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ForestRe

GLOBE UNDERWRITING

Utilising geo spatial data - risk assessment & pricing

Phil Cottle

Founder & MD ForestRe

&

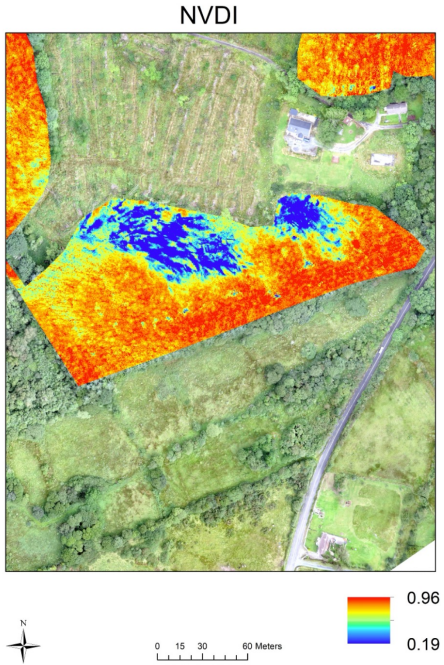
Yuming Zhi:

Principal Analyst & Underwriter at Globe

Geospatial World Forum (GWF) 2024

"Geospatial Transition:
Powering the World Economy".

Rotterdam, the Netherlands; 14 – 16 May 2024



Source; 2017 by- AERIALAGRITECH

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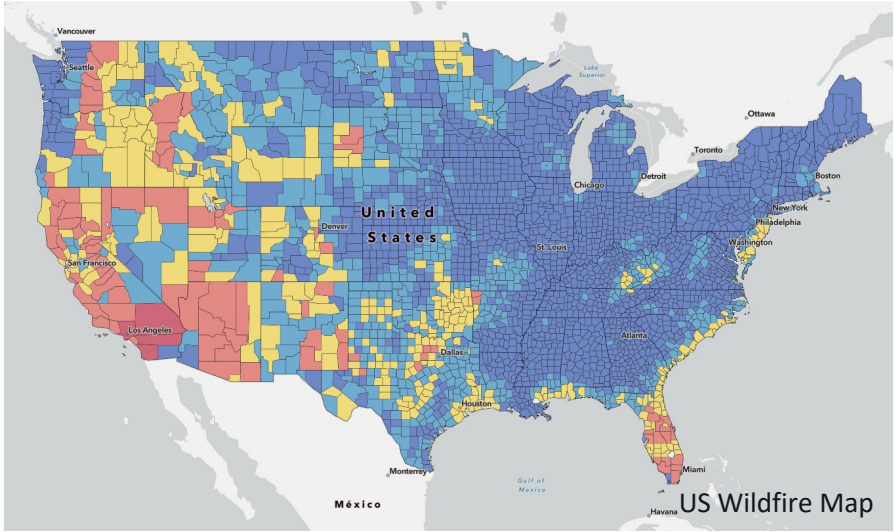
Contents

- Introduction – who are we & what we do?
- Cat. Risks in forestry
- What do we measure?
- How do we analyse the risk?
- What geo spatial data do we use?
- Case Study



