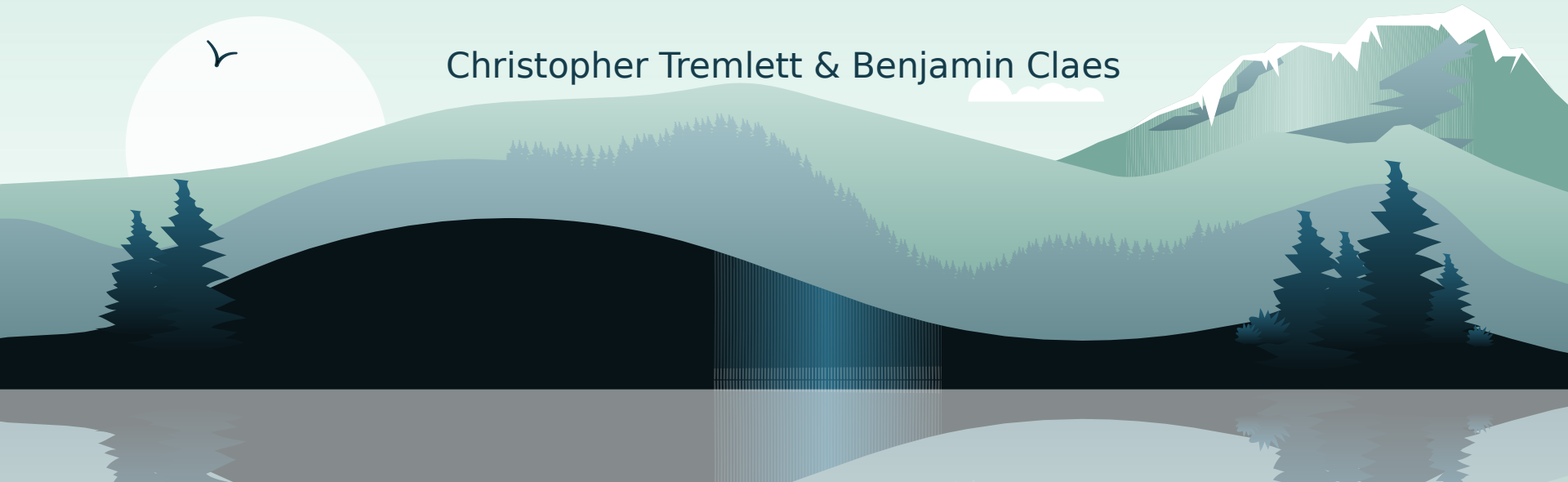
A focus on Eucalyptus plantations in Portugal and how to mitigate wildfires

Christopher Tremlett & Benjamin Claes



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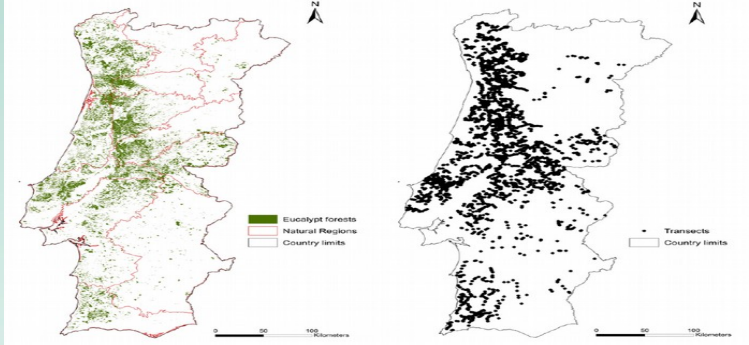
Introduction

- Eucalyptus Globulus
- 26% forest occupation
- The paper & bleached pulp industry
- 4 thousand direct job
- 5% of net export
- 1% national GDP



Nunes, L. J. R., Meireles, C. I. R., Pinto Gomes, C. J., & de Almeida Ribeiro, N. M. C. (2019)

Description if the problem

Forest coverage (pinus pinaster & eucalyptus globulus)

- Species that burn more easily than the native tree

Climate change

- Increase drought
- Heat waves

Human factors

- Land use management

Meira Castro, A. C., Nunes, A., Sousa, A., & Lourenço, L. (2020).

Lutz, O. (2020, September 14). *The Science of Wildfires - Teachable Moments*. NASA/JPL Edu. https://www.jpl.nasa.gov/edu/news/2016/8/22/back-to-school-burn-the-science-of-wildfires/

What is the need to assess this problem?

There is a necessity to assess and avoid this situation to happen in other locations

To avoid catastrophe to happen in other places by learning through Portugal's mistake

What is at risk?

- People
- Resources
- Ecosystems
- Industry
- Bankruptcy

Research question

How to mitigate the impacts of wildfires in Portugal due to the silviculture and forest industry with a focus on eucalyptus plantations?

