ZIENTZIA AZOKA
2021-2022

TITLE OF THE PROJECT: **CLEANER RIVER WATER**

GROUP`S NAME: **LAM**

NAMES:

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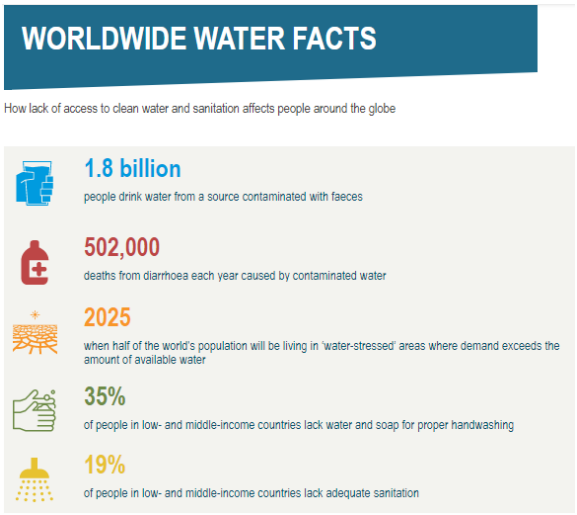
Hypothesis:
We want to demonstrate that river water can be purified using simple, affordable and cheap methods.

Summary:

According to recent WHO and UNICEF data, 2.1 billion people lack access to safely managed drinking water and 4.5 billion lack access to safely managed sanitation. Another devastating statistic is that unsafe water and poor sanitation are the leading causes of child mortality, affecting 1.5 million children annually.
In parts of Africa, Asia or South America, there are still many people who do not have daily access to clean drinking water. They have to travel many kilometers back and forth to collect water and bring it to their homes.

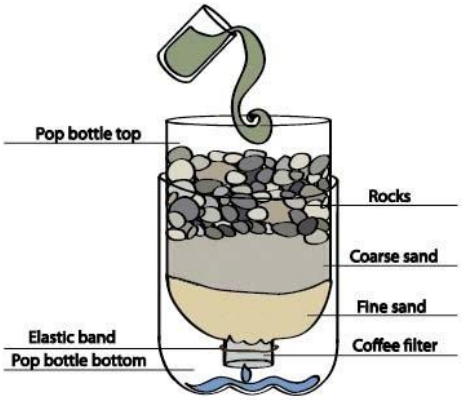


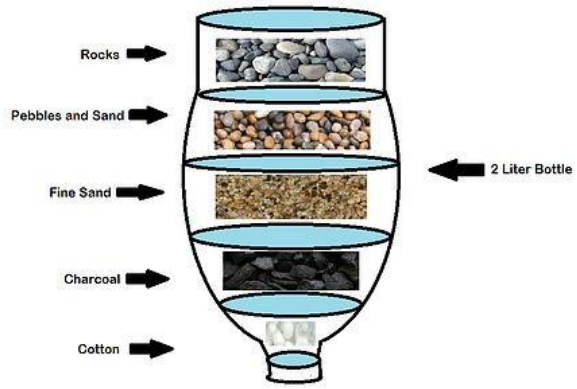
Therefore, we thought that if people living in areas where access to drinking water is difficult, perhaps they could make their own drinking water drinkable themselves using resources that are within their reach.

Materials and methods:

- Plastic bottle 12
- River water 5L
- Arduino to measure turbidity and suspended solids
- Paper strips (pH, nitrates, nitrites,...)
- Different filters:
  - Sand (coarse and fine)
  - Rocks
  - Coffee filter
  - Cotton
  - Gauze
  - Charcoal

The following are the models of homemade filters that we have used as models:





Chronogram

In order to carry out this project, we have organized ourselves as follows:

January	*February*	*March*	*April*	*May*
We have obtained all the materials. We finished the filters	Start to prepare the experiment	Finish the experiment	Check the last results	Present the final report

Procedure:

