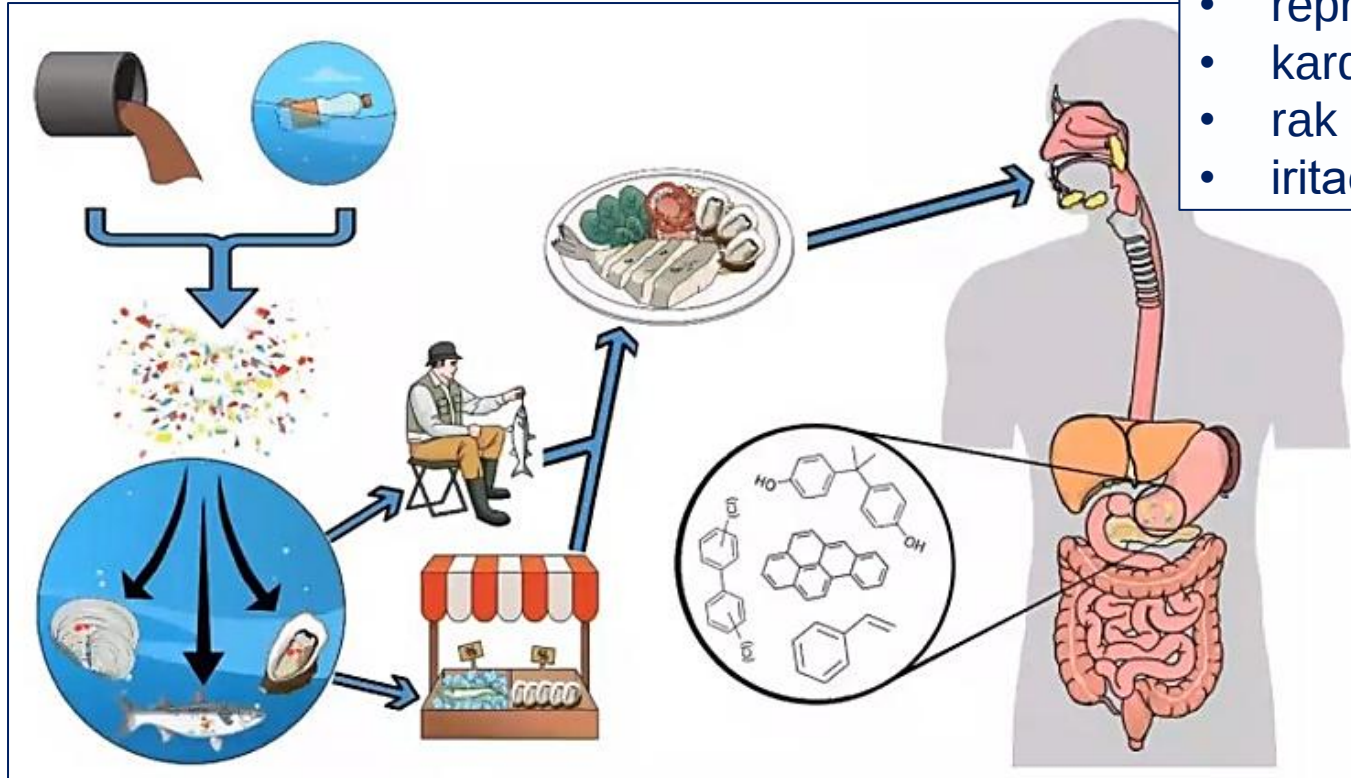


$< 1\text{mm} - 1\mu\text{m}$



Utjecaj mikroplastike na čovjeka:

- respiratorne bolesti
- probavne bolesti
- reproduktivne bolesti
- kardiovaskularne bolesti
- rak
- iritacija kože



ISTRAŽIVAČKA PITANJA

Je li mikroplastika prisutna u moru u zadarskoj uvali Jazine?



