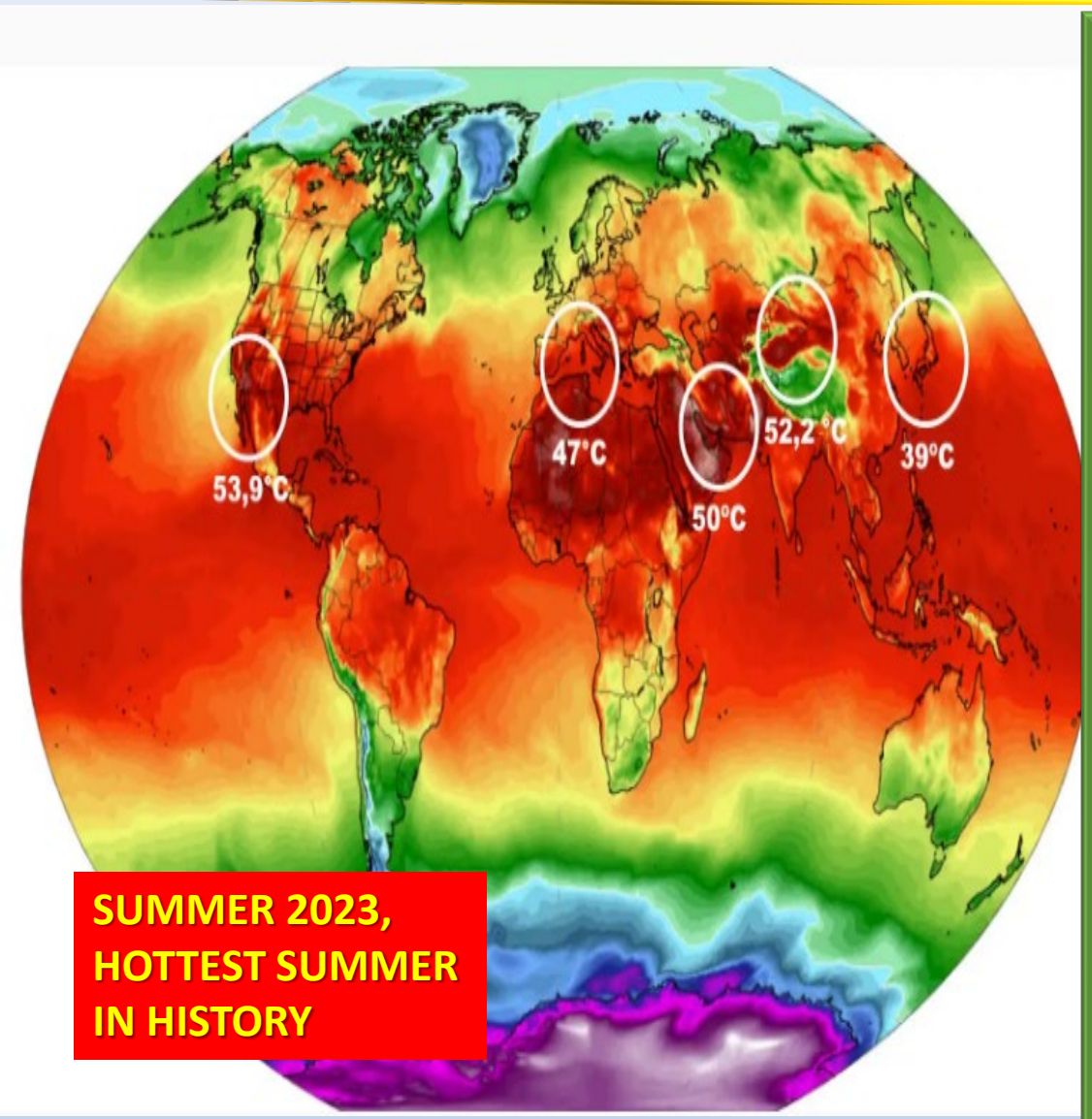
NEW TECHS IN AMAZON RAINFOREST: THE ROLE OF THE EUROPEAN UNION

FAUSTINO GUDIN
EUFJE

GLOBAL WARMING BY JULY 2023

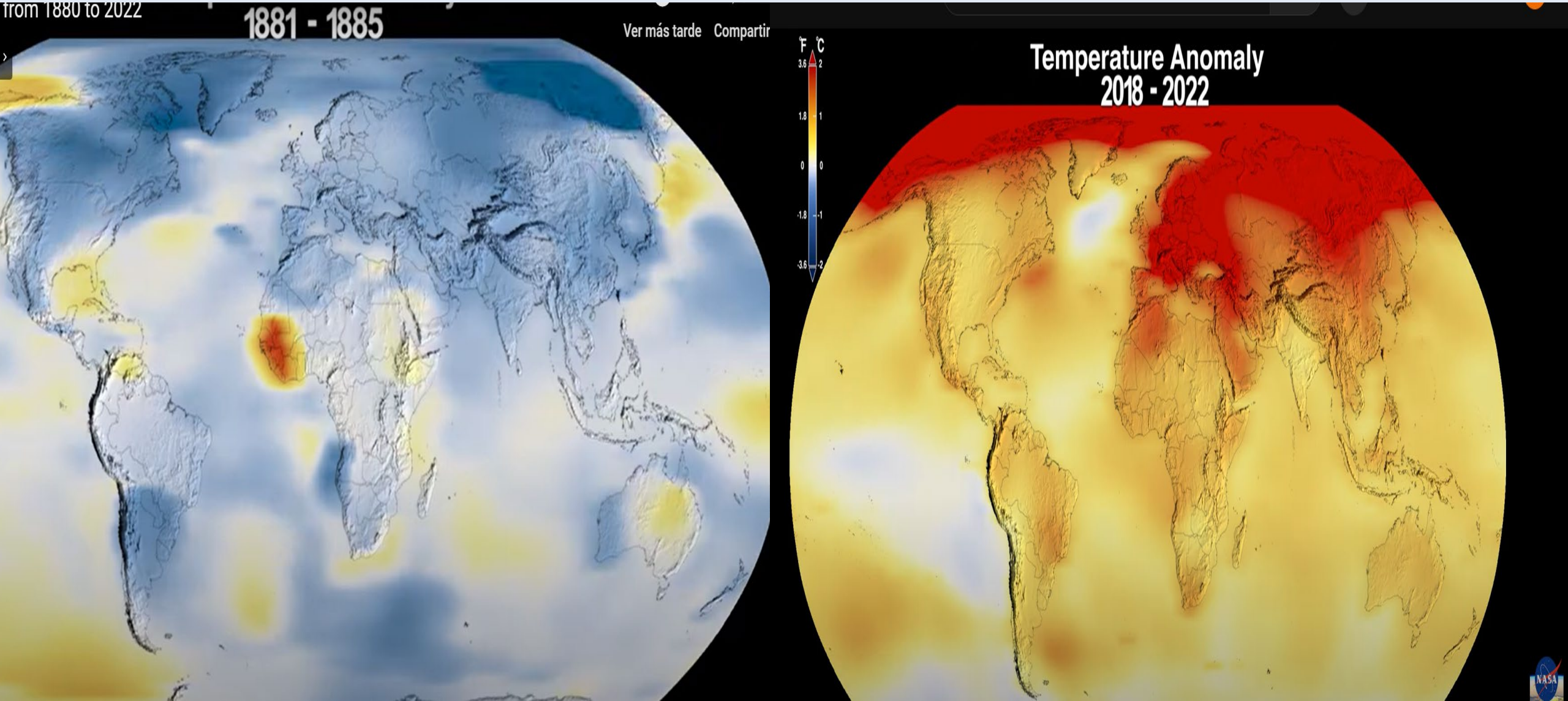
The year 2023 was the warmest year since global records began in 1850 at 1.18°C above the 20th-century average.

The 10 warmest years in the 174-year record have all occurred during the last decade (2014–2023)

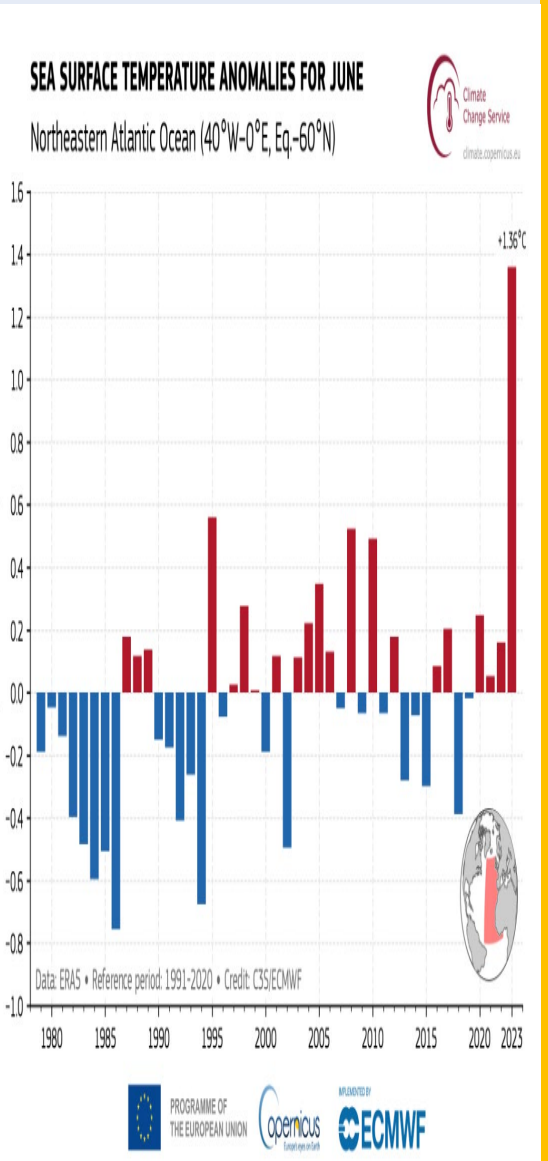


However, scientists point out that July's temperatures were the warmest in 120,000 years, based on millennia of climate data obtained by studying tree rings, coral reefs and deep-sea deposits.

TEMPERATURE CHANGES ACCORDING TO NASA



WARMING OF THE MEDITERRANEAN AND BALTIC SEAS

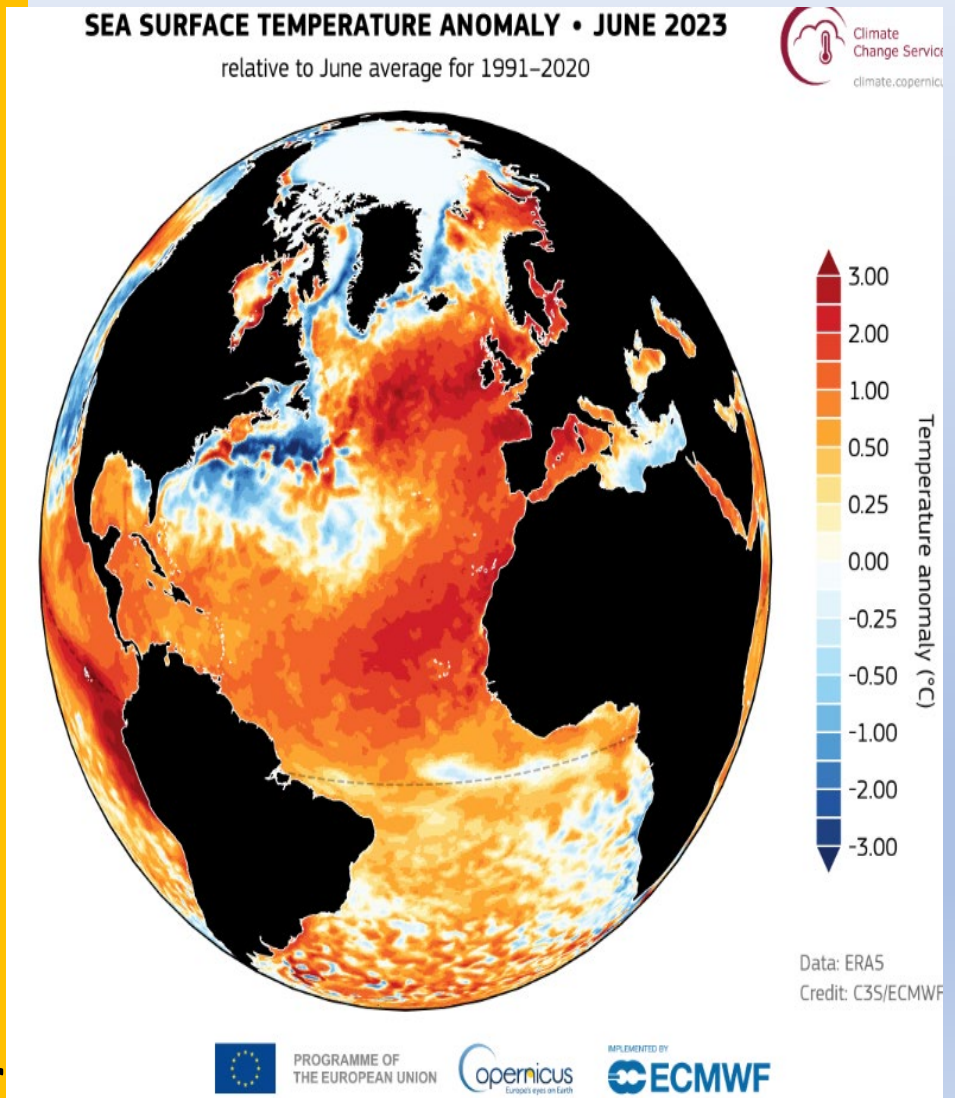


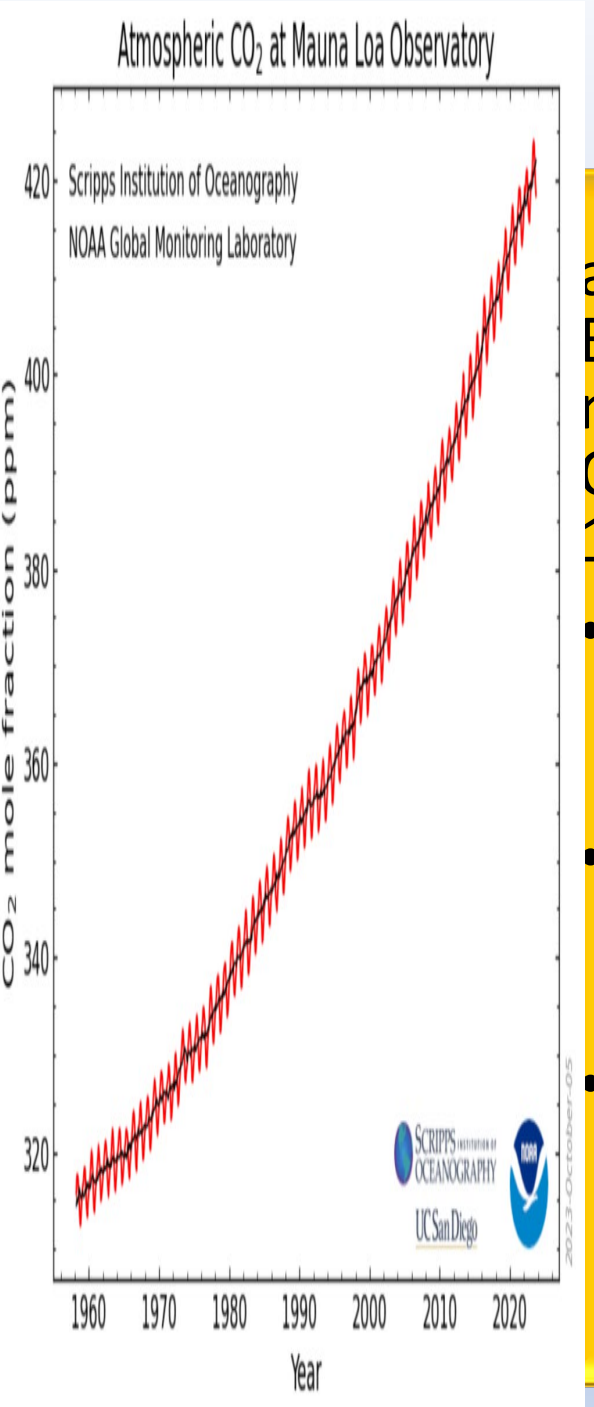
Mediterranean waters reached in some parts 31.36 degrees on July 27, 2022.