First, we obtained discarded plastic bottles, cut them as shown in the illustration.
Then we filled them in layers according to three filter models with different compositions.
We filtered the water through them and measured:
- turbidity and suspended particles in tap water (control)
- the turbidity and suspended particles of water from 3 points in the river before filtering
- the turbidity and suspended particles of the water from 3 points in the river after filtration

We have also measured different parameters in the waters mentioned above using paper strips (colorimetric method).
The results obtained have been compiled in tables and, based on these data, the following graphs have been drawn up

Results and graphic representation

- **KO** refers to a filter that has cotton, stones, ashes, sand, carbon and a T-shirt.
- **IK** refers to a filter that has a T-shirt, coal, sand and stones.
- **KA** refers to a filter that has rocks, ash, sand and coffee filter.

The meaning of the numbers 1, 2 and 3 (KO-1, KO-2…) are
1 for the water of Gazeta,
2 for the water of Iguria and
3 for the water of Labakua.

RESULTS OBTAINED WITH THE COLORIMETRIC STRIPS

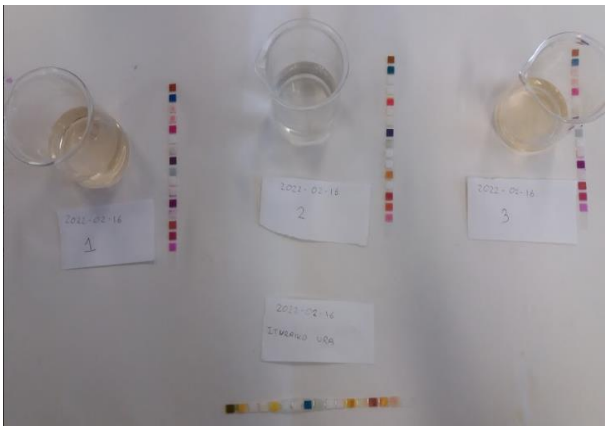


Table 1: Gazeta

GAZETA	KO-1	IK-1	KA-1	IRAGAZI AURRETIK	Iturriko ura
Hardness 30S m	0	250-425	250	125	0-25
Total Alkalinity	240	120	240	0-40	0-40
Nitrate	0	0	25	0	0
Nitrite	0	0	1	0	0
pH	8,4	6,2	8,4	6,2	6,8
Free Chlorine	0	0	0	0	0
Total Chlorine	0	0	0	0-0,5	0
Calcium	0-50	500	1000	100-250	0
VC	0	0	0	0-0,5	0
Bromine	0	0	0	0-0,5	0
Cromium/Cr (Vi)	0	0	0	0	0
Lead	500	0	0	0	0
Iron	0	0	0	0-5	0-5
Fluoride	100-200	25	0	0-25	100-200
Carbonate Root	120	20	80-120	0	20
Cynauric acid	300	0	150	0	0