Postoji li razlika u udjelu mikroplastike u uzorcima mora s iste mjerne postaje u različitim vremenskim razdobljima?

U MORU ĆE BITI VIŠE MIKROPLASTIKE
TIJEKOM LJETA U ODNOSU NA JESEN I
ZIMU ZBOG VEĆEG BROJA PLOVILA I
POVEĆANOG PROMETA U ZADARSKOJ LUCI.



MJERNA POSTAJA

OŠ Šime Budinića Zadar, uvala Jazine u Zadar



VRIJEME ISTRAŽIVANJA

2024.

1.

LIPANJ

2.

RUJAN

3.

PROSINAC

GLOBE PROTOKOL ZA VODU/MIKROPLASTIKU



A MICROPLASTICS RECOGNITION GUIDE

This guide is aimed at helping you recognise microplastics of interest under the microscope.

Site Definition Sheet

* Required Field

School Name: _____ Site Name: _____

Choose a unique name based on location,
e.g. "Grassy area - Front of School"

Names of students completing Site Definition Sheet: _____

Date: Year _____ Month _____ Day _____ Check one: ☐ New Site ☐ Metadata Update

*Coordinates: Latitude: _____ ° ☐ N or ☐ S Longitude: _____ ° ☐ E or ☐ W
Elevation: _____ meters

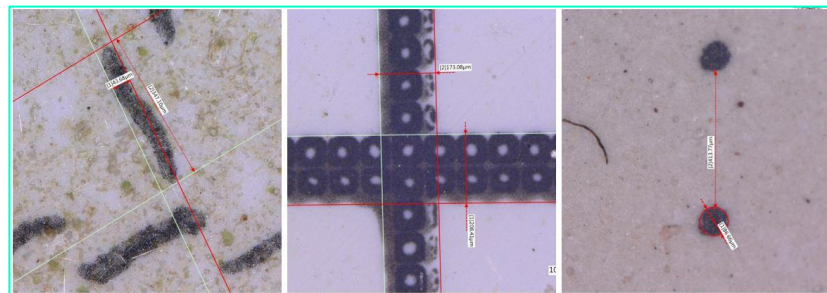
*Source of Location Data (check one): ☐ GPS ☐ Other _____

Comments: _____

Site Type (select all that apply based on intended measurements, then complete the necessary fields below): ☐ Atmosphere ☐ Surface Temperature ☐ Hydrosphere
☐ Biosphere Land Cover ☐ Biosphere Greening ☐ Biosphere Phenological Gardens
☐ Biosphere Lilacs ☐ Soil (Pedosphere) Characteristics
☐ Soil (Pedosphere) Moisture and Temperature ☐ Soil (Pedosphere) Frost Tube

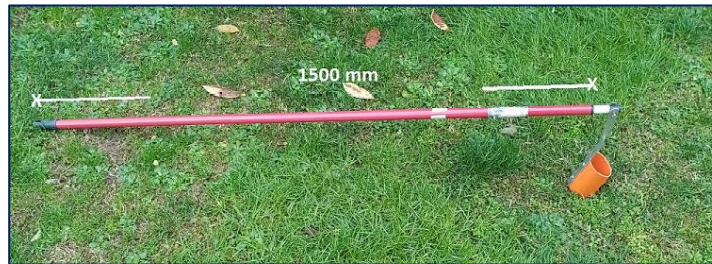
Cover type (Select one): ☐ Short grass (< 0.5m) ☐ Tall grass (> 0.5m) ☐ Barren land
☐ Sand ☐ Closed Forest (Trees interlocking) ☐ Woodland (Trees not interlocking)

☐ Shrubs ☐ Dwarf Shrubs ☐ Flowering Plants ☐ Wetland ☐ Cultivated Agricultural
☐ Cultivated Recreational ☐ Open Water ☐ Bare Rock ☐ Urban Residential
☐ Urban Commercial ☐ Asphalt ☐ Concrete ☐ Other ☐ Land Cover site