Source: https://hazards.fema.gov/nri/wildfire at 11 May 2024

Worldwide risk profiling

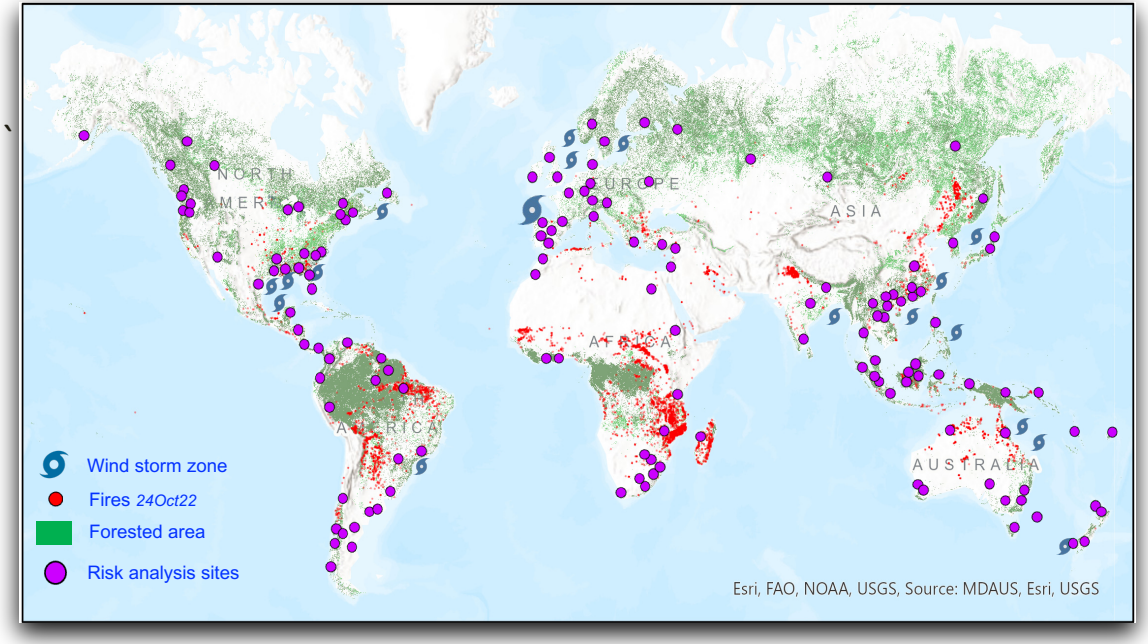
- **'ForestRe'** (**FRe)** is a technical team with 30-years experience in forestry risk profiling, pricing & management

- The team has developed **the tools using geo data, supported by extensive global experience** to quantify those financial risks…

- Across **forestry, agro-forestry and carbon investments**

Global reach of ForestRe

Map of our forest risk analysis sites



GLOBE UNDERWRITING **our partnered MGA**

- Fully FCA authorised Lloyd's cover holder
- **Insure in 30 countries / 6 continents**
- **Supported by our large panel of global insurers**

Catastrophic hazards in forestry

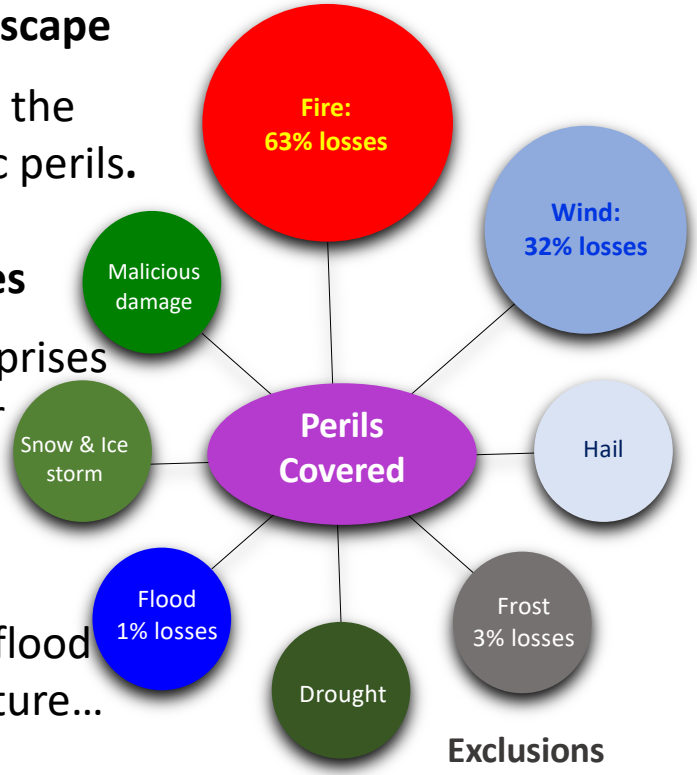
Forestry is a landscape

Fire and wind are the main catastrophic perils.

Fruit trees & vines

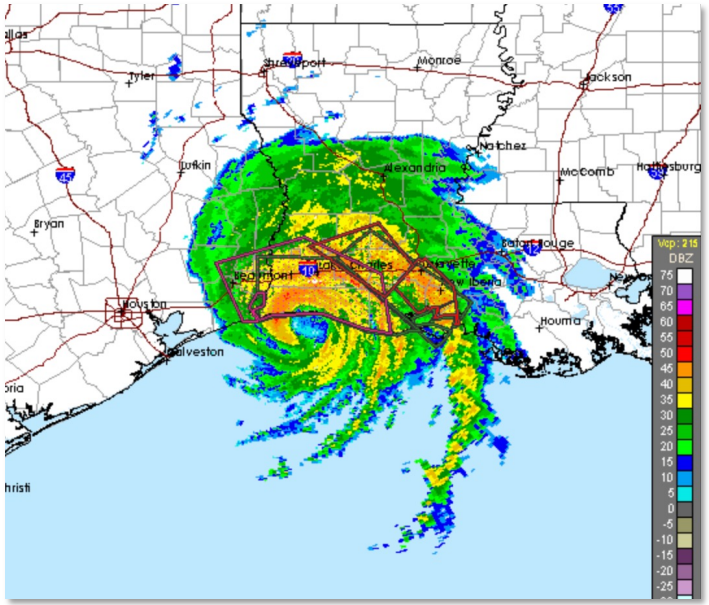
These local enterprises have a far greater exposure to local events:

Hail, wind, frost, flood & excessive moisture…



Exclusions

- Subterranean Fire
- Pests & disease



Hurricane Laura near peak intensity while approaching Louisiana late on August 26 2020; Highest winds 150 mph (Cat. 4):

Source: https://en.wikipedia.org/wiki/Hurricane_Laura

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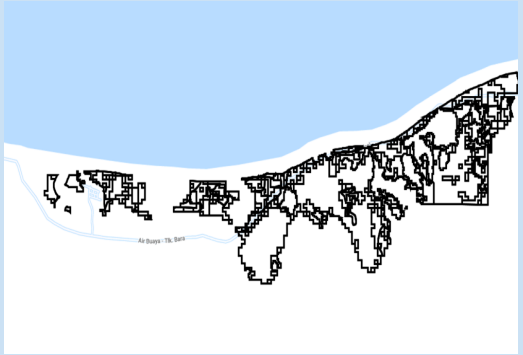
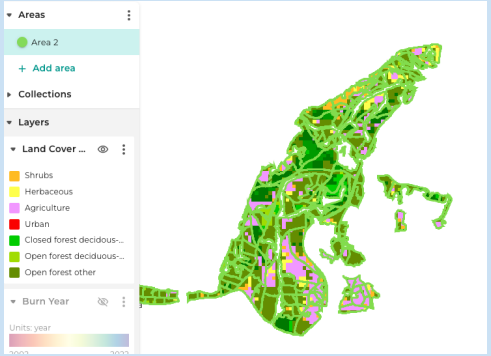
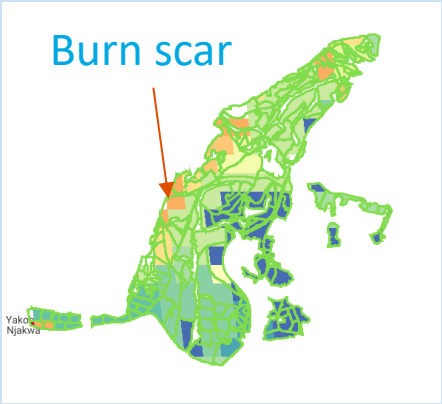
- **What do we measure with Geo-spatial data ?**

Area of the plantation	Landcover Type	Historical Burn Scar
		

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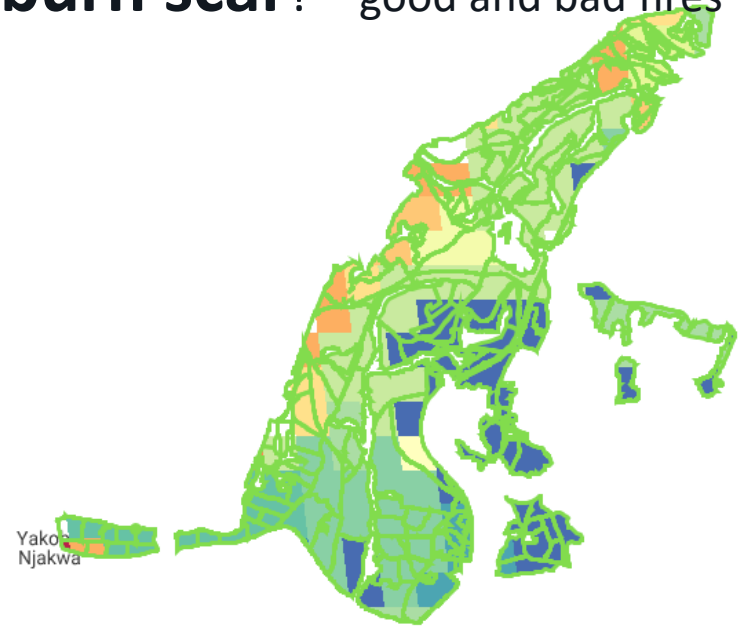
How to interpret historical burn scar? – good and bad fires



