



AMPHORAE OF OUR SEAFLOOR

*GLOBE GROUP SECONDARY SCHOOL MATE BLAŽINE
LABIN , CROATIA*

MENTOR: prof. mentor Olivera Tadić

PARTICIPANTS:

GLOBE GROUP: 15 members

OTHER STUDENTS: 63 students Secondary school mate Blažine Labin

ASSOCIATES:

Tourist community Labin–Rabac,

Labin Healthy City association,

Daniel Mohorović, professional scuba diver „Girandella diving center”,

Vedran Kos, Curator and archaeologist of the National museum Labin,

Karmen Milevoj Diminić, geography professor and GLOBE teacher,

Archeology museum Pula,

Archeology museum Zadar,

Archeology institute Zadar.

REALIZATION TIME: school years 2016. /2017. , 2017./ 2018. & 2018./2019.

1. HYPOTHESIS

We live in a sea surrounded environment, therefore we have a unique give and take relationship with it.

The sea, other than shaping our terrain, also shows us an abundance of underwater riches.

The Globe Group participated in the project of local education of the Istrian County with the theme "Amphora Findings on the East Coast of Istria", so we part of this project decided to present as the Globe Project.

The research questions are:

1. How accurately can we map amphora sites?
2. How much time does it take to desalinate amphorae fragments in the school lab to be exposed later?

Around 70 students took part with the objective of the classes being to determine more about the type, finding sites and the age of the amphorae in the Labin area.

2. RESEARCH METHODS

MAPPING THE AMPHORAE FINDING PLACES

STAGES	METHODS
1. Determining the coordinates of the amphorae fragments	Going to archaeological sites of the southeast Istria from cape Mašnjak to cape Mulac, Globe GPS protocols
2. Mapping the locality	Digital cartography, QGIS
3. Comparing with official data	Talking with the curator



Picture 1: stages of mapping the amphorae sites

Source: Own Creation

DESALINATING THE AMPHORAE

STAGES	METHODS
1. Cleaning of the fragments	Washing out with tap water
2. Desalination	The amphorae fragments are left in a big tub with tap water, the water was replaced every week, and a conductivity meter was used to see the amount of salt dissolved in water, GLOBE hydrological protocols
3. Drying and protecting the fragments	After the salt amount was minimalized, the fragments were taken out, dried off and coated with a protective fluid and displayed at the school.



Picture 2: stages of desalinating the amphorae fragments

Source: Own Creation

3. RESULTS

MAPPING THE LOCALITIES

According to the data we received from the National Museum of Labin and geographic coordinates of the underwater site, we have collected for the first time, we have mapped the map of localities of the amphorae site in the area of Labin.

NOTE: geographic coordinates determined on the ground by the GPS method can not be published to protect the locality.

Picture 3: Map of amphorae finding sites
Source: Own Creation

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DESALINATION

Table 1. Results of conductivity measurements

Weeks	Conductivity	Weeks	Conductivity
1	1213	21	336
2	812	22	263
3	780	23	361
4	757	24	281
5	731	25	320
6	652	26	273
7	624	27	263
8	616	28	256
9	603	29	215
10	597	30	320
11	594	31	343
12	572	32	309
13	548	33	261
14	468	34	310
15	563	35	250
16	563	36	252
17	564	37	250
18	443	38	251
19	421	39	250
20	326	40	250