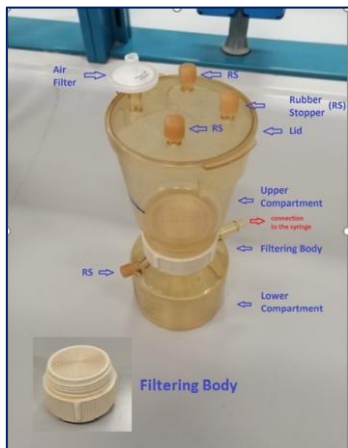


ONLY OFFICE			
Fiber Plugins			
microplastics material list of the costs, NEW.xlsx			
C4			
Info			
Search keywords: filter membrane, gridded, 47 mm, hydrophilic			
Link to website			
Brand			
Info			
1			
2			
3			
4			
5	Membrane solutions	MCE Gridded Membrane Filter, Membrane Solutions Mixed Cellulose Esters Membrane Filter, Sterile Individual Pack Membrane Disc Filter, Diameter: 47 mm, Pore Size: 0.45 µm, 100/Pk	https://www.amazon.com/Membrane-Solutions-Mixed-Cellulose-Esters-Membrane-Filter/dp/B075X9H86U/ref=sr_1_1_sspa?dchild=1&pf_rd_p=1632458194&sc=8-1
6	SimPure	SimPure MCE Micro Disc Membrane Filter, Sterile Gridded Individual Pack, 47mm Diameter and 0.45um Pore Size Hydrophilic Filter Paper, Pack of 100	https://www.amazon.com/SimPure-MCE-Micro-Disc-Membrane-Filter/dp/B075X9H86U/ref=sr_1_2_sspa?dchild=1&pf_rd_p=1632458194&sc=8-2
7	Biomed Scientific	MCE Membrane Filter, Mixed Cellulose Esters Membrane Disc Filter, Sterile, Black Gridded, Hydrophilic, Diameter 47mm, Pore Size 0.45um, Individually Packed (Pack of 100)	https://www.amazon.com/Biomed-Scientific-MCE-Membrane-Filter/dp/B075X9H86U/ref=sr_1_3_sspa?dchild=1&pf_rd_p=1632458194&sc=8-3
8	Foxo Life Sciences	Foxo Life Sciences 366-3633 OEM EZBio Gridded Membrane Disc Filter, MCE Sterile, 47 mm, 0.45 µm Pore Size (Pack of 100)	https://www.amazon.com/Foxo-Life-Sciences-366-3633-OEM-EZBio-Gridded-Membrane-Disc-Filter/dp/B075X9H86U/ref=sr_1_4_sspa?dchild=1&pf_rd_p=1632458194&sc=8-4
9	Millipore via Hach	Filter Membrane, EZ-Pak, 0.45 micron, 47 mm, white, gridded, 600/pk (Millipore)	https://www.hach.com/filter-membrane-ez-pak-0-45-micron-product?id=754024807&callbac...
10	Millipore via Hach	Sterile Membrane Filters, 47 mm, 0.45 µm, gridded, pk/150	https://www.hach.com/sterile-membrane-filters-47-mm-0-45-micron-product?id=754024807&callbac...
	Whatman via Sigma	Whatman® Mixed Cellulose Ester Filters, white gridded, pore size 0.45 µm, diam. 47	