Relevant References

Socio-Economic aspects and perspectives of sustainability of the resource

Nunes, L. J. R., Meireles, C. I. R., Pinto Gomes, C. J., & de Almeida Ribeiro, N. M. C. (2019)

Mapping the causes of forest fires in portugal by clustering analysis

Meira Castro, A. C., Nunes, A., Sousa, A., & Lourenço, L. (2020).

Opportunities and challenges of Eucalyptus plantation in Europe: the iberian peninsula experience

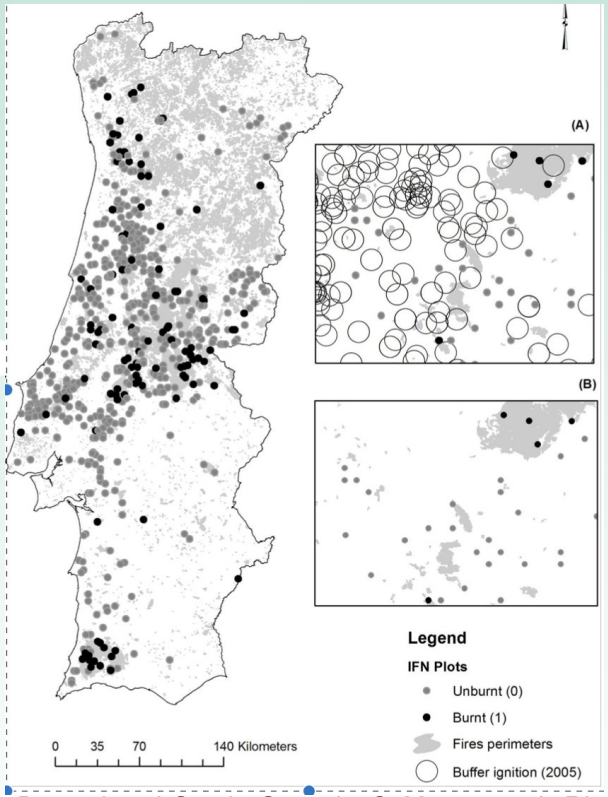
Tomé, M., Almeida, M. H., Barreiro, S., Branco, M. R., Deus, E., Pinto, G., ... & Rodríguez-Soalleiro, R. (2021).

Considering multiple futures: scenario planning to address uncertainty in natural resource conservation

Rowland, E. R., Cross, M. S., & Hartmann, H. (2016).