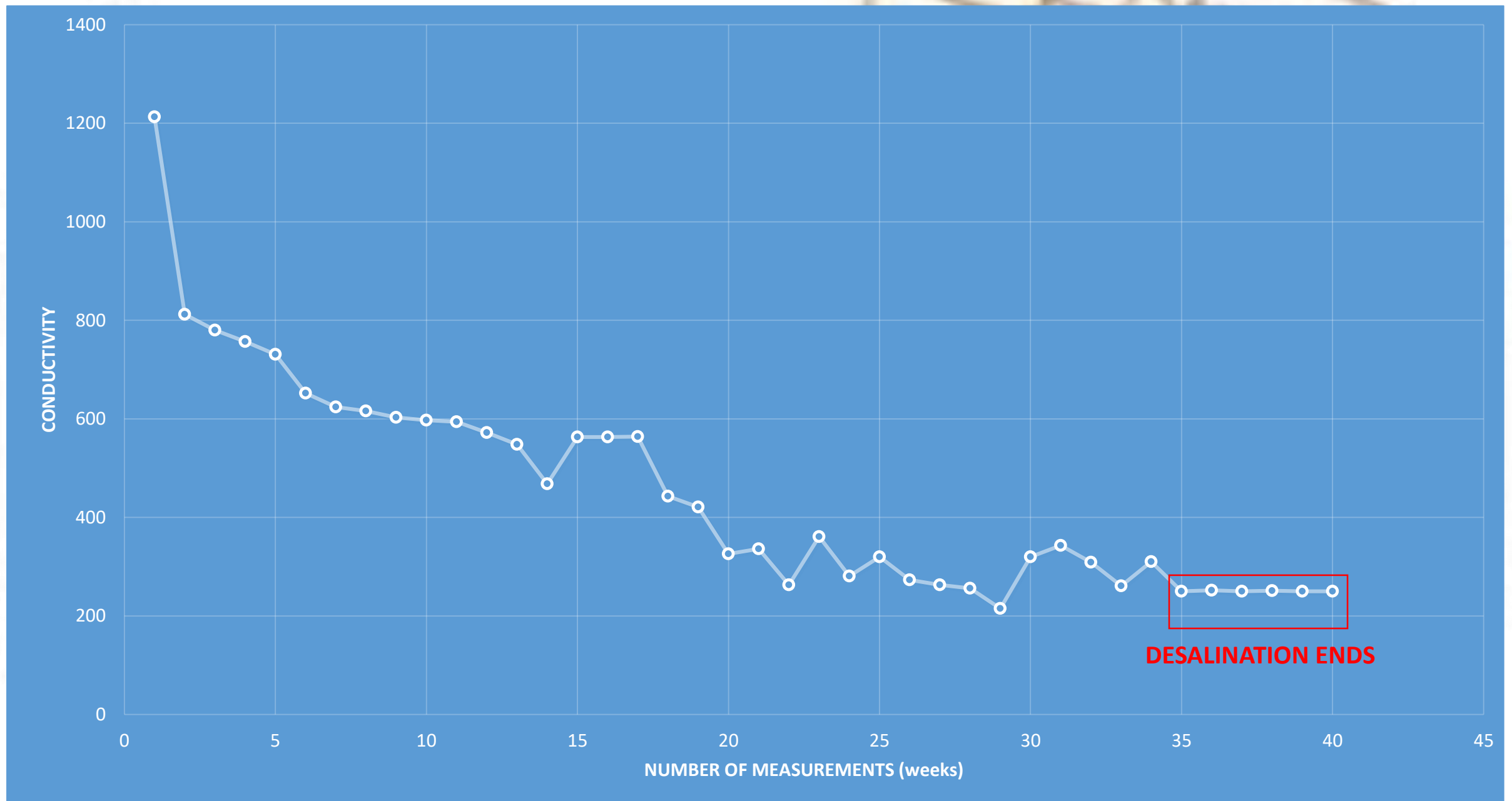
As visible from table 1, the desalination measurements remain constant between the 35th and 40th week, meaning that the desalination process is complete.

The amphorae fragments were washed, covered with protective fluid and exhibited.



Picture 4: Amphorae fragments exhibited in the school
Source: Own Creation

Fragments will remain as a permanent exhibition in our school so we will be able to track changes in time.



Graph 1. Conductivity measuring results

4. RESULT ANALYSIS - DISCUSSION

- Locations of amphora can be mapped very precisely with the help of a GPS device. The same maps with underwater archaeological sites exist in local museums and at the Ministry of Culture of the Republic of Croatia, but they are often unavailable to the public due to possible devastation of underwater locations.
- Since the data of land locations of amphora received from the Custos of the National Museum of Labin, we compared the underwater sites with land sites dating from the antiquity, and it is concluded that almost every underwater site and on the land are ancient sites.

Koncani Uhač I., Kos V., Miholjek I., (2008), Poluotok is immersed in the sea, Undersea archeology of southern Istria in ancient times, <https://www.scribd.com/document/263881287/Poluotok-uronjen-u-more-Katalog-izlo%C5%BEbe>, Archaeological Museum of Istria - Pula (accessed 20.09.2018.)