OPREMA



teleskopski štap



uređaj za filtraciju



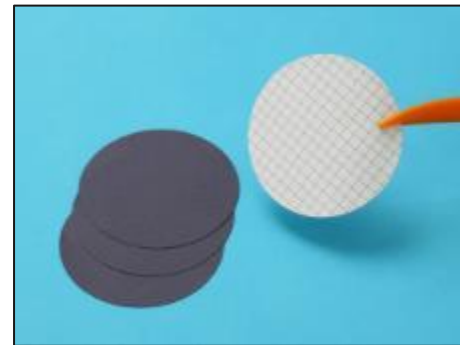
500 ml boca



šprica

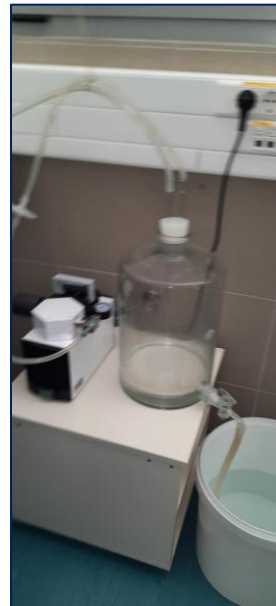


petrijeve posude



filter papir promjera 47 mm,
veličina pora 0,45 μm

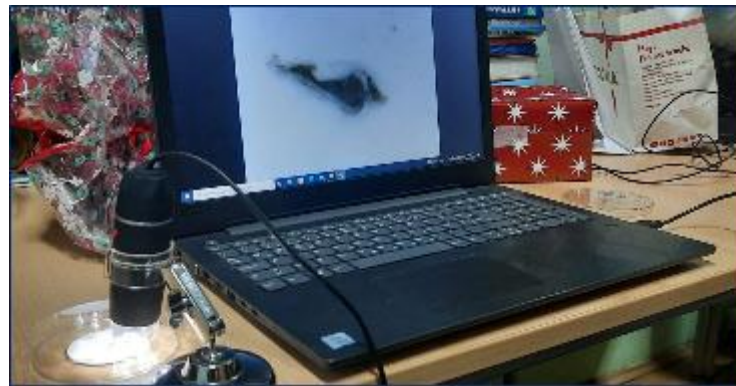
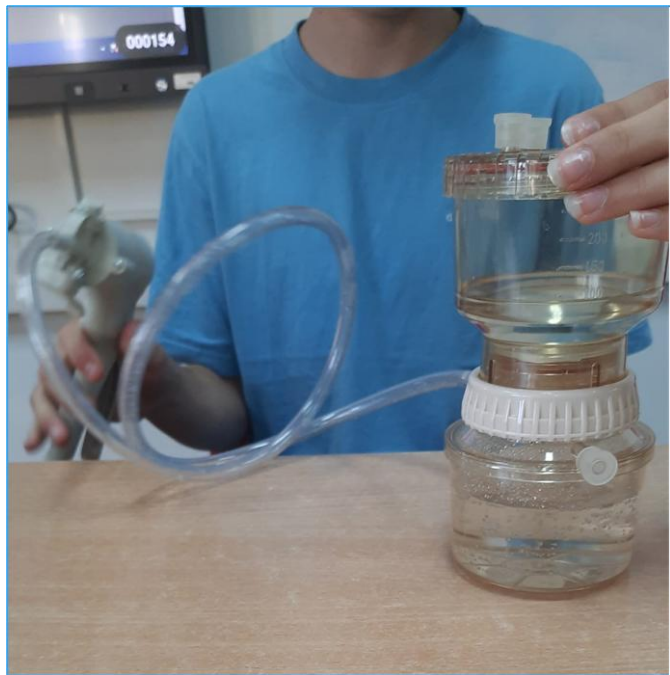
ZAVOD ZA JAVNO ZDRAVSTVO ZADAR, ODJEL ZA ZDRAVSTVENU EKOLOGIJU I ZAŠTITU OKOLIŠA



