A group of children are standing in a pond, holding buckets, participating in a water filtration activity. The pond is filled with lily pads and water. The children are wearing light-colored clothing and are holding buckets of various colors. The background shows a line of trees and a fence. The entire image has a red overlay.

# Innovative Usage of *Fish Scales* on The Detoxification of Waste Water Through Science Education

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# Objectives

- Obtaining a Calcium Rich Collagen Solution
- Precipitating Fluorine ions in Distilled Water

# Collagen

## Type 1 & 3

- ❑ Supports skin, muscles and bone health
- ❑ Hair and nail growth

## Type 2

- ❑ makes up the fluids and function in the cartilage and joints.

Type II-Collagen

# When Collagen Levels Drop

Collagen decreases as you get older, contributing to:

- Thin and wrinkled skin
- Stiffer, less flexible tendons and ligaments
- Shrinking, weakening muscles

# BOVINE



# MARINE



# A Hazard For Our Waters: Fluorine



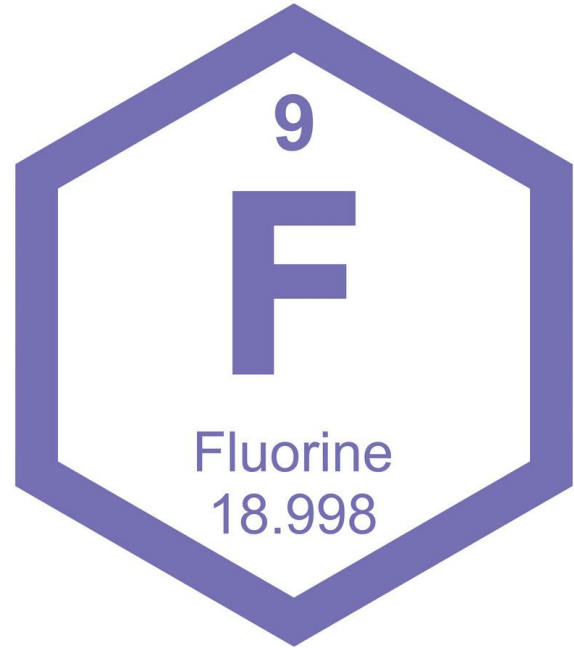
1.3 mg/L



1.5 mg/L

## Benefits of Fluorine

- Decreasing demineralization
- Enhancing remineralization
- Inhibiting bacterial activity