The average surface temperature in the Mediterranean reached 28.7 degrees Celsius on July 24, 2023, the highest in history.

According to the EU's Copernicus programme, the average daily surface temperature in the Baltic in 2023 will reach 20.96 °C and exceed the 2016 average, which reached a record 20.95 °C.

Measurements of water surface temperature from ships have been made for more than 150 years, and researchers found that the average global ocean surface temperature has increased by almost 0.9 °C over the entire observation period, and by about 0.6 °C in the last four

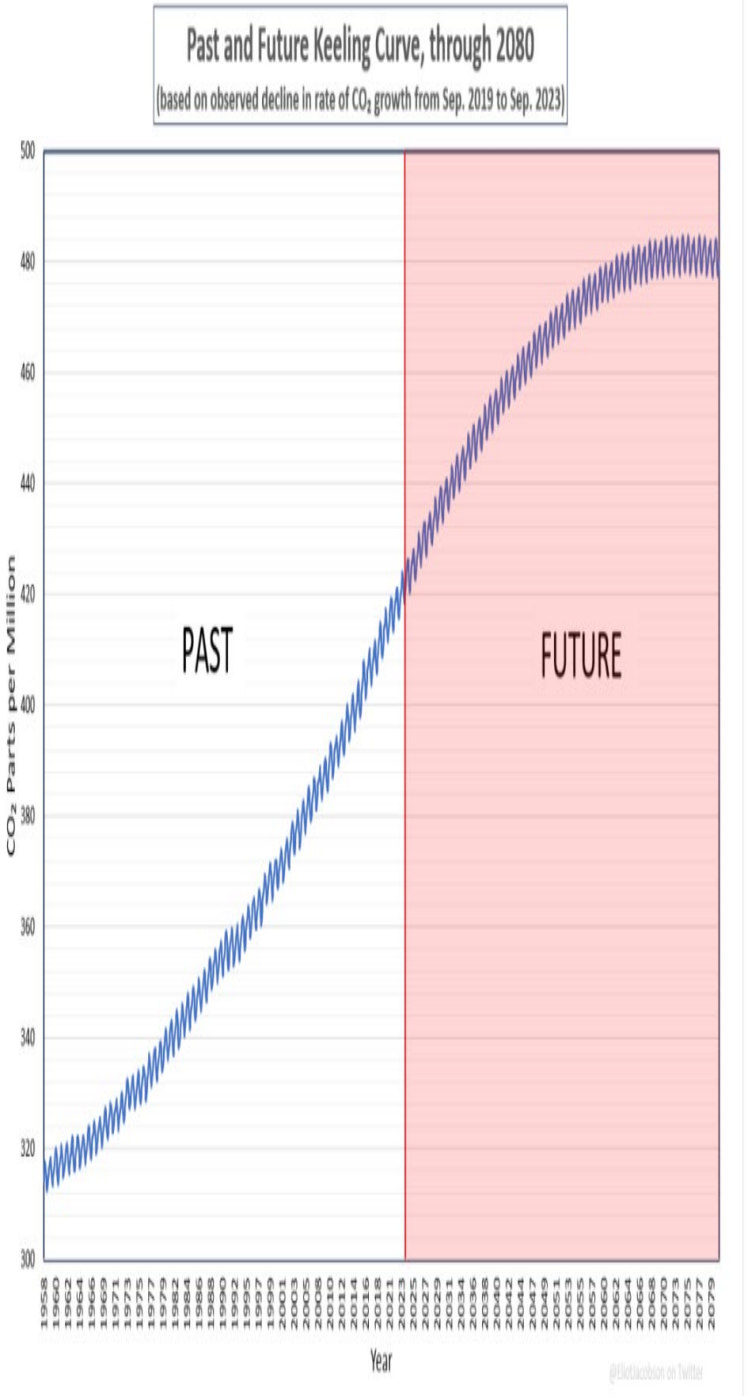




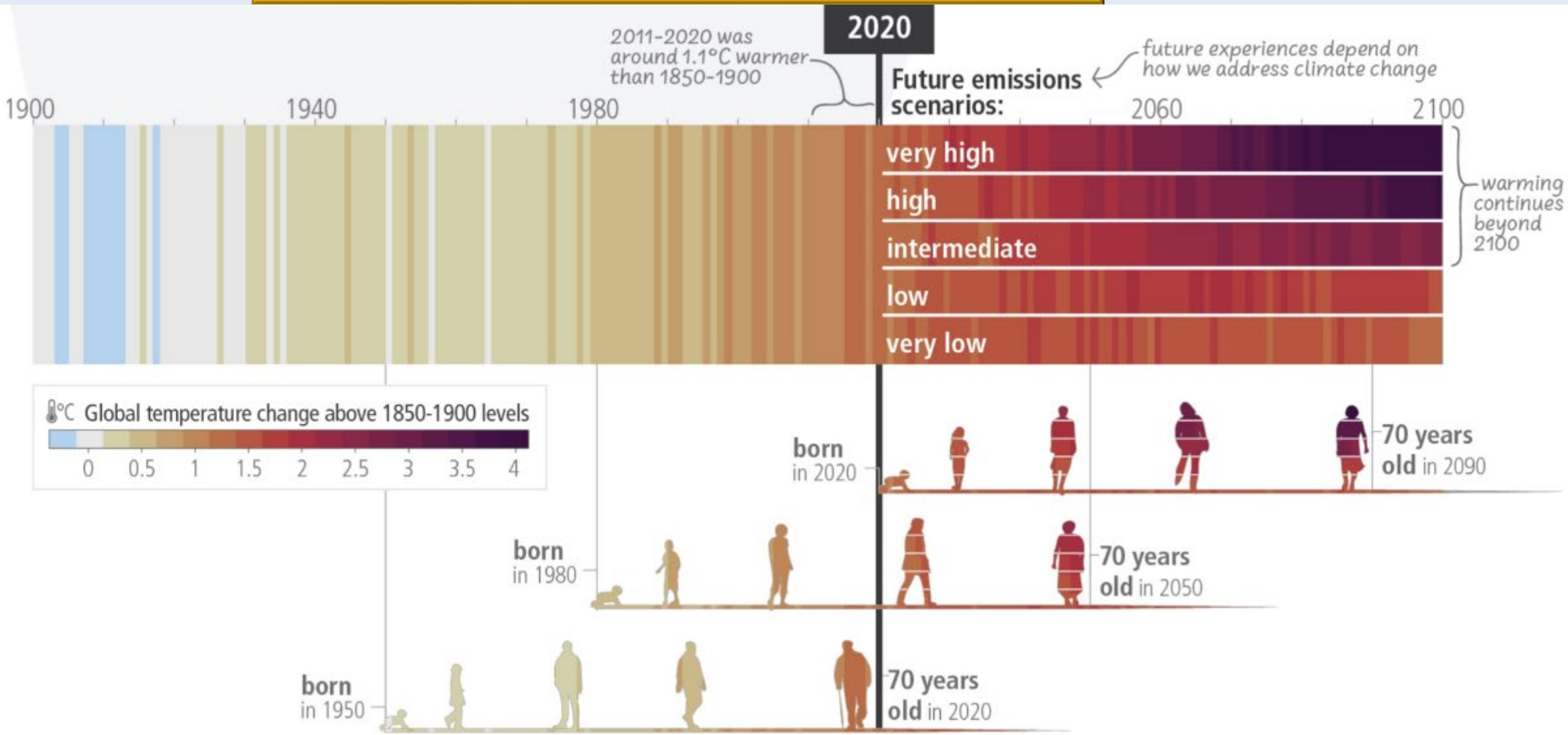
KEELING CURVE

The Keeling Curve is a graph of the accumulation of carbon dioxide in the Earth's atmosphere based on continuous measurements taken at the Mauna Loa Observatory on the island of Hawaii from 1958 to the present day.

- There's no question that CO_2 is going to blast through 430 ppm and 440 ppm over the next ten years.
- Most scientists place the point of no return at around 450 CO_2 parts per million by volume (ppmv).
- Annual increase concentration CH4(methane) about 10 ppb/ year since 2010.



PROGNOSIS


2020
2011-2020 was around 1.1°C warmer than 1850-1900
future experiences depend on how we address climate change
1900
1940
1980
2060
2100
Future emissions scenarios:
very high
high
intermediate
low
very low
warming continues beyond 2100
°C Global temperature change above 1850-1900 levels
0
0.5
1
1.5
2
2.5
3
3.5
4
born in 2020
70 years old in 2090
born in 1980
70 years old in 2050
born in 1950
70 years old in 2020

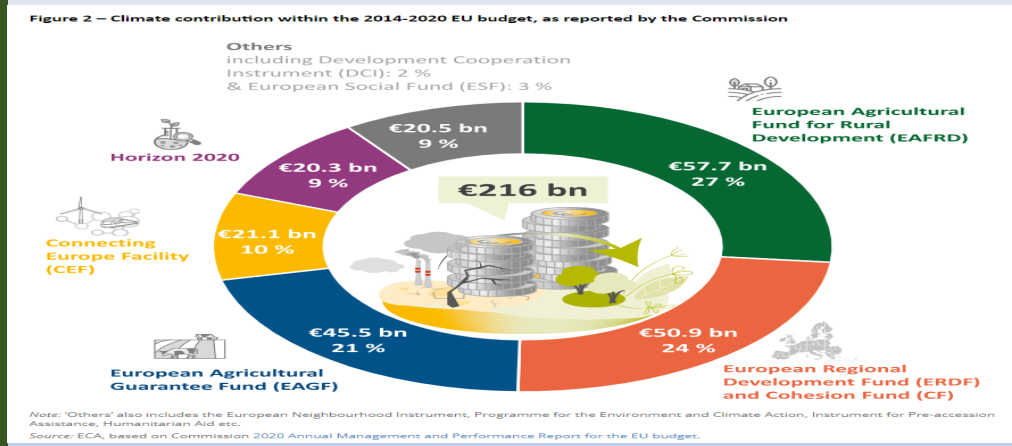
PROGNOSIS

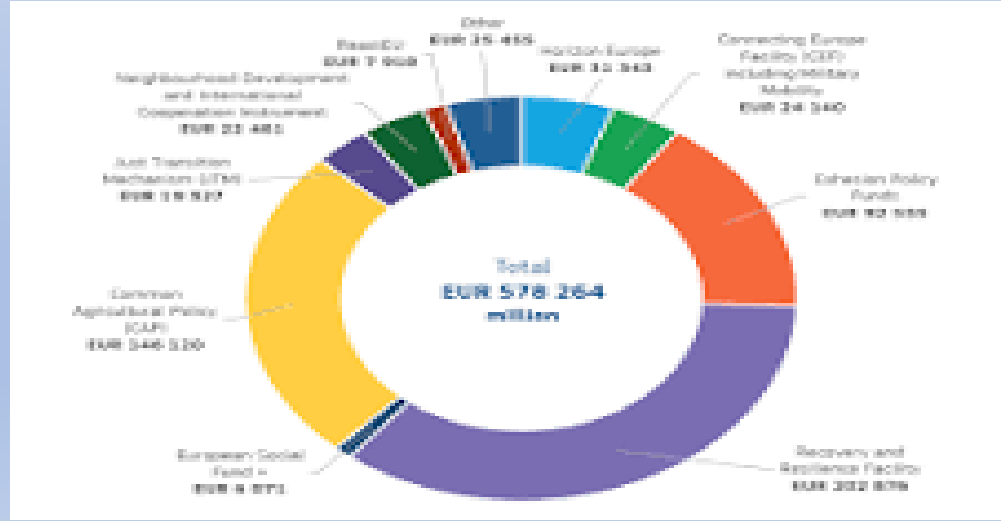
Global heat deaths are projected to increase by 370% if action is not taken to limit the effects of global warming, according to a study published in The Lancet, a medical journal in 2023 (a health impact assessment study in 854 cities in Europe).

Heat-related deaths of adults 65 and older increased by 88 percent between 2018 and 2022, compared with 2000-04.

