Fire Management & Greenhouse Gas Abatement in Northern Australia

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Australia's Tropical Savannas

Fire in Tropical Savannas

- Fire-prone environment
- Fire is a natural ecosystem process
- Fires started by lightning and people
- Many ecosystems are fire maintained
- Some fire sensitive species & ecosystems
- Fire can be GOOD or BAD
- Adapted to a 'fire regime'

Fire Regime - definition

Temporal sequence of:

- Interval (or frequency) of fire
- Intensity (heat energy release) of fire
- Season of fire
- Scale & patchiness of fire

Recently changed fire regimes

Contemporary	Historical
Mostly late dry season every 1-3years	Variable but mostly early dry season probably every 1-5 years
Moderate to high intensity	Lower intensity
Large, complete landscape burnout	Smaller, patchy

The fire issue in the tropical savannas

Today, fires are:

- Too frequent
- Too large
- Too intense

- Lack of cohesive fire plan
- Very limited resources
- Problem recognised – EPA Kimberley Fire Review

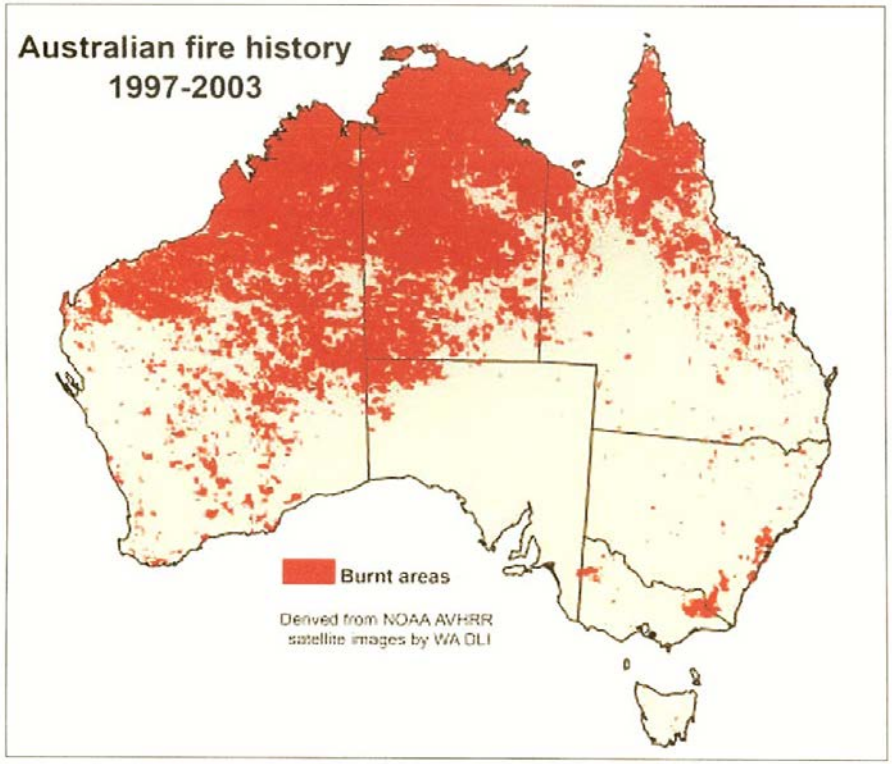
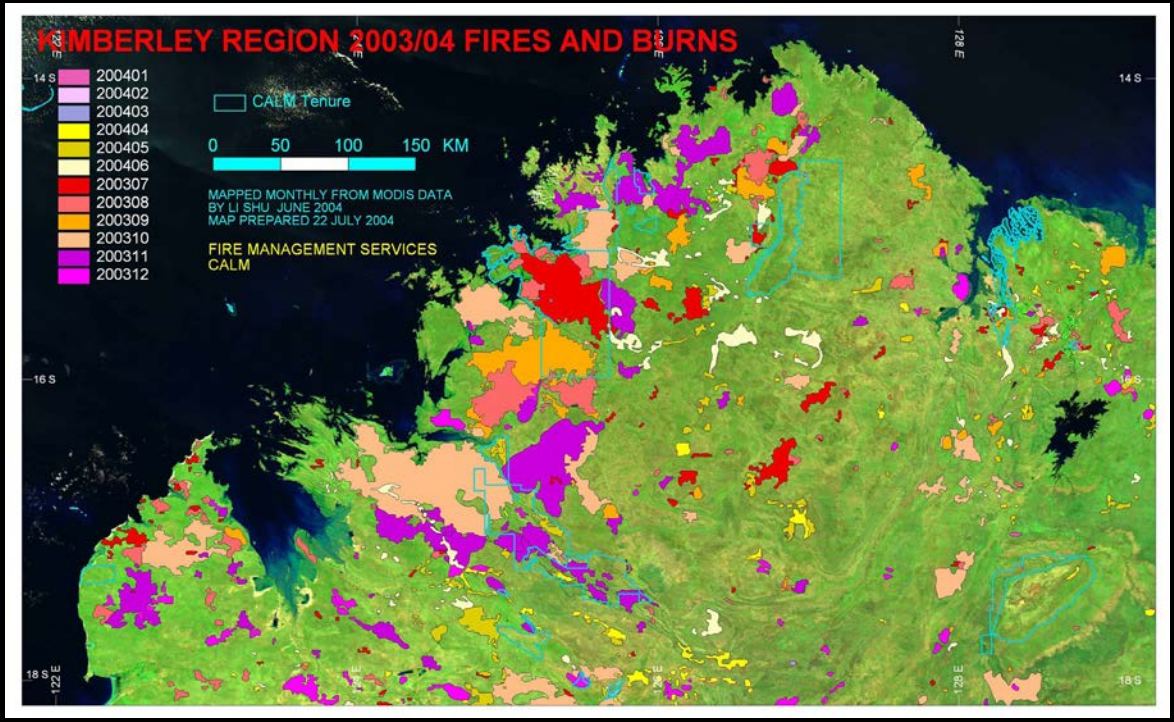