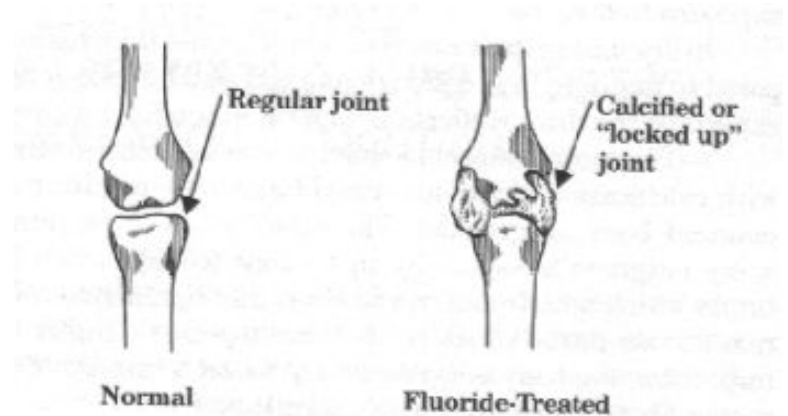


# Detrimental Effects of Fluorine: *Fluorosis*

## 1) Dental Fluorosis



## 2) Skeletal Fluorosis





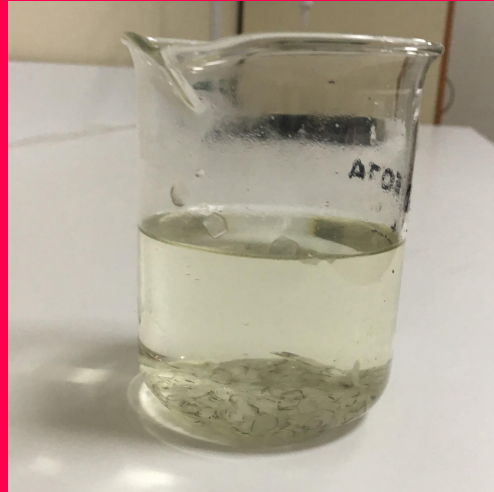


Fluoride treatment methods

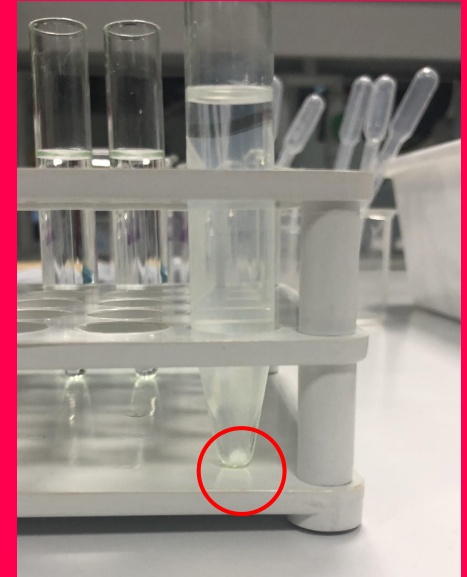
# Our process



**Fish Scales**



**Calcium Rich Collagen Solution**



**Precipitation of Calcium Fluoride**

# Theoretical Analysis, Results & Data



NaF Concentration (M) added into 0.9M $Ca^{+2}$ solution	0.1M (1st Solution)	0.01M (2nd Solution)	0.001M (3rd solution)	0.0001M (4th solution)
$CaF_2$ Precipitate	Observed	Not observed	Not observed	Not observed

# Spectrophotometer

Absorbance:

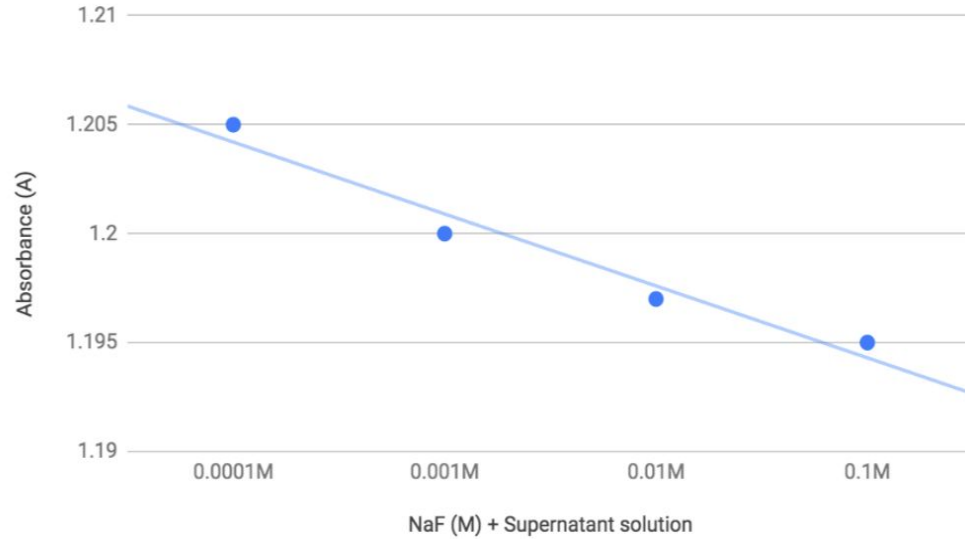
A measure of the capacity of a substance to absorb light at a specified wavelength



The absorbance and ion concentration are directly proportional

**Initial  
Calcium  
Absorbance:  
1.26 A**

Absorbance (A) vs. NaF (M) + Supernatant solution



*As more Fluoride ions are present in the solution, the absorbance values of Calcium ion decreases.*

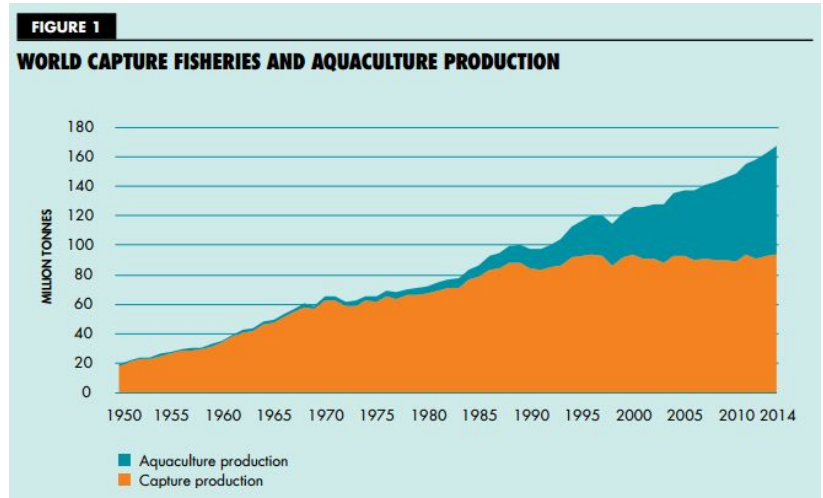


## Turkey

- 8333 km Coastline
- 80791 km square Sea Area
- 10000+ km square Lakes
- 177714 km Streams

# Sustainability

According to the Food and Agriculture Organization of the United Nations, discards from the world's fisheries in 2005 exceeded **seven million tons.**





# Thanks!!

## Any questions?

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