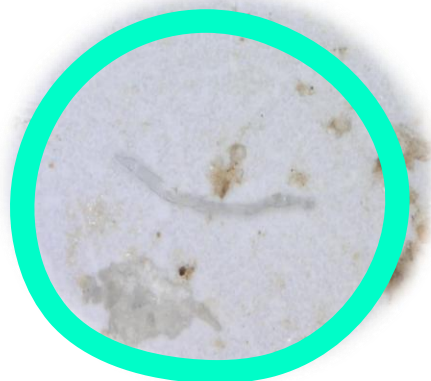
FILTRACIJA MORA



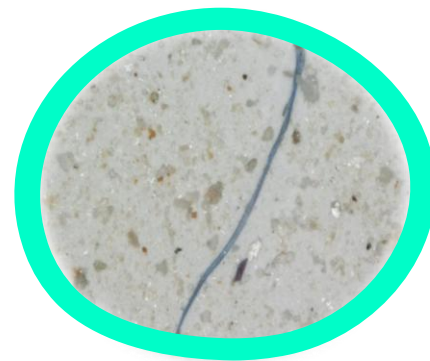
MIKROSKOPIRANJE UZORAKA



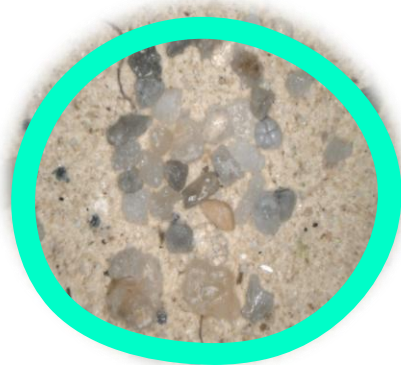
KATEGORIJE U IDENTIFIKACIJI UZORAKA



PAMUK I CELULOZA



TEKSTILNA VLAKNA



PRIRODNE TVARI



PLASTIKA



ŽIVOTINJSKO PODRIJETLO



PRIKAZ I ANALIZA PODATAKA

OŠ Šime Budinića Zadar

- Uvala Jazine

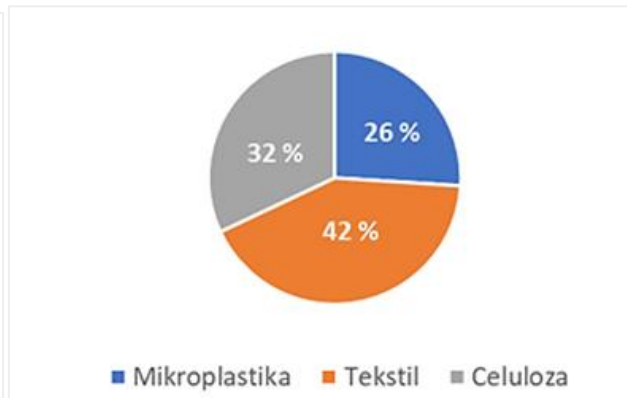


ANALIZA UZORAKA MORA - UVALA JAZINE

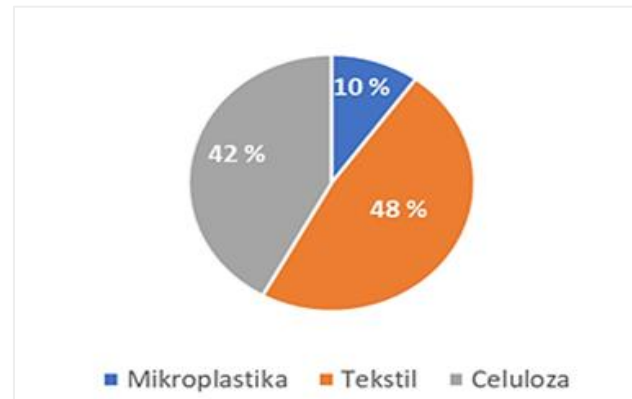
2024.