Figure 1.3 Australian fire history 1997–2003

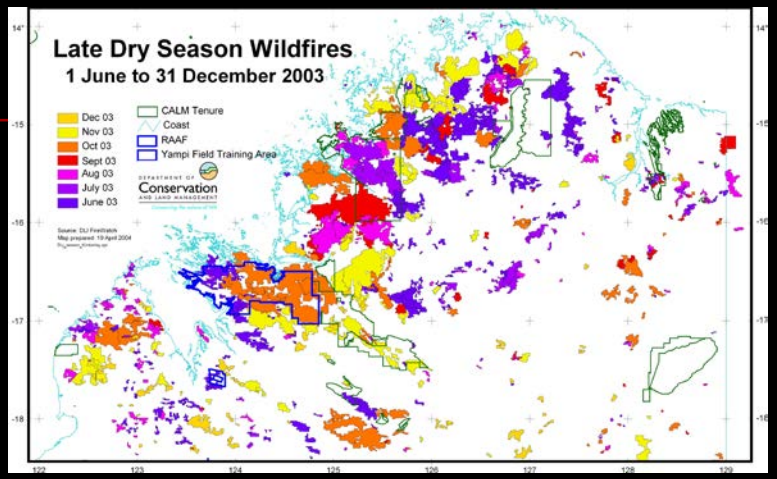
Fire in the north: too much, too often

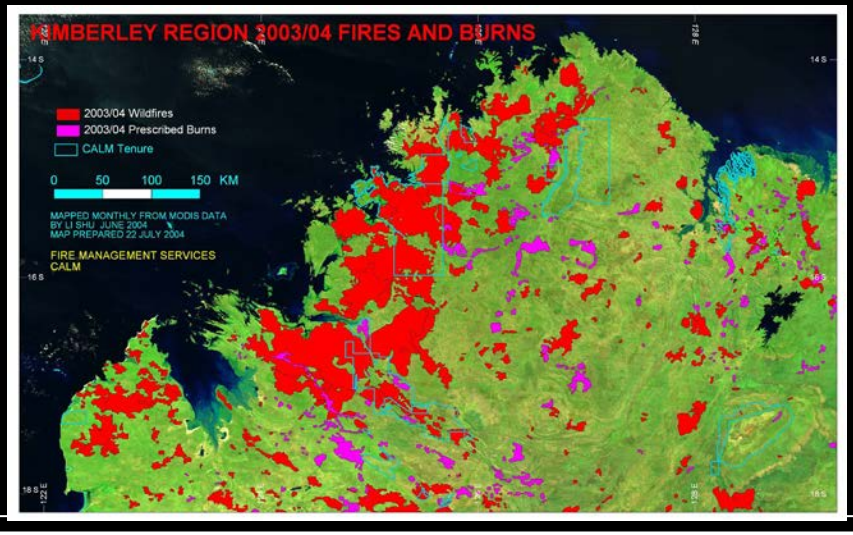


- ~35% of the Kimberley burns each year
- About 60% of the Kimberley has burned more than 5 times in a decade
- 30% of Pilbara burns each year