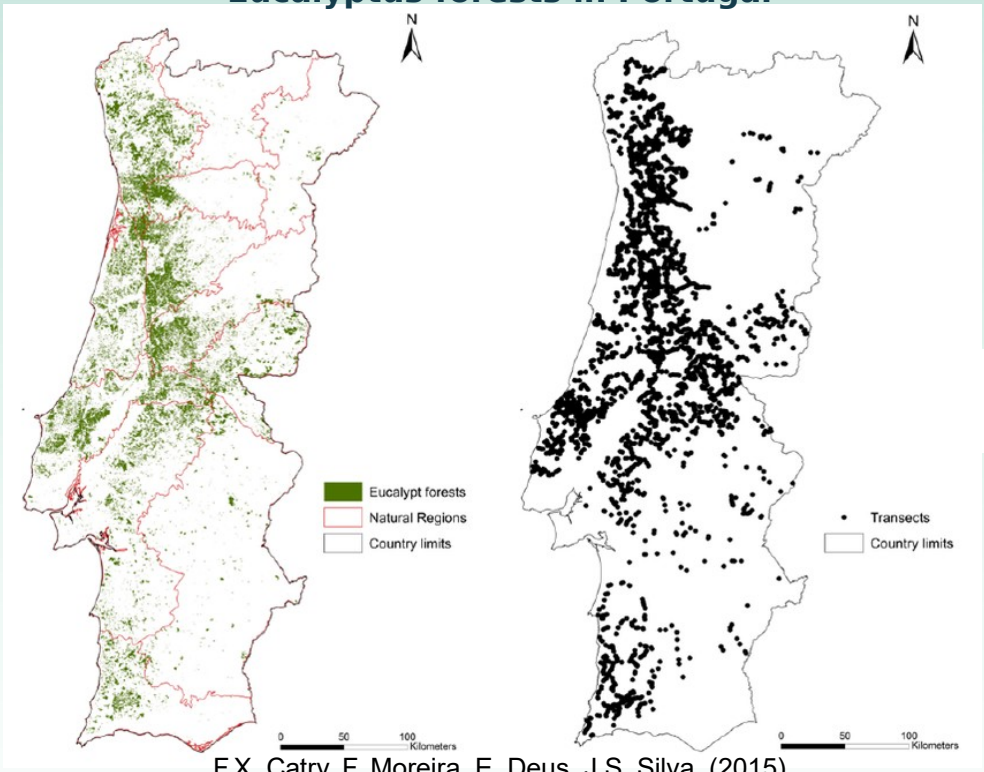
Additional data

Wildfire risk probability legend



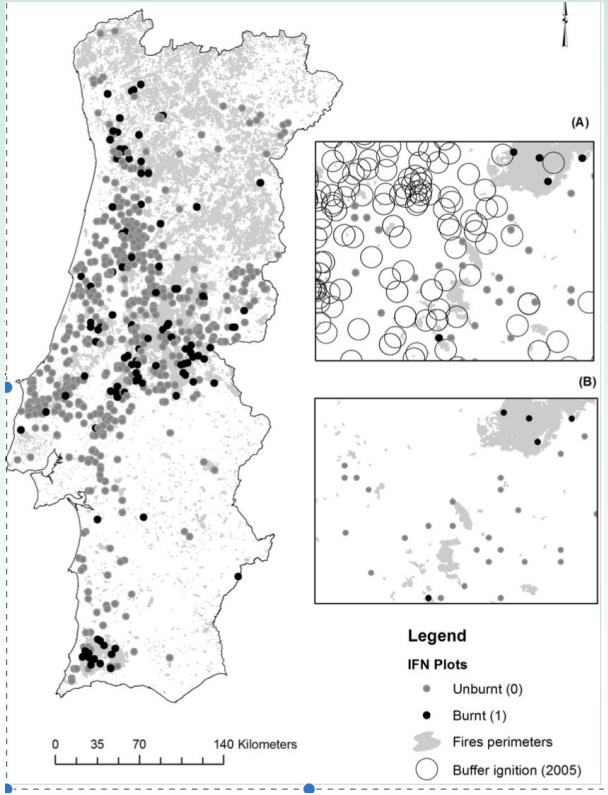
B. Botequim), J.Garcia-Gonzalo, S. Marques (, A. Ricardo, J. G. Borges, M. Tomé), M. M. Oliveira (2013)

Eucalyptus forests in Portugal



F.X. Catry, F. Moreira, E. Deus, J.S. Silva, (2015)

Scenario planning of Portugal’s wildfire problem



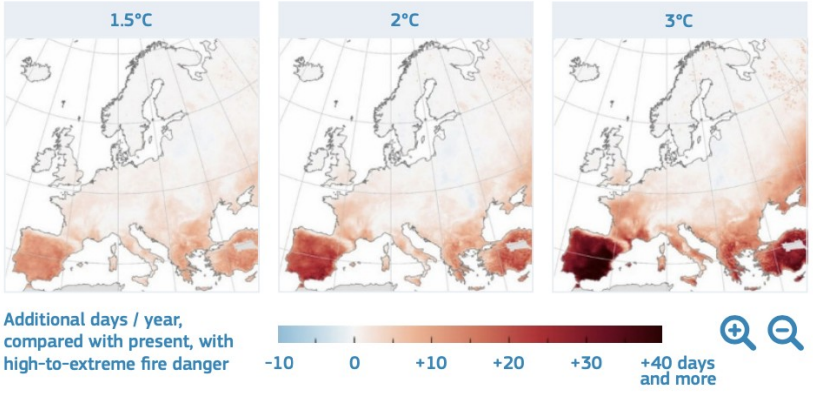


Figure 1. Additional number of days per year with high-to-extreme fire danger (daily Fire Weather Index ≥ 30) for different levels of global warming compared to present (1981-2010).

How will we assess the impact of wildfires on Portugal?

Climate change

Abandonment of eucalyptus plantations

Mismanagement of eucalyptus plantations

Vulnerability of eucalyptus trees to pests and diseases

Outcome?

Uncertain!

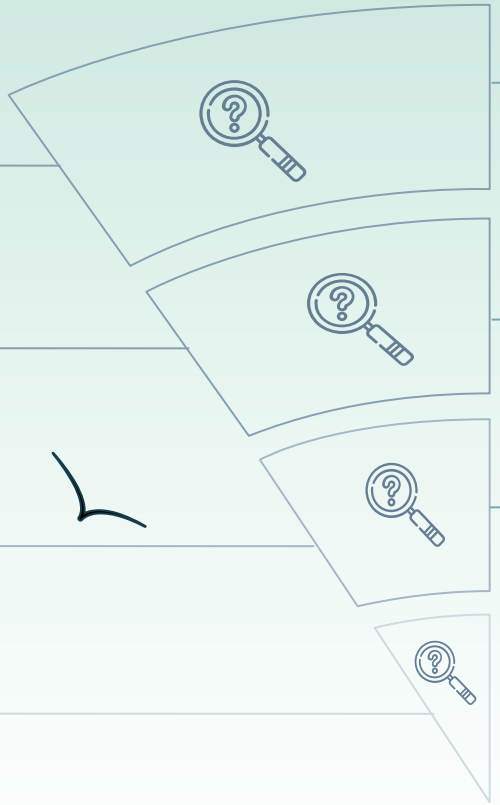
scenario planning

What is it?