Table 2: Iguria

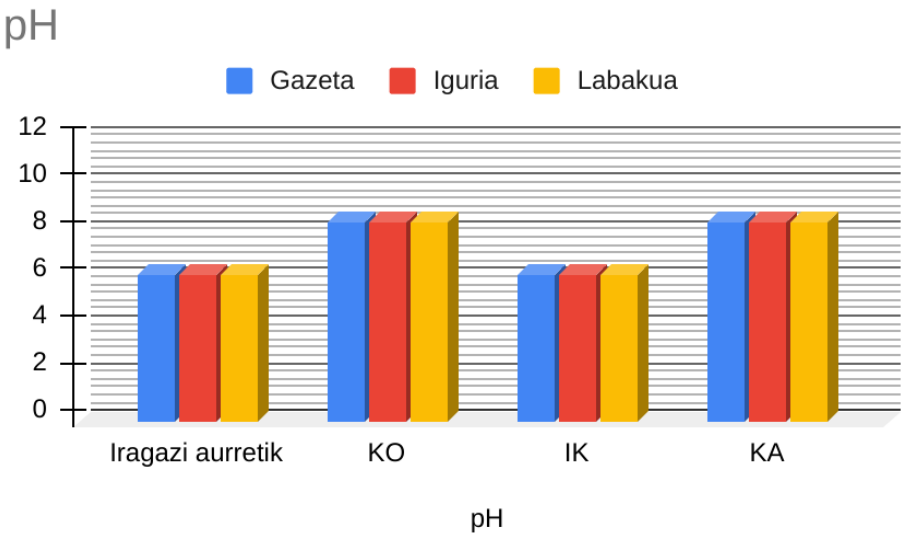
IGURIA	KO-2	IK-2	KA-2	IRAGAZI AURRETIK	Iturriko ura
Hardness 30S m	0	250	250	50	0-25
Total Alkalinity	250	80	240	120	0-40
Nitrate	0	0	0	0	0
Nitrite	0	0	0	0	0
pH	8,4	6,2	8,4	6,2	6,8
Free Chlorine	0	0	0	0	0
Total Chlorine	0	0	0	0	0
Calcium	0	1000	500	0	0
VC	0	0	0	0	0
Bromine	0	0	0	0	0
Cromium/Cr (Vi)	0	0	0	0	0
Lead	500	0	500	0	0
Iron	0	0	0	0	0-5
Fluoride	50	100	0	50	100-200
Carbonate Root	80	0-20	120	20	20
Cynauric acid	300	0	300	0	0

Table 3: Labakua

LABAKUA	KO-3	IK-3	KA-3	IRAGAZI AURRETIK	Iturriko ura
Hardness 30S m	0	125-250	425	50	0-25
Total Alkalinity	240	50-80	220	120	0-40
Nitrate	0	0	0	0	0
Nitrite	0	0	0	0	0
pH	8,4	6,2	8,4	6,2	6,8
Free Chlorine	0	0	0	0	0
Total Chlorine	0	0	0	0	0
Calcium	0	1000	500-1000	50	0
VC	0	0	0	0	0
Bromine	0	0	0	0	0
Cromium/Cr (Vi)	0	0	0	0	0
Lead	500	0	500	0	0
Iron	0	0	0	0	0-5
Fluoride	0	25-50	25-50	25	100-200
Carbonate Root	120	0-20	80-120	20	20
Cynauric acid	300	0	300	0	0

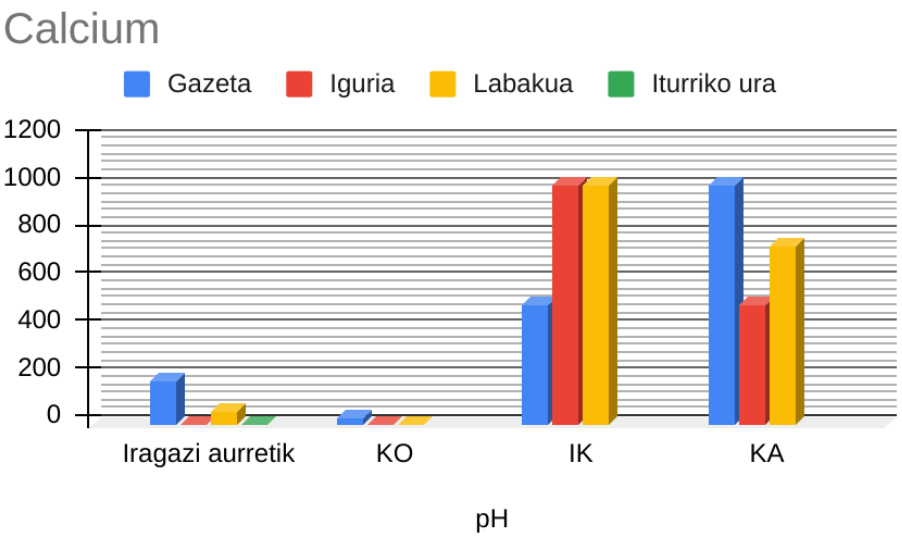
Graphic 1: pH

In this graphic we can see the pH that we take in the rivers of Gazeta, Iguria and Labakua. We can see that the pH before filtering is the same and changes depending on the filter that we use. The filter KO has the highest pH and the filter IK has the lowest.



