Mitigating Climate Risk for Investors into Forestry

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Banking, Financial Services & Insurance Sector
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*Forestry wind damage, cyclone Gabrielle
February 2023, New Zealand*

'ForestRe'

UK-based **Forestry insurance Agency (MGA)**

- **Insure managed forests Globally**
  - We have our own 'capacity'
  - Access international reinsurers

- **Provide risk profiling**

- **Risk transfer solutions**
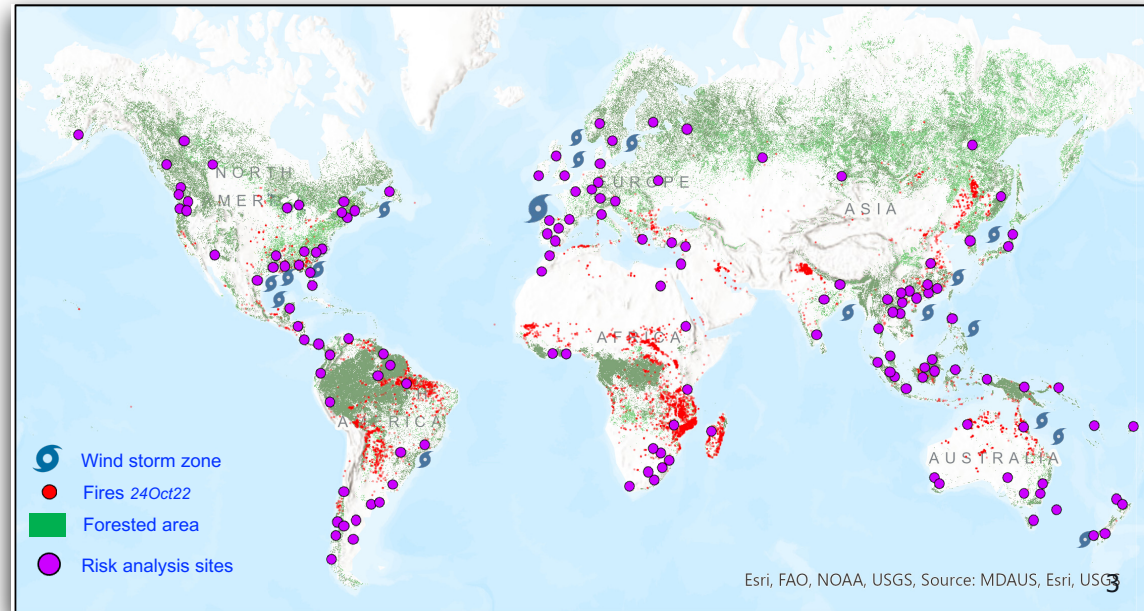
Clients with values from: **US$ 0.5m to US$ 10bn**

Worldwide forest risk profiling
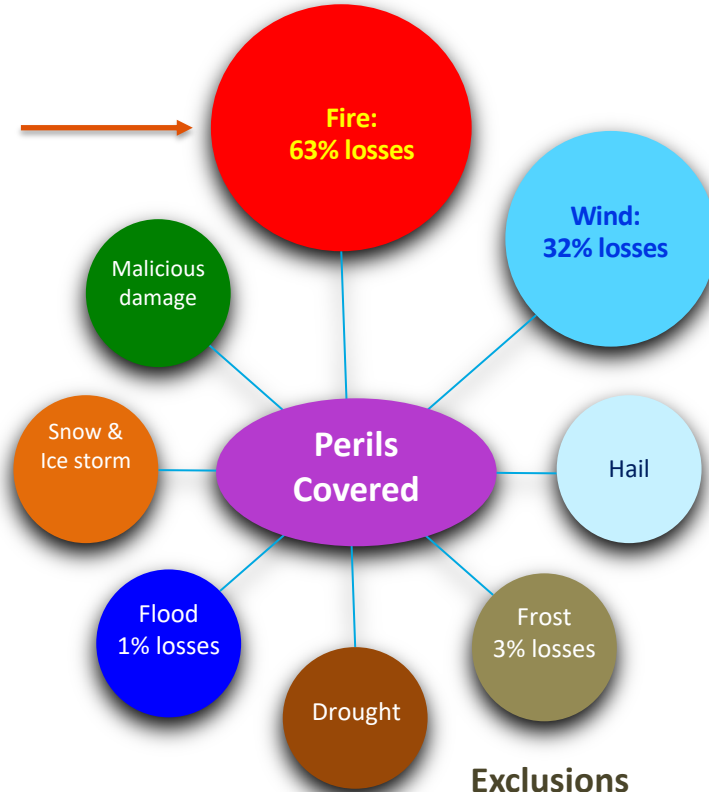
Global reach of ForestRe
Map:- forest risk analysis sites