Why use it?

How to use it?

The questions to ask!



Decision support method that addresses uncertainties in natural resource management

Already used for environmental assessment & uncertainties related to climate change

Three phases. 16 steps and a dream!

scenario planning

How to use it?

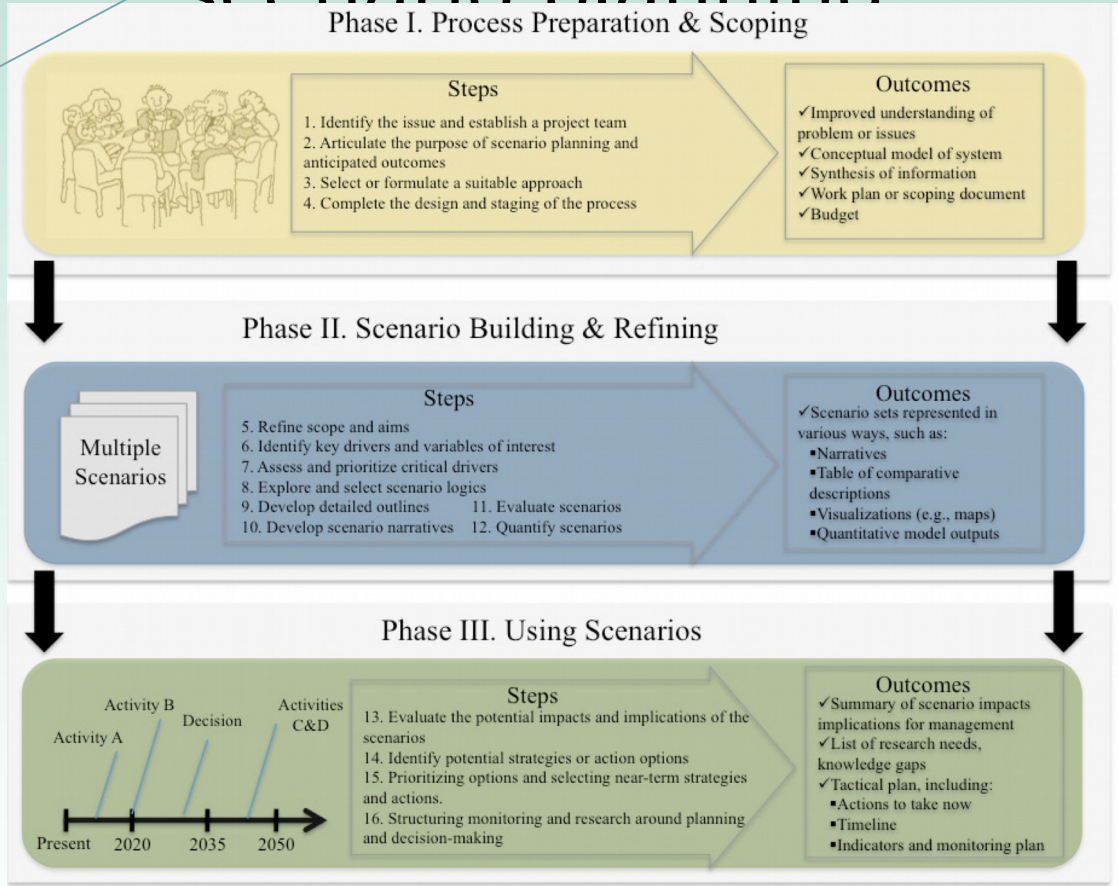
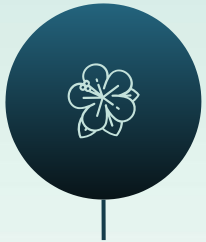


Figure 1.1. Three phases in the scenario planning process (modified from Wiseman et al. 2011 and others). More detail about the phases, the steps within each phase, and outputs for each phase can be found in Section 2

Rowland, E. R., Cross, M. S., & Hartmann, H. (2016). Considering multiple futures: Scenario planning to address uncertainty in natural resource conservation.

