

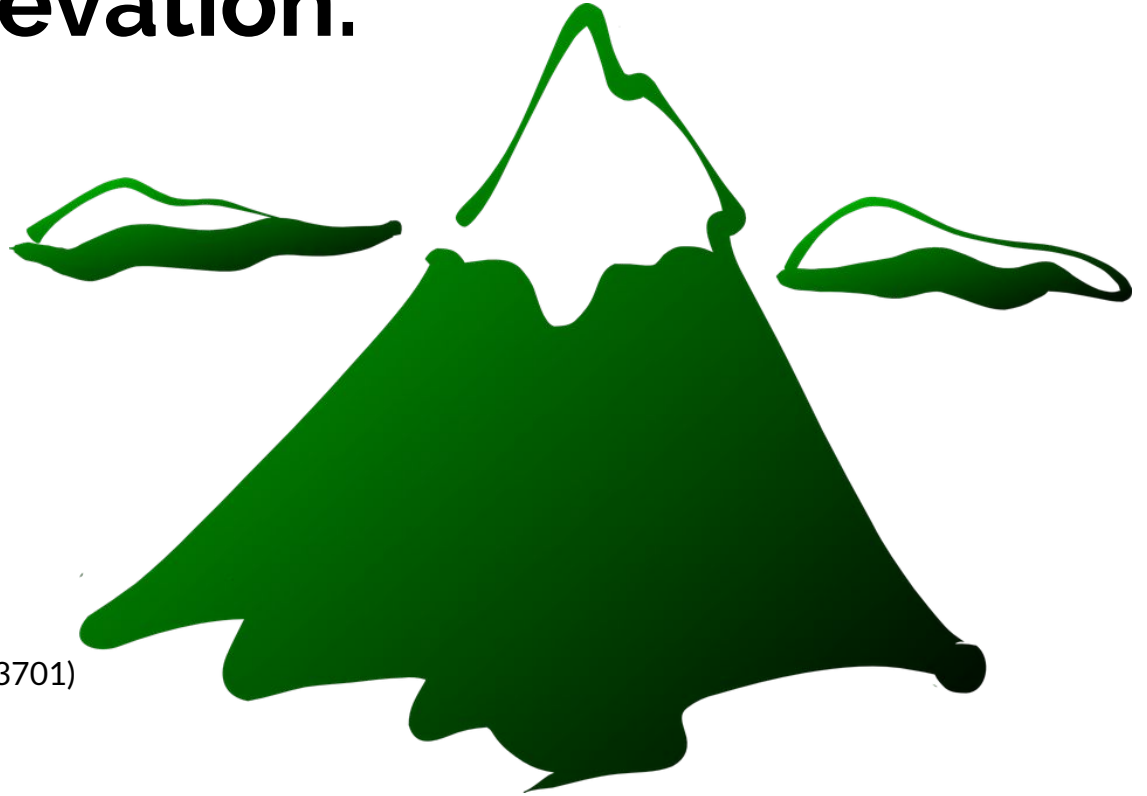
# Life at High Elevation:

Water

Health

Volcanoes

Agriculture



John Escobar & Moira Sweeder  
International Sustainable Development (SUST 3701)  
Stockton University  
Instructor: Dr. Tait Chirenje  
Presentation date: January 10th, 2020

# Outline

1. Biome change with elevation & altitudinal zonation
2. Effects of pressure change on health and lifestyle
3. Water use and supply
4. Agriculture
5. Volcanism

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# Turn & Talk

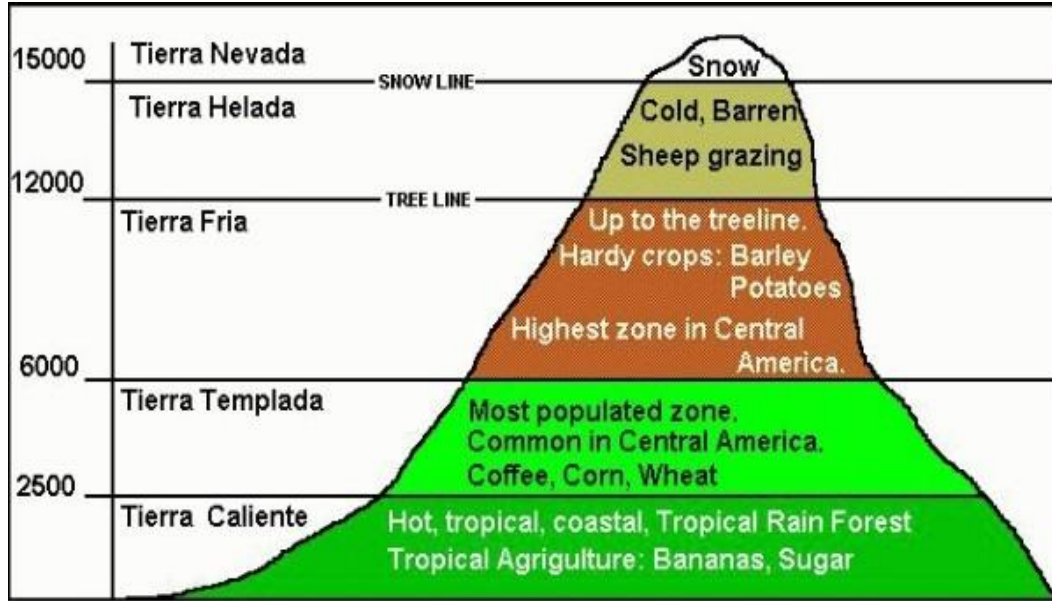
Get into groups of 2-3 for discussion questions that will be presented throughout the evening.

We will ask 1-2 groups to share each time with the whole group.