Reach

- **Insuring in 30 countries & 6 continents**

- 30-years experience in forestry risk analysis, pricing & management

Wind storm zone
Fires *24Oct22*
Forested area
Risk analysis sites

Esri, FAO, NOAA, USGS, Source: MDAUS, Esri, USGS

Climate perils insured

Wind and fire are the major catastrophic perils representing 95% of all our insured losses

ForestRe

SPECIALTY MGA UK

Fire: 63% losses

Wind: 32% losses

Malicious damage

Snow & Ice storm

Hail

Perils Covered

Flood 1% losses

Drought

Frost 3% losses

Exclusions
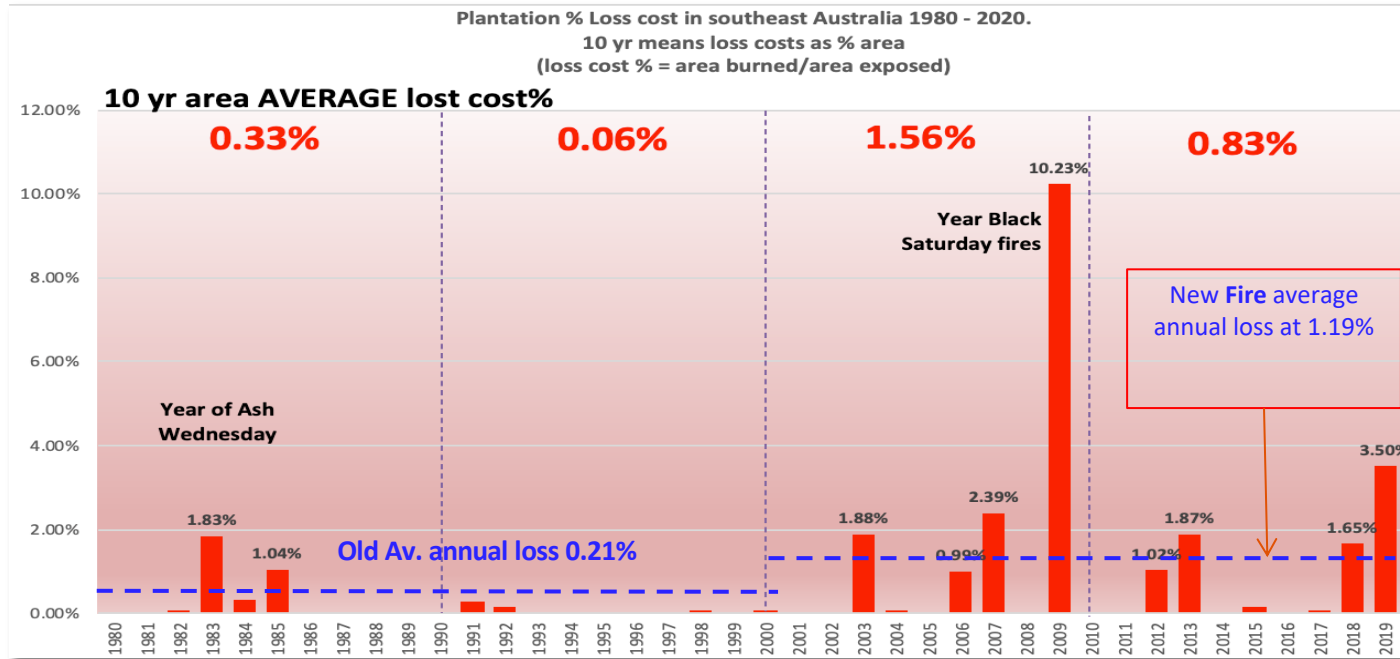- Subterranean Fire
- Pests & disease