CLIMATE SPENDING IN THE 2014-2020 EU BUDGET

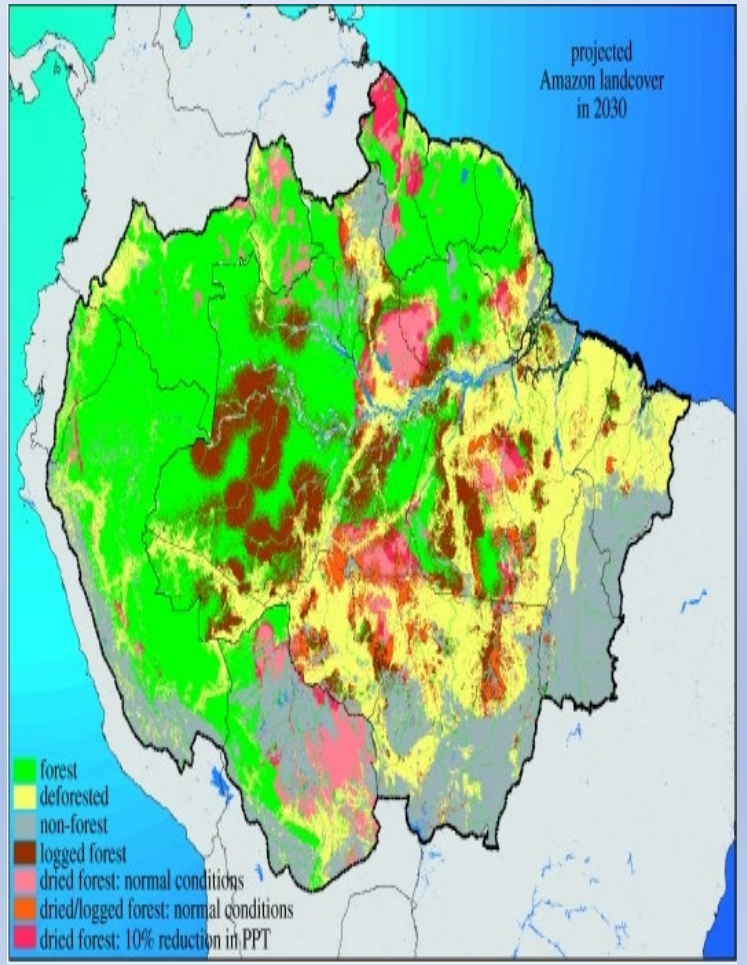
- The EU committed to spending at least 20 % of the budget for 2014-2020 on climate action.
- In 2021, the Commission reported that it had met the target, having spent €216 billion (20.1 %) on climate-relevant measures.
- For the 2021-2027 period, the EU budget – including NextGenerationEU – is projected to contribute EUR 578 billion to climate spending, representing 32.6% of the budget envelope.



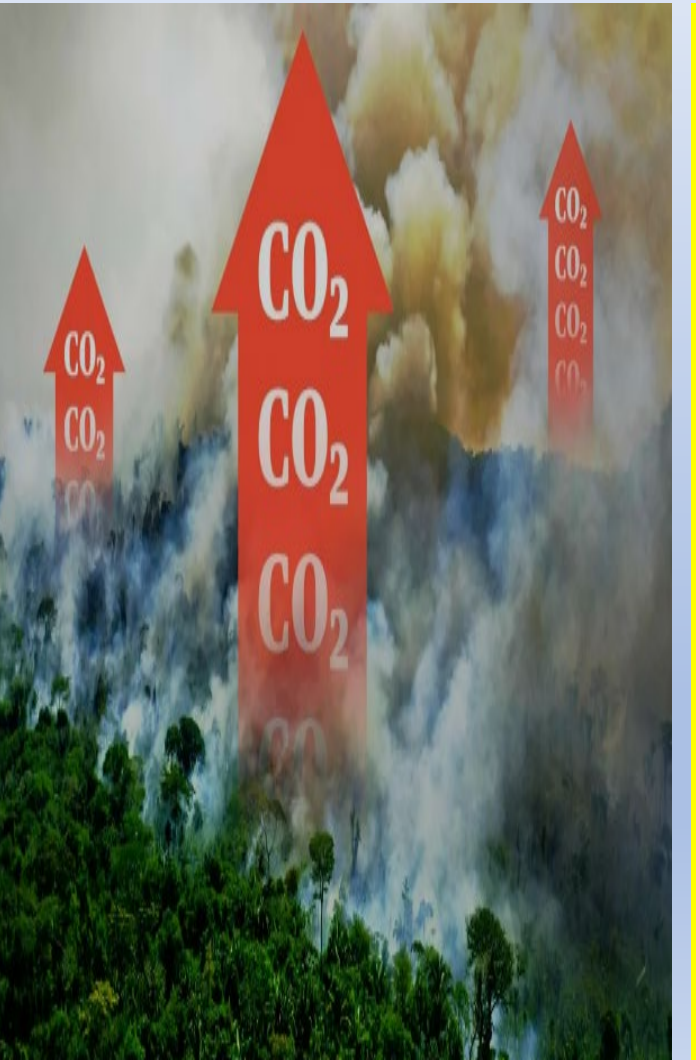


THE NEW ROLE OF AMAZON FOREST IN THIS NEW SCENARIO

- The Amazon rainforest is nicknamed the “lungs of the earth” because it is a vital source of oxygen for the entire planet.
- As an ecosystem, the Amazon is one of the most biodiverse places on earth. Over 3 million species live in the rainforest (10% planet) , and over 2,500 tree species (or one-third of all tropical trees that exist on earth) help to create and sustain this vibrant ecosystem.
- Like many wilderness areas, it is under threat from human activities. Just 2.8% of the world’s terrestrial surface is still “wild” or mostly intact.
- The Amazon River and its tributaries contain 20% of the world's flowing freshwater and the Amazon rainforest hosts one-third of all known terrestrial plant, animal, and insect species.



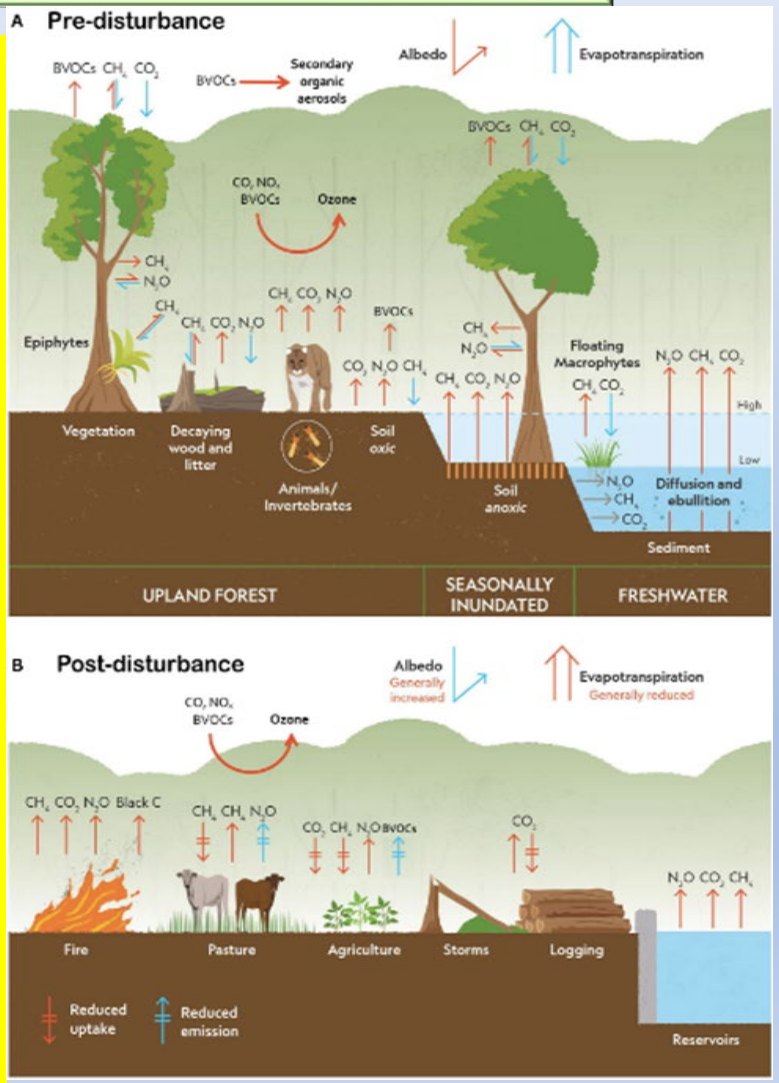
LOSS OF THE AMAZON RAINFOREST'S ABILITY TO ABSORB CARBON DIOXIDE



The Amazon rainforest holds an estimated 123 billion tons of carbon above and below ground.

It absorbs around **5% of the total annual carbon dioxide emissions** worldwide, sequestering about **2.2 billion tons of CO_2** each year.

Forests play a crucial role in maintaining the global carbon budget. Worldwide, they suck up 2.4 billion metric tons of carbon each year, with the massive Amazon absorbing a quarter of that total.



A CHANGE OF PARADIGM

The Amazon rainforest used to absorb a lot of carbon dioxide (CO_2) but now absorbs 30% less due to deforestation.

This deforestation has caused the Amazon to switch from absorbing CO_2 to producing it, leading to rising global temperatures.

Alarmingly, the Amazon's hottest months are now 3.07 degrees Celsius warmer compared to the past. This is on par with the Arctic's warming and triples the global average.

If deforestation continues and reaches 20-25% of the Amazon, the rainforest will irreversibly turn into a savanna (grassland).

AMAZON HUMIDITY

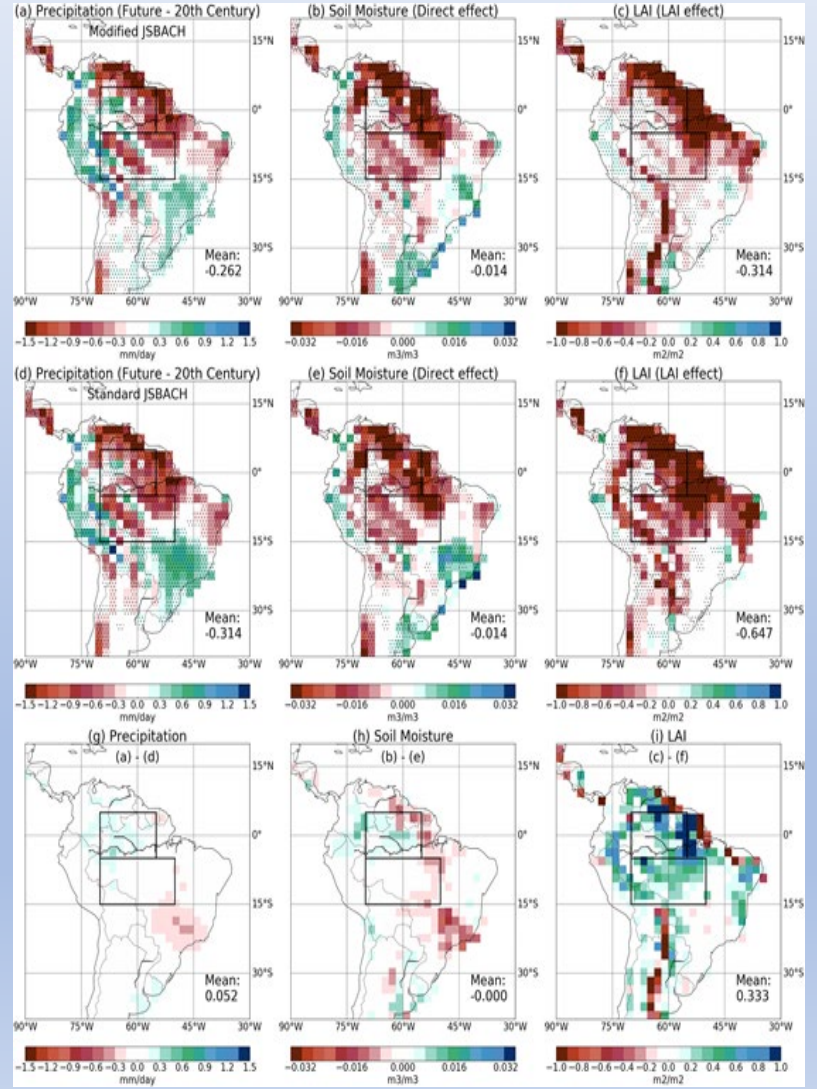
Each day, the trees in the Amazon release 20 billion tons of moisture into the atmosphere, seeding the clouds with rain, much of which ends up in the Atlantic.

It is capable of regenerating 75% of the rainfall it produces.

This moisture is an essential factor in the Gulf Stream.

If evapotranspiration and its role in maintaining the ecological balance is altered, the climate of the entire region and the Gulf Stream will be significantly impacted.

It acts as the planet's air conditioner



THE THIN HUMUS LAYER IN AMAZON RAINFOREST

The nutrient-rich humus layer is only a few millimeters thick in many tropical rainforests.

Without moisture, the soil tends to become a savanna and dry out.

Once the key factor of humidity is lost, soil with low humus quality erodes and the climate becomes hotter.

