

FUTURE SCENARIOS AND ECONOMICS

1. Fire Managers worldwide are being challenged to keep pace with a rapidly changing environment:
 - a) Climate Change
 - b) Demographic change
 - c) Expanding rural urban interface
 - d) Declining resource base
 - e) Increased political and community expectations
 - f) Increased accountabilities
 - g) Soaring suppression costs
2. Despite advancements in suppression capabilities – the impact of bushfires continues to increase
3. Challenge – where to invest what resource is available that returns greatest value for the investment and is defensible?

THE DILEMMA FROM AN END USERS PERSPECTIVE

1. **What** are the likely bushfire scenarios in the future?
2. **Where** might they have the greatest impact?
3. **What** do the community value?
4. **What** are the economic implications associated with these future scenarios?
5. **Where** should I be investing my efforts and resources?
6. **Where** is the balance between prevention and response?
7. **How** can I influence the political agenda
8. **How** can I best communicate the implications?
9. **Are** my decisions robust and defensible?

- (i) Develop future scenarios of bushfires for selected areas in Australia using critical, evidence-based knowledge
- (ii) Identify appropriate economic methods for understanding key examples of economic implications associated with bushfires
- (iii) Preliminary analysis of projected economic implications associated with future bushfires in Australia, based on the future scenarios

Lead End-users

Shane Wiseman, Manager, Fire Management Branch, DENR, SA

Andrew Stark, Chief Officer, ACT Rural Fire Service

Researchers

Josh Mulvaney, Research Officer, Future Scenarios (f/t)

Dr Helena Clayton, Research Fellow, Economics (f/t)

Dr Malcolm Gill, Bushfire Science (p/t)

Professor Steve Dovers, Policy/Economics (p/t)

Dr Geoff Cary, Project Leader, Bushfire Science (p/t)

Cross-project links

Law & Policy (ANU), Shared Responsibility (RMIT), Planning (UC),
& Integrated assessment of prescribed burning projects (UWA)

FUTURE SCENARIOS COMPONENT

Geoff Cary, Malcolm Gill & Josh Mulvaney

1. Initial question:

- *What do the expected changes to Australian fire regimes mean for asset management?*

2. Progress to date:

- **Project workshop initiated discussions on:**
 - How changes to fire regimes affect specific assets
 - How policy and management intervention can be used to mitigate and adapt to the expected changes in fire regimes

3. Current direction:

- **The current focus is on scenario development, which entails:**
 - Developing a repeatable framework for exploring the relationship between management intensity and asset quality, and the associated changing fire regimes
 - Applying this framework to specific case-study assets