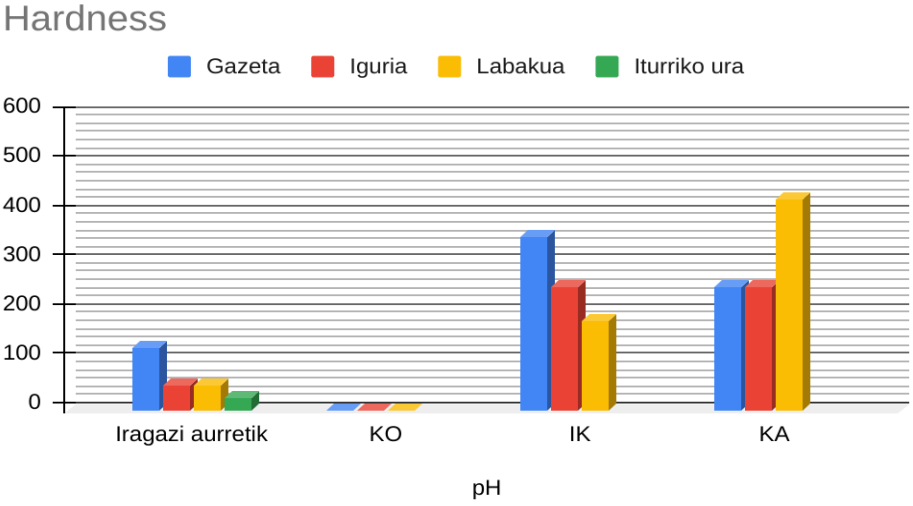
Graphic 2: Calcium

In this graphic we can see the calcium, after filtering water from the filter IK the results are the highest and the KO and before filtering are very low.



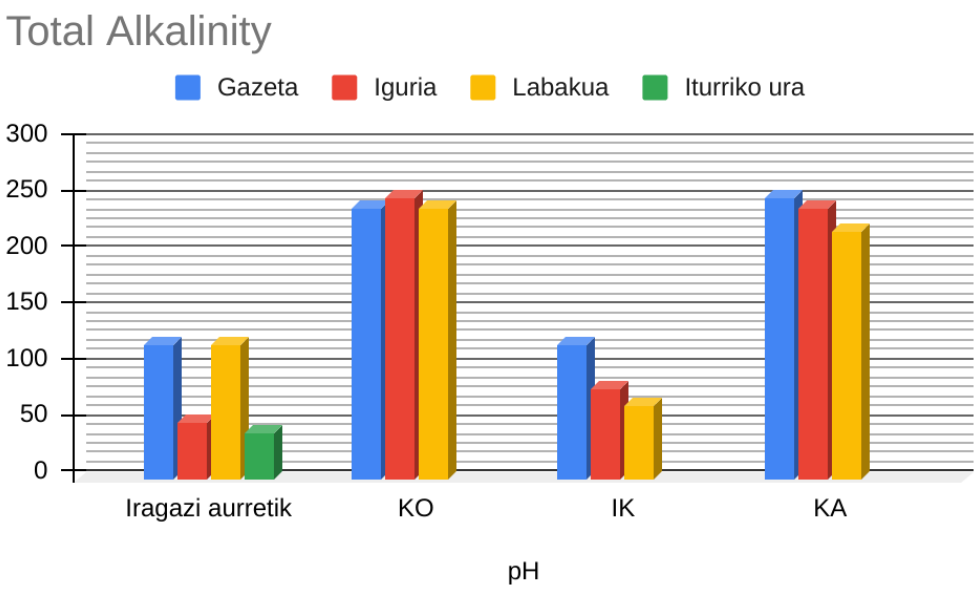
Graphic 3: Hardness

In this table we see that in the filter KO the hardness is 0 and in the filters IK and KA it increases.