Too Large

- Fires burn for weeks
- Commonly 10^4 Ha
- Homogenise landscape
- Simplify habitat





Too intense

Most fires are in the late dry season:

- High fire intensity:
- Tree death
- Soil damage
- Landscape burnout
- Biomass loss
- Difficult to suppress

Lack of a cohesive approach

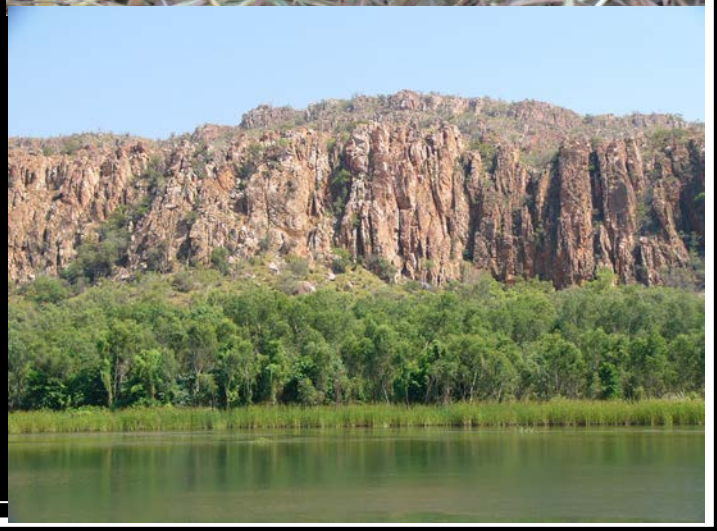
- Aboriginal community
- DEC
- FESA
- Local Govt
- Pastoralists
- Varying levels of coordination and commitment
- HUGE TASK

Constraints to effective fire management

- Large and remote areas
- Diverse tenures/ownership
- Sparsely populated
- Local govt – small capacity
- Lack of equipment, trained people
- Pastoralism - low capital industry
- Aboriginal communities have potential

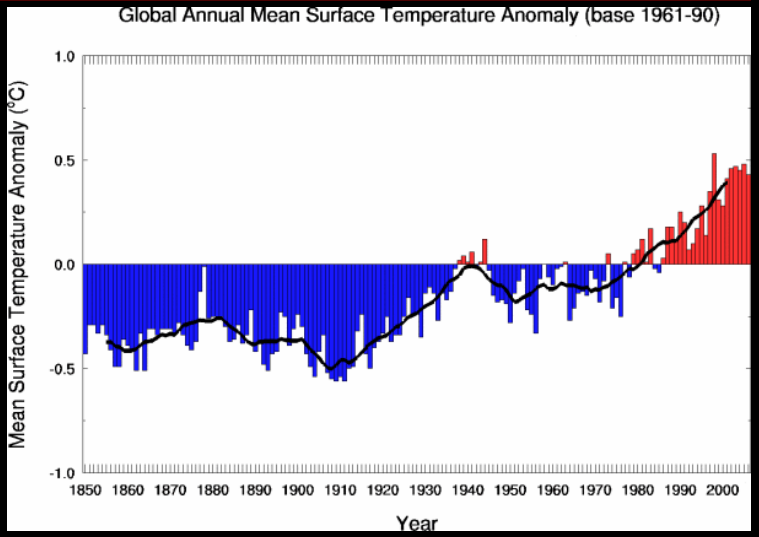
The Problem with altered fire regime

- Loss of biodiversity
- Loss of ecosystem productivity
- Loss of pasture
- Damage to property & infrastructure
- Suppression/response costly
- Loss of amenity (tourism) and air quality
- Greenhouse gas emissions