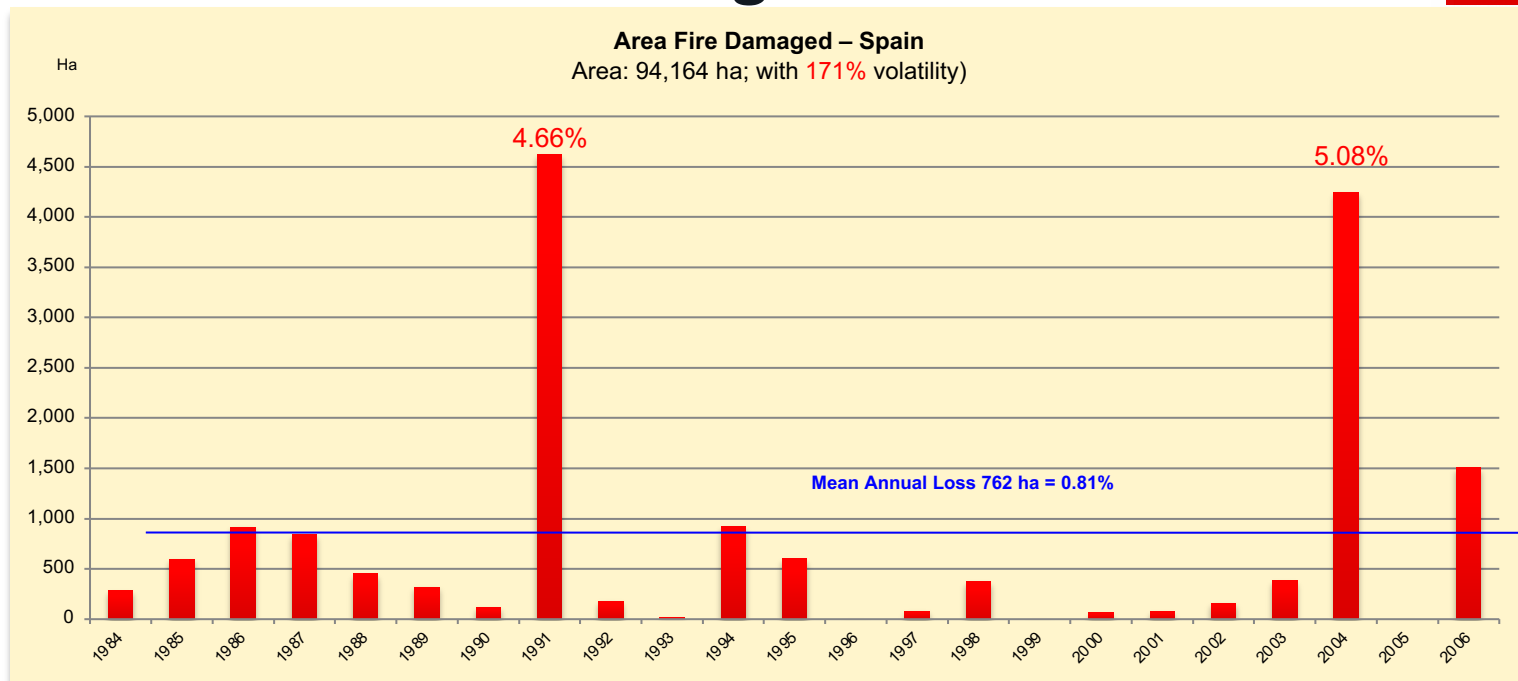**What does climate-related risk look like in forestry (frequency & severity)**

Forest impacts of a warming climate?

Patterns & severity of losses – example 1

1. Large forestry investment – Australian Fire

Value 2022 = US$256m

Plantation % Loss cost in southeast Australia 1980 - 2020.
10 yr means loss costs as % area
(loss cost % = area burned/area exposed)

Beware the average & extreme events

Area Fire Damaged – Spain
Area: 94,164 ha; with **171%** volatility)

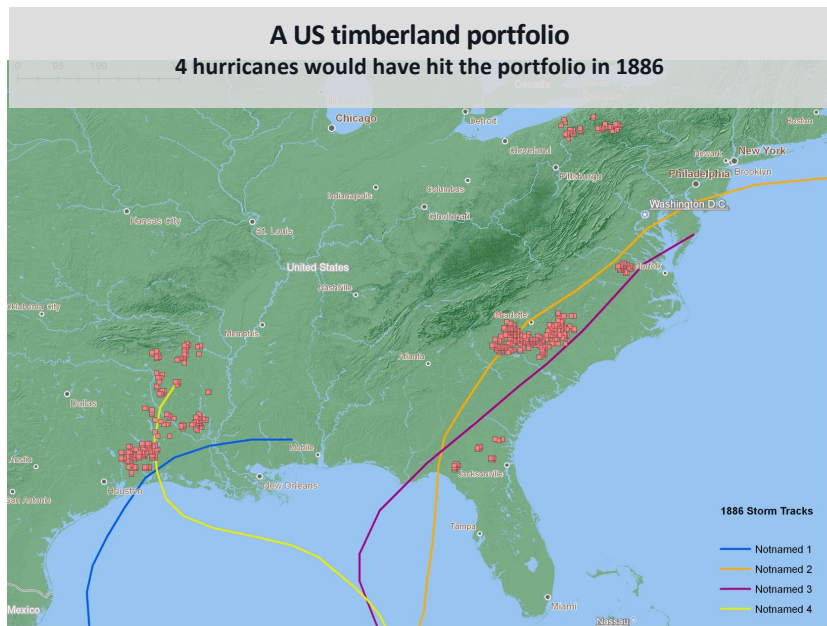Fire catastrophes occur when**… the improbable coincides with the improbable.**
Extreme events are impossible to prevent or predict.