Slika 4 Analiza uzorka mora u uvali Jazine u Zadru, lipanj 2024. godine

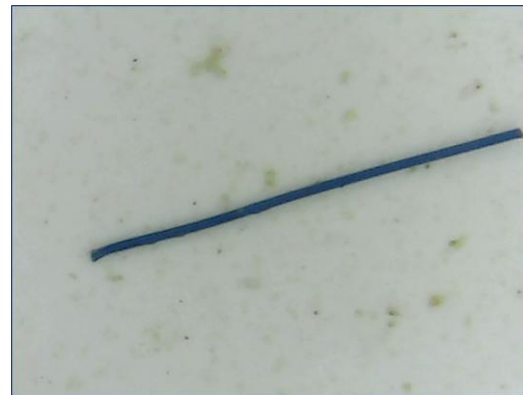
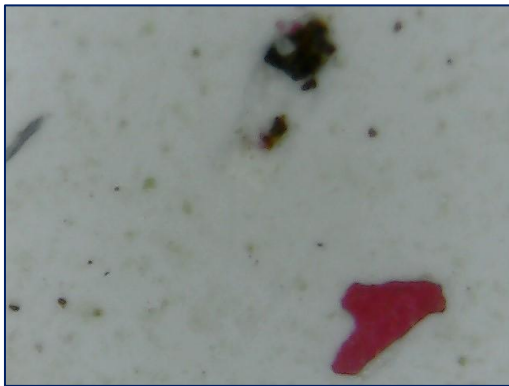


Slika 5 Analiza uzorka mora u uvali Jazine u Zadru, rujan 2024. godine



Slika 6 Analiza uzorka mora u uvali Jazine u Zadru, prosinac 2024. godine

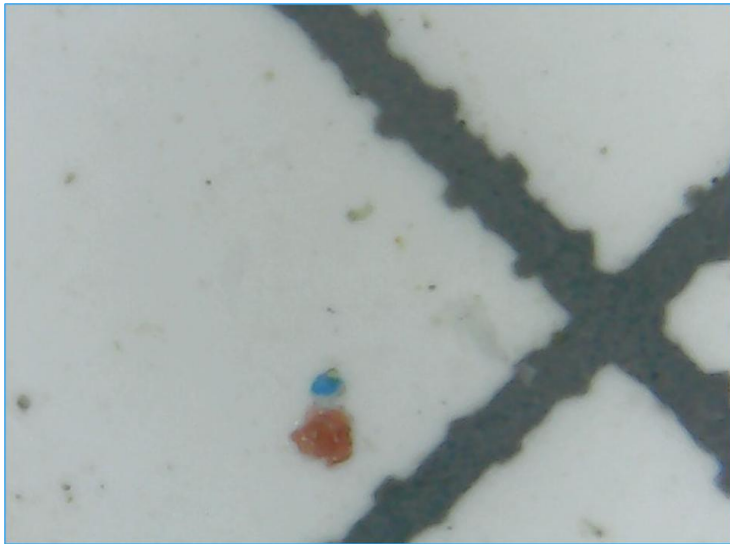
MIKROSKOPIRANJE UZORAKA MORA



- ✓ Analiza rezultata s mjerne postaje uvala Jazine pokazale su različite udjele mikroplastike, celuloze i tekstila u različitim uzorcima.
- ✓ U svakom uzorku pronađena je mikroplastika.
- ✓ Najniži udio tekstila prisutan je u uzorku mora iz rujna.
- ✓ Najviši udio celuloze prisutan je u uzorku mora iz prosinca.

RASPRAVA I ZAKLJUČCI

Za potpunu i točnu analizu potrebno je analizirati uzorke mora na mjernoj postaji i tijekom ostalih mjeseci kako bi se bolje uočile promjene u sastavu filtrata.