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Initial question

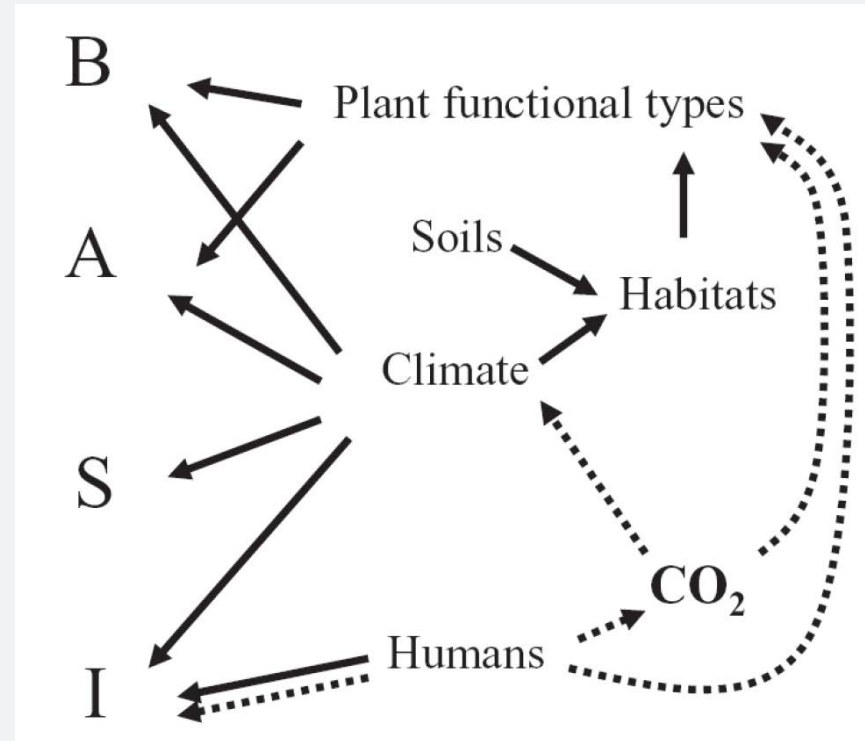


B - Biomass growth

A - Availability of
fuel for burning

S - Ambient fire
weather

I - Ignitions



What do these changes mean for asset management?

Source: Bradstock RA (2010) A biogeographic model of fire regimes in Australia: current and future implications. *Global Ecology and Biogeography* **19** (2), 145-158.

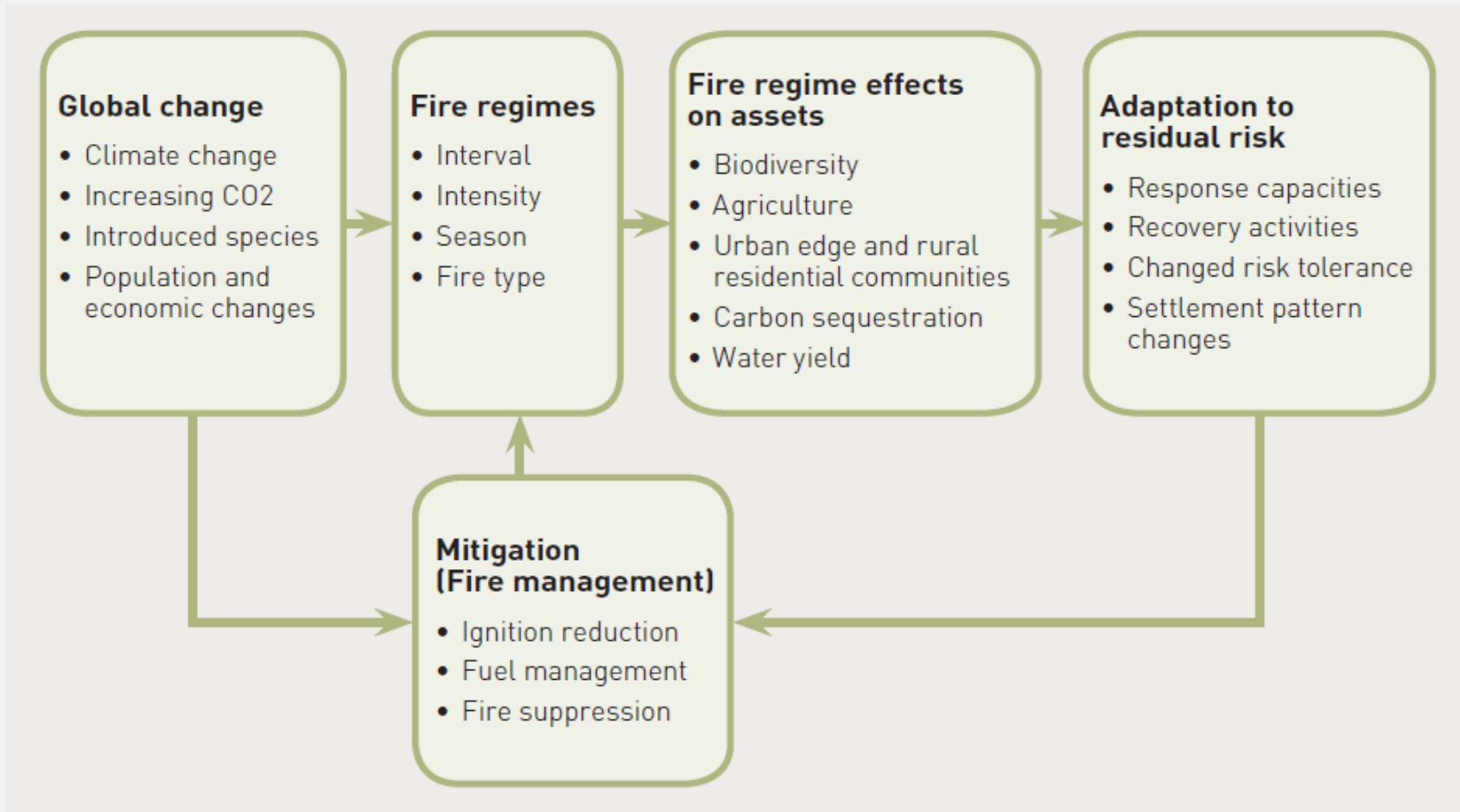
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Progress to date