What’s next? Plan of action



Phase 1

Process Preparation & Scoping

Phase 11

Scenario Building & Refining

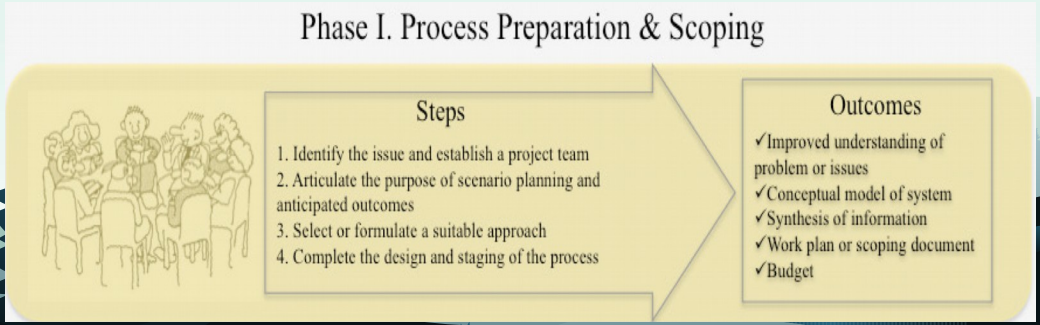
Phase 111

Using the scenarios

Phase 1→ Process preparation & scoping

1 : Eucalyptus plantation and the risk of wildfires

2 : different strategies → Predict different outcomes → look at the best option



3: scenario for portugal →

1)Forest management plan

2)Comply with the intervention standards in forestry areas

3)Not to exceed the limits of area that may be occupied by eucalyptus

4: who is involved →

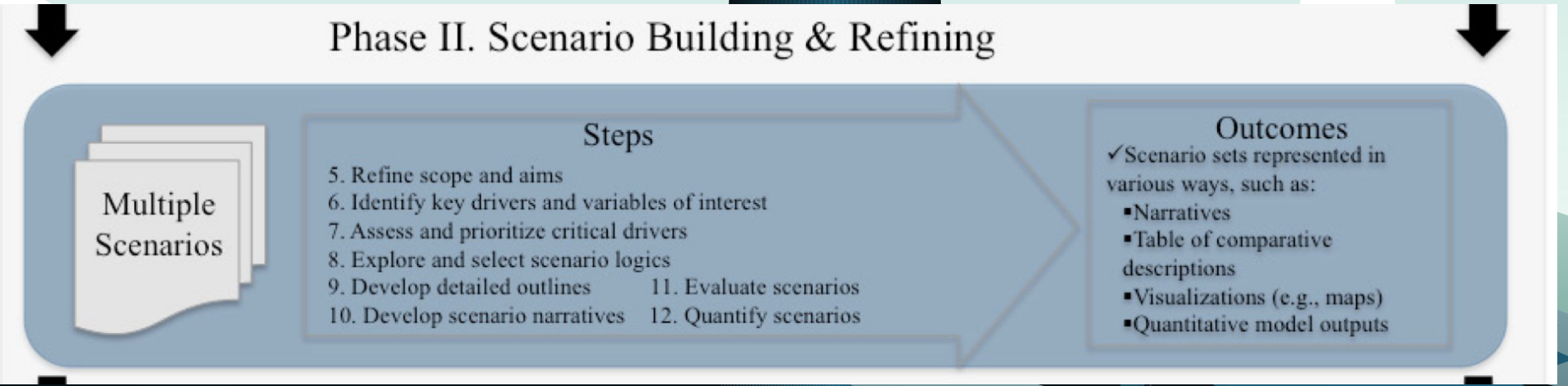
4) Forests managers

5) Land owners

6) Forest Industry

7) …