Our aim is to measure fires that damaged the value of the forest since 2001
From that to determine:

- Severity
- Frequency

Not all fires are 'bad'

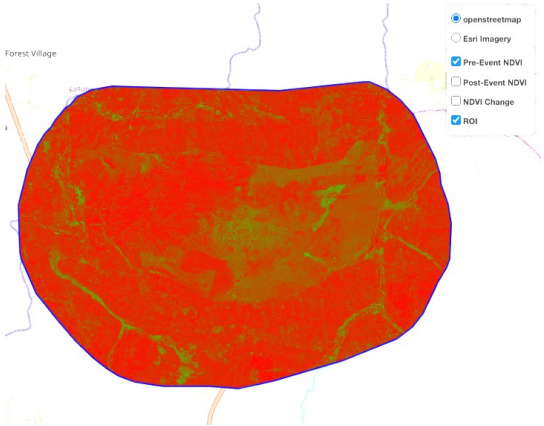
- Some fire prevent bigger fires – 'good' fires
  such as fuel reduction – burning off ground fuel such as weeds, shrubs, invasive tree species
- Burning along fire breaks so fires do not pass.

We need good geo-spatial data to help us do this.

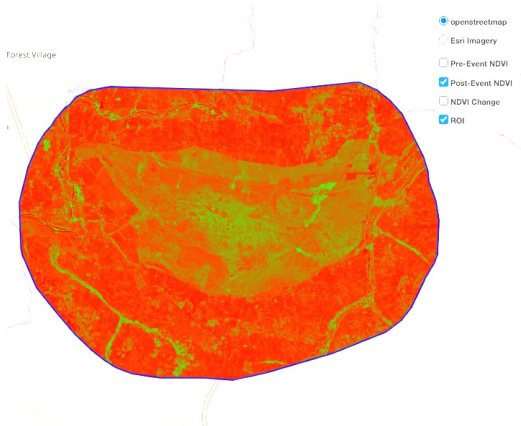
Damaging fires - NVDI

Good Fire (fire to reduce fuel load to prevent bigger fires in future) or Bad Fires?

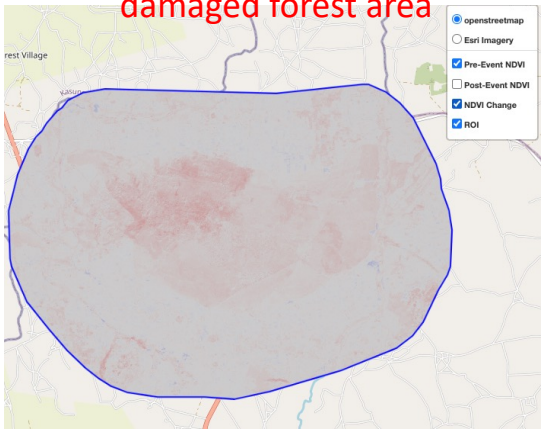
Before event



After event



The difference being damaged forest area



*NDVI Justification: reflects the reduction in live vegetation and the exposure of charred surfaces, compared to the pre-fire measurements that indicated healthier and denser vegetation cover.

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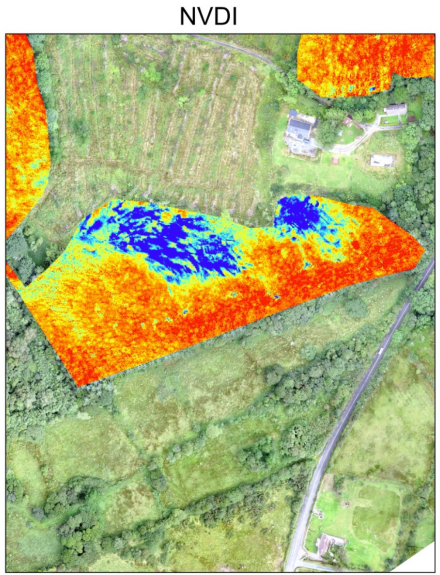
Wind damage – NVDI also useful



Source; 2017 by- AERIALAGRITECH

NDVI Justification:

reflects the reduction in live vegetation and the exposure of wind-blown trees, compared to the pre-storm measurements

Essential for us to help acquire empirical wind damage data for any client.

