Climate Emergency Case Study Template

This template is to provide input to the IAM Climate Emergency Program. The aim is to capture individual and collective experience of operational and technical practices so that it can be shared and discussed. *Suggested* headings are shown in **bold.** Comments and suggestions are shown in italics.

Author: Zachary Christin
Company represented: AMCL
Role: *Consultant*
Sector: Land Management / *Timber*
Asset owner: *State of Idaho Dept Lands*

Introduction

Using ecological economics and risk analysis to prioritize investment interventions in Idaho public forests

Description of assets in study

This case study focuses on forests as assets and their value to the community and economy due to timber value, recreation, and stormwater abatement contributions.
Lake Pend Oreille region, accounting for nearly 46,000 acres of coniferous forest. Approximately 21% of this forest is public land. Nearly 19,000 acres of this forest was deemed high risk, threatened by pest and high intensity wildfire.

When was the activity carried out?

The risk assessment was carried out in 2022.

Why was the activity carried out?

The State of Idaho spends millions of dollars contributing to fighting wildfire. Additionally, the Idaho State Department of Lands spends millions more on forest maintenance (treatments) to abate the risk to wildfire and protect sensitive species. The State had incentives to spend this money as wisely as possible.
Having an understanding of where highest value regions across Idaho AND understanding of highest risk areas across Idaho allows the State to prioritize funding to maximize best use of taxpayer dollars. Funding would be allocated to highest value (structure protection, sensitive habitat, recreation hotspots) where forests were at highest risk.

Description of activity

Methodology

Using remote sensing technology and aerial imagery, the State of Idaho found that nearly 19,000 acres of forest were in conditions susceptible to pest infestation from Mountain Pine Beetle and Balsam Woolly Adelgid. Historic infestations have resulted in acres of dead trees, creating ripe wildfire conditions. Historic fires have resulted in billions of dollars in damage. This georeferenced risk data in combination with an understanding of where the most valuable regions are in Idaho provides means of prioritized funding and an understanding of how much funding is needed to mitigate high risk high value areas from loss to wildfire.

Value estimates of forest was calculated using multiple methods: 1) Timber products sales, 2) Hotspots for recreational spending in national forests, state parks, and BLM land. 3) Forests upstream of larger cities where stormwater abatement is provided (where in the case of forest loss, stormwater would impact city infrastructure).

References

All work is published in the report: IDAHO'S NATURAL CAPITAL ASSESSMENT: A STATEWIDE ECOSYSTEM SERVICES EVALUATION written by Zachary Christin, Jared Soares, David Batker, Lance Davisson, Tim Maguire, Tyre Holfeltz, Erika Eidson.

Risk types
Economic risk (risk of high intensity infestation of pest and high intensity fire resulting in economic damage), Environment risk (risk of high intensity infestation of pest and high intensity fire resulting in sensitive habitat loss and recreation loss)

Risk management process
Risk of pest infestation and severe wildfire was traditionally based on weather conditions (dry heat, drought conditions, high winds) and limited on-the-ground condition information. This assessment was the first of its kind to use a state-wide risk assessment with geospatial data. Use of this information required the development of a new risk framework and register, based on a catalogue of areas identified as high risk.
Asset management planning in this case was in the context of maintenance of forest assets traditionally ignored. Planning required business cases to demonstrate the value of forest maintenance (treatments) to reduce risk cost of severe pest infestation and wildfire. This risk cost was measured in $/acre/year.

Tools used and resources used.
Geospatial data files used:

Vegetation geospatial data

GIS Data Layer Name	Source	Use Description
Landfire - Existing Vegetation Type	Multiple organizations	Base vegetation type (aka Land Cover) for the project
NLCD Dataset	USGS	Crosswalk Landfire classes to NLCD to assist in ESV analyses
NHDPlus Waterbody	ESGS	Add further detail to "Open Water," enabling the separation of rivers and lakes. Determine lakes greater than 1 acre in size.