Thanks for your cooperation!! 😊



# The Andes- Most elevated region in Ecuador

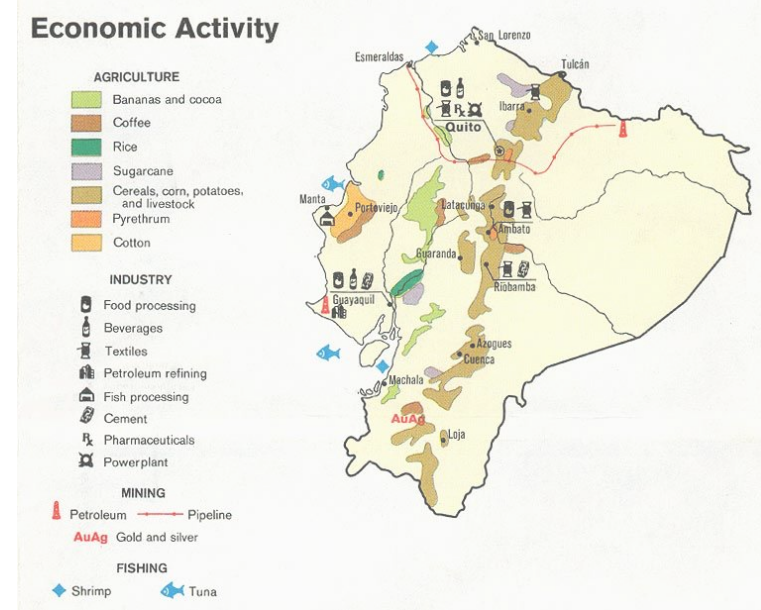
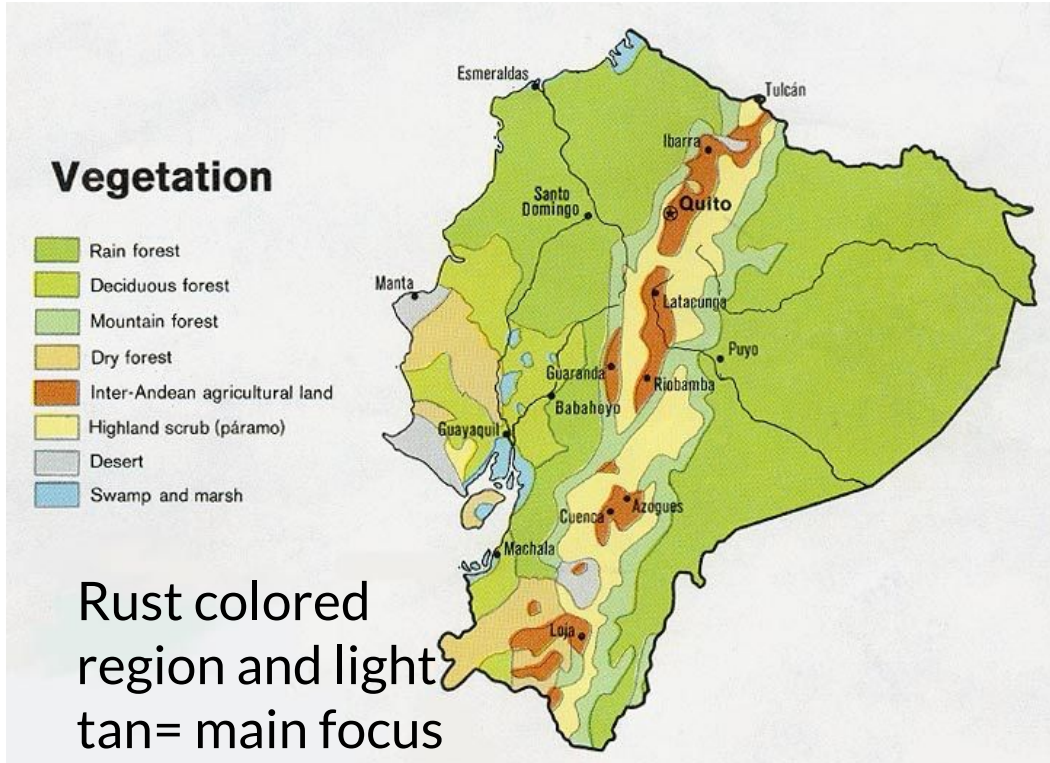


## ALTITUDINAL ZONATION

We will talk about regions between 2500-6000 ft, 6000-12000 ft, 12000-15000ft, & above.



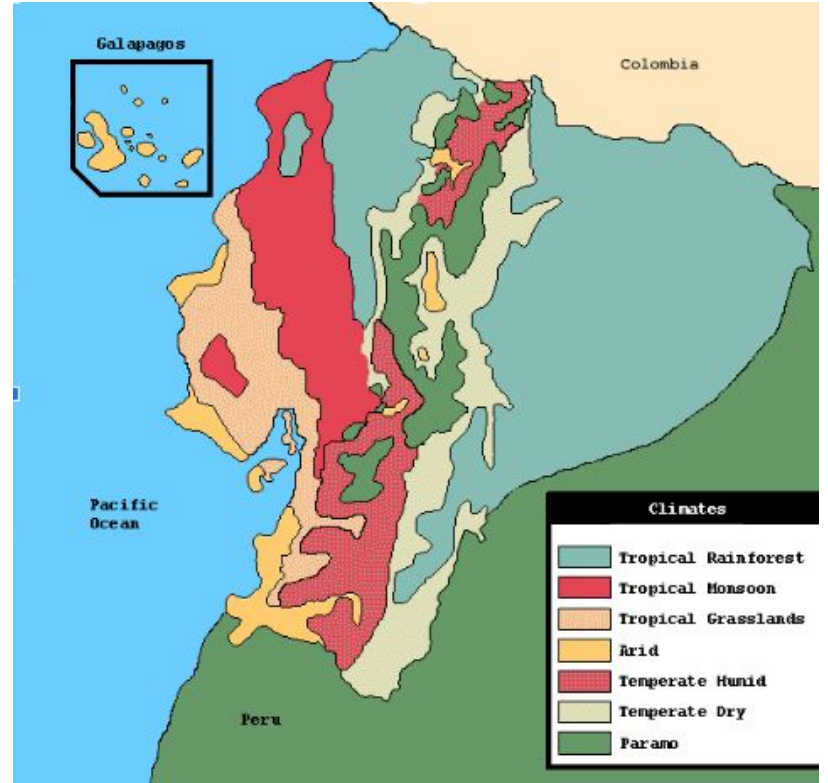
# Maps of High Elevation Farming Regions in Ecuador



# Climate Maps



We will talk about the Paramo ecosystem & temperate farming regions.