Other tools:

Surface depression of forest canopy due to wind.

How do we analyse the risk?

Shapefile Validation

Key: Is the kmz file complete and accurate?

Workflow Creation

Find the right dataset and set the correct parameters

Data Analysis & Input

Landcover Type Detection

Burn Scar Mapping and Burn Data Validation

Landcover and Burn Scar Mapping

Pricing Model

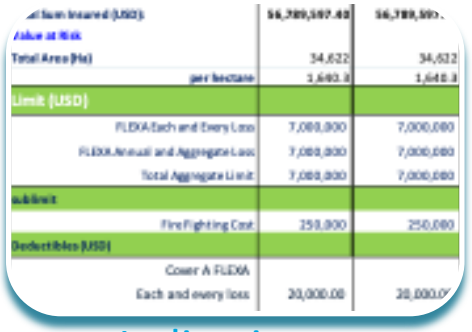
Loss cost calculation:-

Monte Carlos Simulation for Loss iteration

Loss Distribution Fitness Check

Generating Technical Pricing

Risk Assessment Report



Total Area (Ha)	34,622	34,622
per hectare	1,640.3	1,640.3
Limit (USD)		
FLEXA Each and Every Loss	7,000,000	7,000,000
FLEXA Annual and Aggregate Loss	7,000,000	7,000,000
Total Aggregate Limit	7,000,000	7,000,000
Additional		
Fire Fighting Cost	250,000	250,000
Deductibles (USD)		
Cover A FLEXA Each and every loss	20,000.00	20,000.00

Indication Quote

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What geo spatial data do we use?

Land Cover Data

- Copernicus Global Land Cover (2019)
- Dynamic World Landcover (10m)
- Planet – NICFI tropical regions

Burn Scar Data

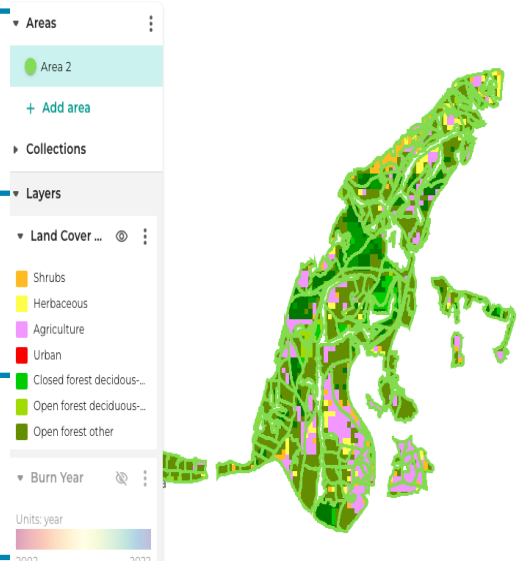
- FIRMS: Fire Information for Resource Management System (1km)
- Modis Burned Area Monthly Global (500m)

Land Image Data

- Landsat 4/5/7/8/9 Combined (30km)
- Sentinel-2 MultiSpectral (10-60m) - NDVI

Weather Data

- ERA5 Land Daily Aggregated Reanalysis
- ERA5 Land Monthly Aggregated Reanalysis (11km)