Australian
National
University

bushfire CRC



Source: Cary GJ, Collett E, Gill AM, Clayton H, Dovers S (2012) Future scenarios for Australian bushfires: Report on a Bushfire CRC workshop. *The Australian Journal of Emergency Management* **27** (3), 34-40.

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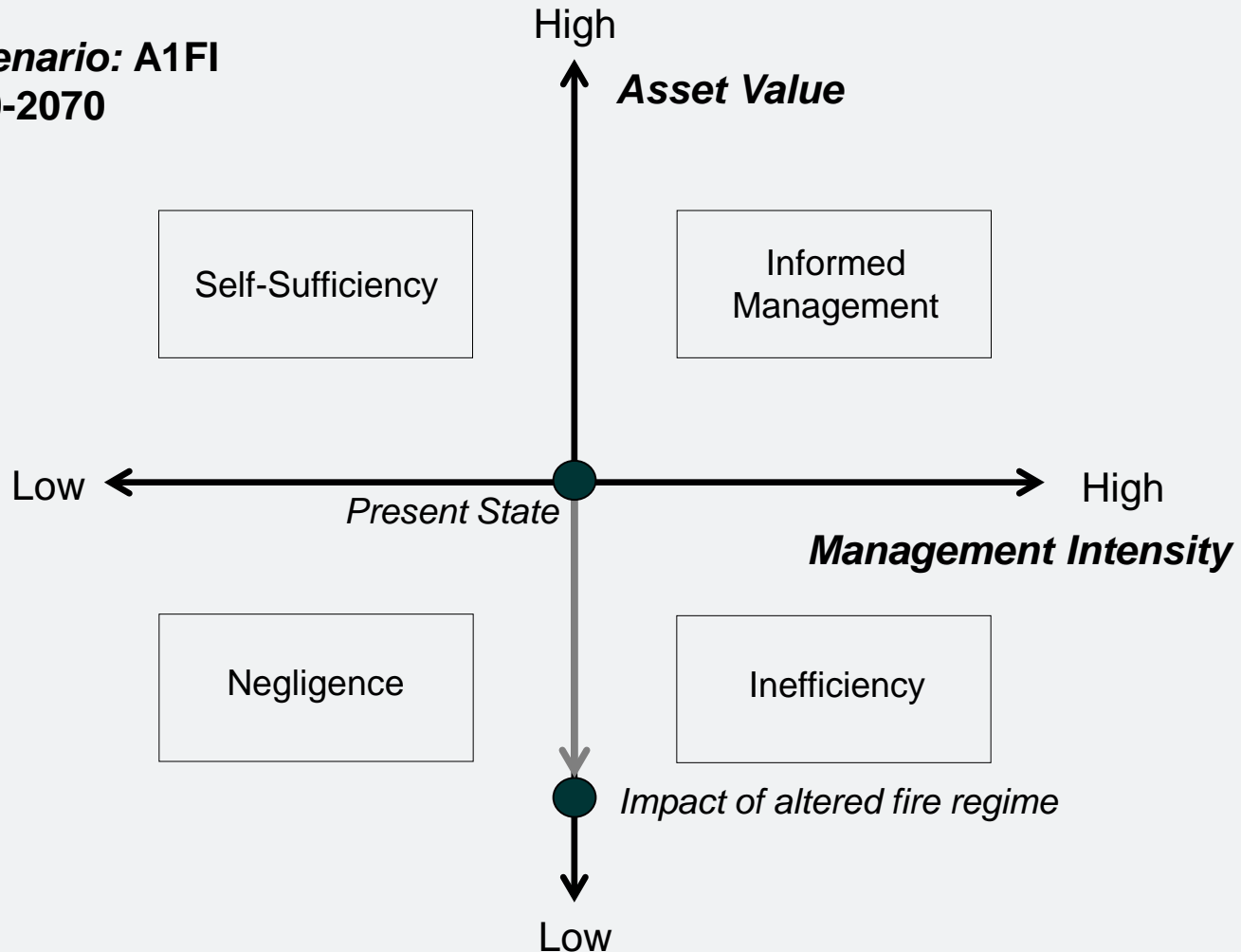
Current direction



