



RAIN Will Stop the Fires

Crypto Conservation: Preventing Amazon Deforestation Utilizing Blockchain

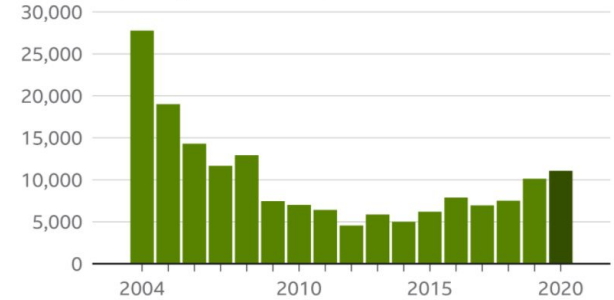
A proposal by Aaron Devaney, Carlos Tacchi, Dhruv Mudambi, Feng Zhang and Zach Green

Amazon Deforestation

- Deforestation of the Amazon has persisted at a rapid rate over the past decade, with 6,890 square miles of rainforest lost in 2020 alone.
 - For comparison, this approximately the size of New Jersey
 - **It is estimated that 40 football fields of rainforest are destroyed every minute**
 - It is estimated that 17% of the Amazon was lost by 2018
 - Scientist believe that the Amazon biome is currently approaching a tipping point which could result in the emission of 90 gigatons of greenhouse gasses
- Deforestation is largely driven by development, with substantial portions of the rainforest systematically removed or burned in order to create fields which may be utilized for agricultural activities such as cattle grazing and soya cultivation.
- The Amazon Rainforest is the most biodiverse region on earth, providing shelter to three million species of plants and animals. Additionally, it is estimated that trees in the Amazon produce 20% of the earth's oxygen.

Amazon deforestation highest since 2008

Annual rate in square kilometres

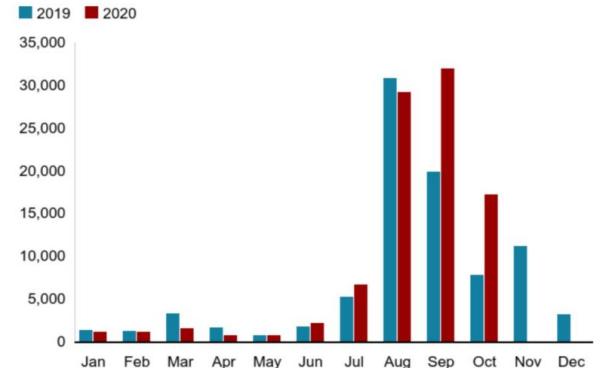


Note: Annual figures August-July

Source: PRODES, Inpe

BBC

Wildfires in Brazil's Amazon 2019-2020



Note: 2020 data up to 1 November

Source: INPE

BBC

Preventing Deforestation

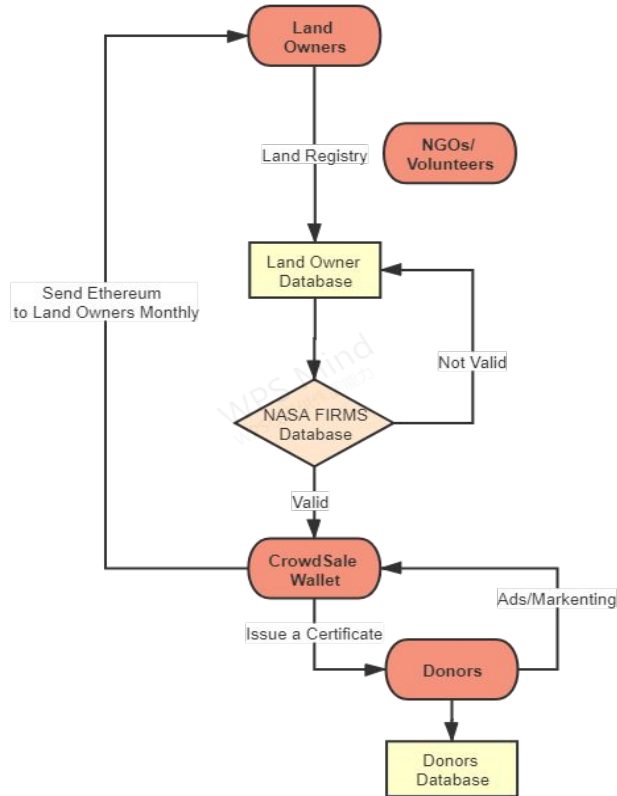
- While a number of charitable organizations exist, which are dedicated to preserving the Amazon rainforest, the problem of deforestation is primarily driven by the economic needs of individuals living within the ecosystem: **people are positively incented to make additional agricultural land for grazing and crop cultivation as agriculture is an important means of earning a living.**
- In order to prevent the burning of the Amazon, it must be economically more attractive to maintain the natural ecosystem than to develop the land for alternative uses.
- We are launching Crypto Conservation as a non profit which utilizes blockchain as a means to prevent Amazon deforestation. On a daily basis, The Crypto Conservation provides subsidies to landowners who do not set fire to their land.