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# Turn & Talk

One minute for a brief turn & talk!

Get into groups of 2-3 and discuss the following question:

As altitude increases does air pressure increase or decrease? Explain or give an example.

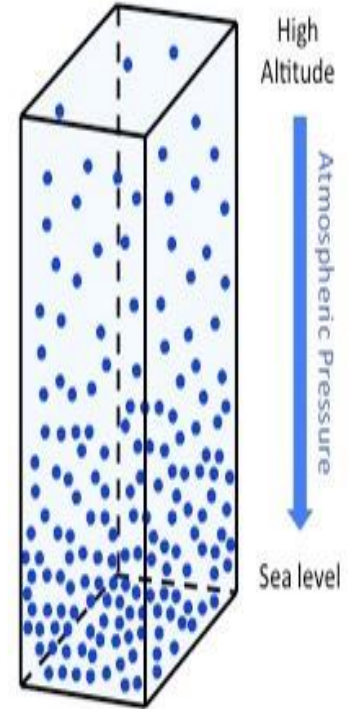
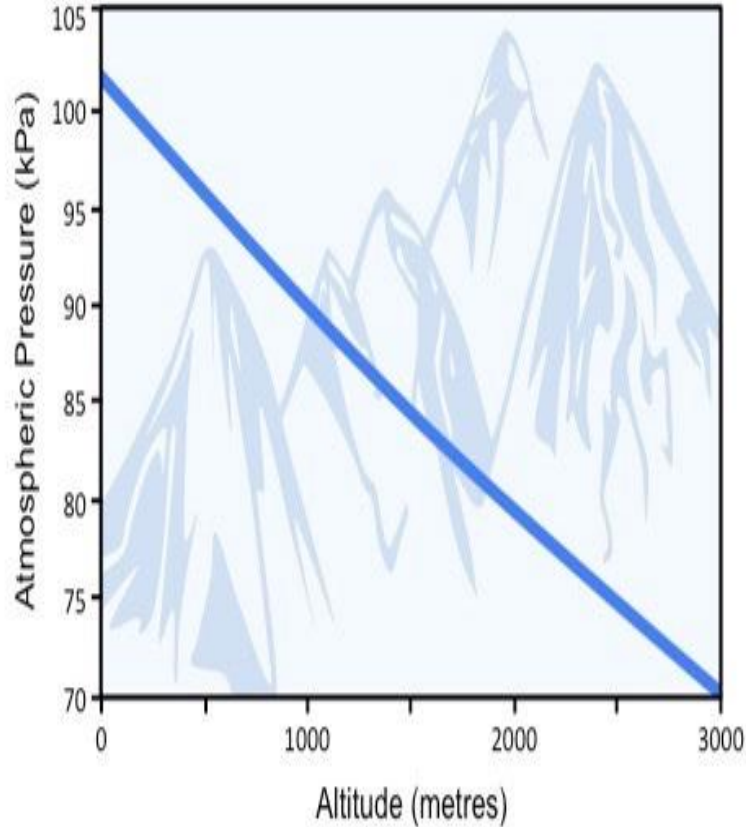
We will need at least 1 group to share :)

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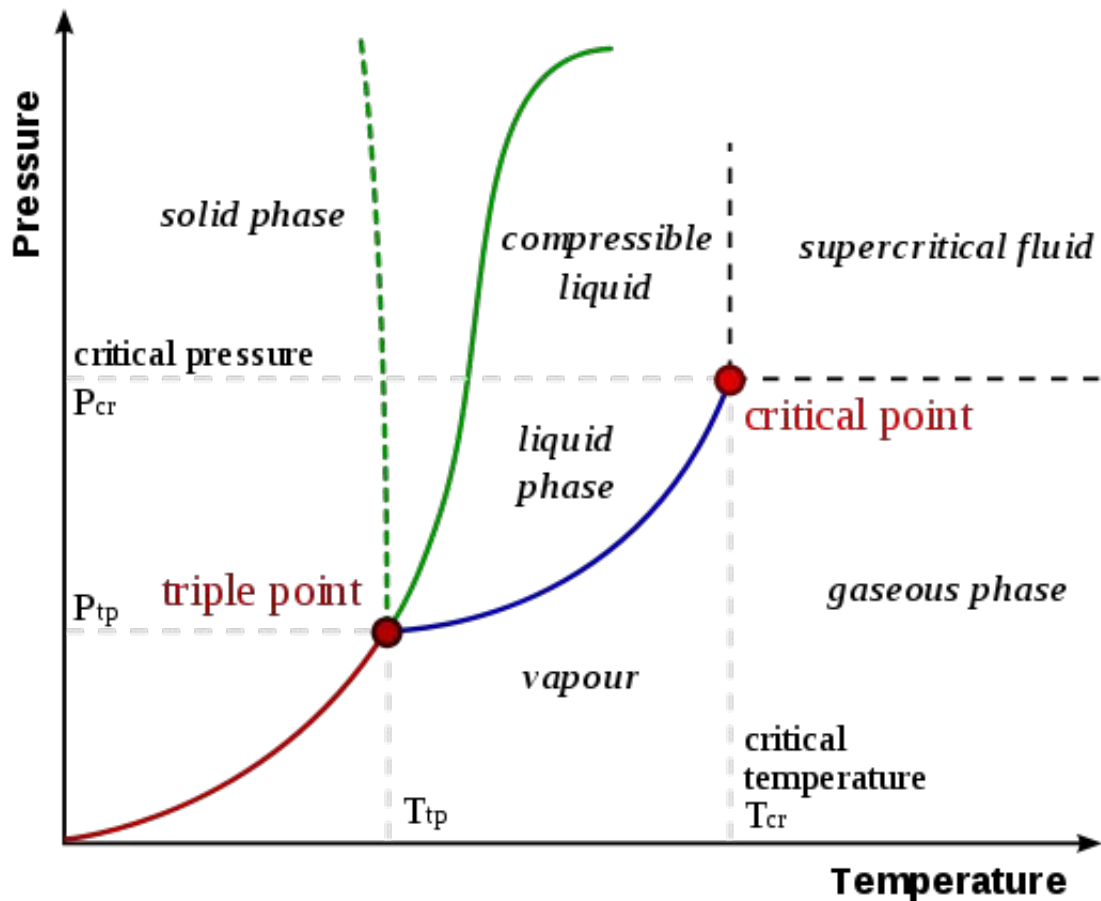
# Pressure