Risk and Economic Value geospatial data

GIS Data Layer Name	Source	Attribute Definition
Urban and Suburban Boundaries	US Census Bureau, 2021	Cities with populations over 50,000, or metro areas, were identified as urban. All other cities and all census blocks with greater than one house per acre were identified as suburban.
Public Drinking Water	FAP, 2020	This layer identifies the physical area around wells or surface water intake including the boundaries of surface and subsurface areas that contribute to those water sources.
Terrestrial Species of Economic Importance	WAFWA, 2019	Identifies terrestrial game species especially if habitat needs are not already covered by "Species of Concern" mapping.
Aquatic Species of Economic Importance	WAFWA, 2019	Identifies sportfish, especially if habitat needs are not already covered by "Species of Concern" mapping.

Wildfire and Pest Risk Geospatial Data

GIS Data Layer Name	Source	Use Description
Forest Health – Bark Beetle (MPB)	USFS, 2021	Historical: Uses recent GIS snapshots of forests in areas impacted by bark beetle, mountain pine beetle specifically (other beetles not included). "TPA / Percent Affected" field filtered for "severe outbreaks" only.
Forest Health - Balsam Wooly Adelgid	USFS, 2021	Historical: Uses recent GIS snapshots in areas impacted by BWA.
Composite Relative Risk to Forest Health (Insects, pathogens, invasive species, climate change)	FAP 2020	Risk (Potential): Combines seven data sources to create a weighted scale risk categorization

Forest Fire History	FAP 2020	Historical: Identifies high severity wildfires that occurred over the last 10 years.
Relative Fire Risk to Communities and Ecosystems	FAP 2020	Risk (Potential): Identifies location of communities, their infrastructure, and landscapes at risk of fire.

Metrics

All geospatial values varied in metrics measured, but all were measured in acres impacted or scores by acreage.

Economic values were reported in $/acre/yr or $/yr based on the measure. The impact of risk was measured in $/acre/yr, and the reduction in risk due to forest treatments in the same units.

All metrics represented a single snapshot in time. Data is updated based on the following parameters:

- Inflation annual update
- Updates in GIS information (avg. 5 years)
- FAP report updates (5 years)

Costing

The final financial parameter was reported in $/acre/yr. This output represented the risk cost of unchanged high-risk regions without intervention. For example, the risk cost associated with a severe wildfire event was measured by the probability of a wildfire * the damage associated with a high severity fire. Probability distribution was determined by historic data and field conditions.

Reduction in risk was demonstrated through forest treatments. Reducing high intensity wildfire through forest treatments resulted in reduce overall risk and thus lower risk costs. Budget impacts came into consideration when understanding the scope of forest treatments needed to achieve risk cost goals. This resulted in a budget request for additional forest treatments in future budget planning cycles.

In addition to costs to lost timber value, recreational opportunities, and stormwater abatement, the cost of carbon released was incorporated into the model as well. EPA guidelines were used, deriving a 2022 social cost of carbon to calculate total value loss.

People

• Idaho Department of Lands Urban Interface/Planning Program Manager
• Idaho Department of Lands/ US Forest Service National Fire Plan Coordinator
• Idaho Department of Lands Urban Interface/Planning Program Manager
• Mary Fritz – Idaho Department of Lands Forest Stewardship Program Manager
• Idaho Department of Lands Forest Health Program Manager
• Idaho Department of Lands Fire Risk Mitigation Program Manager

Evaluation

What was the main output of the activity?

• Securing Pre- and Post-Disaster Funding: The report results helped equip the State of Idaho in assessing the economic impacts of future disasters in requesting pre- and post-disaster funding from a variety of agencies, including but not limited to: Federal Emergency Management Agency (FEMA), USDA Forest Service (USFS), USDA Natural Resource Conservation Service (NRCS); Idaho Department of Lands (IDL); Idaho Fish and Game (IDFG).
• Estimate Return on Investment of Idaho's forest treatment programs: The spatial data, economic values, and methods described in this report can be used to estimate a rate of return on investment for forest treatments and other mitigative activities (e.g., hazard fuel reduction, wetland creation etc.).