- In conversation with the curator of the National Museum Labin we have confirmed the accuracy of our collected data on the underwater sites, so our map can be used for the purpose of tourist promotion of our region as agreed with TZ Grada Labin.
- Geographic coordinates determined on the ground by the GPS method can not be published to protect the locality.

- A great danger to the objects taken from the sea are salts, in the case of drying objects in the air can crystallize and cause great damage. It is therefore objects from the sea to the restoration workshop they are delivered in a wet state, where desaline.
- The process of desalination and purification of the amphora needs to be done to change its original environment. About 2,000 years of amphora lay at the bottom of the sea, and so the sea salt and other minerals came into the ceramic walls of amphora itself. In order for the amphora to be exposed under normal conditions, it is necessary to perform desalinization and cleaning, otherwise, the amphora under the influence of the air will begin to decompose.
- An example of this was found in the Lapidarium of the National Museum of Labin, where there is an amphora which, after it was formed, dried and exposed and after two years began to be lightly peeled.



Picture 5: Amphorae
Source: Vedran Kos, Curator
National museum in Labin

The desalination process lasted 40 weeks, which, according to accessible sources on the internet, is enough to complete the process and the fragments are dried and protected to be permanently exposed.

Čurković M. <http://www.h-r-z.hr/index.php/djelatnosti/konzerviranje-restauriranje/podvodna-arheologija/341-restauriranje-i-konzerviranje-amfore-tipa-spatheion>, Hrvatski restauratorski zavod (approach 12.5.2017.)

5. CONCLUSIONS

As it is an interesting project, it has attracted a lot of interest from students. Using globe protocols in this project, we include other students of our school in the Globe program while at the same time gathering enough data to answer the research questions that we have set at the beginning of our work.

You can see more in the video made by our group:

www.youtube.com/watch?v=c6Q402q5Jhg&t=3s&spfreload=10

Nalazišta amfora na istočnoj obali Istre

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PROJECT RELATED ACTIVITIES

FIRST REGIONAL FESTIVAL PAZIN

There was a first ever Regional Festival in Pazin where 16 high school represented their work which was an extracurricular activity. Every group explained their work with presentations.



Glas Istre

Picture 6: Presenting during the Regional Festival
Source: Own Creation



Picture 7. TV Istra – Secondary School Mate Blažine investigated amphorae.
Source: Own Creation

Badges

Collaboration

We collaborated with two Globe teachers-mentors during this project.

Our mentors showed us how to use the GLOBE protocols and method of digital cartography.

We also collaborated with other member of GLOBE group and other students of our school on field work. They helped us to determine the coordinates of locations using GPS method.

Community Impact

We have presented our results to the GOVERNMENT and TURIST AGENCY and they have shown great interest, so we believe that our map will be part of the tourist promotion of our region.

We published our results in the media (Glas Istre i TV Istra)

Connecting With A STEM Professional

We collaborated with scientists from “Girandella diving center”, National museum in Labin, Karmen Milevoj Diminić, geography professor and GLOBE teacher, Archeology museum Pula, Archeology museum Zadar & Archeology institute Zadar, from which we have learned a lot from digital cartography, oceanography and archeology

6. Sources

- Caravale A., Isabella Toffoletti I.,(1997) *Anfore antiche – conoscerle e identificarle*, IRECO, Formello
- Čurković M. <http://www.h-r-z.hr/index.php/djelatnosti/konzerviranje-restauriranje/podvodna-arheologija/341-restauriranje-i-konzerviranje-amfore-tipa-spatheion>, Hrvatski restauratorski zavod (approach **12.5.2017.**)
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- TV ISTRA, (2017) <http://tvistra.hr/video-srednja-skola-mate-blazine-labin-u-sklopu-projekta-zavicajne-nastave-istrazivala-nalazista-amfora/> (approach **18.5.2017**)



Thank you for your
attention!

I lađa hitaše brzo niz valove
putujući dalje.
A kad već sprave sve
povezaše po crnoj lađi,
onda poredaju vrče do vrha
nalite vinom
i žrtve stanu vječnim i
besmrtnim bozima liti,
sjajnookoju Zeusovoj kćeri
Ateni navlastito lijuć .

(Odiseja, II, 429-433)