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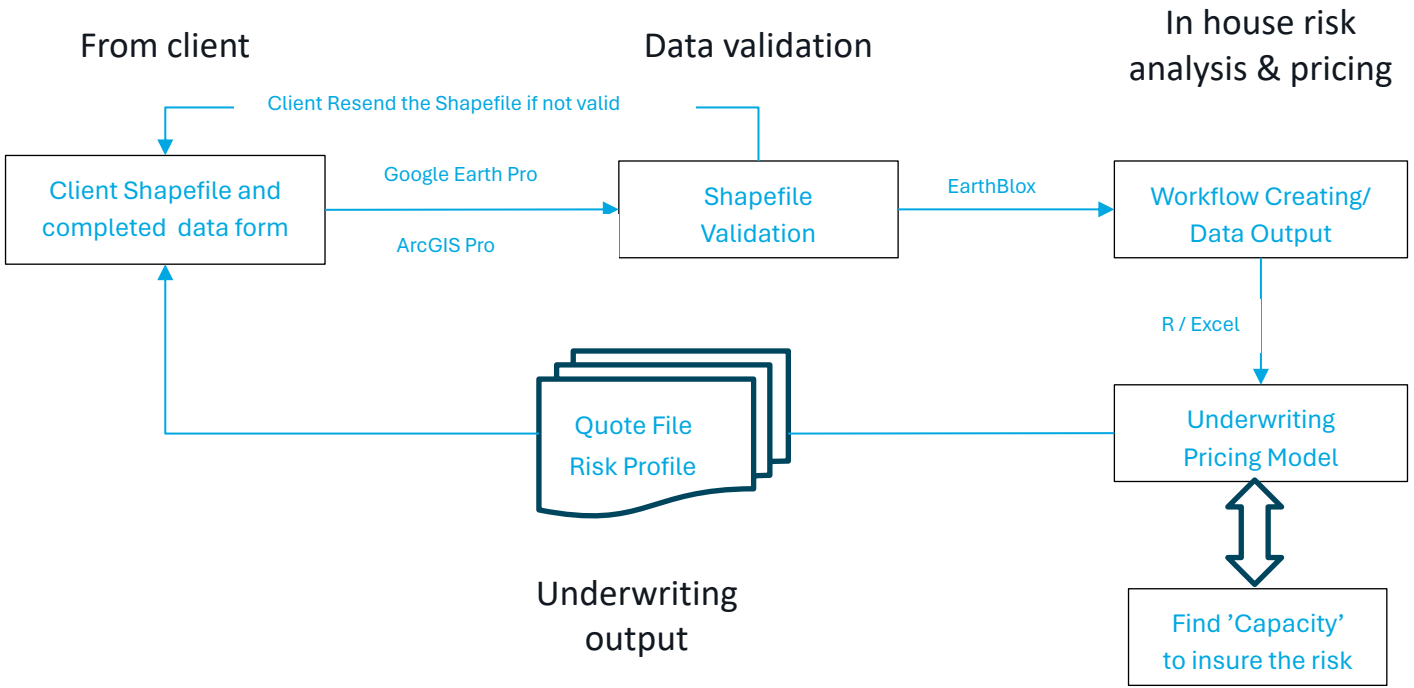
What platform do we use?

EARTH BLOX

1) Collaborated since 2019
2) This data feeds into our **In-house pricing tool** through API connecting to EarthBlox for data

Source; Earthblox: Land cover change data
https://www.earthblox.io/packages/land-cover-change

Case Study – Pricing Process



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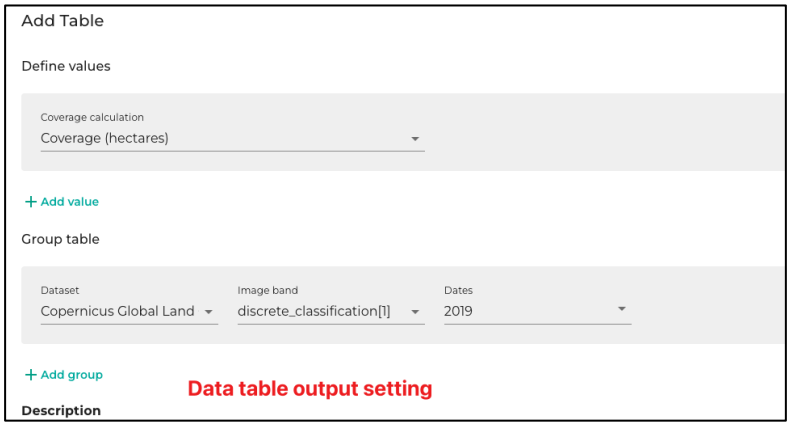
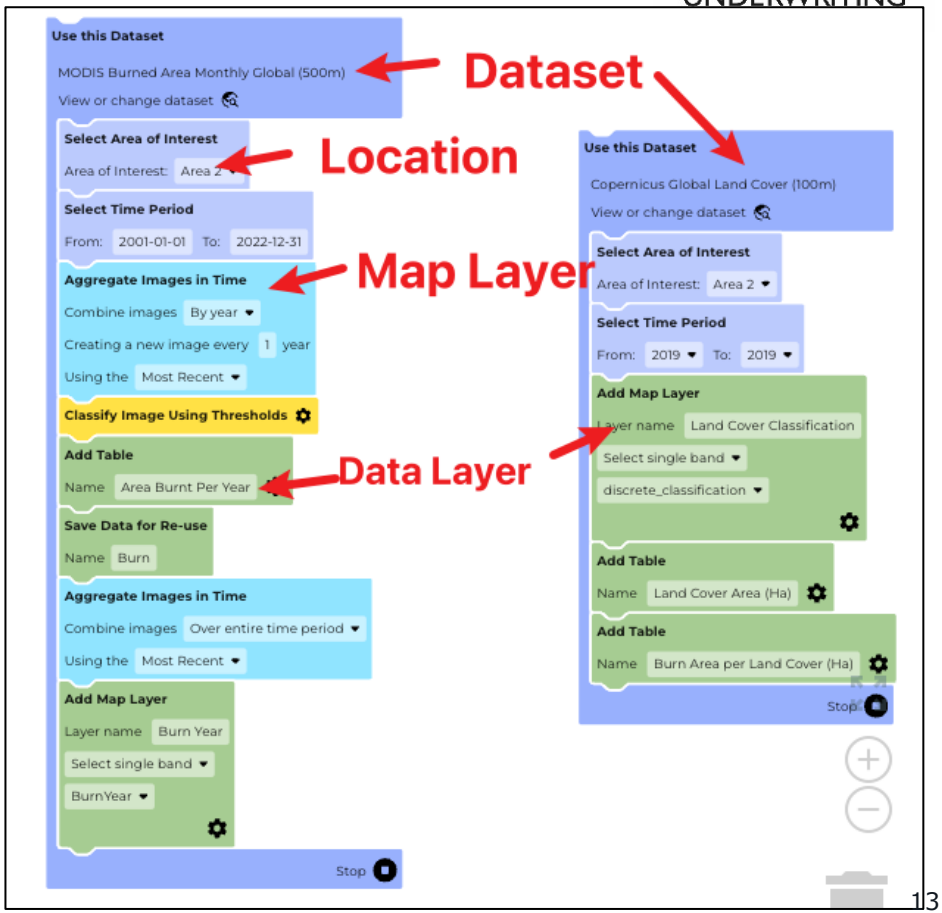
Case Study – Malawi Account