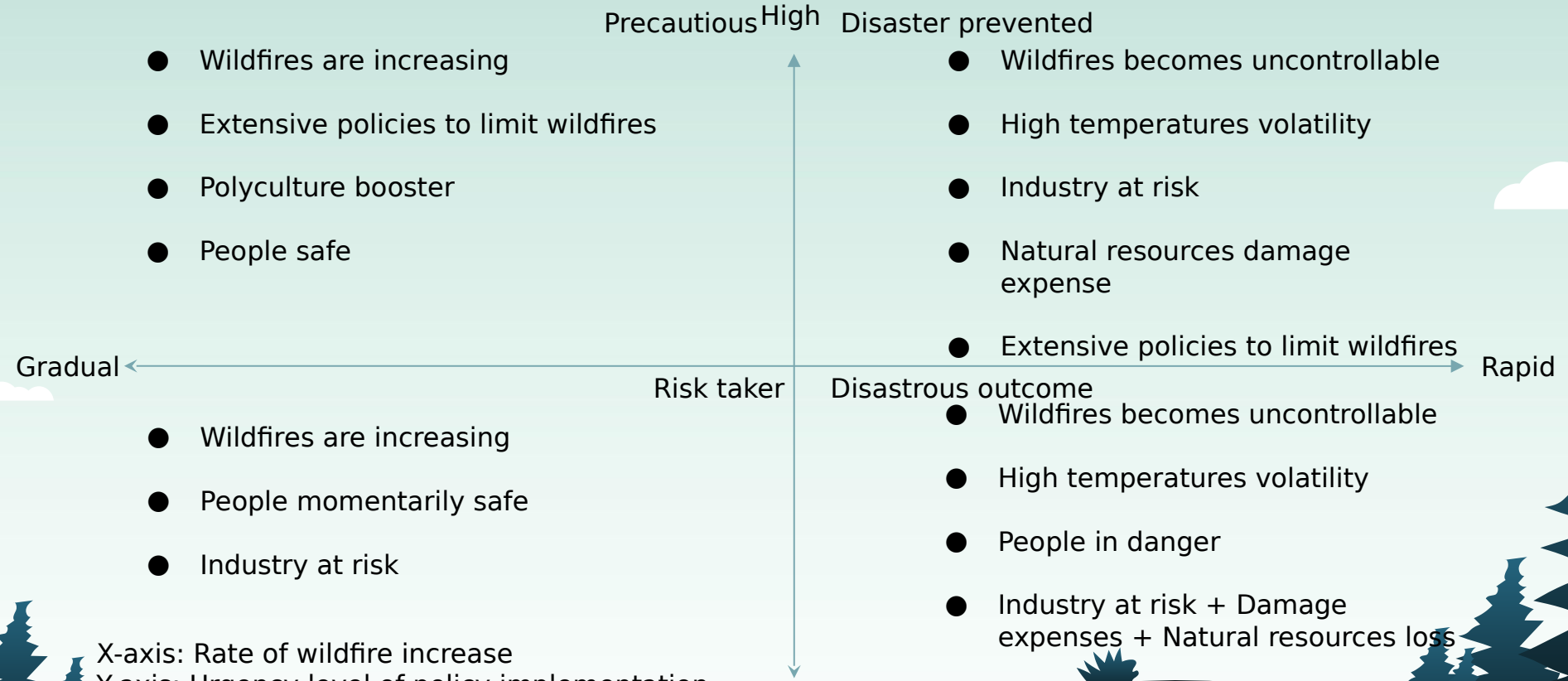
Phase 11 → Scenario building & refining



Wildfire scenarios quadrants

Phase 11

Step 5,6,7 and 8



- Wildfires are increasing
- Extensive policies to limit wildfires
- Polyculture booster
- People safe

- Wildfires becomes uncontrollable
- High temperatures volatility
- Industry at risk
- Natural resources damage expense
- Extensive policies to limit wildfires

- Wildfires are increasing
- People momentarily safe
- Industry at risk

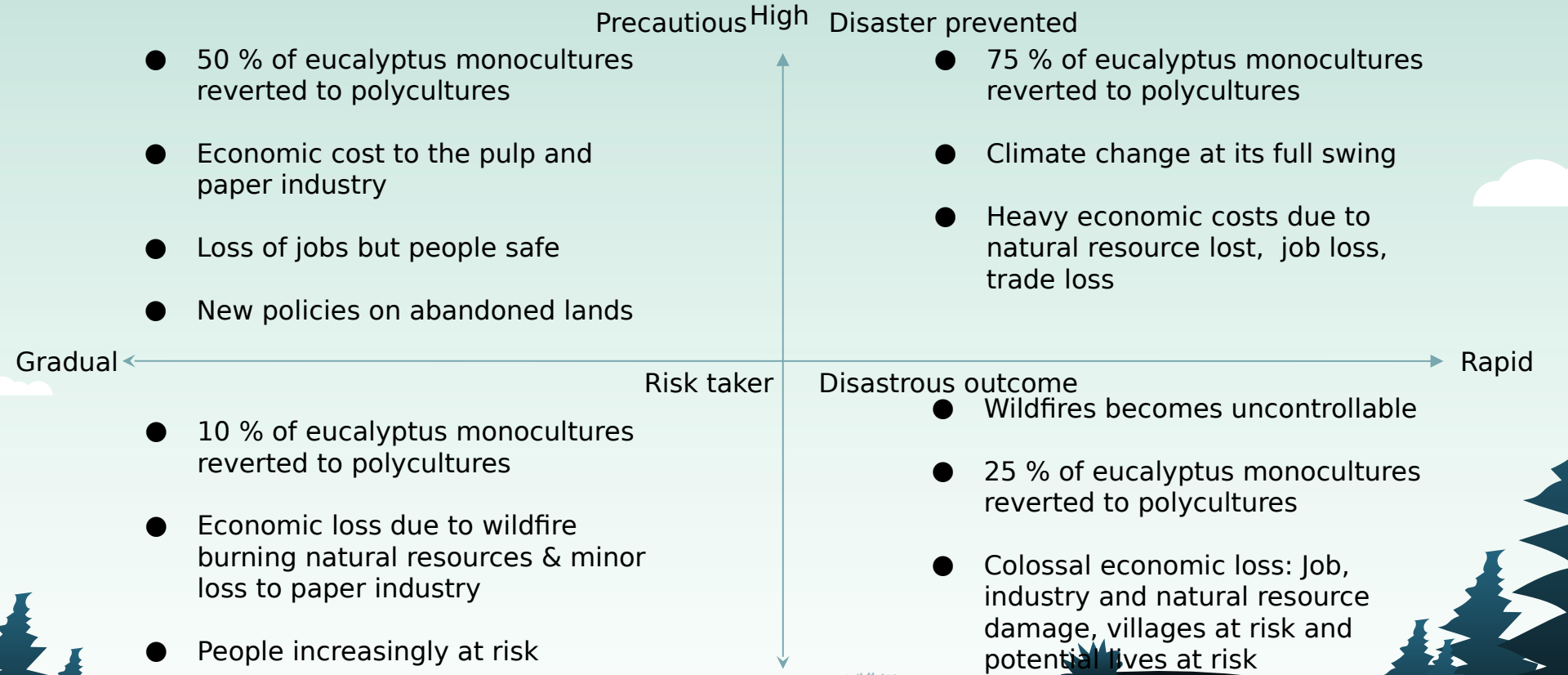
- Wildfires becomes uncontrollable
- High temperatures volatility
- People in danger
- Industry at risk + Damage expenses + Natural resources loss