Charity Operations Overview

- Landowner's receive subsidies from Crypto Conservation so long as they do not set fire to their land to make way for development or their land is caught up in a fire irrespective of who set it on fire. Crypto Conservation works to incentivize land owners to maintain the Amazon Rainforest as follows:
 1. Ether is raised for the charity through donations.
 2. Landowners register their land within a blockchain land registry and land owners are issued a token, RAIN, which stores basic information about their land parcel including latitude, longitude, owner name, wallet address and a fire registry ultimately used to determine whether or not the landowner should be paid.
 3. On a periodic basis, which could be as often as daily and no less than once a month, each RAIN is referenced against NASA data which has information regarding the location of fires in the Amazon. If the Land Owner's land is on fire, then the fire counter is increased and such token is no longer entitled to payment.

Rain Coin Workflow



Fire Information for Resource Management System (FIRMS)

NASA FIRMS uses satellite observations from the Moderate Resolution Imaging Spectroradiometer (MODIS) and Visible Infrared Imaging Radiometer Suite (VIIRS) instruments to detect active fires and thermal anomalies and deliver this information in near real-time to decision makers through email alerts, analysis ready data, online maps and web services.

FIRMS was originally developed by the University of Maryland, with funds from NASA's Applied Sciences Program and the United Nations Food and Agriculture Organization (UN FAO). It was transitioned to NASA LANCE in 2012.