US forestry investment risk profile

Patterns & severity of losses – example 2

Large forestry investment – USA Hurricane
Value 2010 = US$430m

'As-if' hurricane US$ losses at constant 2010 prices

About 15-20-year gaps between major loss events

A US timberland portfolio
4 hurricanes would have hit the portfolio in 1886

1886 Storm Tracks

Notnamed 1
Notnamed 2
Notnamed 3
Notnamed 4

7.8% portfolio **loss** 1886

Mean annual loss = **0.65%** highly volatile from year to year.

Annual Aggregated Loss
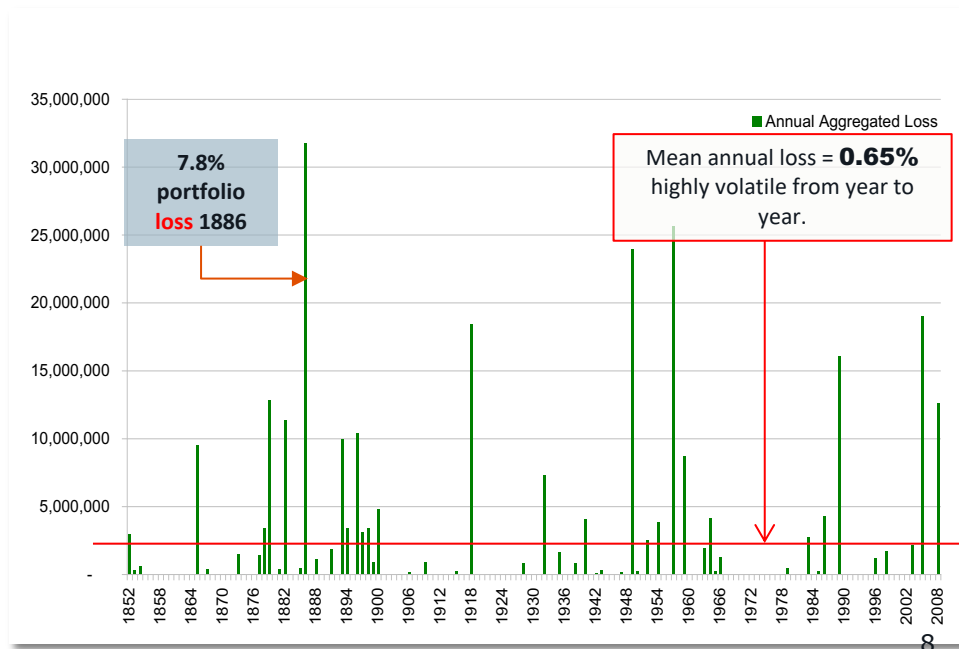
USA hurricane frequency trends

Number of combined tropical storms, subtropical storms, and hurricanes each year from 1878 to 2020.
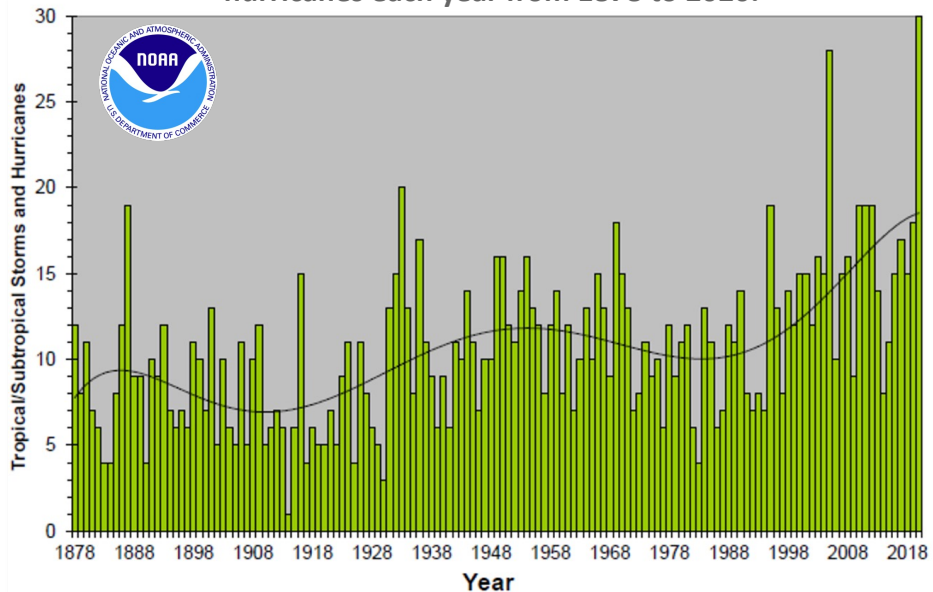
Loss patterns are changing;

increasing frequency of events
Atlantic, Pacific and across Europe

Increased temperature is a factor

SRe Corporate Solutions Oct. 2022

A **+1C rise** in sea-surface temps generates: **+ 5% wind speed** & **+ 50% destructive potential**