X-axis: Rate of wildfire increase
Y-axis: Urgency level of policy implementation

Wildfire scenarios narratives

Phase 11

Step 9 and 10



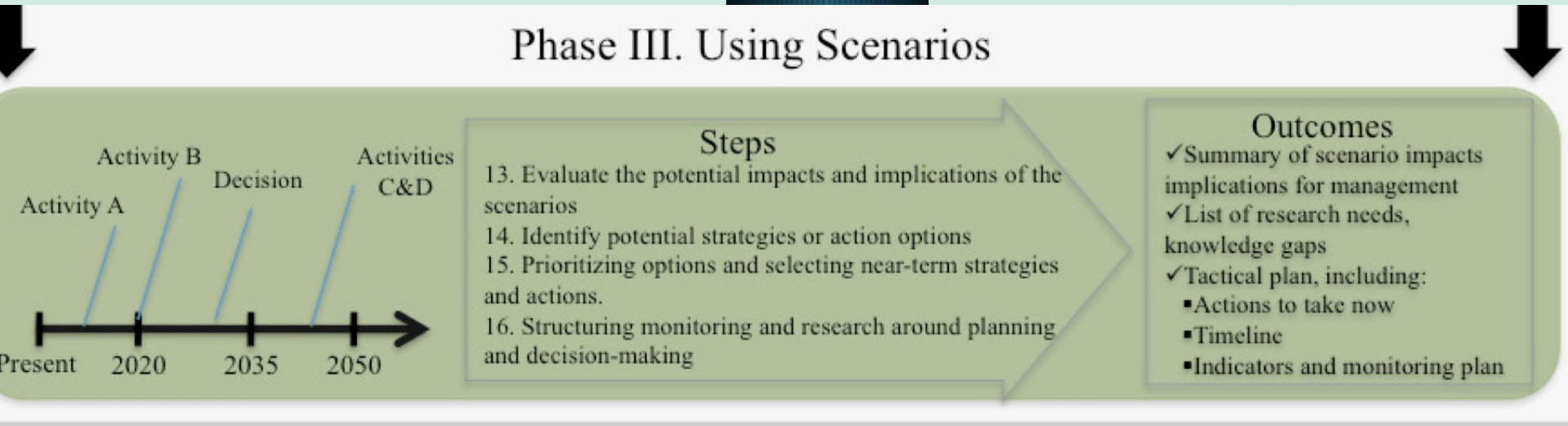
- 50 % of eucalyptus monocultures reverted to polycultures
- Economic cost to the pulp and paper industry
- Loss of jobs but people safe
- New policies on abandoned lands

- 75 % of eucalyptus monocultures reverted to polycultures
- Climate change at its full swing
- Heavy economic costs due to natural resource lost, job loss, trade loss

- 10 % of eucalyptus monocultures reverted to polycultures
- Economic loss due to wildfire burning natural resources & minor loss to paper industry
- People increasingly at risk
- Favours economic benefit

- Wildfires becomes uncontrollable
- 25 % of eucalyptus monocultures reverted to polycultures
- Colossal economic loss: Job, industry and natural resource damage, villages at risk and potential lives at risk

Phase 111 → Using scenarios



gure 1.1. Three phases in the scenario planning process (modified from Wiseman et al. 2011 and hers). More detail about the phases, the steps within each phase, and outputs for each phase can be und in Section 2.

What are the direct and indirect impacts of these scenarios?

Scenarios	Direct impact	Indirect impact	Resources of concern
Precautious	Loss of pulp and paper trade Long term less wildfires Biodiversity reinforcement	Job loss New job creation	Eucalyptus trees
Disaster prevented	Loss of pulp and paper trade	Job loss	Eucalyptus trees
Risk taker	Fire fighting costs high		Eucalyptus trees
Disastrous outcome	Industry and residency loss Life loss Loss of pulp and paper trade		Eucalyptus trees

What intervention points are necessary for the scenarios to be successful?