MODIS_C6_South_America_24h

latitude	longitude	brightness	scan	track	acq_date	acq_time	satellite	confidence	version	bright_t31	frp	daynight
-27.168	-55.143	301.7	1.6	1.3	2021-03-02	205	T	43	6.0NRT	290.7	6.8	N
-26.131	-60.846	304.3	4	1.9	2021-03-02	205	T	24	6.0NRT	285.2	44.8	N
-24.565	-56.302	307.8	1.8	1.3	2021-03-02	205	T	72	6.0NRT	291.8	16.6	N
-23.296	-58.239	311.4	2.4	1.5	2021-03-02	205	T	82	6.0NRT	293.8	31	N
-23.296	-58.262	315.3	2.4	1.5	2021-03-02	205	T	91	6.0NRT	293.8	42	N
-23.282	-58.24	311.5	2.4	1.5	2021-03-02	205	T	83	6.0NRT	293.7	31.3	N
-23.284	-58.264	318	2.4	1.5	2021-03-02	205	T	96	6.0NRT	294.1	50.5	N
-23.288	-58.246	327.4	2.4	1.5	2021-03-02	205	T	100	6.0NRT	294.5	85.3	N
-23.29	-58.27	316	2.4	1.5	2021-03-02	205	T	92	6.0NRT	294	43.4	N
-22.035	-53.8	326.2	1.2	1.1	2021-03-02	205	T	100	6.0NRT	279.7	33.1	N
-22.657	-61.451	323.5	4	1.9	2021-03-02	205	T	100	6.0NRT	292.3	148	N
-22.66	-61.49	307.2	4.1	1.9	2021-03-02	205	T	70	6.0NRT	292.9	45.2	N
-22.67	-61.457	303.9	4	1.9	2021-03-02	205	T	57	6.0NRT	292.1	30.1	N
-22.653	-61.458	323.3	4	1.9	2021-03-02	205	T	100	6.0NRT	292.5	146.4	N
-21.664	-60.657	313.3	3.4	1.7	2021-03-02	205	T	86	6.0NRT	294.9	54.5	N
-21.67	-60.664	319.1	3.4	1.7	2021-03-02	205	T	98	6.0NRT	295.1	86.4	N
-21.49	-59.846	303.8	3	1.6	2021-03-02	205	T	53	6.0NRT	293.4	19.9	N
-21.316	-61.283	304	3.8	1.8	2021-03-02	205	T	53	6.0NRT	293.6	25.6	N
-20.567	-56.055	303	1.5	1.2	2021-03-02	205	T	29	6.0NRT	290	7.6	N
-20.848	-59.559	306.4	2.8	1.6	2021-03-02	205	T	65	6.0NRT	294.1	20.1	N
-20.857	-59.538	304.6	2.8	1.6	2021-03-02	205	T	56	6.0NRT	293.9	17	N
-17.96	-56.389	304.1	1.5	1.2	2021-03-02	205	T	58	6.0NRT	293.2	6.2	N
-15.913	-60.819	304.6	3	1.6	2021-03-02	205	T	61	6.0NRT	292.1	22.4	N

Data Preparation

- NASA maintains a daily database of coordinates on earth at which they believe a fire exists based on fire radio active power(frp) score.
https://firms.modaps.eosdis.nasa.gov/active_fire/#firms-txt
- Utilizing raw data from the NASA MODIS file, filtered through roughly 3000 coordinate locations.
- Post research, a fire is located based an above average frp score.
- Resulting in **600 on-fire** locations and **2400 non-fire locations**.
- Hand picked 10 locations, 5 on fire and 5 not, to test against contracts.



Tokens Overview

- We use the Non Fungible Token standard ERC721 to create our token, RAIN
- The problem at hand required the use of a non fungible token, as each RAIN represents not only is it linked to different pieces of land but also it is entitled to different revenue streams (fire vs no fire)
- Additional flexibility and customization can be achieved. e.g. offer a different revenue stream if the owner of a piece of land has a many dependents



Contracts Overview

- The ERC721 contract, which we called LandFax, contains a series of functions that allows to
 - a. Register the land in exchange of RAIN
 - b. Report a fire and keep count of them
 - c. Transfer money from the foundation wallet to each token holder, if certain conditions are met

```
contract LandFax is ERC721Full {  
  
    constructor() ERC721Full("LandToken", "RAIN") public {}  
  
    using Counters for Counters.Counter;  
    Counters.Counter token_ids;  
  
    struct Land {  
        string LatLon;  
        uint fire;  
    }  
  
    mapping(uint => Land) public lands;  
  
    event fire(uint token_id);  
}
```

```
function registerLand(address payable Landowner, string memory Coordinates, string memory token_uri) public returns(uint) {  
    token_ids.increment();  
    uint token_id = token_ids.current();  
  
    _mint(Landowner, token_id);  
    _setTokenURI(token_id, token_uri);  
  
    lands[token_id] = Land(Landowner, Coordinates, 0);  
  
    return token_id;  
}  
  
function reportFire(uint token_id) public returns(uint) {  
    lands[token_id].fire += 1;  
  
    emit fire(token_id);  
  
    return lands[token_id].fire;  
}  
  
function pay(uint amount, uint token_id, bool Fire) public payable {  
    if (Fire == false) {  
        lands[token_id].Landowner.transfer(amount);  
    }  
}
```

Deployed Contracts

The Fundraiser contract allows the donor to donate ETH to the beneficiary address and keeps track of the number of donations and the total amount donated.