Australian National University



Emissions Scenario: A1FI
Timeline: 2050-2070

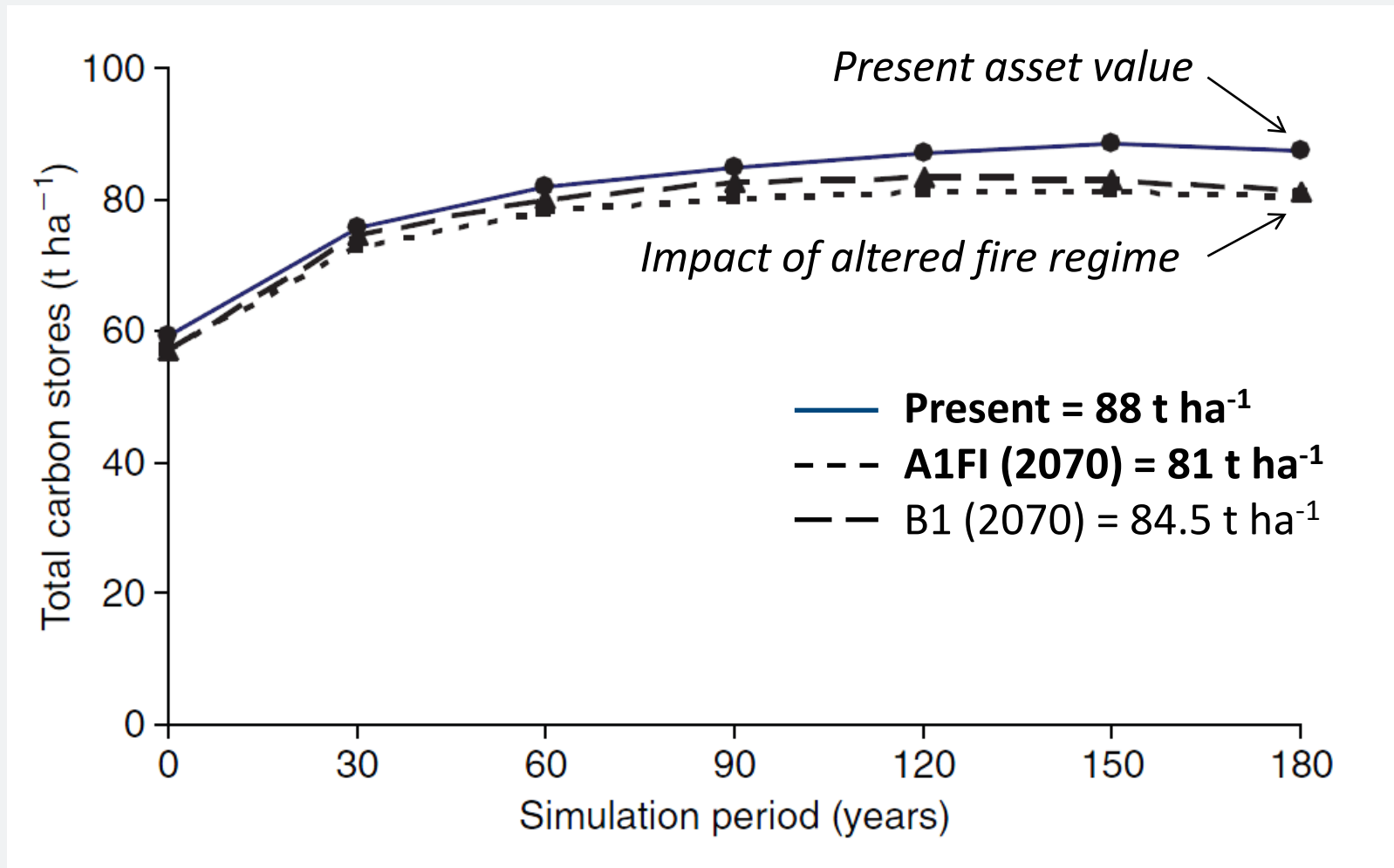


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Current direction: case study