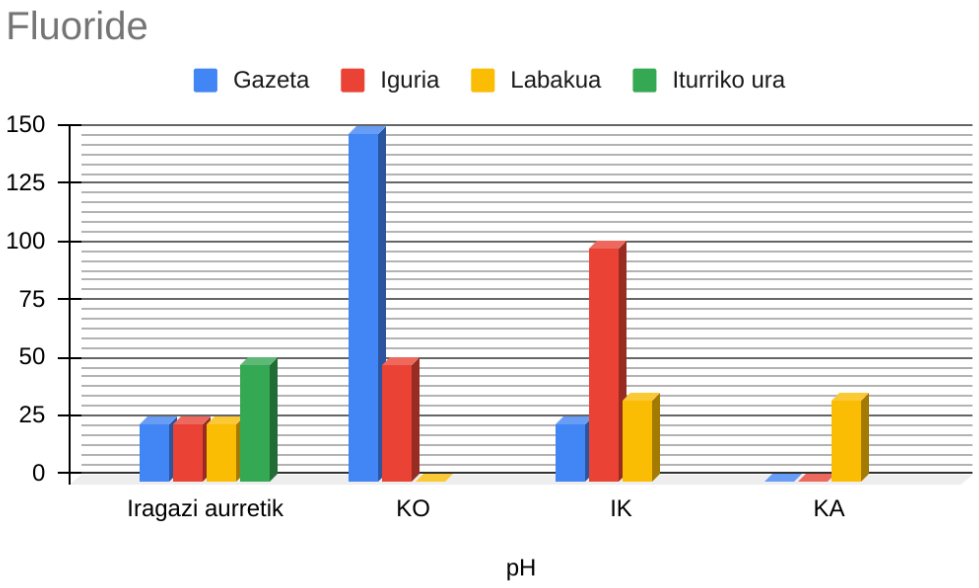
Graphic 4: Total Alkalinityl

In this table of total alkalinity we see that in the filters KO and KA have it very high and the difference between before filtering and IK is that water of Iguria has grown and the water of Labakua has decreased.



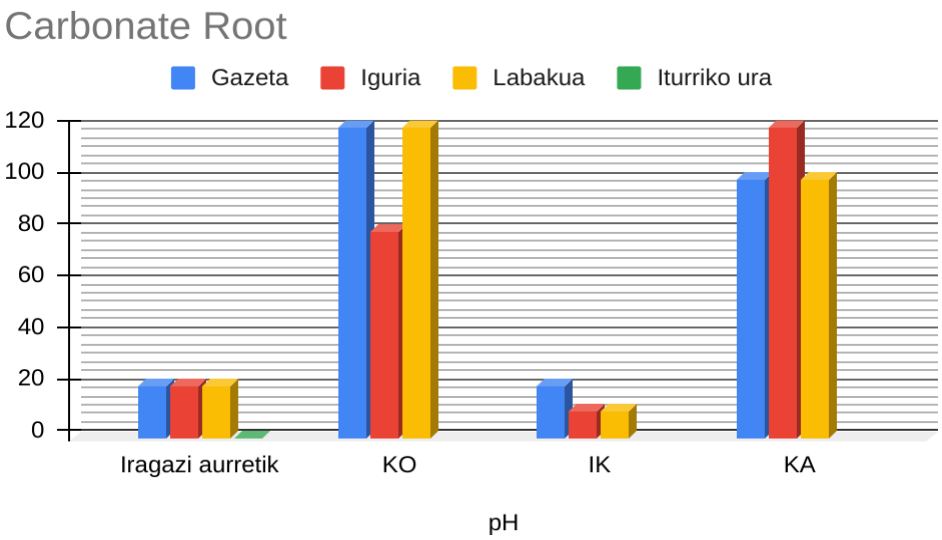
Graphic 5: Fluoride

in the case of fluoride, we observed large differences in the results depending on the filters used.