RASPRAVA I ZAKLJUČCI

Protokol za praćenje mikroplastike u površinskoj vodi

A/Prof. Alessandra Sutti and
Environmental Engineer Stuart Robottom
of Deakin University in Geelong, Victoria,
Australia



WEBINARI ZA PRIMJENU PROTOKOLA
MICROPLASTICS MONITORING PROTOCOL

eTwinning TwinSpace

POČETNA STRANICA | STRANICE | MATERIJALI | FORUM | MREŽNI SASTANCI | ČLANOVI

Podrška

Stranice

> 1. UVOD/INTRODUCTION

- [Nacrt] a) Osnovne informacije o projektu/Basic information about the project
- [Nacrt] b) učitelji - nositelji projekta/ teachers - project holders
- c) Učenici sudionici projekta/Students-introduce yourself
- [Nacrt] d)Karta Europe/Partner location-map
- e)Predstavljanje škole/School presentation

Arhiv

Stvorite stranicu

1. UVOD/INTRODUCTION

MIKROPLASTIKA U VODI/ MICROPLASTICS IN WATER

Srednja škola Petrinja
Osnovna škola Rugvica

Školska godina 2021./22.



padlet

Seherzada Šaini Talic + 5 • 6 dana

Partner location map

Na poveznici označite mjesto/školu iz koje dolazite Mark the place / sch come from on the link

Mikroplastika u vodi

Map showing partner locations in Europe, including Slovenia, Croatia, and Italy. Two pink location pins are marked on the map.

Podaci karte ©2022 GeoBasis-DE/BKG (©2009), Google, Inst. Geogr. Nacional, Mapa GISrael Uvjeti pružanja usluge

eTWINNING PROJEKT – MIKROPLASTIKA U VODI

Podlet

Europe and Eurasia Globe • 58 • 3mo

GLOBE Water Bodies Challenge

Dear teachers and students, this is an online board for you to post photos, videos, short tweets and links to what you do in 2022 GLOBE Water Bodies Challenge. There are several categories (columns) below to which you can post. You Please keep the posts short and write your school name and country to the post. Click on + to add a new post. If you have any questions, you can always contact us on ee.region.globe@gmail.com

A story of my favourite lake, river, sea or spring.

Bothayna Salami 1yr

Alsabeel elementary school
Horfaish Israel

drive.google.com
water body horfaish.mp4

Add comment

Anonymous 1yr

Secondary school Yuverta
Eindhoven, The Netherlands

YouTube

Denkend aan water; De Dommel

We observed the Water Body surroundings with GLOBE protocols and GLOBE Observer App

Irena Chlebounova 1yr

Archbishop Grammar School in Prague, Czech Republic

The temperature of the water in the stream Botič near Havlíčkovy sady

Add comment

Irena Chlebounova 1yr

How we organized an awareness campaign or Clean Up Day

Laura Cettolo 1yr

Brignoli High School, Science Under18 Festival, Monfalcone, Italy

This is a picture of our awarness campaign during the Science Under 18 Festival which took place in Monfalcone, Italy from 19th to 21st of May. We explained to the public how we use Globe apps to study the Isonzo river and the Doberdò lake and informed people about the importance to preserve

Anything else that relates to GLOBE Water Bodies Challenge

Add comment

Zrinka Klarin 1yr

Elementary school Šime Budinića Zadar, Croatia

Uvala Jazine Zadar, Croatia - Microplastics in sea water

Add comment

Zrinka Klarin 1yr

Elementary school Šime Budinić Zadar, Croatia

WB Padlets in other languages

Add comment

Checking pH, בדיקת רמת חומציות, level

Add comment

Marijana Škunca-Vikić 1yr

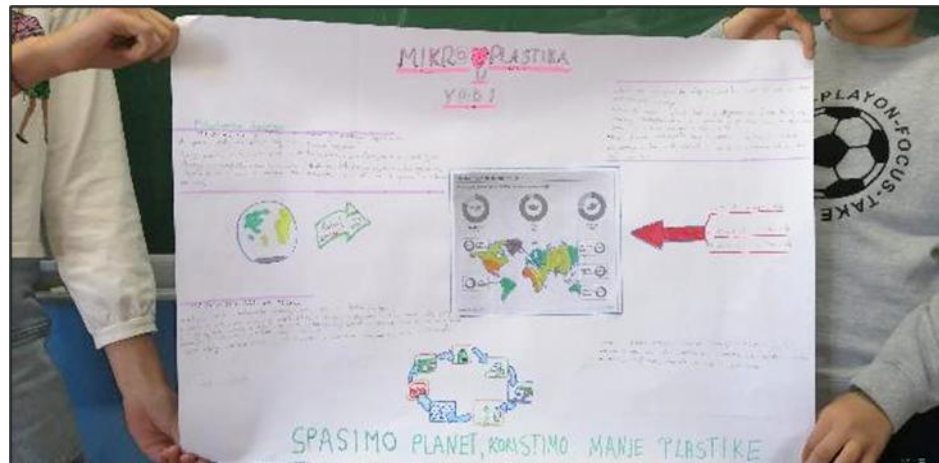
Secondary Medical School Ante Kuzmanić Zadar