Greenhouse Gas Emissions & the Kyoto Protocol

- An agreement to reduce greenhouse gas emissions by **developed** countries to at least **5 per cent below 1990 levels by 2012**. The Protocol provides for international emissions trading.
- Australia has now ratified the Kyoto Protocol



Australian Labor Government political settings

http://www.alp.org.au/media/0507/speloo300.php

- Ratify the Kyoto Protocol
- Develop a carbon market
  - a national standard for carbon offsets
  - emissions trading scheme to provide the financial incentives to set us on a path to a 60 per cent cut by 2050.
- A clean renewable energy revolution
- Bring indigenous land management into carbon trading with offset credits for reducing emissions from savannah burning

Carbon Trading

- Carbon (or other GGs) emitters pay another party to carry out an activity that results in genuine abatement of GGE
- The pros and cons of carbon credits continue to be debated by the international community
- The Sydney Futures Exchange has established a carbon credits trading market and many carbon emitters are buying credits
- "*Carbon will be the world's biggest commodity market, and it could become the world's biggest market overall.*" (The New York Times)

Greenhouse Friendly™ approved abatement projects must:

- occur in Australia,
- generate additional, permanent and verifiable greenhouse gas emissions reductions or sequestration,
- abatement generated is "additional to business as usual",
- generate approved abatement for a five-year approval period

Fire & Greenhouse Gas Emissions

- Bushfires emit greenhouse gasses (CO2, Methane, Nitrous Oxide)
- Greenhouse Gas Emission is a function of the total amount of vegetation that burns
- Unmanaged fire = large, frequent and intense fires = high emissions
- Managed fire = less biomass burnt/annum = lower emissions.

Calculating Emissions:

The amount of biomass burned in savannas fires, and resultant accountable greenhouse emissions, can be calculated by:

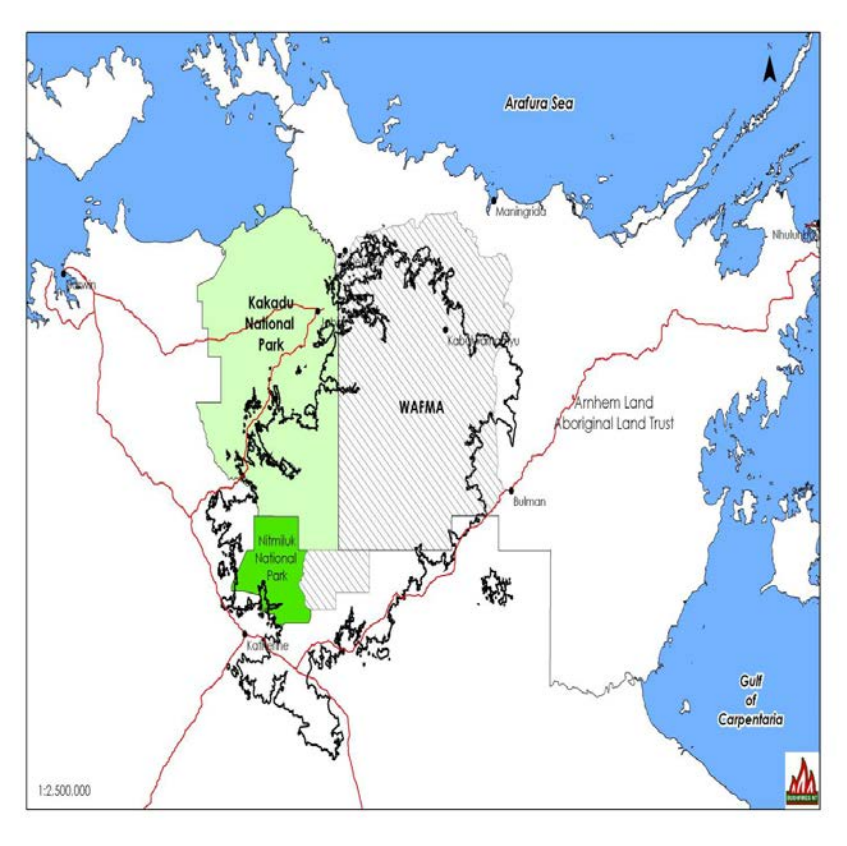
$$M = A \times FL \times BEF$$

where:

- **M** = mass of fuel/veg burnt (tonnes)
- **A** = area of fires (hectares)—derived from Landsat
- **FL** = fuel load (tonnes/hectare)—taking into account accumulation of different fuel components
- **BEF** = burning efficiency factor—taking into account (a) patchiness, (b) amount of fuel pyrolised in different seasons / fire severities

The West Arnhem Fire Management Agreement (28,000 km^2)

- Partnership between Conoco Phillips (Darwin Liqueified Natural Gas), NT Govt, Northern Land Council & Traditional Owners



Project aims

- Reduce greenhouse gas emissions by effective fire management
- Conserve environmental & cultural values
- Reduce the adverse impacts of unplanned fire on property & infrastructure
- Provide employment & business opportunities for Aboriginal communities

Links to the LNG Plant & Traditional Owners

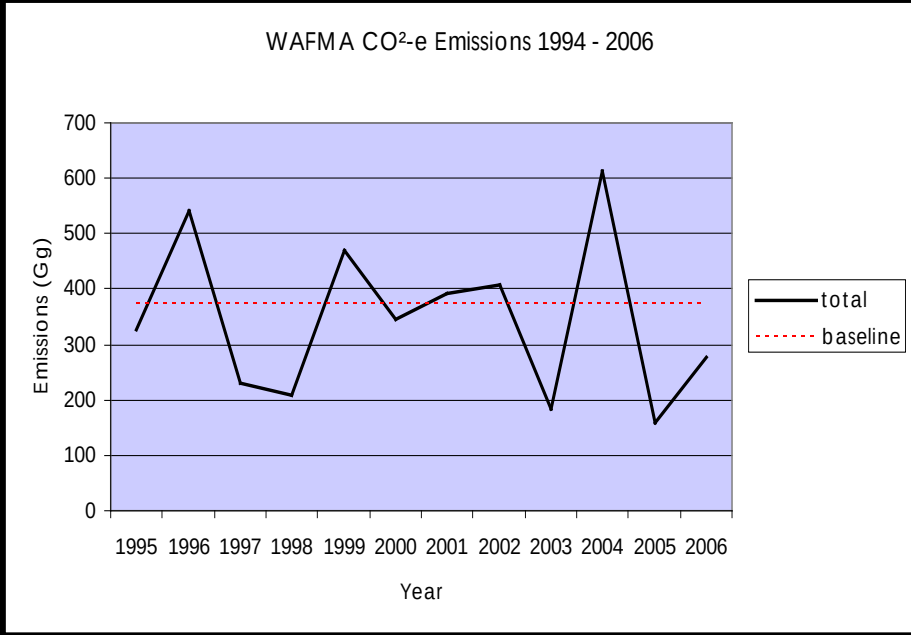
- Agreement with NT govt to offset greenhouse gas emissions produced by the Conoco Phillips LNG Plant
- Traditional Owners are paid by Conoco Phillips under a contractual arrangement to carry out the burning – targets, PIs, monitoring, etc.

What constitutes valid greenhouse gas abatement in this context?

- Stems from Kyoto. Must involve:
  - Anthropogenic cause of emissions (human-caused fires, not lightning)
  - CO_2 cannot be counted; methane & nitrous oxide counted (in CO_2 equivalents)
    - CO_2 emitted by bushfires is re-absorbed (sequestered) by subsequent plant growth (carbon recycling)

How does fire management reduce GGE?

- Planned burning in the early dry season means fires are:
  - smaller
  - less intense
  - burn less country
  - burn less vegetation
- This equates to less GGE



What does this mean for fire management in the Pilbara?

- Fire is a natural environmental factor in most Pilbara ecosystems.
- Plants and animals have evolved with fire, many depend upon fire
- Not all fire is good fire - some fire regimes threaten biodiversity and contribute to GGE.