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Our use of geospatial data

ForestRe data source transition

Spain	Fire Loss Cost per Region			
Year	Cataluna	Galicia	Castilla La Mancha	Extremadura
2012	0.578%	0.353%	0.396%	0.082%
2011	0.015%	0.660%	0.038%	0.064%
2010	0.020%	0.214%	0.009%	0.012%
2009	0.121%	0.162%	0.265%	0.181%
2008	0.014%	0.071%	0.009%	0.013%
2007	0.061%	0.085%	0.006%	0.071%
2006	0.130%	3.951%	0.070%	0.087%
2005	0.258%	1.574%	0.818%	0.506%
2004	0.028%	0.721%	0.088%	0.118%
2003	0.530%	0.352%	0.195%	1.287%
2002	0.068%	0.539%	0.060%	0.106%
2001	0.071%	0.286%	0.051%	0.112%
2000	0.189%	0.722%	0.419%	0.110%
1999	0.035%	0.104%	0.082%	0.095%
1998	0.984%	0.790%	0.024%	0.086%
1997	0.045%	0.398%	0.051%	0.065%
1996	0.038%	0.246%	0.025%	0.017%
Total	0.187%	0.660%	0.153%	0.177%

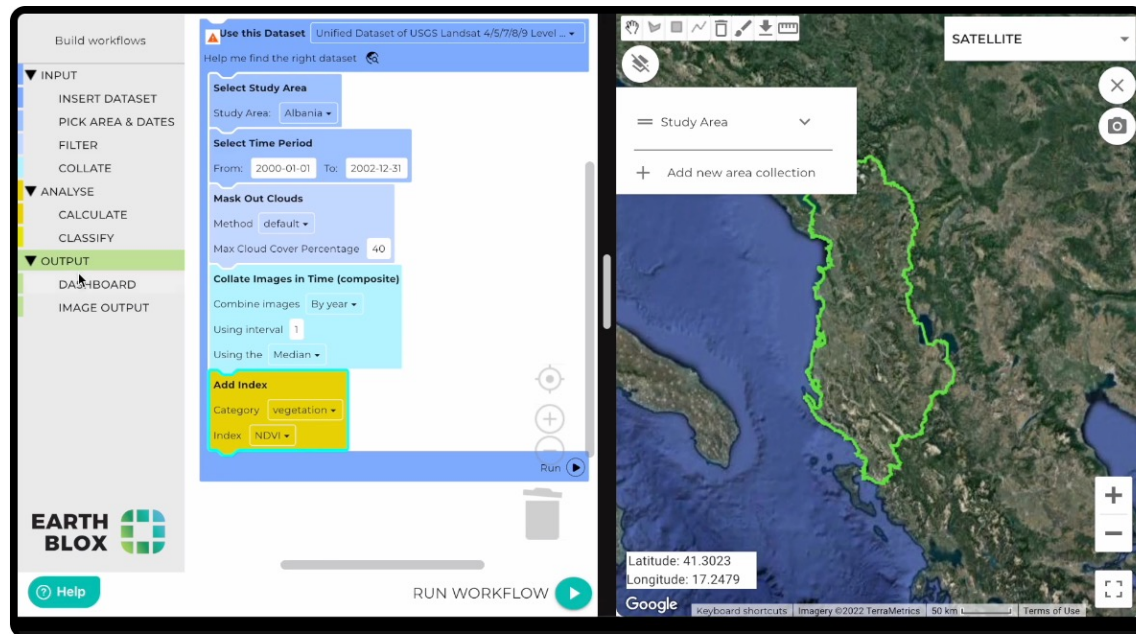**'Loss cost' = hectares burnt / all forestry hectares**

1. **To 2019:**

   - Used empirical data of forest losses from a private company or public authorities

   - Often data incomplete so would source substitute data recorded by ForestRe.

   - So, data often **NOT** representative of true risk

   - The data may not include a major event but reflected its 'volatility' – an indicator of major loss potential