World Water Day Medicinsl ► oia Ante Kuzmanić Zadar, Croatia

Video • 02:24
World Water Day
World Water Day 2022.

Add comment

WATER BODIES CHALLENGE – GLOBE



MIKROPLASTIKA – UČENIČKI POSTERI



Mikroplastika u vodi

OŠ Šime Budinić



Mikroplastika u vodi

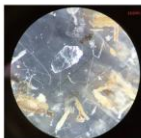


Što je mikroplastika?

Mikroplastika su sitne plastične čestice nastale raspadanjem u morima. Velik su zagađivač mora.

Kako nastaje mikroplastika

Razgradnjom većih plastičnih predmeta poput bočica za vodu, vrećica, raznih igračaka i ambalaža hrane, nastaje mikroplastika. No, iako ljudskom oku nevidljiva, mikroplastika ne nestaje razgradnjom, ona se samo usitni na manje komadiće.



Rješavanje problema

Osmišljena je europska strategija koja bi trebala postupno smanjiti proizvodnju i upotrebu plastike. Njome je određeno da do 2030. godine sva plastična ambalaža mora biti pogodna za recikliranje.

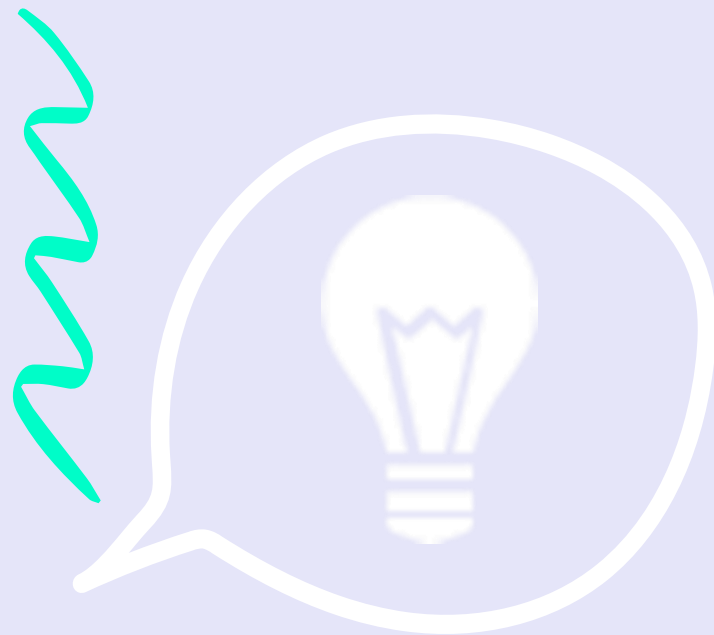
Mnogo životinja je stradalo zbog ovog problema zato čuvajmo oceane i mora!



RADOVI UČENIKA U RAZLIČITIM AKTIVNOSTIMA

EVALUACIJA

MEDNARODNA KONFERENCA
PROGRAMA EKOŠOLA, 31.5.2025



<https://forms.office.com/e/Bfiq3hL0fC>



HVALA !

ZRINKA I ANITA

OSNOVNA ŠKOLA ŠIME BUDINIĆA ZADAR