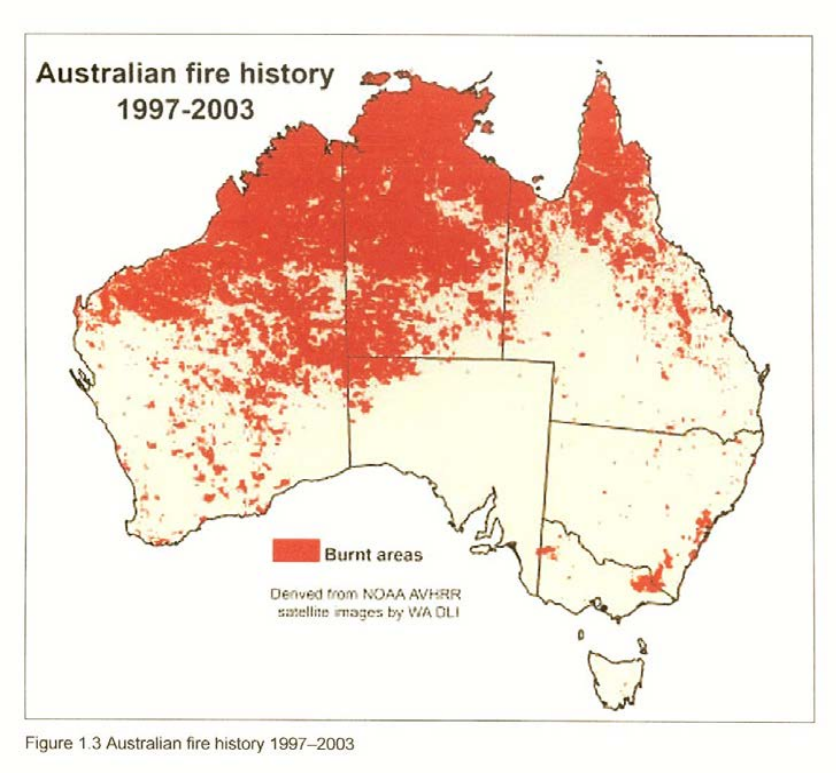
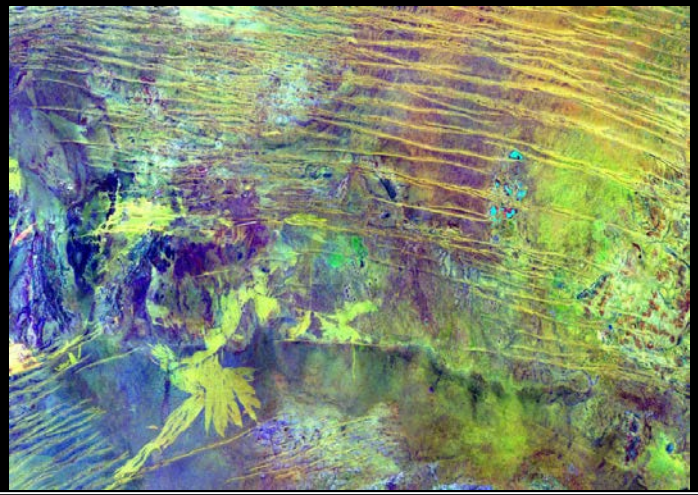


Figure 1.3 Australian fire history 1997–2003

Good fire



Bad fire

Pilbara - altered fire regime

Contemporary	Historical
Mostly moderate-infrequent frequency summer lightning wildfires esp. after good seasons	Mostly frequent, human & lightning, throughout the year
Moderate to high intensity	Low to moderate intensity
Often very large, complete landscape burnout (10^4 ha)	Mostly small, patchy ($<10^2$ ha)

Key differences between northern savannas and Pilbara fire

- Savanna fire return intervals 1-3 yrs (annual grass), Pilbara 5-10 Yrs (spinifex)?
- Most savanna fires anthropogenic; Most Pilbara fires lightning?
- Land tenure & ownership?
- Agreed emissions offset/trading scheme

North Kimberley Fire Project

- Emulate the West Arnhem project
- Project outcomes:
  - GGE abatement
  - Biodiversity benefits
  - Economic, social & cultural benefits
- Partnership between various land holders (DEC, Traditional Owners, pastoralists
- Philanthropic funding support, strong interest by TNC
- Strong State and Federal Gov't interest

Project Development Steps

- Statistics on fire history in the Pilbara e.g., areas burned, locations, causes, frequency, scale
- Off-sets agreement with govt./ trading scheme?
- Parametise and validate the bushfire emissions formulae to determine net emissions abatement by managing fire, agreed emissions baseline
- Obtain Greenhouse Friendly certification (AGO)
- Determine partnerships, location, business & governance models, monitoring & reporting protocols

Thank You