Quito  
Elevation: 9,350'  
Or 2851 meters





# Pressure



# Cooking

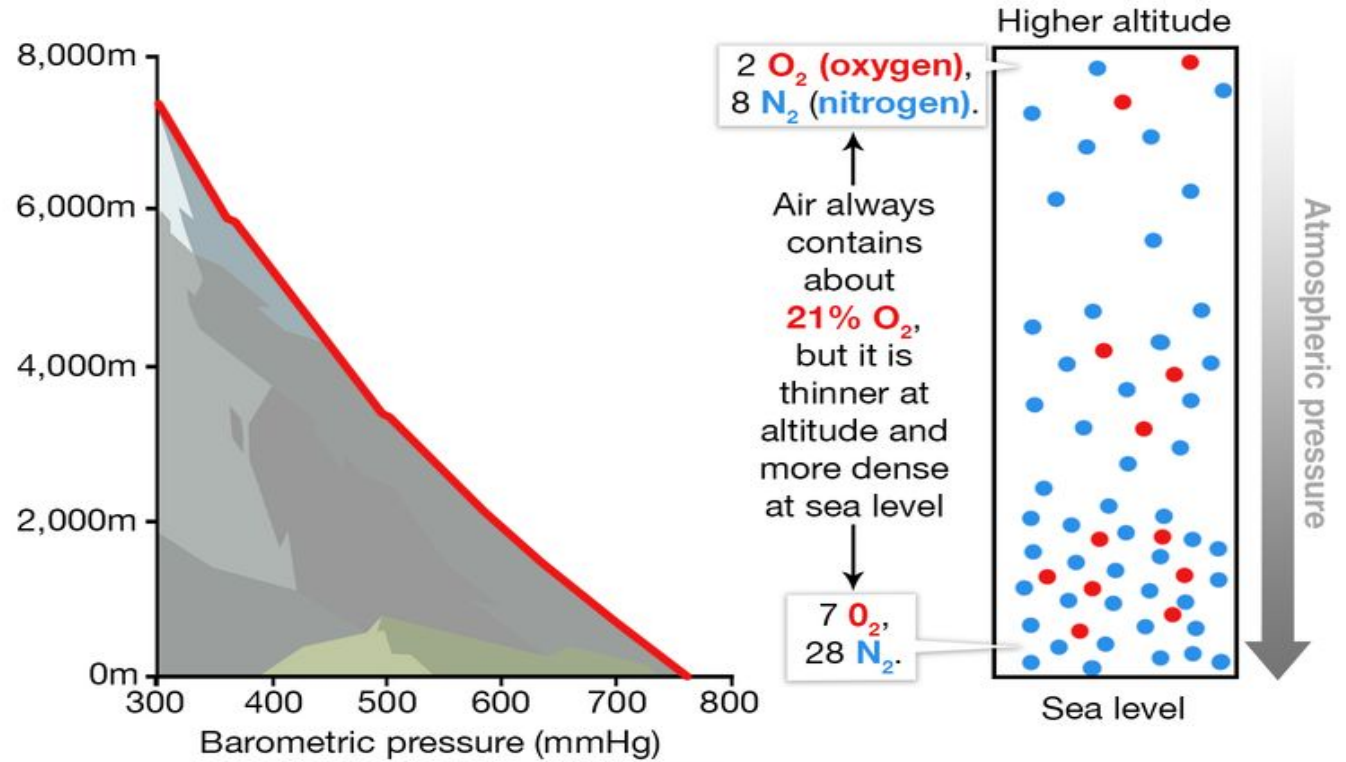
Corn, potatoes, melloco, choncho, and eggs are common in Ecuador's mountain diets. Soup is very commonly eaten.

But cooking at altitude can be tricky.