EMERGING THREATS

ILLEGAL LOGGING

GOLD MINING

CRIMINAL ACTIVITIES

PRE-POLIFEROUS EXPLOITATIONS

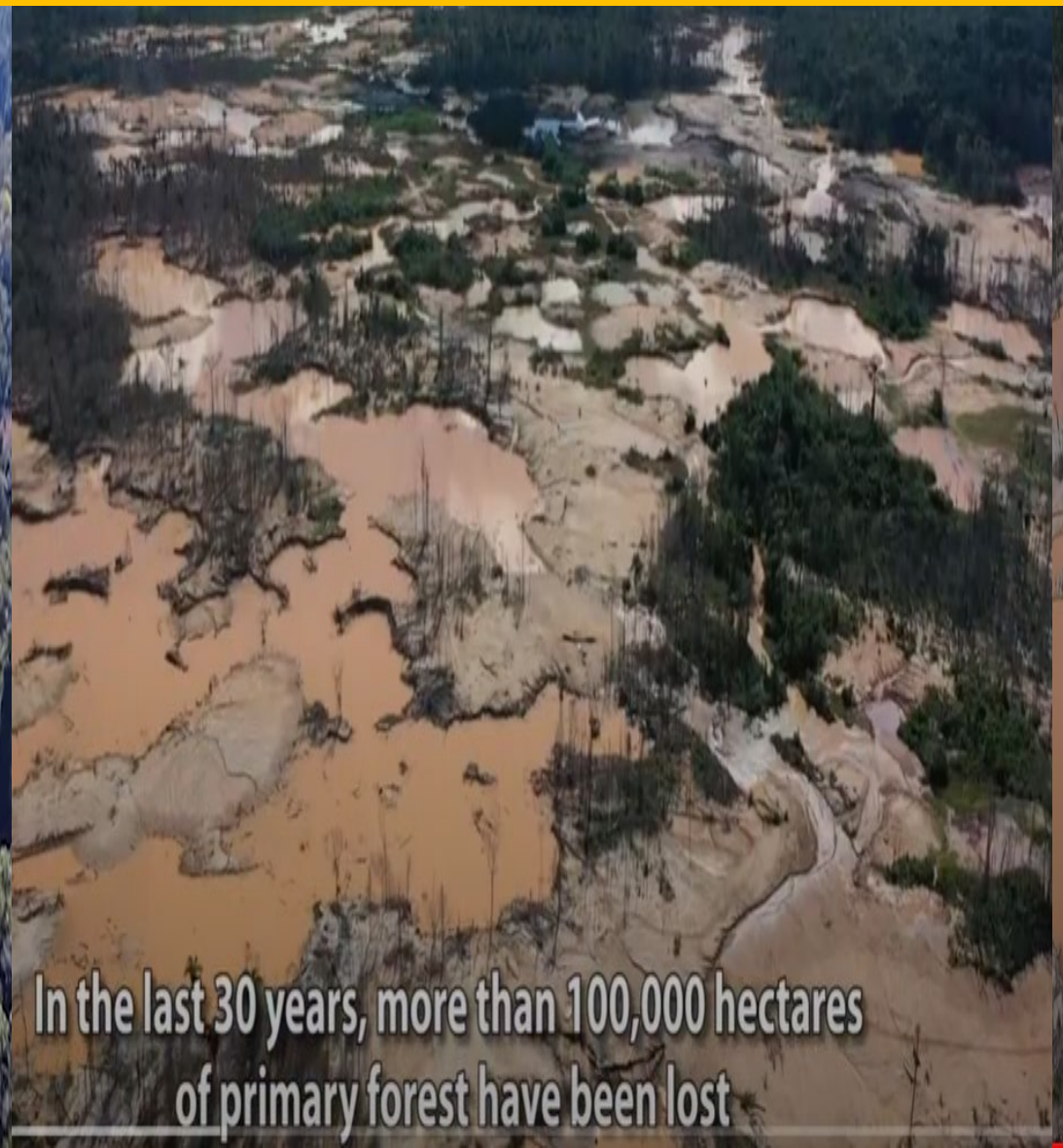
LAND SPECULATION AND AGRICULTUR EXPANSION

LEGAL ACTIVITIES THAT COMPROMISE THE ENVIRONMENT

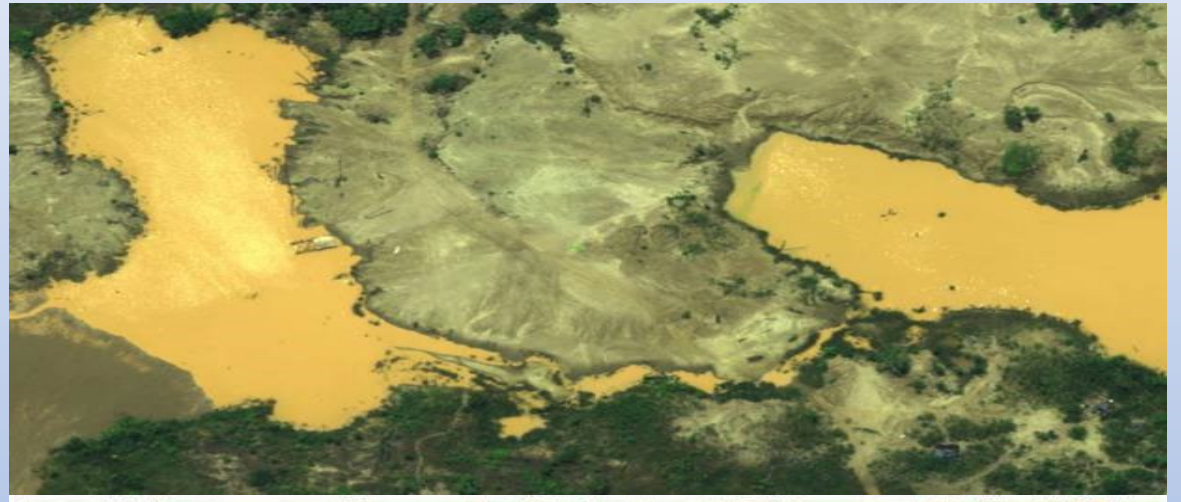
CRIME OF OIL POLLUTION

SEWAGE POLLUTION

ILLEGAL MINING



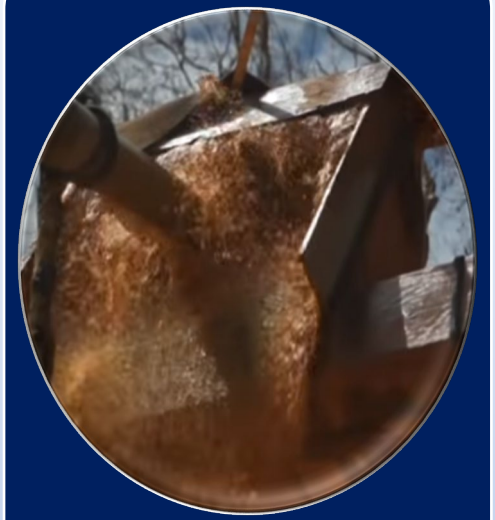
ILLEGAL MINING



THE ILLEGAL MINING PROCESS IS BASED ON FIVE STAGES THAT CAN TURN A PARADISE INTO A TOXIC DUMP IN A MATTER OF DAYS.

1.- TREES ARE CUT DOWN TO CLEAR THE AREA.

2.- PRESSURISED WATER HOSES ARE FIRED TO LOOSEN THE SOIL.



LOCKS OR COMPARTMENTS FORMED BY SEDIMENTS OF ALL KINDS ARE FORMED AND MERCURY IS APPLIED TO THIS MIXTURE.

4 . MERCURY HAS A UNIQUE VIRTUE WHICH IS TO FORM A CONGLOMERATE WITH THE GOLD, FORMING AN AMALGAM OF TWO INDISSOLUBLY UNITED SUBSTANCES.

5. SUBSEQUENTLY, HEAT IS APPLIED SO THAT THE MERCURY EVAPORATES, TURNING TO A TOXIC GAS THAT IS VERY DANGEROUS FOR HUMAN HEALTH, AND THE GOLD IS OBTAINED

ILLEGAL MINING PROCESS



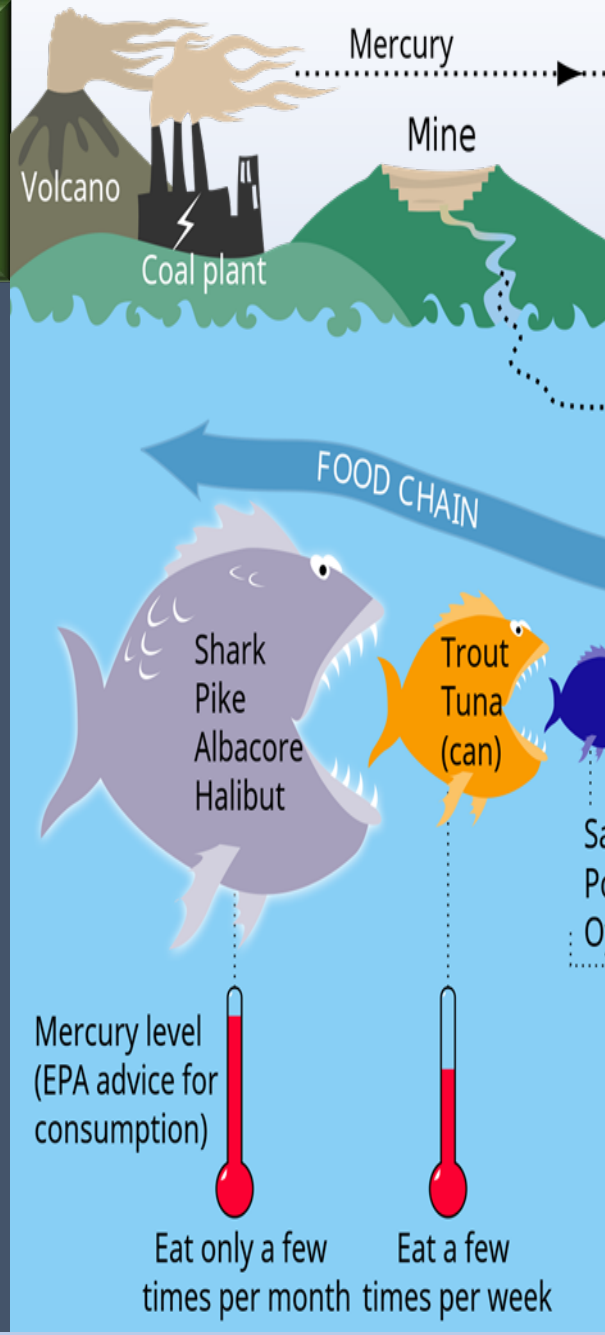



STUDIES ON THE IMPACT OF MERCURY ON HUMAN HEALTH

Once mercury comes into contact with water, bacteria break it down into methylmercury and this enhances its lethality, so it passes to micro-organisms and insects and then to fish, mammals and into the human food chain.

Every time someone consumes a living thing with methylmercury and it is absorbed by another organism the health damage is multiplied exponentially and humans are at the bottom of the food chain.

The consequences are evident through alterations in the central nervous system, in the most severe cases, uncontrolled tremors, lack of lividity, insomnia, memory loss, headache, cognitive and motor dysfunctions.

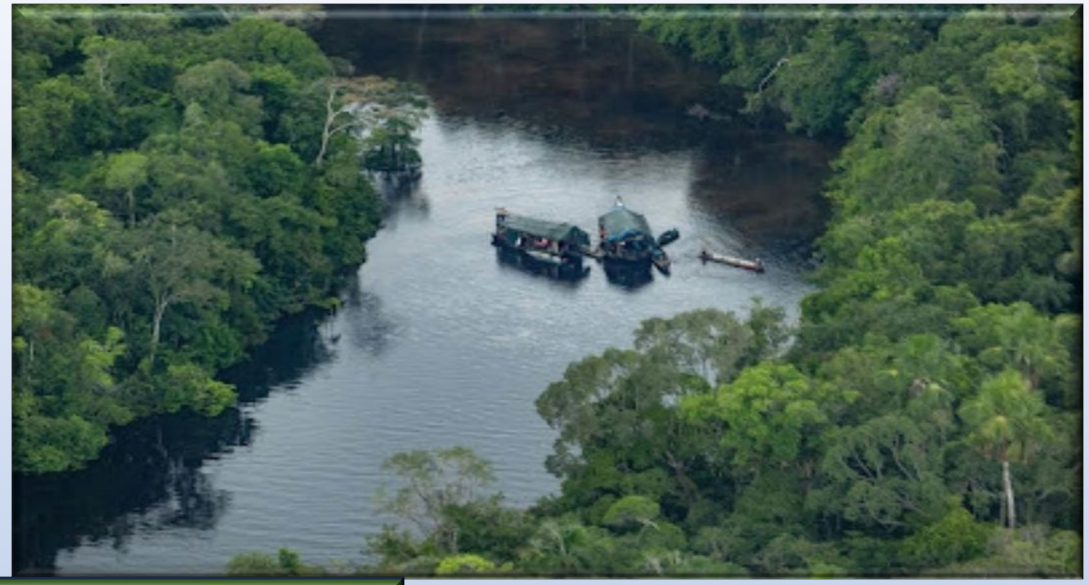


CONSEQUENCES OF METHILMERCURY ON FOETAL DEVELOPMENT

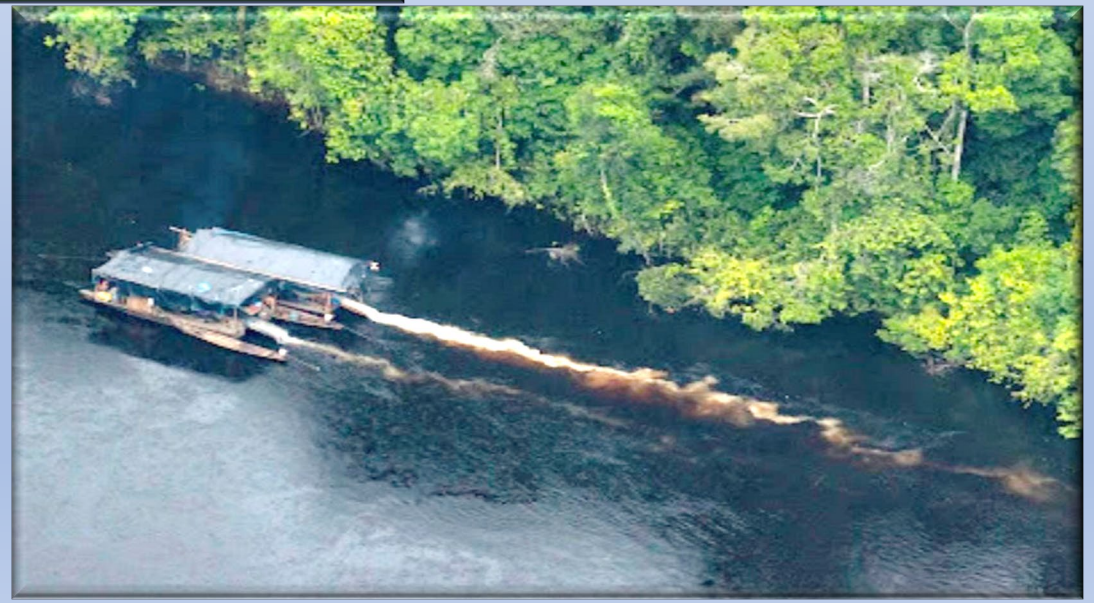
MeHg readily crosses the placenta and the blood-brain barrier and is neurotoxic. The developing fetal nervous system is especially sensitive to its effects.

Prenatal poisoning with high dose MeHg causes mental retardation and cerebral palsy, other characteristic neurologic signs and symptoms (sensory disturbance, cerebellar ataxia, and constriction of visual field) .