Australian
National
University



Source: King KJ, de Ligt RM, Cary GJ (2011) Fire and carbon dynamics under climate change in south-eastern Australia: insights from FullCAM and FIRESCAPE modelling. *International Journal of Wildland Fire* **20** (4), 563-577

ECONOMICS COMPONENT

Steve Dovers and Helena Clayton

1. Review of economic contributions

- Broad & targeted reviews

2. Industry perspectives

- Industry survey (Nov/Dec 2012)
- Economics PD workshop (mid-2013)

3. Integration with future scenarios

- Economic & policy implications
- Investment priorities into the future

The overall objective of the economics component is to:

Clarify and build common understanding of different economic approaches, what problems they are suited to, constraints and priorities for applied economic analysis, and inferences that can be drawn in relation to the costs and benefits of bushfires and their management across different decision-contexts and future scenarios.

- Expanding interest in economic evaluation
 - Increasing incidence/impact of bushfire
 - Increasing suppression costs
 - Industry concern about securing resources and influencing allocation decisions
 - Cost-effectiveness of interventions
- Support tends to be simplistic, mismatched or narrowly focused
- Clarifying understanding and expanding the agenda
 - Profile and evaluate peer-reviewed economic contributions
 - Linking management/policy questions with methods (decision-typology)

Mode of analysis	Management/policy challenge
1. Analysis of benefits and costs	<ul style="list-style-type: none"> ▪ Justifying investment in the context of increasing bushfire incidence & impact ▪ Comparing the net benefits of management strategies ▪ Social valuation of fire impact and response
2. Decision-support frameworks	<ul style="list-style-type: none"> ▪ Optimal investment across a fire program ▪ Balancing investment across multiple objectives
3. Institutional/behavioural analysis	<ul style="list-style-type: none"> ▪ Negotiating shared responsibility ▪ Understanding community response to fire management/policy interventions
4. Political-economic interactions	<ul style="list-style-type: none"> ▪ Effect of politics, media, etc on the efficiency of fire management decisions

- Outputs: AFAC12 poster; Fire Note; journal manuscript

- Targeted review to address specific interest in benefits and cost of fire and fire management:

Profile and analysis of differences in:

- Management/policy problem addressed;
 - Assets, benefits and costs included;
 - Evaluation methods applied;
 - Transferability and applicability across context and time.
- Outputs: Industry report (Dec 2012) & manuscript (AJEM target)

Mary Milne



Web-based survey of bushfire management and emergency agencies (Nov/Dec 2012)

- Improve understanding of industry perspectives on the use and usefulness of economic evaluation
 - industry priorities and needs for economic evaluation, support and training
 - constraints and missed opportunities for agencies to draw upon economic evaluation
 - what needs to be considered when applying economics in a highly complex, uncertain and politically charged context?