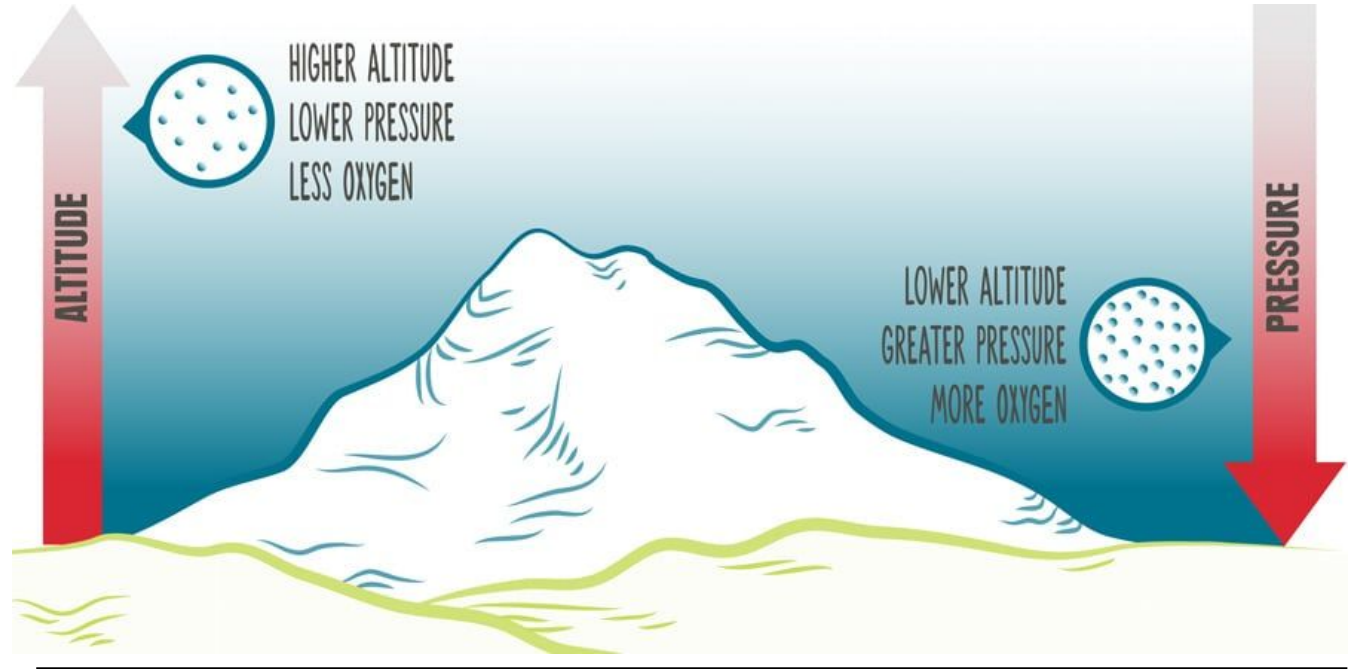
# Oxygen

## The impact of altitude on oxygen levels



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# Both pressure & oxygen decline at higher altitudes



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# Turn & Talk

One minute for a brief turn & talk!

Get into groups of 2-3 and discuss the following question:

Have you ever experienced the physiological effects of low pressure or oxygen?

We will need at least 1 group to share :)

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# Physiological Effects

## Symptoms

- lack of appetite, nausea, or vomiting
- exhaustion or weakness
- dizziness
- insomnia
- pins and needles
- shortness of breath upon exertion
- feeling sleepy
- general malaise
- swelling of the hands, feet, and face



<https://www.medicalnewstoday.com/articles/179819.php#symptoms>

# Dealing with Physiological Effects



# Acute Health Threats





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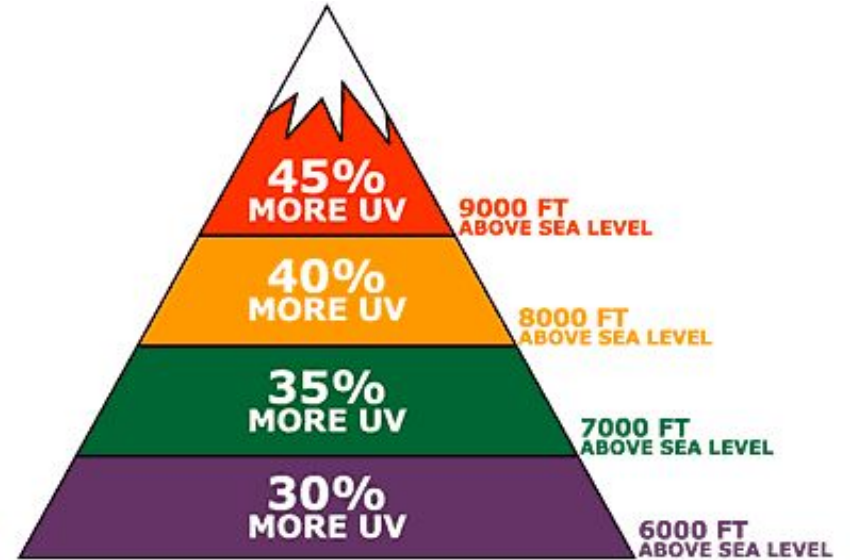
# Positive Physiological Effects



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# Reduced solar protection

“



Even though the temperature is colder at 9000 ft there is more UV exposure.

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# UV Exposure

Plants that grow in mountain regions have developed an increased tolerance to UV rays.



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# Temperature Flux

Homes are constructed by using the most plentiful natural resource.



# Water Supply

## WATER SUPPLY RISK

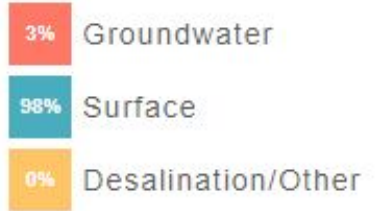
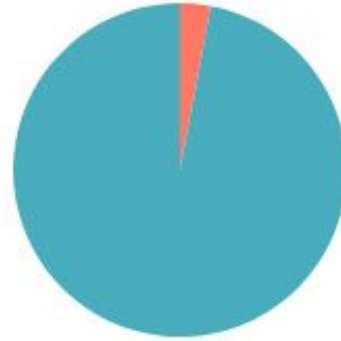
### QUALITY