Fetal Minamata disease causes serious cognitive effects of MeHg in neonates and children, as well as underlying changes in cytoarchitecture



NANAY RIVER: 28 CARAT GOLD

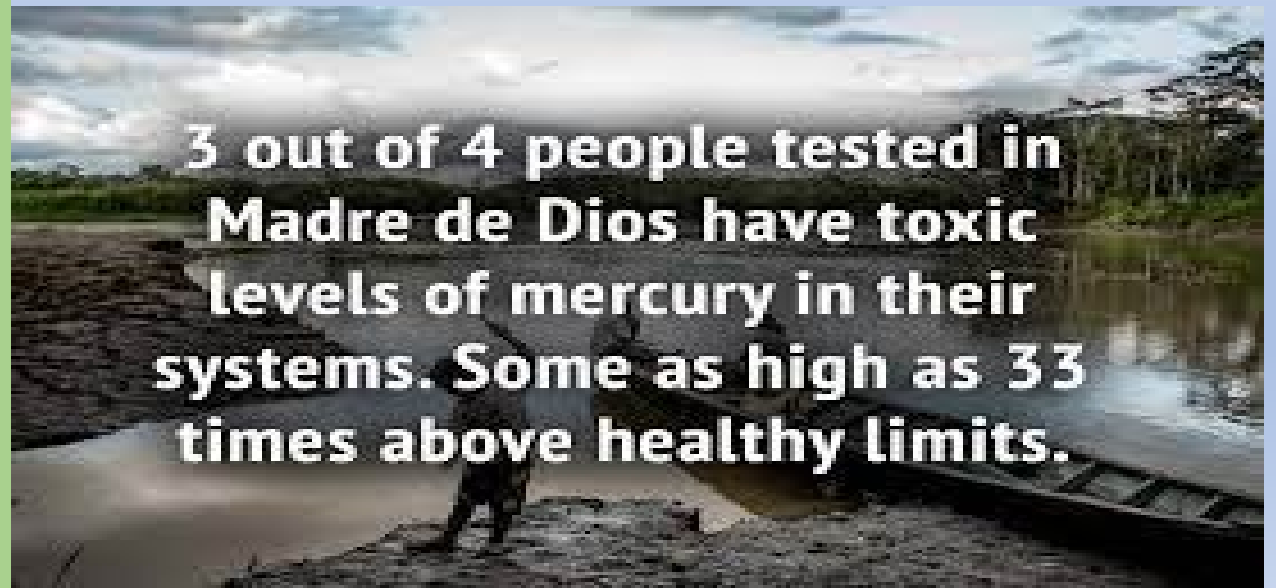


MERCURY CONTAMINATION IN LOCAL POPULATIONS

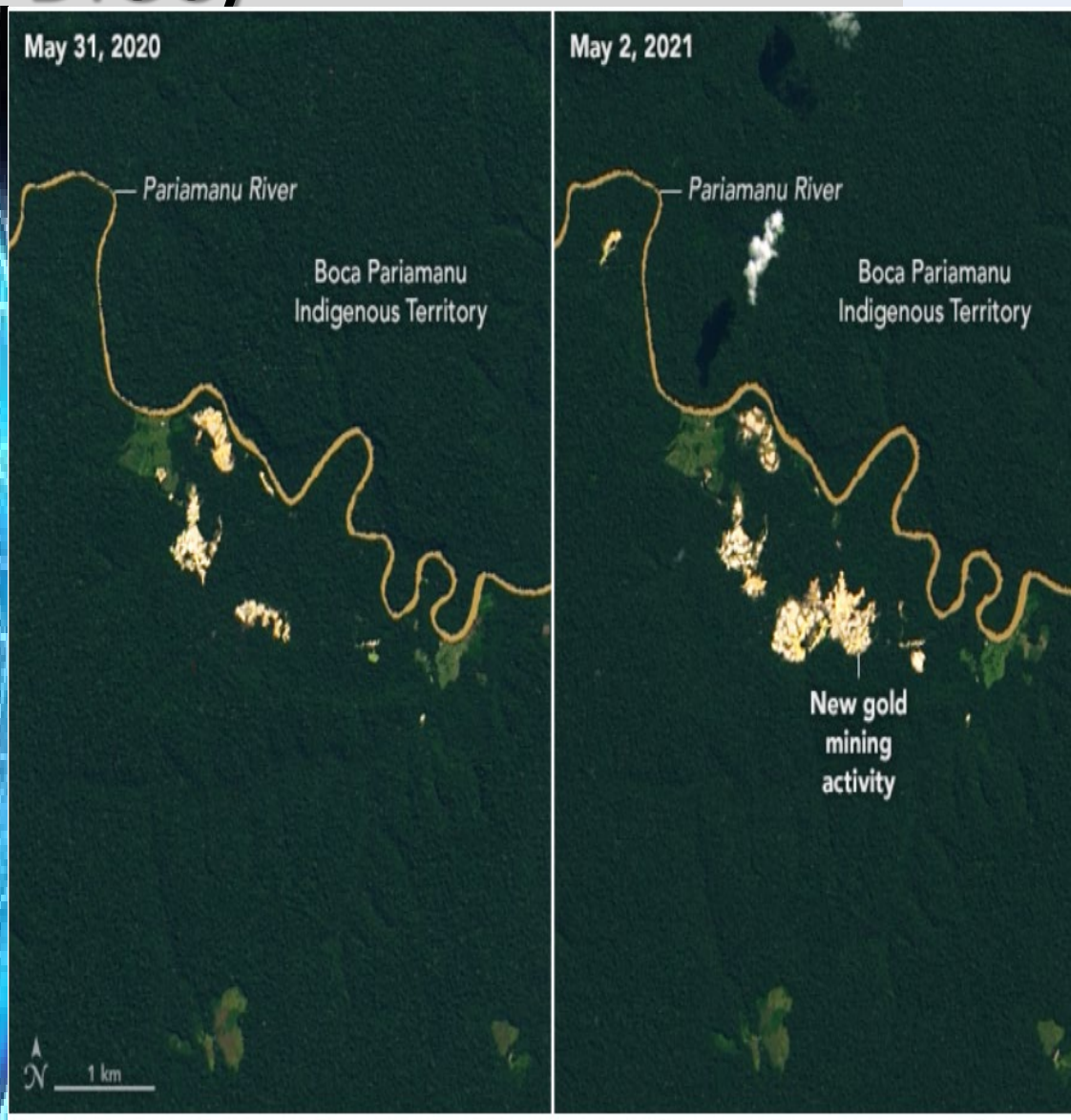
Several national and international bodies, such as the US Environmental Protection Agency (EPA) and the World Health Organisation (WHO) state that, in the case of hair, the maximum permissible limit is 1 ppm, in areas where 37 ppm (parts per million) of mercury have been found in the hair of the Machiguenga indigenous people.

More than 92 percent of Yanomami Indians tested in Aracaçá (the closest community to illegal mining sites) had unsafe rates of mercury in their bodies The vast majority, 84 percent of Yanomami tested, had contamination equal to or above 2 micrograms per gram, a level of exposure that can lead to several health problem.

Of particular concern is the situation in Iquitos, a city with a population of half million inhabitants, where the number of mercury ponds has multiplied exponentially in recent years.



GPS IN AMAZON RAINFOREST (PERU: MADRE DE DIOS)



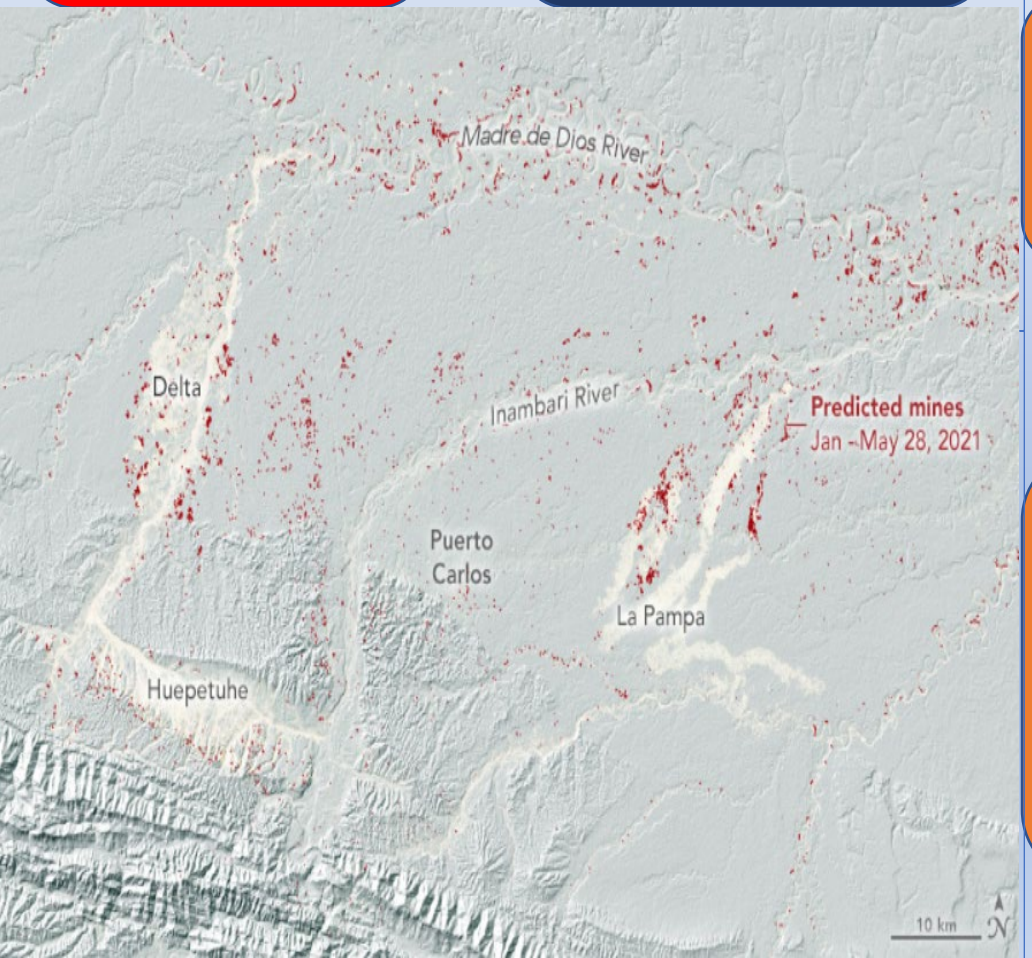
May 31, 2020 - May 2, 2021

MADRE DE DIOS: PREUVIAN AMAZON

96.000 HECTARES OF PERUVIAN AMAZON

RADAR MINING MONITORING

RAMI

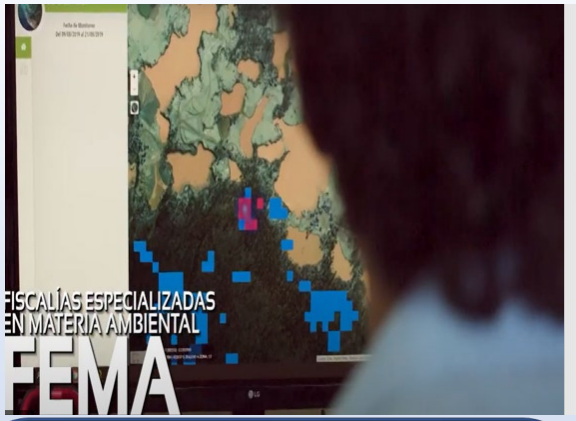


LANDSAT 8 NASA (optical imagery)

COPERENICUS SENTINEL-1 EUROPEAN SATELITE AGENCY (mapping for forest, wáter and soil manggment)

REAL TIME

ANALYSIS & ALERTS



SPECIAL PROSECUTOR (FEMA)