1. Parameters building

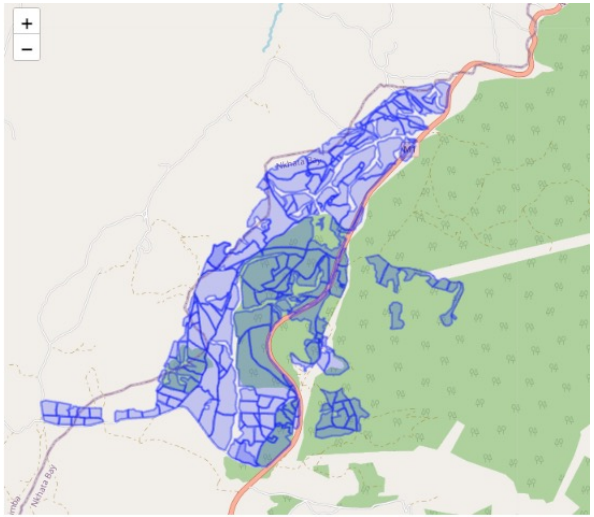


Lego like
Drag, Combine & Run



Case Study – Malawi Account

2. Area Check



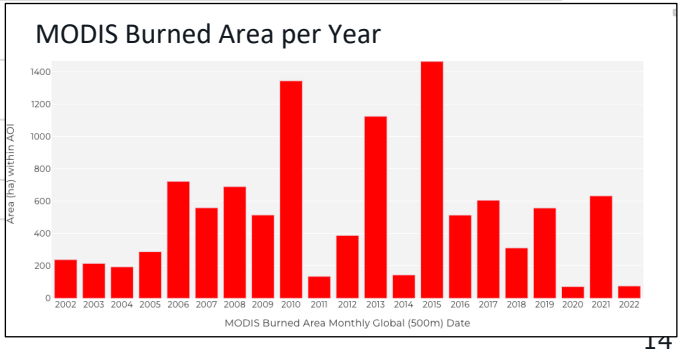
Area_m2	Area_ha	Area_ac
64,847,552.79	6,484.76	16,024.48

<5% Discrepancy - schedule and KMZ areas

*Assuming the shapefile has been validated

3. Landcover Type

Land Type	Area (ha)	Area (ac)	Percentage
Shrubs	868.7	2,146.6	13.40%
Herbaceous	376.5	930.5	5.81%
Agriculture	1,536.0	3,795.5	23.69%
Urban	2.4	5.9	0.04%
Closed forest evergreen-broad	70.3	173.7	1.08%
Closed forest deciduous-broad	57.2	141.3	0.88%
Closed forest other			
Open forest evergreen-broad			
Open forest deciduous-broad			
Open forest other			
Total			