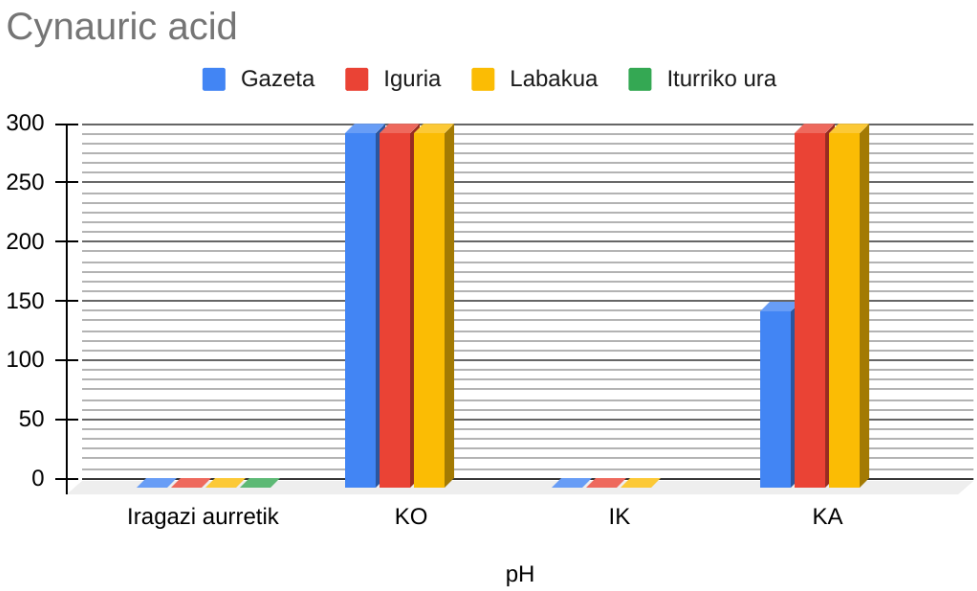
Graphic 6: Carbonate Root

the filter known as IK is the most carbonate reducing filter.



Graphic 7: Cyanuric acid

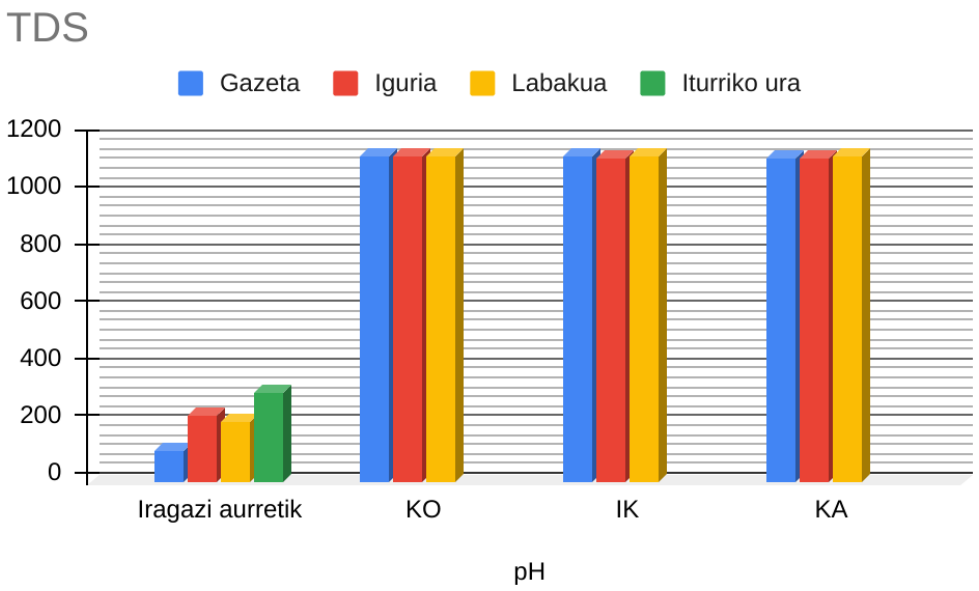
Here, we can see the cyanuric acid from the rivers Gazeta, Iguria, Labakua and water from the water tap. Water from the filter KO and IK is all the cyanuric acid the same, but acid from the filter KA and Gazeta is lower than Iguria and Labakua.