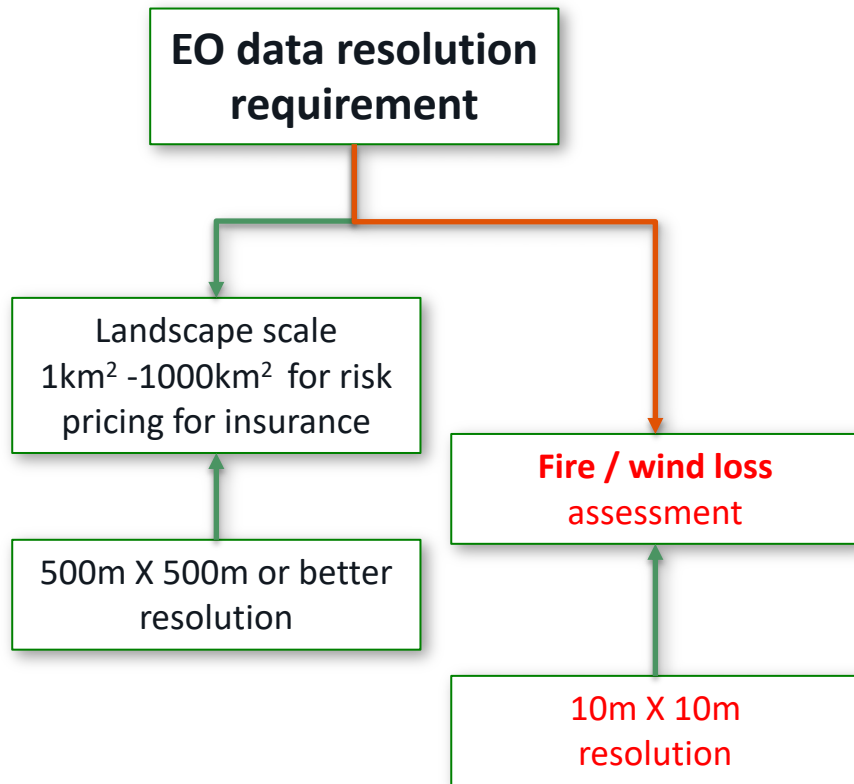   - Ran Monte Carlo simulations for **MEAN** and **1:250 event worse case**

2020 ForestRe transitioned to EO data

2. Engaged **Earth Blox** to produce**:**

- Very user-friendly tool to access & process earth observation databases

- To examine:

a. Land use cover
b. Burn scar time series/d-NBR
c. Soil moisture
d. Weekly rainfall
e. Flood
f. Wind damage and much more.

ForestRe EO data requirement

EO data resolution requirement

Landscape scale
1km^2 -1000km^2 for risk pricing for insurance

500m X 500m or better resolution

Fire / wind loss assessment

10m X 10m resolution

Data cost is a factor:

- We generate income only when insurance is completed.

- However, the costs of assessing an insured loss do get paid by insurers

Comparing fire risk client Vs environment
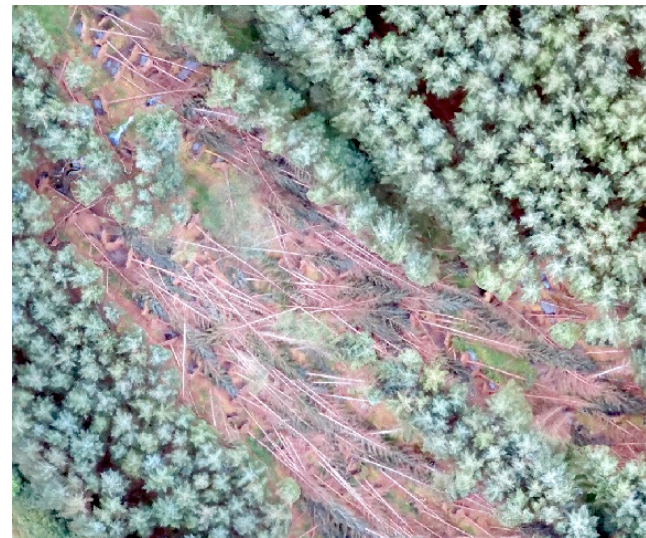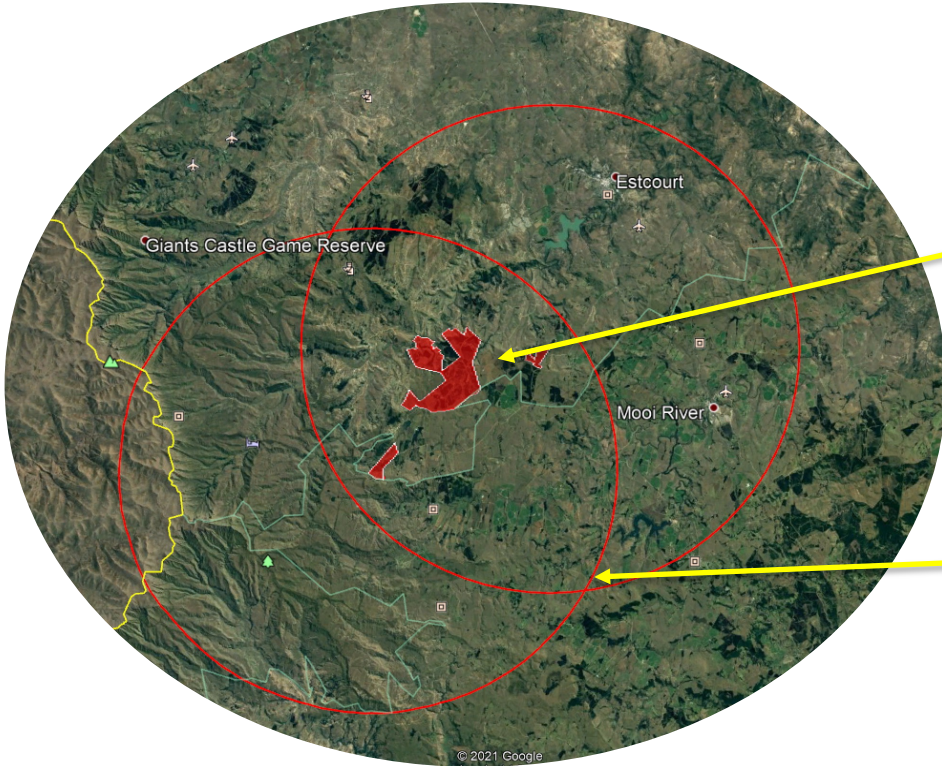
We can now compare:

- the fire loss 'performance' of the insured's locations

with

- the general fire incidence in the region in which it is located
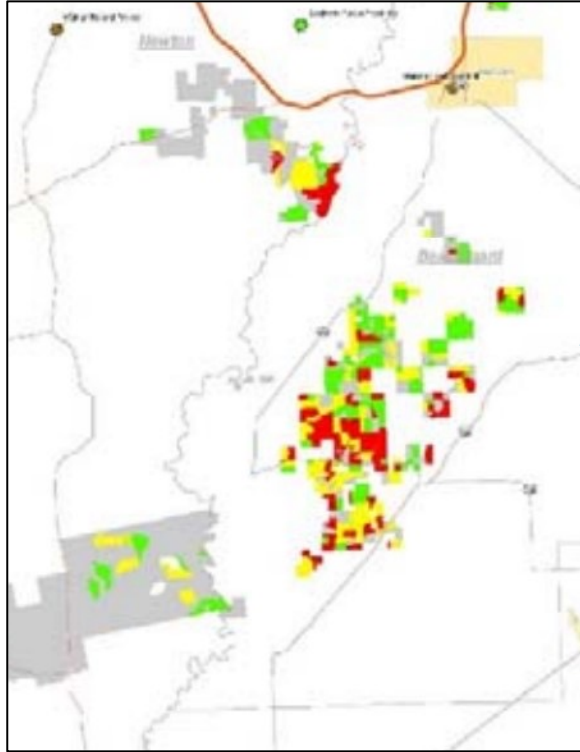
Forest Manager loss assessment vs Earth Blox

*Figure 1 **Forest Manager** initial assessment after H. Laura*

This capability already helping forest managers following a storm loss

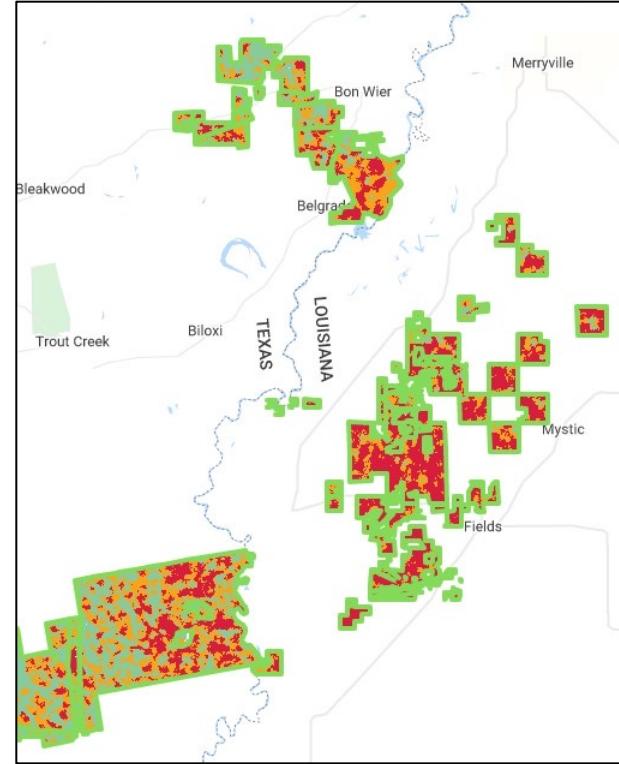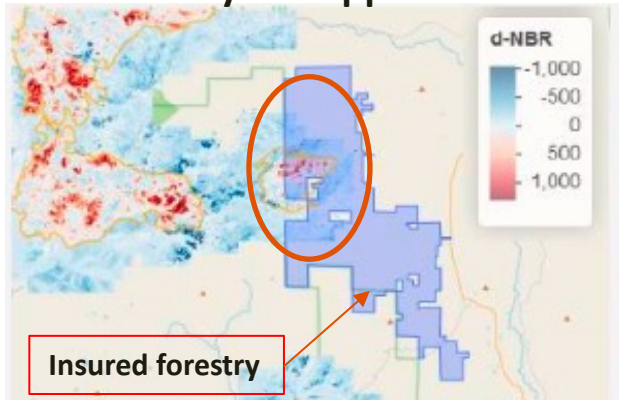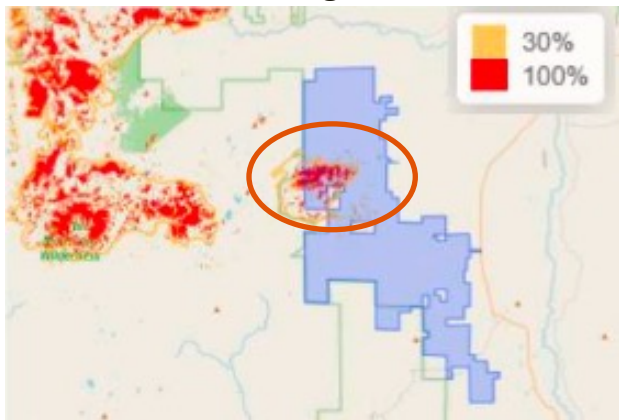Without technology wind assessment costs could be >$200/ha