The screenshot displays the 'Fundraiser' contract interface, divided into two main panels. The left panel, titled 'DEPLOY & RUN TRANSACTIONS', contains configuration options for deploying the contract. It includes a sidebar with icons for environment, account, gas limit, value, and contract. The main area shows the 'ENVIRONMENT' set to 'Injected Web3', 'ACCOUNT' as 'Custom (5777) network', 'GAS LIMIT' as '3000000', and 'VALUE' as '1000 wei'. The 'CONTRACT' dropdown is set to 'Fundraiser - browser/Fundraise'. Below this, the 'DEPLOY' section shows the '_BENEFICIARY' address as '0x241a839634f72D299e6a17e4' and a 'transact' button. There is also a checkbox for 'PUBLISH TO IPFS' and an 'OR' section with an 'At Address' field containing '0x8064c98f4a4C4dB8E5b58Fa9'. At the bottom, it shows 'Transactions recorded' as 2 and 'Deployed Contracts' as 1. The right panel, titled 'FUNDRAISER AT 0X1AA...47189 (BLOC)', displays a list of functions available for the deployed contract. These functions include 'donate', 'renounceOwn...', 'setBeneficiary', 'transferOwn...', 'withdraw', 'beneficiary', 'donationsCou...', 'isOwner', 'myDonations', 'myDonations...', 'owner', and 'totalDonations'. Each function is represented by a button with its name and a corresponding icon.

DEPLOY & RUN TRANSACTIONS

ENVIRONMENT
Injected Web3

Custom (5777) network

ACCOUNT
0xe70...3fb87 (50.8938%)

GAS LIMIT
3000000

VALUE
1000 wei

CONTRACT
Fundraiser - browser/Fundraise

DEPLOY
_BENEFICIARY: 0x241a839634f72D299e6a17e4
transact

☐ PUBLISH TO IPFS
OR
At Address 0x8064c98f4a4C4dB8E5b58Fa9

Transactions recorded 2

Deployed Contracts 1

FUNDRAISER AT 0X1AA...47189 (BLOC)

FUNDRAISER AT 0X1AA...47189 (BLOC)

donate

renounceOwn...

setBeneficiary "0x241a839634f72D299e6a17e4"

transferOwn... address newOwner

withdraw

beneficiary

donationsCou...

0: uint256: 1

isOwner

myDonations

myDonations...

owner

totalDonations

0: uint256: 1000

Deployed Contracts


The LandFax contract allows landowners in the Amazon Rainforest to register their land and they receive a RAIN token, which entitles them to subsidies.

registerLand

Landowner: 0xd6e6008Bec33D45BB43751d


Coordinates: -14.92452/-59.89958

token_uri: string

 **transact**

lands



: 1

 **call**

0: address: Landowner 0xd6e6008Bec33D45BB43751d83C559276c0b7Ea8F

1: string: Coordinates -14.92452/-59.89958


2: uint256: fire 0

 Localhost 8545 


Connected


Account 4
0xEbd7...B440


⋮



29.9897 ETH


 Buy


 Send

 Swap

Assets

Activity

 **29.9897 ETH** >

 **1 RAIN** >

Deployed Contracts

If a fire is detected, it is reported to the contract and written to the blockchain. As long as no fires are reported, the landowner will continue to receive subsidies; however, if a fire has been written to the blockchain, the landowner will no longer be eligible to receive subsidies.

reportFire

token_id: 1

transact

lands

: 1

call

0: address: Landowner 0xd6e6008B
ec33D45BB43751d83C559276c0
b7Ea8F

1: string: Coordinates -14.92452/-5
9.89958

2: uint256: fire 1

pay

amount: 1000

token_id: 1

Fire: true

transact

Project Improvements

- Creating a front end to give donors the platform to learn more about the contributions made
- Automate the fire registry process, pulling the data from NASA and updating the fire registry on a daily basis
- Automate the periodic payment to all the landowners or RAIN holders with no registered fires



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Questions?