Uni. Canberra
collaborators

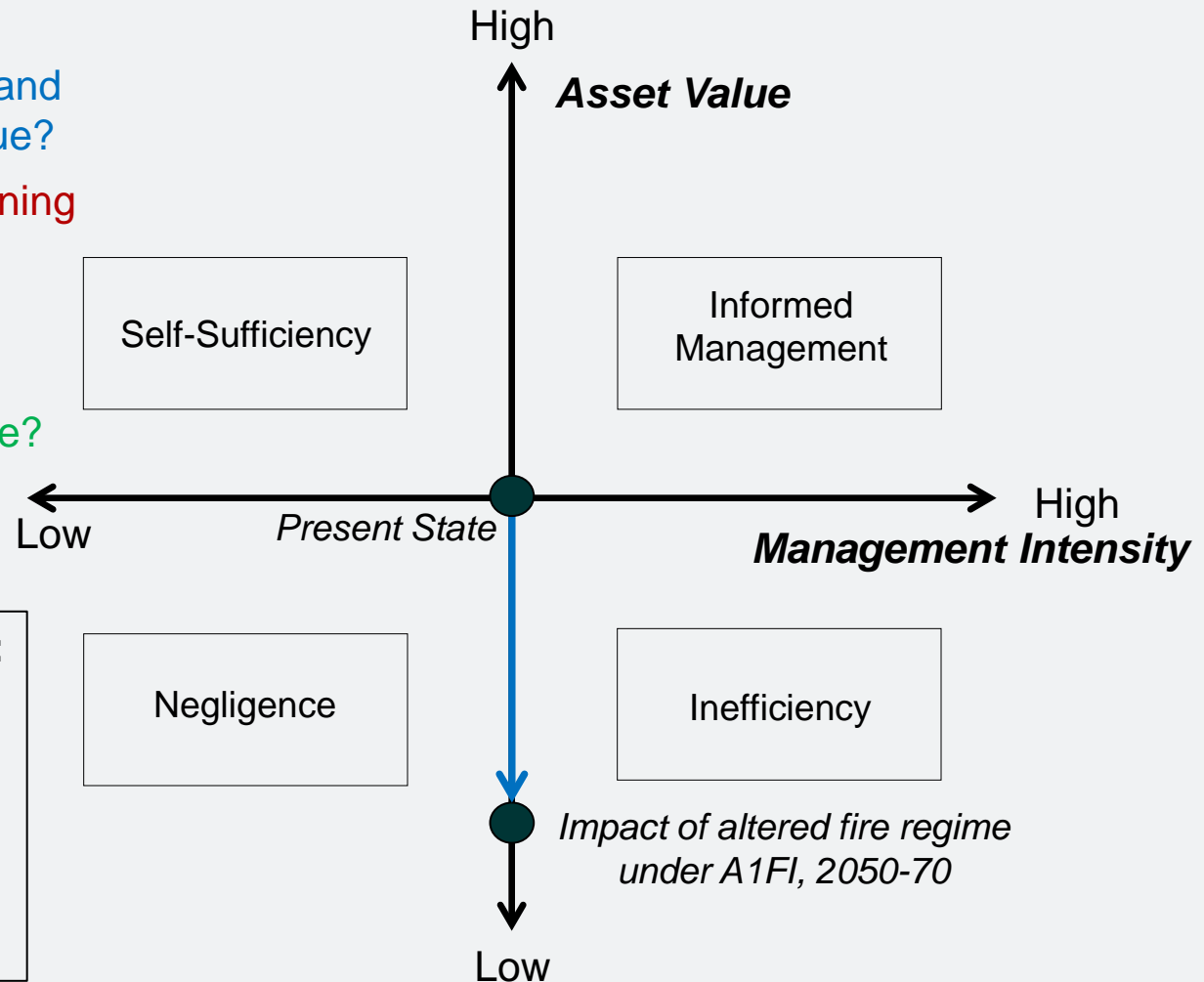


INTEGRATION

Economics and future scenarios

Is investment justified?

- Cost of 'doing nothing'?
- Future management options and costs for improving asset value?
- Costs and benefits of maintaining current value?
- Cost-efficiency of alternative management responses
- Incentives for increasing value?



How are answers affected by:

- Policy/institutional arrangements
- Trade-offs & multiple values
- Public/private costs and benefits

Journal Publications:

King KJ, Cary GJ, Gill AM, Moore AD (2012) Implications of changing climate and atmospheric CO₂ for grassland fire in south east Australia: Insights using the GRAZPLAN grassland simulation model. *International Journal of Wildland Fire*.

Cary G, Collett E, Gill, M, Clayton H, Dovers S (2012) Future Scenarios for Australian Bushfires: Report on a Bushfire CRC Workshop. *Australian Journal of Emergency Management*

Gill AM, Stephens S, Cary GJ (*Online early*) The world-wide 'wildfire' problem. *Ecological Applications*.