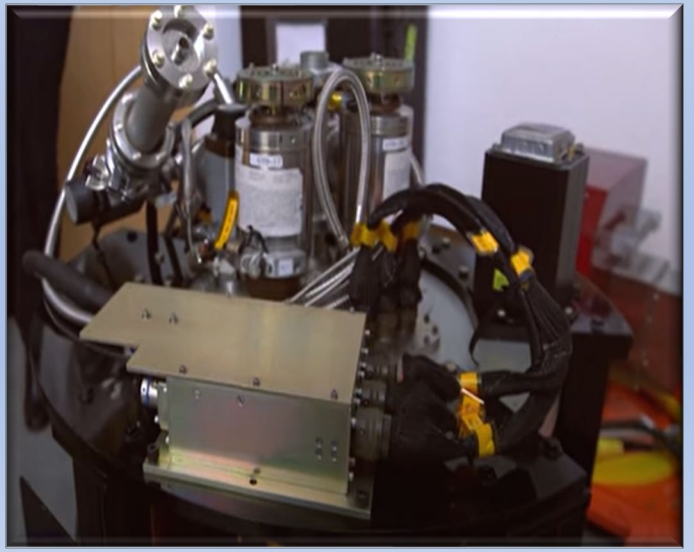
STAKEHOLEDERS

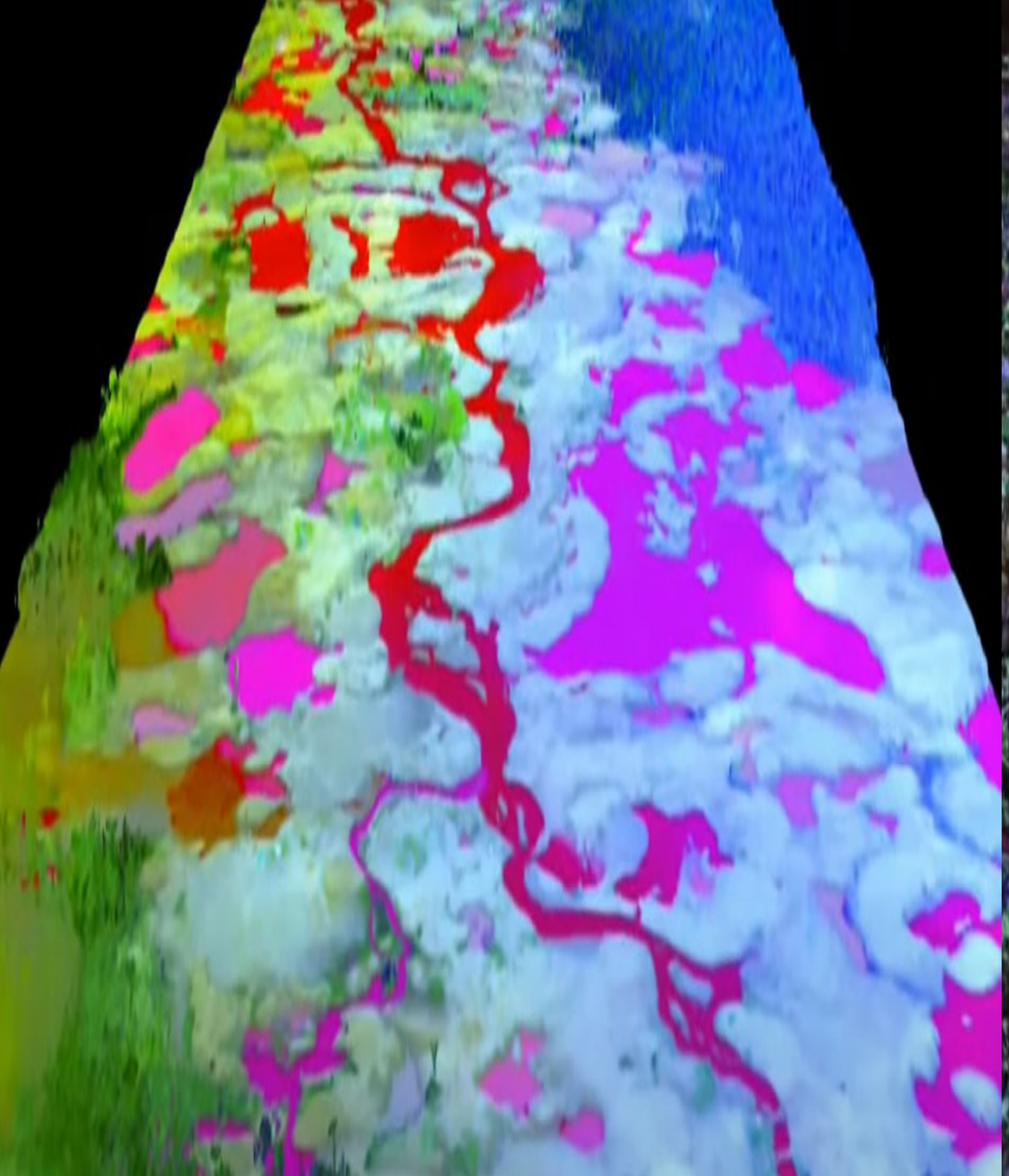
GLOBAL AIRBORNE OBSERVATORY

(former Carnegie Airborne Observatory, Stanford University).

FIRE LASER BEAN: LASER IMAGING SYSTEM

INFRARED IMAGING SPECTROMETER: 420 CHANNELS OF LIGHT THAT CAN DETECT CHEMICALS IN THE LOWER FOREST, INCLUDING MERCURY



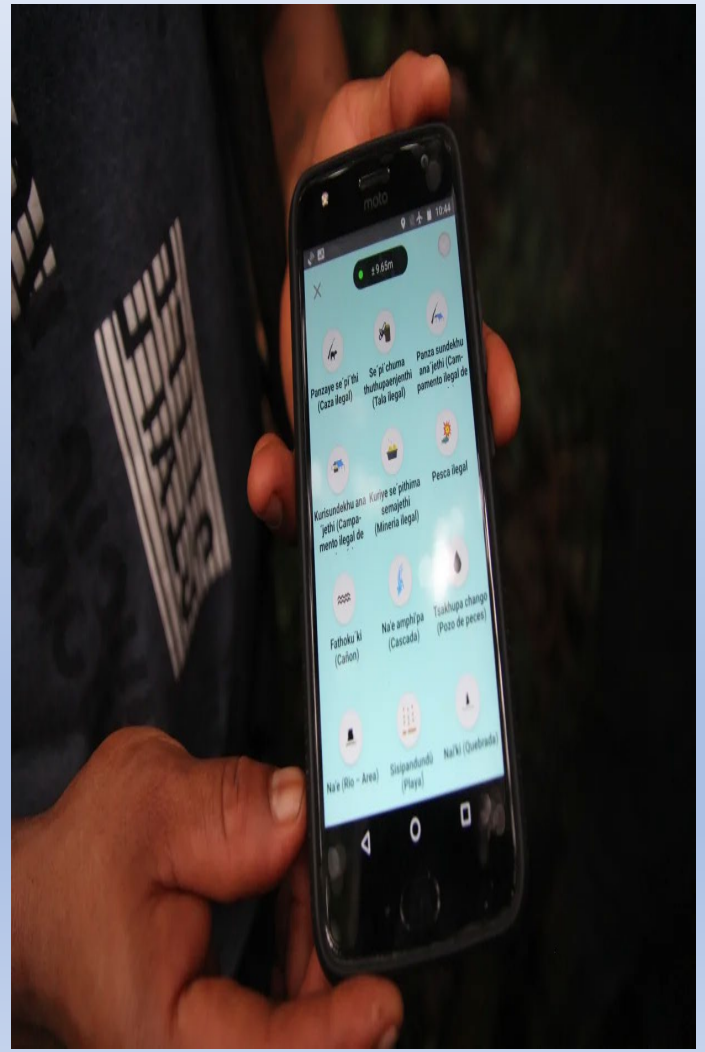


THE USE OF DRONES

- The use of drones and smartphones that can process satellite data allows **indigenous communities** to successfully monitor their territories thus considerably limiting **deforestation**, according to a STUDY recently published in the journal Proceedings of the National Academy of Sciences (PNAS).
- The survey took into account the data collected in three years which showed the excellent results achieved by the initiative. Launched in 2018, the monitoring program involved three non-governmental organizations: the **Rainforest Foundation US**, the World Resources Institute (WRI) and ORPIO an association working in 15 river basins in the Peruvian Amazon.

THE BENEFITS OF USING DRONES AND AERIAL MAPPING

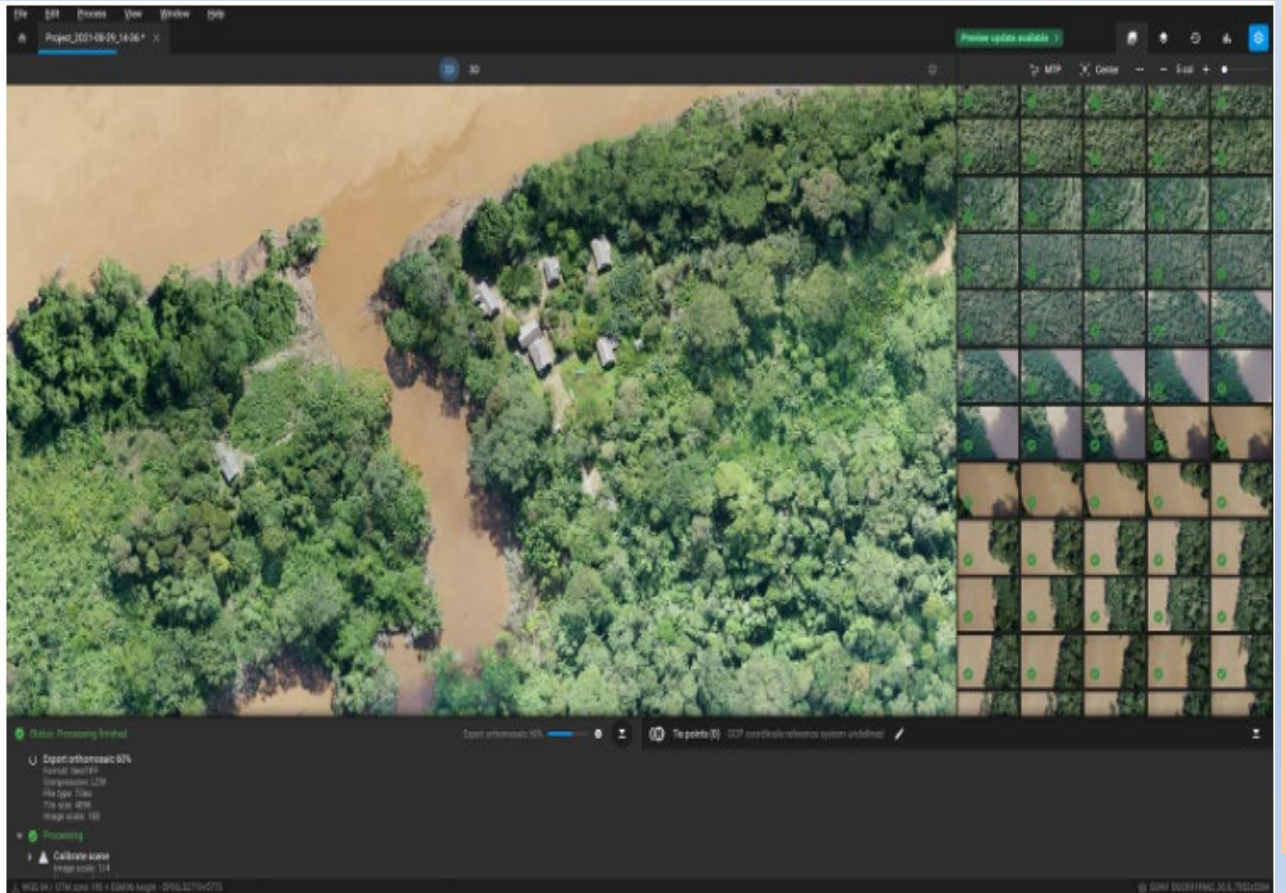
- Monitor vegetation health and assist conservation efforts
- Provide transparency and be accountable to Wilderness International donors
- Check for illegal logging on the Wilderness International land.
- The situation in remote and hard-to-reach areas can be made more visible.
- Greater transparency and increased possibilities for information transfer with stakeholders.



USING PHOTOGRAMMETRY AND DRONES IN THE PERUVIAN RAINFOREST

SPECIAL ATTENTION TO THE RIVERS

The Amazon is full of dense vegetation, so traveling via the rivers makes it easier to access the forest

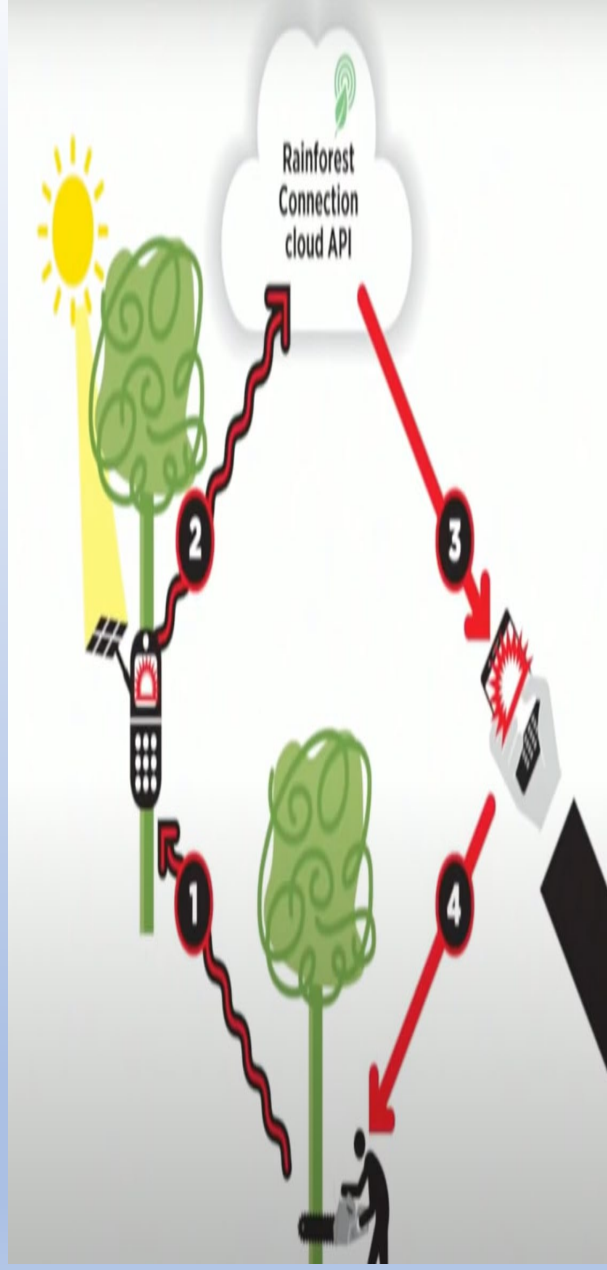


- **Norway funds satellite map of world's tropical forests Through its International Climate and Forests Initiative (NICFI).**
- Drone image processing involves an analysis of the information that can be processed under AI systems.
- It is important to collect a huge dataset of very high quality, and to connect the drone to a base station at the camp to ensure that the images are geotagged, which guarantees the accuracy of the final map.
- **The multi-spectral images were imported to PIX4Dfields, which can analyze how plants reflect green light. Measuring these light reflections will tell researchers about the health of plants, their age, etc.**

ON-THE-GROUND SENSORS

Topher White has found that listening for the sounds of chain saws through hundreds of recycled cell phones might give us a chance to fight illegal logging

It has developed an audio detection device from repurposed cellphones and solar panels that can be hidden in tree canopies to pick up errant noises, such as chainsaws, trucks and motorcycles. The device is paired with an alert system that instantaneously notifies users when a suspect noise is detected.



ON-THE-GROUND SENSORS

The new devices use visual and thermal cameras and infrared sensors to capture photos of intruders into protected areas, and immediately transmit these photos to authorities.