- High Sedimentation
- High Nutrient Pollution

### QUANTITY

- Not Stressed

## WATER SOURCES



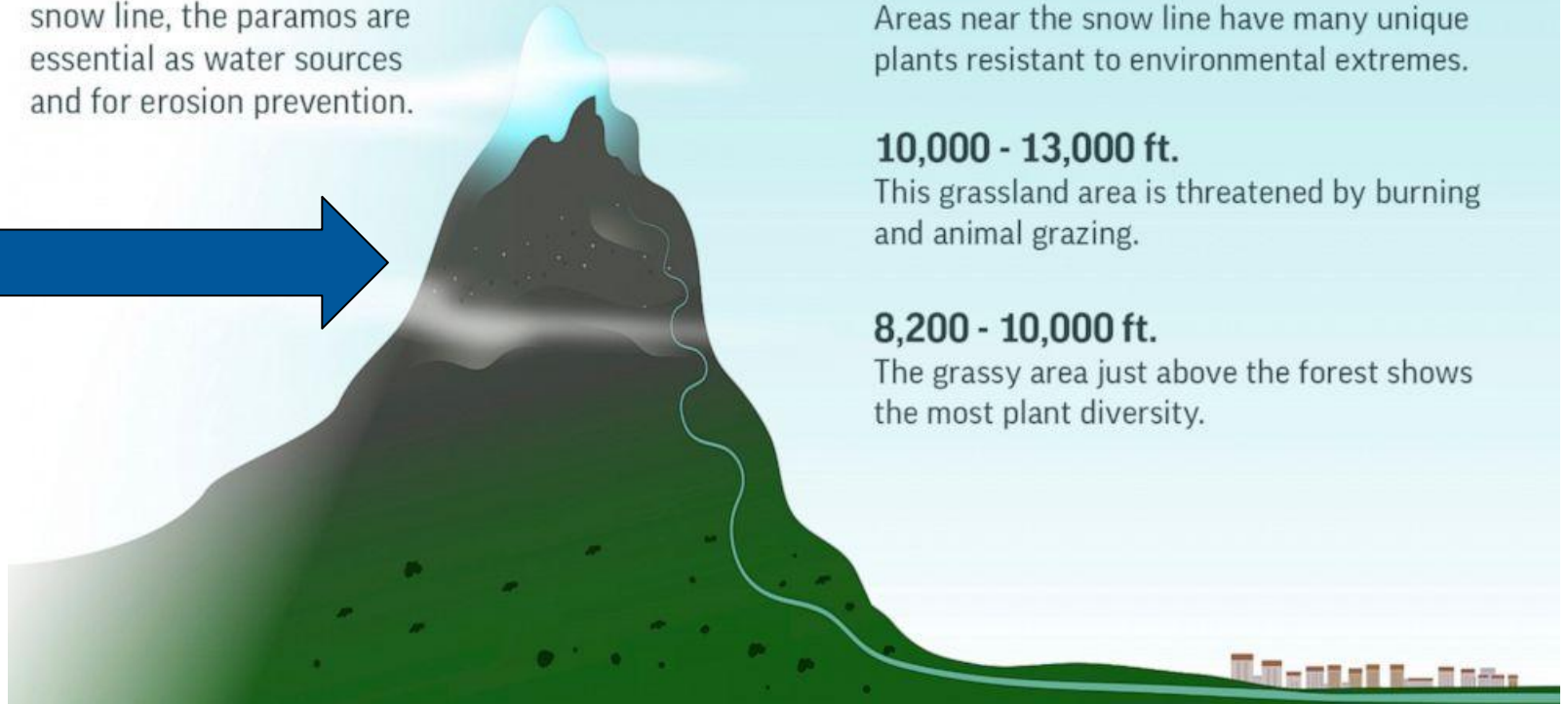
**AVERAGE DISTANCE  
TO SOURCES:**

**34 KM**

# Paramos Region

## The Paramos

Between the tree line and snow line, the paramos are essential as water sources and for erosion prevention.



**13,000 - 16,000 ft.**

Areas near the snow line have many unique plants resistant to environmental extremes.

**10,000 - 13,000 ft.**

This grassland area is threatened by burning and animal grazing.

**8,200 - 10,000 ft.**

The grassy area just above the forest shows the most plant diversity.