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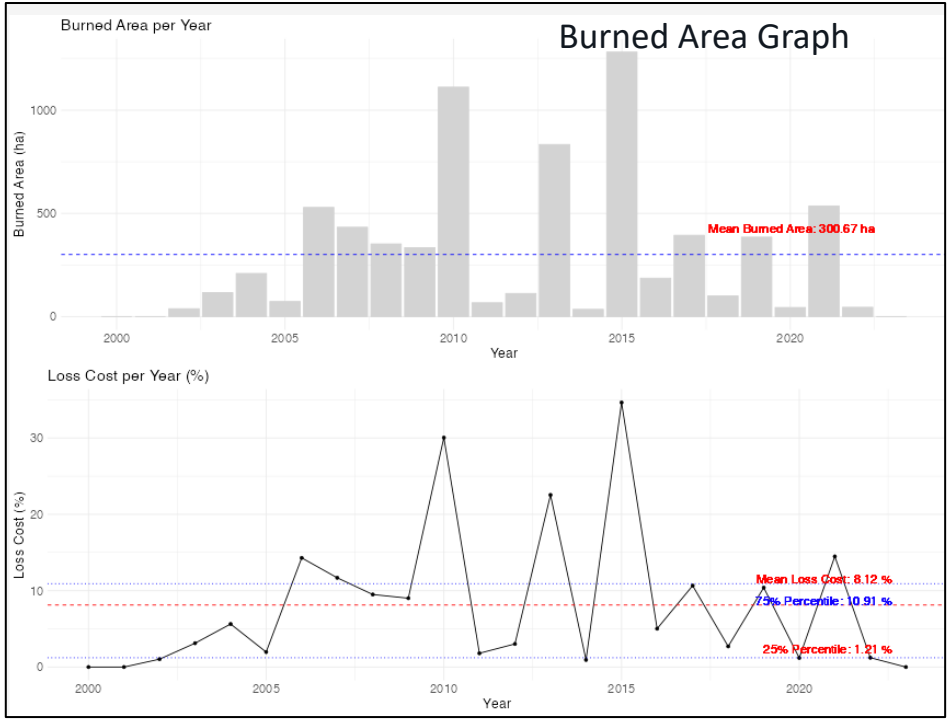
Case Study – Malawi Account

3. Generating 'Loss Cost' Table

	Year	Burned Area (ha)	Loss Cost
1	2000	0	0.00%
2	2001	0	0.00%
3	2002	38	1.03%
4	2003	116	3.12%
5	2004	209	5.63%
15	2014	35	0.93%
16	2015	1,282	34.64%
17	2016	186	5.02%
18	2017	394	10.66%
19	2018	100	2.70%
20	2019	385	10.40%
21	2020	44	1.19%
22	2021	536	14.49%
23	2022	45	1.22%
24	2023	0	0.00%

'Loss cost' (=area burnt/total area as %)



Case Study – Parametrics in Brief

Provides payouts based on pre-set parameters linked to an event, rather than traditional loss assessment.

Trigger Events

Payouts are triggered by measurable events such as wind speed, earthquake magnitude, or rainfall levels.

Rapid Settlements

Benefits include quicker claims processing and payouts due to the use of objective data.

Transparency

Clear terms and pre-defined triggers enhance transparency between insurers and policyholders

Innovation in Pricing

Offers opportunities for innovative pricing models in emerging risks like climate change.

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This is the structure we have developed:

One-Stop-Data supplier

- Powerful Data Processing
- Real-Time Data Access
- API access
- Scalability
- Collaboration Features

Source: ChatGPT 4

Source: ChatGPT 4

Summary

1. The 'ForestRe' team introduced geospatial data into all routine underwriting in 2019
2. …To measure loss frequency and severity especially for fire
3. The geo data platform supplemented the empirical data from clients
4. Geo data provides an ability to underwrite globally without any location limits
5. BUT great care required to interrogate the data – what is burning; was there an economic loss?
6. Work in progress to develop tools for accurate long term wind events
7. We still have lots to learn…

Contact Details:

Phil Cottle
phil.cottle@forestre.com;
+44 (0)7769 895048

Yuming Zhi
Yuming Zhi@globeuw.com
+44(0)7909 336875

Daniel Longden
Daniel.Longden@globeuw.com
+44 (0) 7756 961500