*Figure 2 **Earth Blox** wind damage assessment*

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Mapping fire impact: - burn scars

Fire intensity is mapped

Insured forestry

Insured forest damage is calculated

Forestry burn scar indemnity product

o Based entirely on satellite burn scar measurements

o **A loss is required to make a claim**

o The forest manager will assess his fire loss

o The burn scar analysis provides independent verification check

o Images comparing pre and post fire data

Assisting clients with their Climate risks in forestry

Contribution to managing fire risk

1. **Analysis of portfolio fire risk – 'know your risk'**
    - 20 year burn scar analysis
    - Modelling for volatility and projected size of severe events as 1 in 250
    - Indicating the quantum of an extreme event

2. **In-forest fire management & plans**
    - **Prevention** – daily fire weather index x site
    - **Identification** – fire detection cameras
    - **Rapid suppression** – crews and equipment

3. **Transfer of risk to insurers**
    - Policy structuring
    - Risk sharing and
    - Minimising premium costs

Increasing client's wind risk awareness

1. **Analysis of historic wind risk - ('know your risk')**
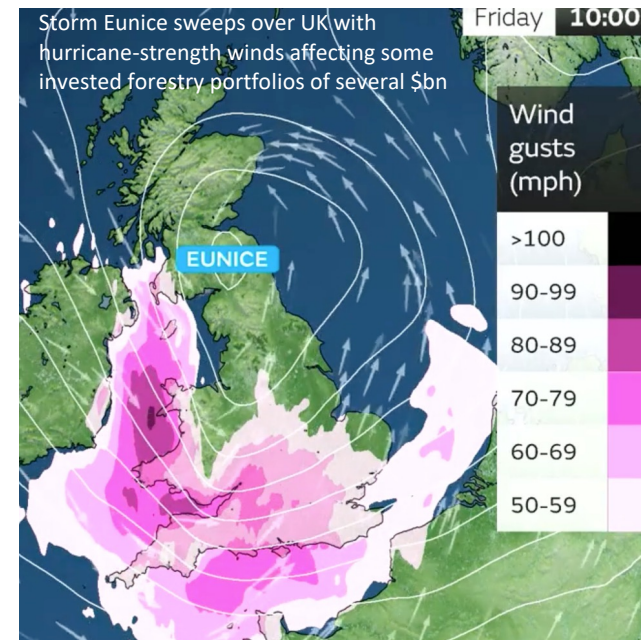
   - Hurricane frequency – good data from NOAA
   - Extra-tropical storms
   - Localised wind storm impacts - poor data

2. **Mapping client's historic wind risk - ('know your risk')**

   - Mapping past wind damage over last 5+ years

3. **Transfer of risk to insurers – policy structuring**

   - Risk sharing and
   - Minimising premium costs

Storm Eunice sweeps over UK with hurricane-strength winds affecting some invested forestry portfolios of several $bn

Friday 10:00

EUNICE

Wind gusts (mph)
>100
90-99
80-89
70-79
60-69
50-59

Storm Eunice - possibly the strongest since 1990 with speeds >106 knots (Cat 3 hurricane)

Summary & Contact Information

1. Rapid improvement in data capability in recent years

2. Much closer relationship with clients adding value to their business

3. Clients becoming far more aware of their exposure to climate change

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