Bradstock RA, Boer MM, Cary GJ, Price OF, Williams RJ, Barrett D, Cook G, Gill AM, Hutley LB, Keith H, Maier SW, Meyer M, Roxburgh SH, Russell-Smith J (2012) Modelling the potential for prescribed burning to mitigate emissions from fire-prone, Australian ecosystems. *International Journal of Wildland Fire*.

King KJ, Cary GJ, Bradstock RA, Marsden-Smedley J. Divergent fire responses to climate and management: insights from contrasting Australian ecosystems. Submitted to *Global Change Biology*

[Vivian LM, Cary GJ (2012) Relationship between leaf traits and fire response strategies in shrub species of a mountainous region of south-eastern Australia. *Annals of Botany* 109 (1): 197-208.]

Peer-Reviewed Book Chapters:

Cary GJ, Bradstock RA, Gill AM and Williams RJ (2012) Global change and fire regimes in Australia. In *Flammable Australia* (Eds. Bradstock RA, Gill AM, Williams RJ). pp. 149-169. CSIRO Publishing, Melbourne

Gill AM, Cary GJ (2012) Socially Disastrous Landscape Fires in South-eastern Australia: Impacts, Responses, Implications. In (D. Paton and F. Tedim, Eds.) 'Wildfire and Community: Facilitating preparedness and resilience' Springfield, Ill., Charles C. Thomas Publisher.

Gill AM (2012) Bushfires and biodiversity in southern Australian forests. In *Flammable Australia* (Eds. Bradstock RA, Gill AM, Williams RJ). pp. 235-252. CSIRO Publishing, Melbourne

SUMMARY

...Outputs to date

Posters/Fire Notes:

Cary G, Dovers S, Gill M (2010) Future Bushfire Scenarios and Economics. *Proceedings of AFAC/Bushfire CRC 2010 Conference*, Darwin, September.

Cary G, Bradstock R, Gill M, Williams R, Collett E (2011) Future Scenarios for Australian Bushfires. Poster presented at the AFAC/Bushfire CRC 2011 Conference, Sydney, August.

Clayton, H., Dovers, S., Cary, G. (2012). 'What does economics have to offer bushfire management & policy decision-makers?', Poster presented at the *56th Annual Agricultural and Resource Economics Society Conference*, Fremantle, Feb 2012

Cary G, Collett E, Gill M, Clayton H, Dovers S (2012) 'Future Bushfire Scenarios', Conference Poster prepared for *AFAC 12: Diverse Country*. Common Ground. Perth, 28-31 August 2012.

Clayton H, Dovers S, Cary G (2012) 'Linking Economic Analysis to Fire Management and Policy', Conference Poster prepared for *AFAC 12: Diverse Country*. Common Ground. Perth, 28-31 August 2012.

Clayton H, Dovers S, Cary G (*forthcoming*) 'A framework for evaluating economic contributions to bushfire management and policy, Bushfire CRC Fire Note

Other:

Bushfire CRC and National Centre for Climate Adaptation Research Facility (NCCARF) meeting on disasters, law and policy (2011) – on-going collaboration.

Quarter 1 (April-June 2011) – Quarter 6 (June-Sept 2012): Milestones achieved to date

SUMMARY

Research progress to date

- Extended broad-level review of economics applied to bushfire, linking methods to bushfire management and policy challenges
- Strong understanding of biophysical changes to fire regimes associated with global change (climate change in particular).
- Extended understanding of ‘global change’ through a working ‘Future Scenarios’ framework linking changes to fire regimes and asset value; mitigation strategies and asset value; with scope for integrating an evaluation of the economic and policy implications

- Applying and testing the 'Future Scenarios' framework to specific case-study assets and landscapes, integrating with economics
- Economic industry survey & professional development workshop
- Finalising manuscripts: economics review & future scenarios method and application
- Future resourcing
 - Leave (1 Dec 2012 - 1 July 2013)
 - Mary Milne – Oct to Dec 2012 (p/t)
 - Melinda Mylek, Dr. Jacki Schirmer, Professor Helen Berry (University of Canberra), Nov 2012 – June 2013 (p/t)
- Project to be finalised in September 2013

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