# Paramos Region Characteristics



# Paramos Region Characteristics



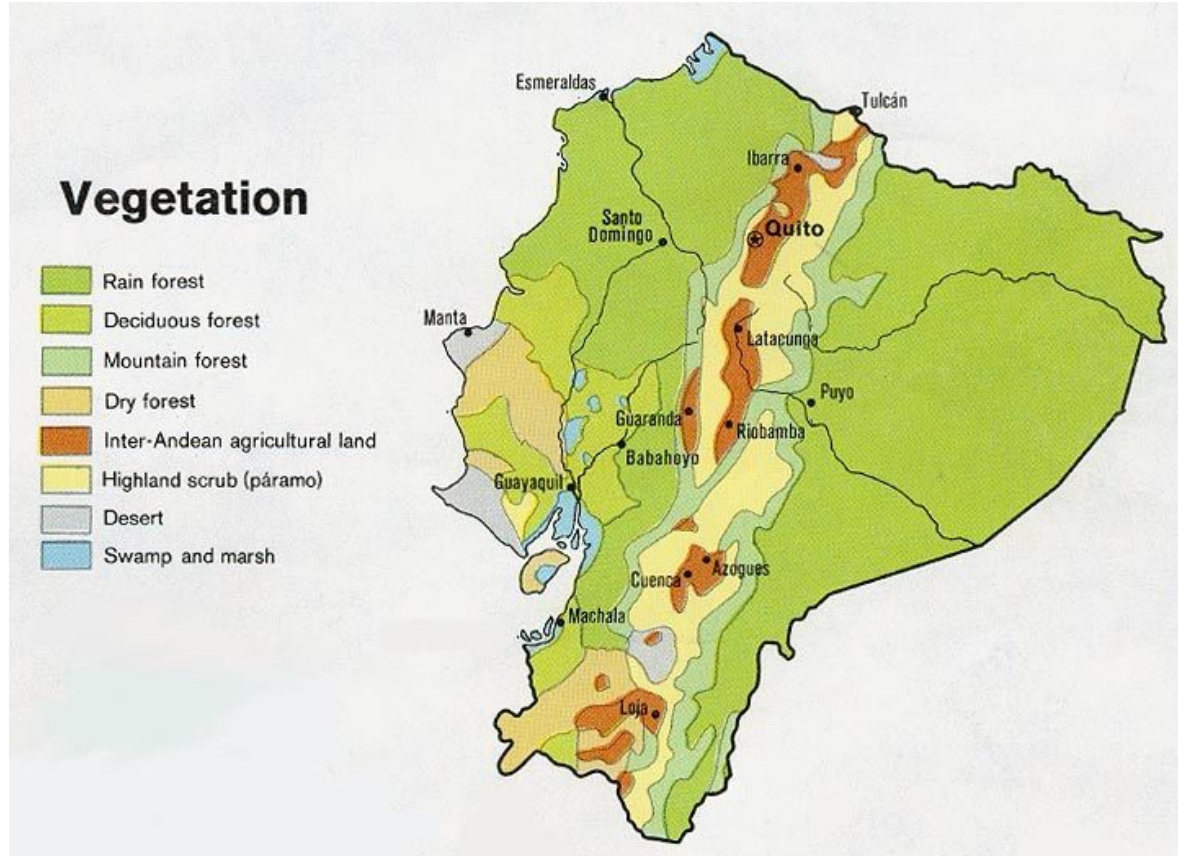


# Paramos and Climate Change

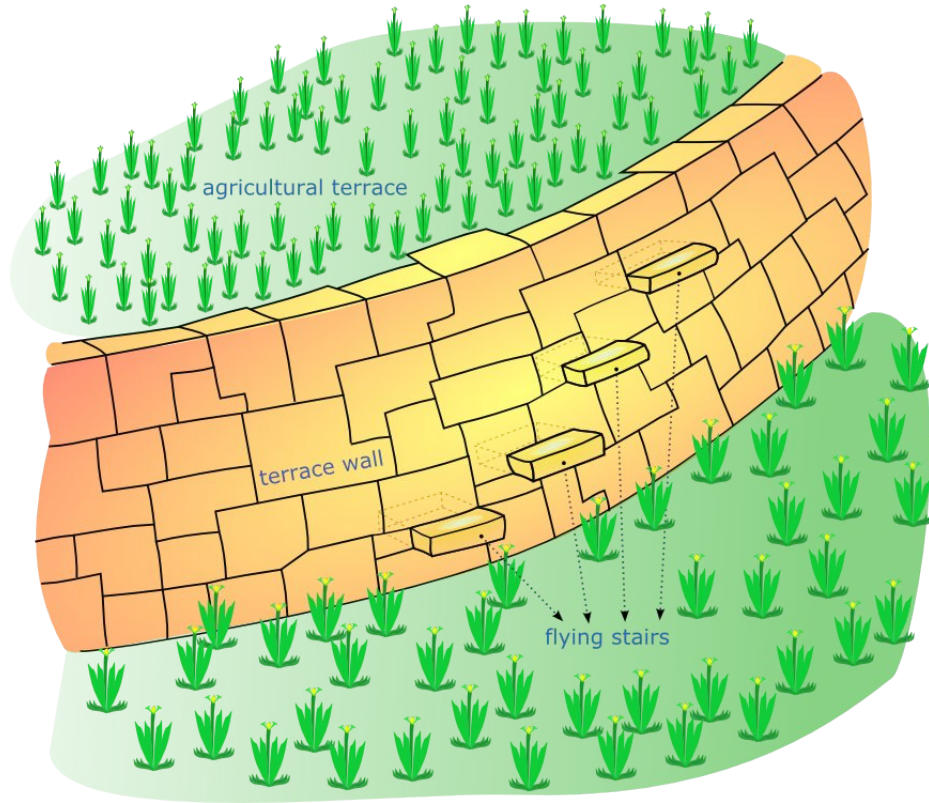


<https://m.youtube.com/watch?v=cgNzS3F64Rc>

# Farming Region Map



# Farming in Mountainous Regions



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# Turn & Talk

One minute for a brief turn & talk!

Get into groups of 2-3 and discuss why you think ancient civilizations living in mountainous regions developed terrace farming?

We will need at least 1 group to share :)



# Brief Background on Terrace Farming



[https://youtu.be/6GyTyHnCX\\_E](https://youtu.be/6GyTyHnCX_E)

# Access in Mountainous Regions



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# Farming in Mountainous Regions



# Crops grown in the Andes

Climbing Bean



Soft Maize



Faba Bean



Potatoes



Barley



These are the most common crops that are grown in the Andes.

These crops thrive at an elevation higher than sea level.