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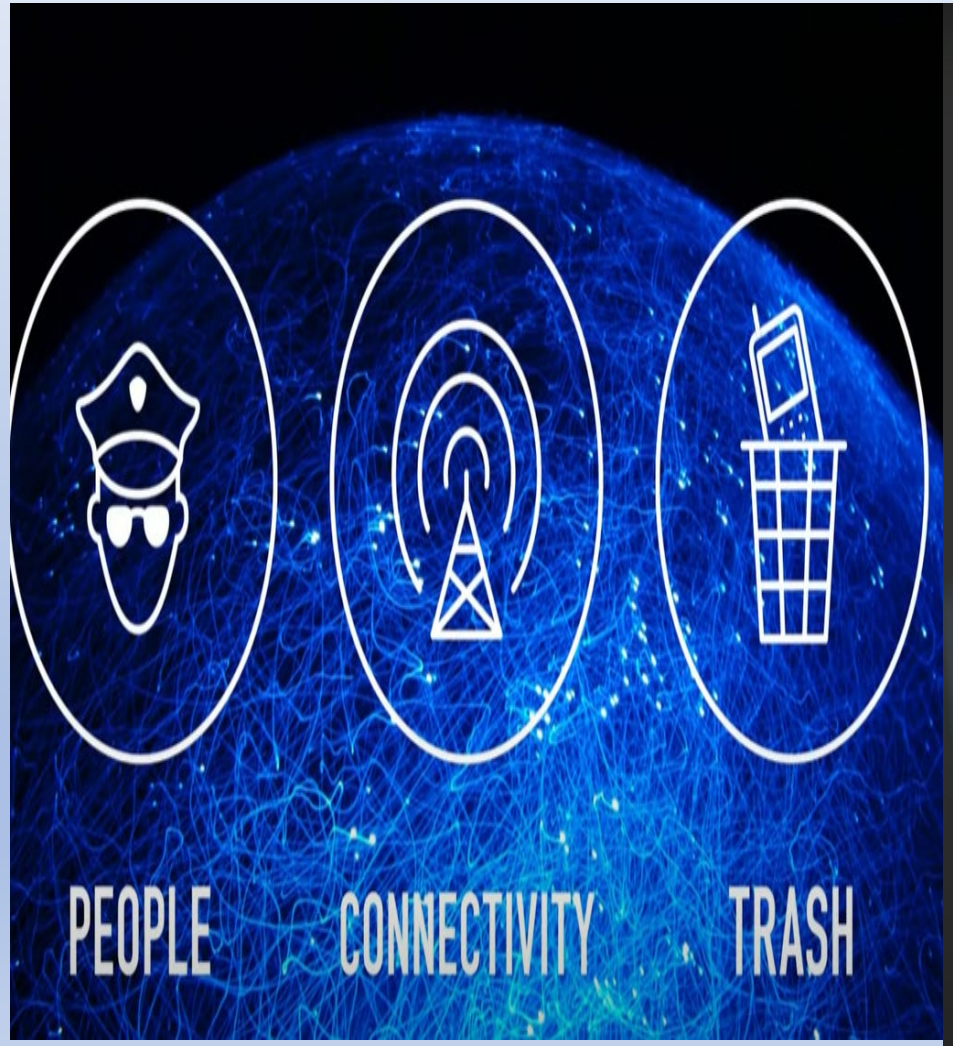
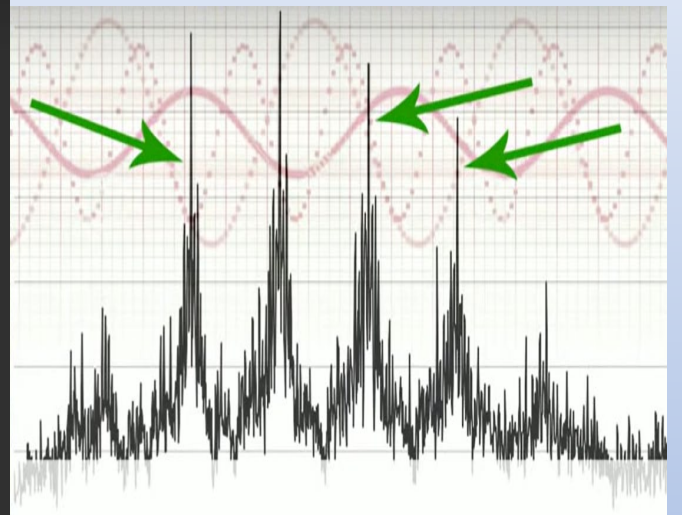
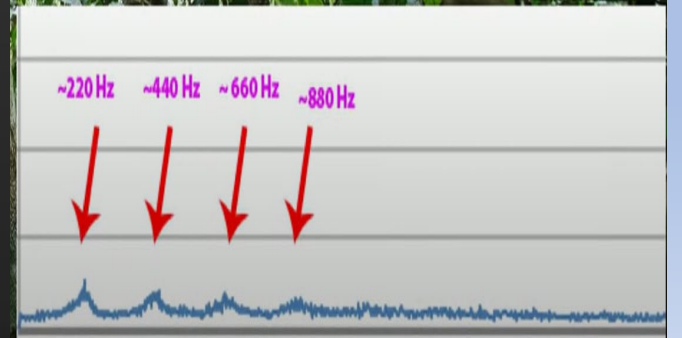

PEOPLE
CONNECTIVITY
TRASH




~220 Hz
~440 Hz
~660 Hz
~880 Hz

PROJECT GUACAMAYA (MACAW IN ENGLISH)

It uses a mix of new AI models for satellite analysis, and modified AI models from existing projects within Microsoft for camera trap analysis and bioacoustics. The databases are stored in the cloud and the group is using the virtual machines and computational power of Microsoft Azure to design and train the models.

According to the Alexander von Humboldt Institute of Bogota, the Sinchi Institute, and Microsoft AI for Good Lab, based on information provided by satellite data, it is possible to predict the rate of deterioration of the Amazon, and the climatic consequences that this deterioration will have.

CURUPIRA IN BRAZIL

Boxes designed to “hug” trees and remotely send out any danger signals. This story once again expands the growing literature on the use of artificial intelligence in the fight against deforestation.

Named after a creature from Brazilian folklore, the “curupiras” – which are attached to plants with a belt – are equipped with sensors and software programmed to recognize the sounds of all those tools, from chainsaws to tractors, whose use is associated with deforestation.

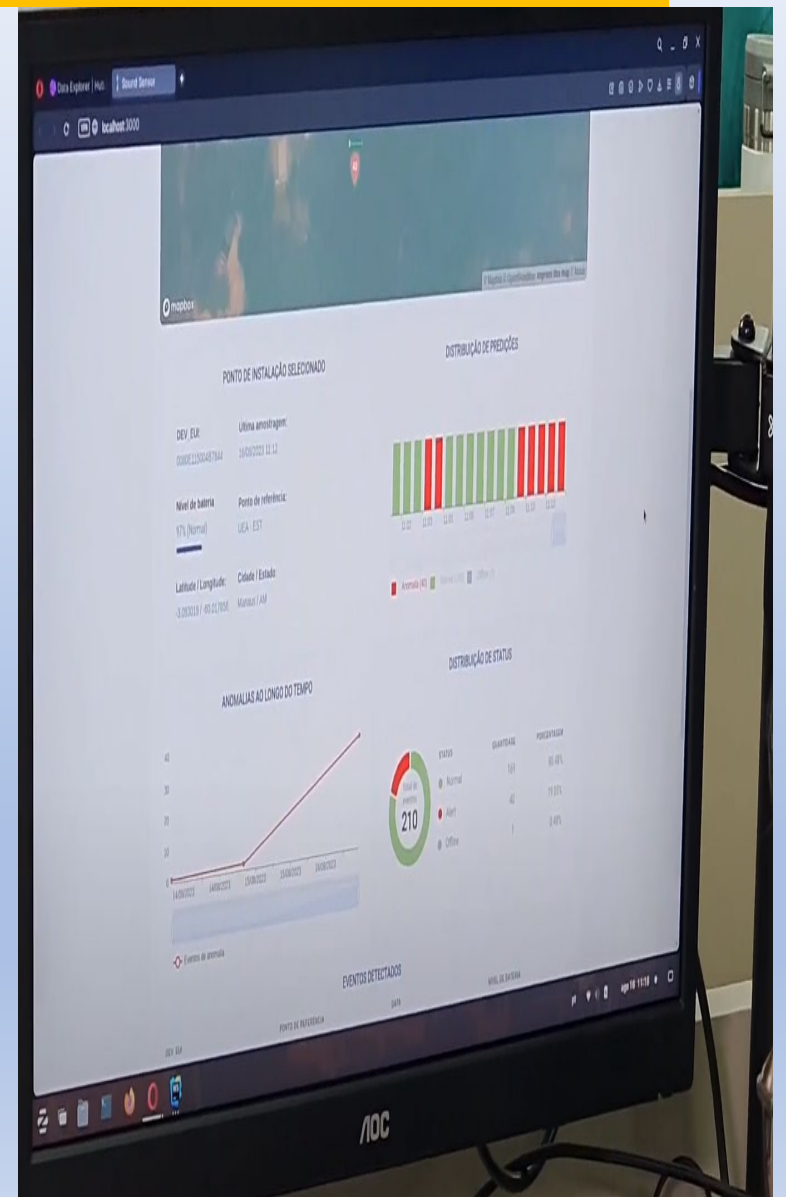
The system identifies the threat and sends a remote communication to authorities called to intervene.

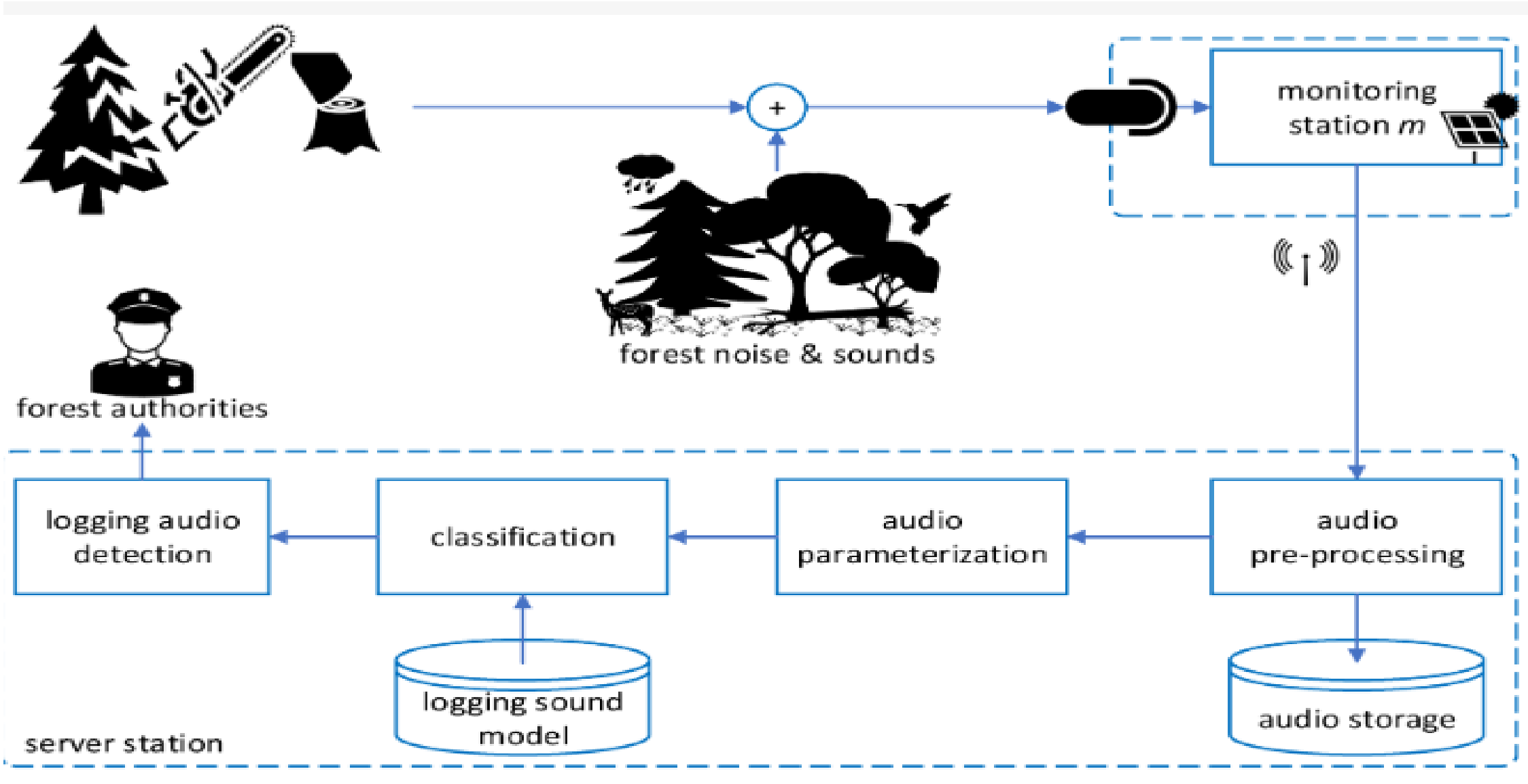
CURUPIRA IN BRAZIL

The new system, is a real time alert and it has important advantages.
Other high-tech solutions, such as **satellite analysis** for example, can provide very precise information but only after the fact.
Wireless sensors, moreover, can transmit data up to a kilometer away.
That’s about four times the range of similar instruments tested by other studies,

CURUPIRA IN BRAZIL

The device, he pointed out, was **successfully tested** in a forest located at the side of the BR-174 highway, in the direction of Manaus-Presidente Figueiredo, in northern Amazonia. The tool identified attacks in progress by sending a message to the server. the project, funded by the Brazilian company **Hana Electronics**, has just completed its pilot phase. The test involved ten prototypes attached to trees. The authorsnow hope to find new funding to add hundreds more sensors, including ones that can detect smoke and heat from **fires**.
Low production **costs** are also among the advantages: in fact, manufacturing each sensor requires $200 to $300.




monitoring station m
forest noise & sounds
forest authorities
logging audio detection
classification
audio parameterization
audio pre-processing
logging sound model
audio storage
server station

COLLABORATION WITH INDIGENOUS COMMUNITIES

- **Phone app and drones have enabled 80 native communities in the Peruvian Amazon.**
- **Crowdsourcing Applications seems to be useful to report new cases**
- the use of drones and smartphones that can process satellite data allows **indigenous communities** to successfully monitor their territories thus considerably limiting **deforestation**, according to a study of the National Academy of Sciences (PNAS). The survey took into account the data collected in three years which showed the excellent results achieved by the initiative.
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COMBATING ILLEGAL LOGGING