Policy making

Reduce eucalyptus monocultures

Land management incentive

Give incentive to people to manage their private lands

&

Industry incentive to move towards Polyculture

Species management

Increase polycultures

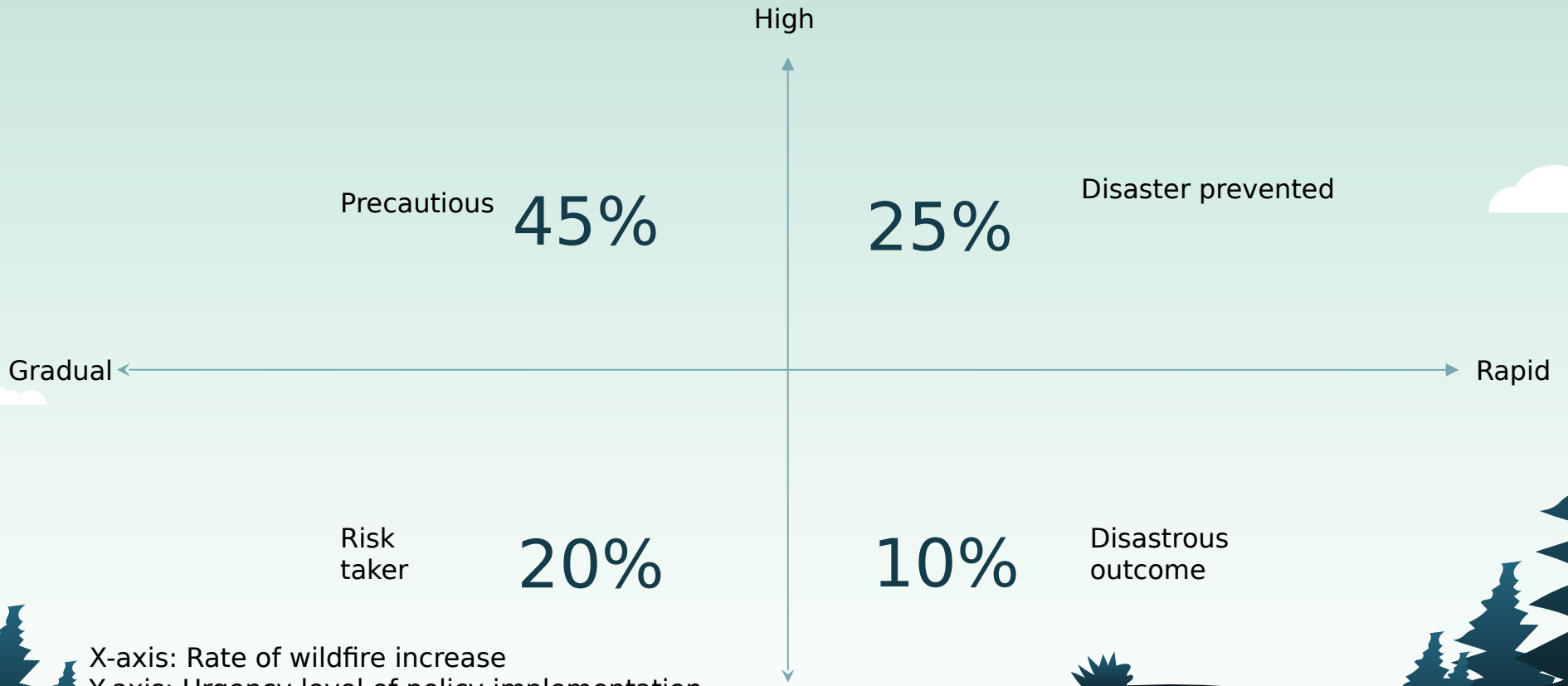
Experts Recruitment

Credibility through experts

Wildfire scenarios quadrants

Probability/ analysis

Approximate numbers to be refined



X-axis: Rate of wildfire increase
Y-axis: Urgency level of policy implementation

Recommendation

Fire breaks

Create fire Breaks between eucalyptus plantations

More polyculture

Reduce eucalyptus monoculture by 50%

Vegetation walls

Create vegetation walls between plantation of low flammable plants

Education

Educate local population about wildfire risk

Land management incentive

Incentive for private landowners and industry

Define planting zones

define strict zones where eucalyptus can be planted

Directions for future research

Tree species

Look into alternatives to eucalyptus

Modifying industry

Look how the industry have other alternatives to make pulp

Fire intensity

Study the intensity of fires and not the number

BCA analysis

Conducting an BCa analysis on the different scenarios

THANKS!

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