RESULTS OBTAINED WITH ARDUINO

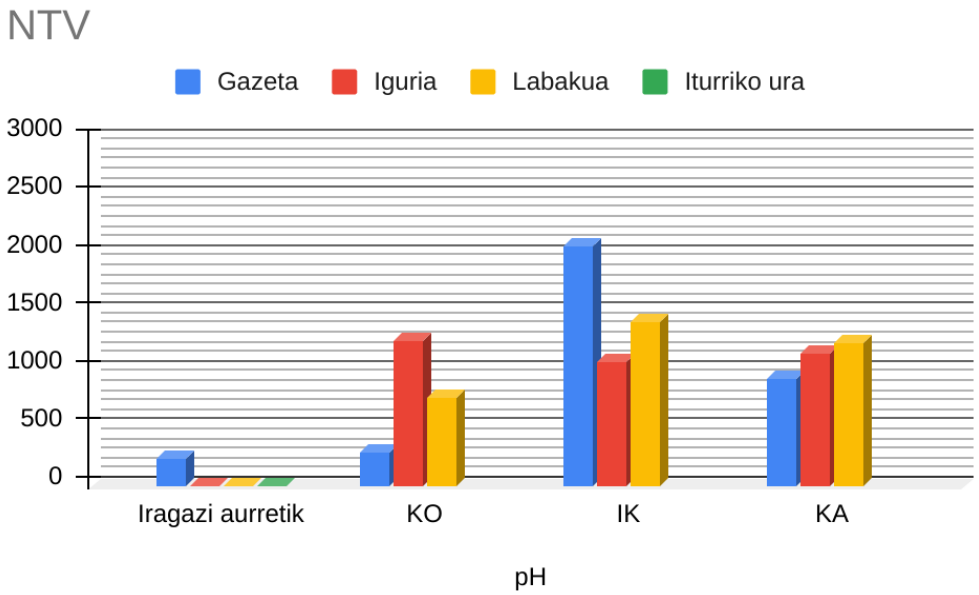
Graphic 8: TDS

Here we can see the TDS of the rivers from Gazeta, Iguria, Labakua and water from the water tap. After filter the water of the three filters have the same TDS, but before filter the TDS is much lower.



Graphic 9: NTV

Here we can see the NTV of the rivers from Gazeta, Iguria, Labakua and the water tap. Water after filtering from the IK filter has the highest NTV and the water of the filter KA has the lowest. However, the water tap doesn't have NTV.



Conclussions

Our filtered waters in general do not show results comparable to the quality of water for human consumption that is permitted by law in our country.

It would be advisable to continue with further research along the lines we have begun, given that access to drinking water will be one of the great challenges facing humanity in the future, especially if we take into account the influence of climate change on the distribution of rainfall and droughts on the planet.

AKNOWLEDGMENTS:
We would like to thank Elhuyar for giving us the opportunity to participate in Zientzia Azoka.
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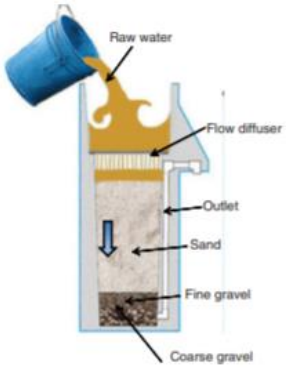

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