CORRUPTION CAN HAPPEN AT EVERY STAGE OF THE GLOBAL TIMBER SUPPLY CHAIN

INTERPOL

1
LOGGING PERMIT ISSUED
Government officials are bribed to influence the bidding process

2
HARVEST
Inspectors or rangers are bribed to allow illegal activity to continue

3
TRANSPORT
- Transport documents are falsified
- Checkpoint officials are paid off to let trucks through

4
PROCESSING
Mills launder illegal timber by mixing it with legally sourced logs

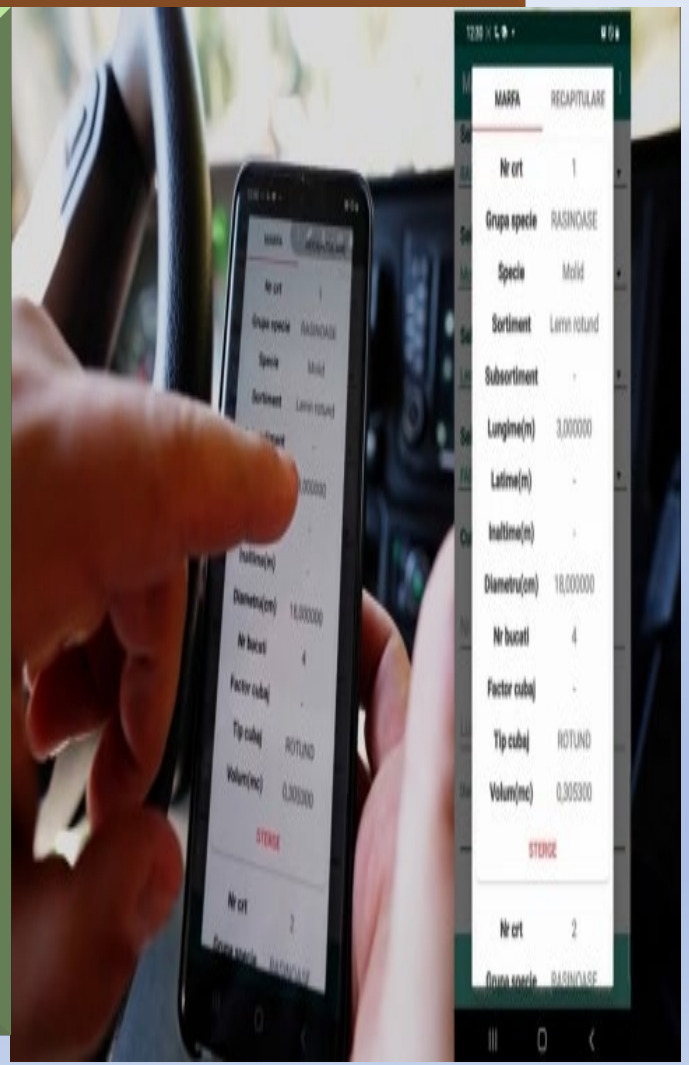
5
EXPORT
False claims are made on customs papers

6
SALE
Inspectors are bribed to cover up the sale of illegal timber or protected species

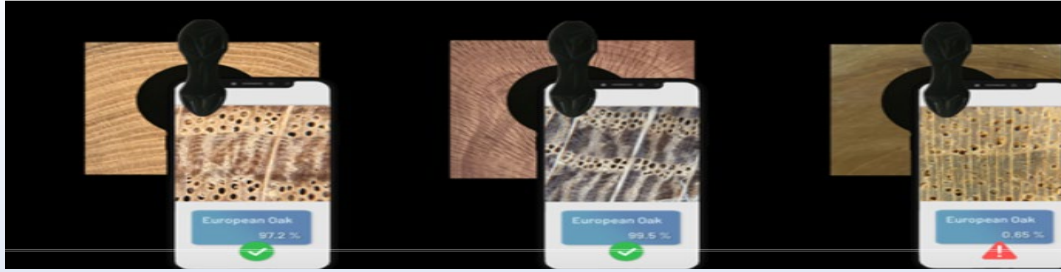
CUT IT OUT

ELECTRONIC TAGGING AGAINST ILLEGAL LOGGING: THE CASE OF ROMANIA. SUMAL 2.0 | DIGITAL WOOD TRACKING

- An online portal automatically identifies illegal logging transports from Romania using satellite alerts that show changes in forest vegetation every 2 to 7 days.
- The portal accesses Romania's Ministry of Waters and Forests' SUMAL database in real-time, processing data on logging permits, wood transport locations, and related information.
- Digitized logging permits allow for satellite tracking of logging activities, and transports must obtain a unique code from the system before leaving the loading site, ensuring all transport details are logged.
- The portal includes an API that provides public access to all information on the portal, enabling stakeholders to analyze and combat illegal logging.



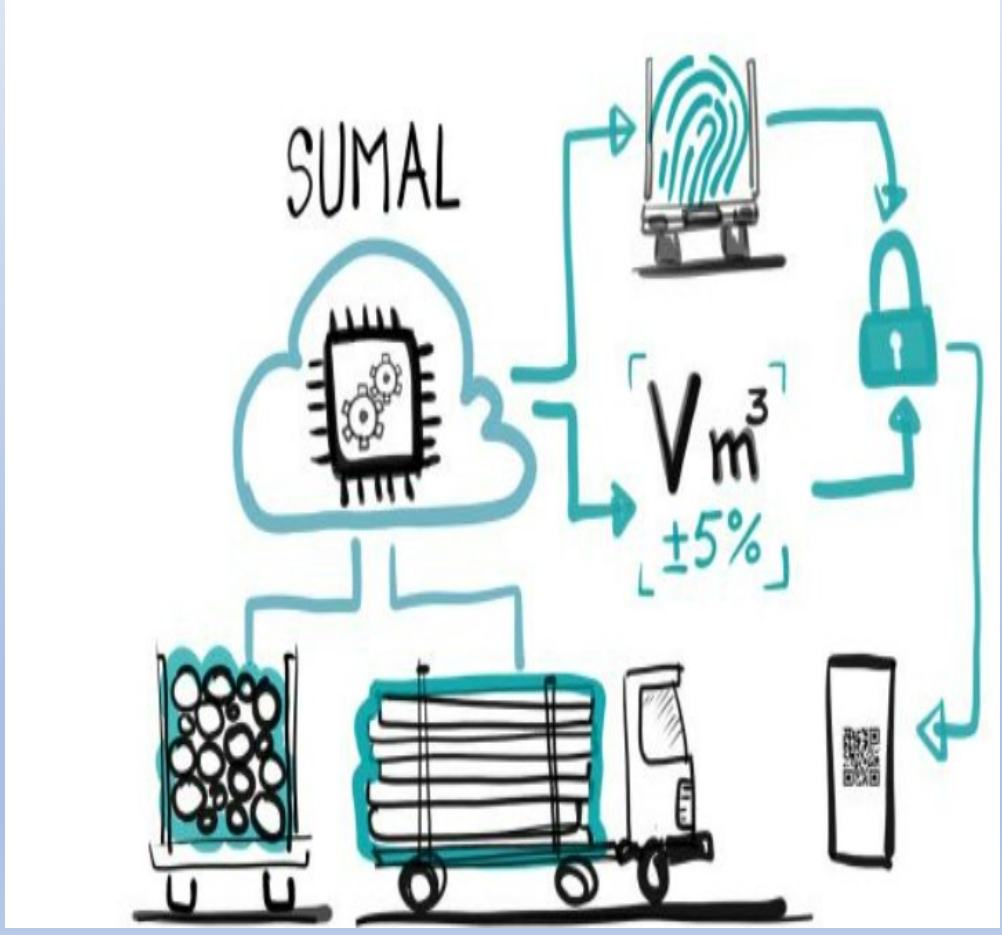
ILLEGAL LOGGING: APP THAT DETECTS THE ORIGIN OF TIMBER IN SPAIN



- The app is being developed by the IMAI Operational Group, including the Polytechnic University of Madrid, the University of Granada, and the Spanish Association of Wood Commerce and Industry.
- The app will feature a database of 400 types of wood and use artificial intelligence and wood anatomy to detect potentially illegal wood shipments using mobile phone lenses.
- The app will assist authorities like the European Timber Regulation (EUTR), CITES, customs agents, and SEPRONA in monitoring and controlling the wood trade.
- The app combines macroscopic wood anatomy with Deep Learning (DL) techniques to prevent the trade of uncertified wood.
- The app will enhance transparency in the wood import market, particularly for tropical woods.

ELECTRONIC TAGGING TO COMBAT ILLEGAL LOGGING

An Invisible Track, smaller than a deck of cards, passes location information from the module to a central server, via the local cellular networks.
From the server, alerts are then sent to rangers and officials of the Brazilian Environment and Natural Resources Institute (IBAMA), the country's environment protection agency.



Using solar-powered seed planting robots to reforest the Amazon

A pilot project in Peru is using a robot to plant seeds to help reforestation of the Amazon, where pristine rainforest and biodiversity is being blighted by illegal mining and logging.
The solar-powered robot is capable of seeding 600 trees in a single morning and could drastically boost reforestation efforts in the region.
Non-profit organisation, Junglekeepers International, has teamed up with the Swiss-Swedish robotics company, ABB, to run a pilot project using a seed-planting robot in the rainforest.
The robot is connected to a base in Sweden, 12,000 km away via solar satellite wifi.

TECHNIQUES FOR THE LOCALIZATION OF THE ORIGIN OF GOLD

Due to its chemical structure, gold melts relatively easily and it is difficult to detect its origin because gold from different parts of the world can converge in a single gold bar.

Gold fingerprinting is a method of identifying an item made of gold based on the impurities or trace elements it contains.

This method is used to characterize gold or a gold-containing item by its trace elements, a.k.a. fingerprinting the sample by mineralizing event and to the particular mine or bullion source.

Some companies have decided to separate themselves from the so-called “dirty gold” by offering a quality certificate, guaranteeing that their gold does not come from troubled areas and is pure gold. Attempts are being made to impose a quality certificate on the market to prove that the gold is licit.

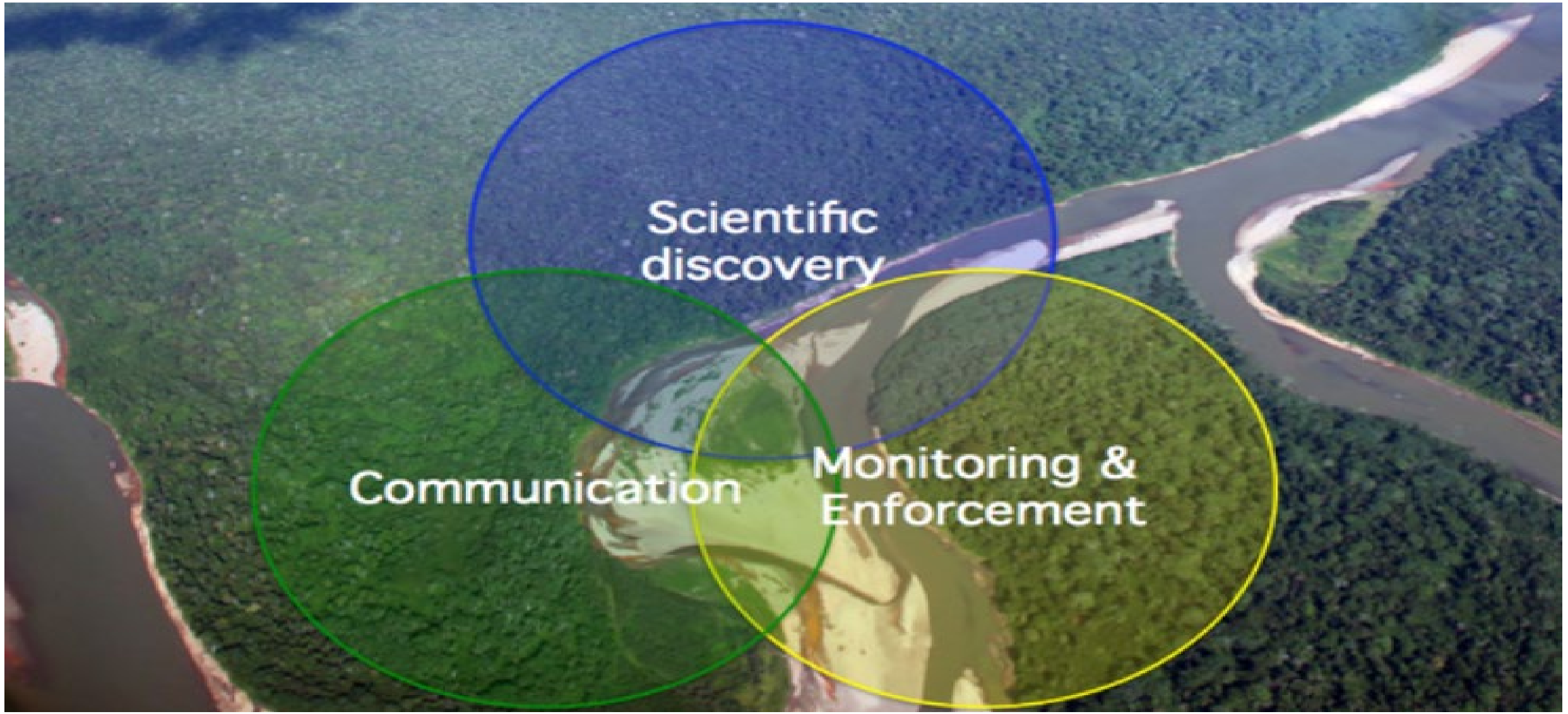
NEED TO LOCATE MERCURY SUPPLIERS

The Third Meeting of the Conference of the Parties (COP3) to the Minamata Convention on Mercury agreed to ban the manufacture and global trade of products containing mercury by 2020.

Since 1994, 2,300 metric tons of Hg have been dumped in the Brazilian Amazon. However, this number, which was already high, has been growing steadily. Today, according to a series of analyzed studies, 150 tons of Hg are presumably being dumped in the region each year.

According to a study by the Canadian NGO Artisanal Gold Council, more than 180 tons of this metal are dumped annually into the soil, air and water of the Madre de Dios territory.

TECHNOLOGY COULD BE A GAME-CHANGER



CONCLUSIONS

- The Amazon rainforest plays a crucial role in climate change that is impossible to forget. Defending a place as vast and rugged as the Amazon rainforest is an extremely complex task.
- Technology is not a panacea, but it can serve to counterbalance the real systematic plundering that is taking place in this area.
- To this end, there are multiple technologies (GPS, drones, monitoring tagging, on-the-Ground Sensors, smartphone, Apps, etc.) that should be coordinated by an international body.
- Technology is “not all rainbows and unicorns” — there are very substantial detrimental impacts of technology on tropical forests. Technology can speed forest destruction, identify new areas ripe for resource extraction, and facilitate exploitation of previously inaccessible areas.
- The EU should set up technological assistance programmes to support and coordinate the different countries involved.

ANY QUESTIONS


THANK YOU VERY MUCH FOR
YOUR ATTENTION!!!