# Greenhouse Crops

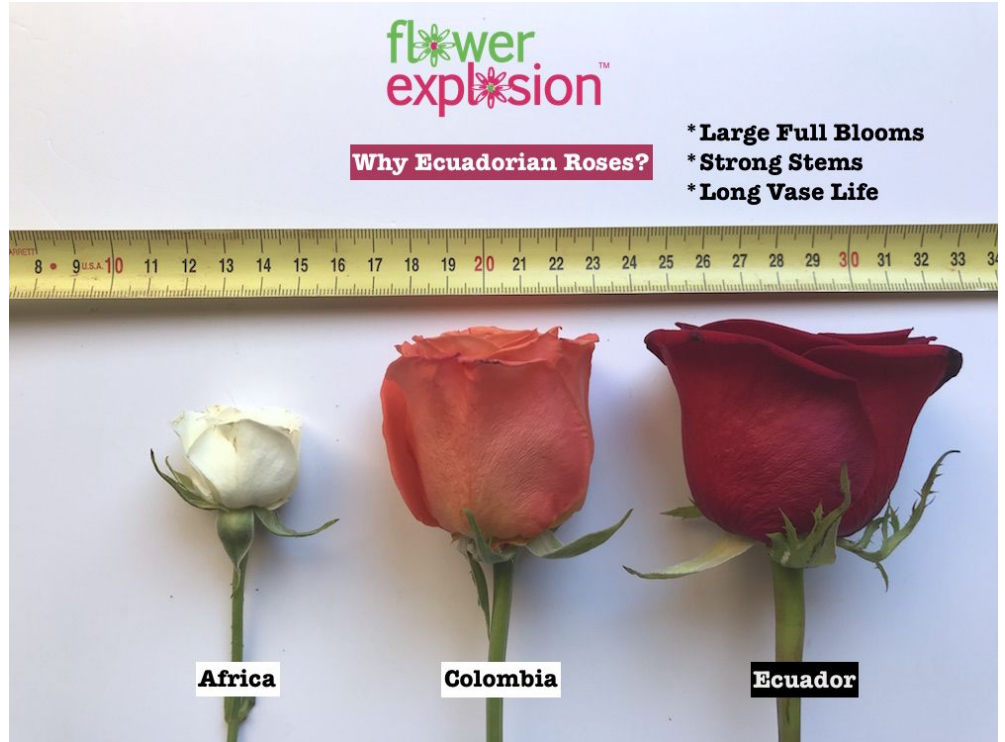


# Example: Rose Production

Main location:

Pichincha province at an elevation of 9,200-10,000 ft.

At this elevation the temperature is cooler.



# Food Supply & Security

Smallholder farms in the Ecuadorian Andes provide the main food supply for both rural & local communities.



# Irrigation at High Altitude



**Aqueducts** are one main source of irrigation.

# Hydroelectric Development

The Andes mountains in Ecuador make the country a prime location for hydroelectric power.

Locations of hydroelectric projects →



1 Manduriacu 2 Toachi Pilatón 3 Coca Codo Sincallr 4 Quiljos  
5 Mazas Dudas 6 Sopladora 7 Minas San Francisco 8 Delsitanisagua

# Volcanic Soil in the Andes

Volcanic eruptions introduce new minerals to the soil.



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# Turn & Talk

One minute for a brief turn & talk!

Get into groups of 2-3 and discuss whether you would rather live on an active or inactive volcano. Explain why.

We will need at least 1 group to share :)

Bonus points if you can name Ecuador's 2<sup>nd</sup> highest & active volcano!

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# Living on an Inactive Volcano- Pululahua Crater

A small community lives on the crater using the rich soil left behind from the eruption.



Pululahua crater is near Quito in a protected reserve. The last eruption of the volcano was over 2,500 years ago.



# Living with Active Volcanoes- Cotopaxi

Those who live near Cotopaxi in the “red zone” which is the most dangerous/close region would face difficulties evacuating due to a lack of transportation.



# Living with Active Volcanoes- Cotopaxi



# Volcano Video

# Climate Change & Farming in the Andes

Crops being grown in the Andes have been experiencing production issues due to rising temperatures.

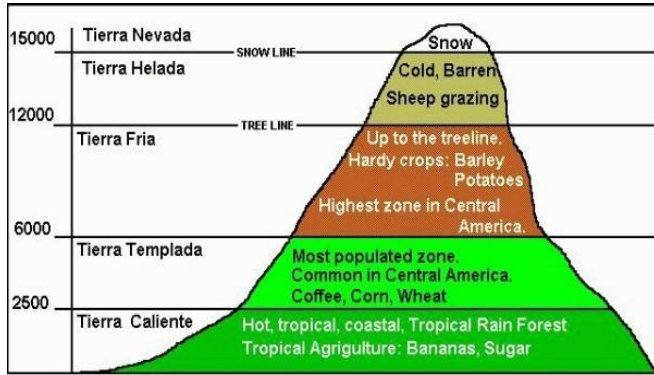


# Climate Change & Farming in the Andes

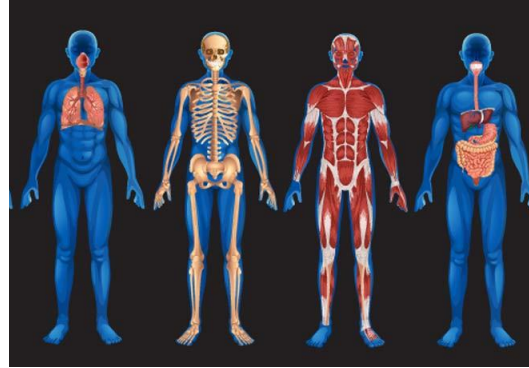


Poverty, lack of sanitation, minimal infrastructure, and declining resources all increase the susceptibility of Andean regions to the effects of climate change.

# Thank you!

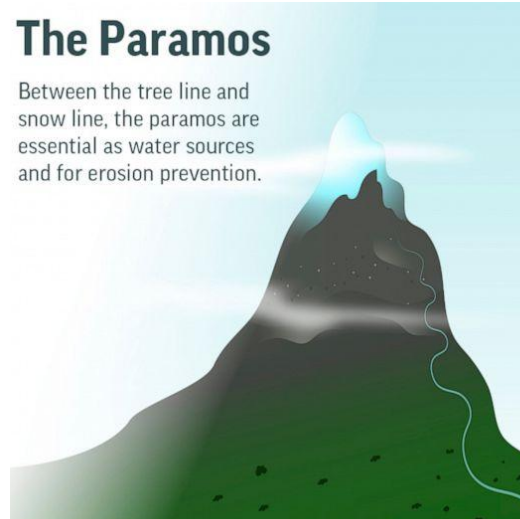


## ALTITUDINAL ZONATION



## The Paramos

Between the tree line and snow line, the paramos are essential as water sources and for erosion prevention.



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farming/ temperature flux

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Water

<https://water.nature.org/waterblueprint/city/quito/#/c=9:-0.79731:-78.40208>

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