

# PRODUCTION VERSUS BIODIVERSITY

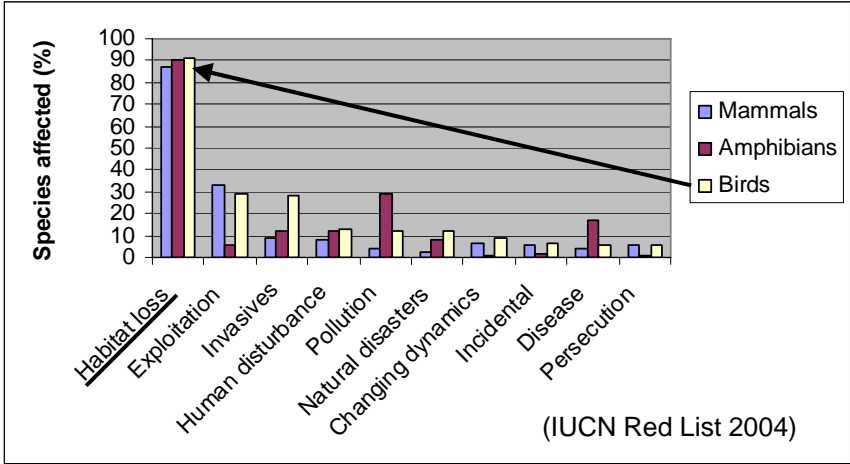
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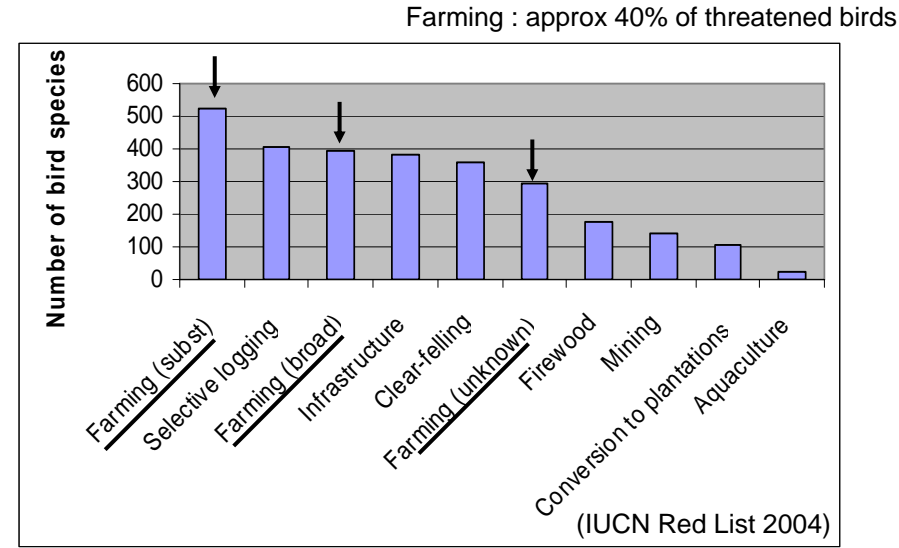
## Outline of talk

1. Impacts of farming **on** biodiversity
    - Globally
    - In Australia
  2. Can we create a virtuous circle between farm economic performance and biodiversity?
    - Trade issues
    - Farm - biodiversity schemes
    - New crops
- Global perspective

## Farming a major risk for globally threatened species

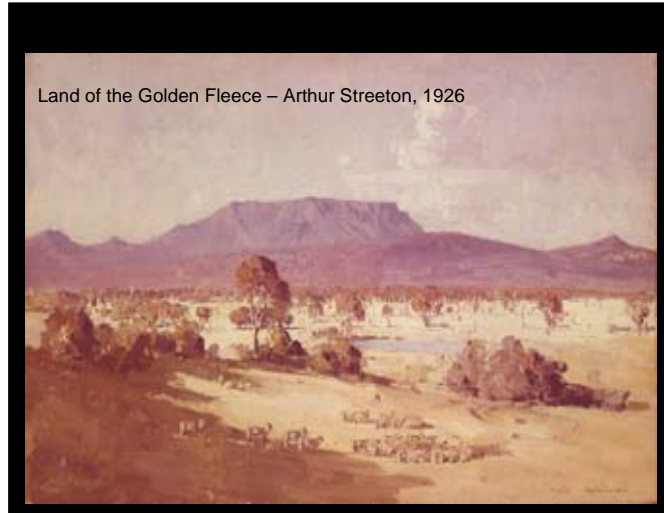


## Farming is a key global causes of habitat destruction affecting threatened birds

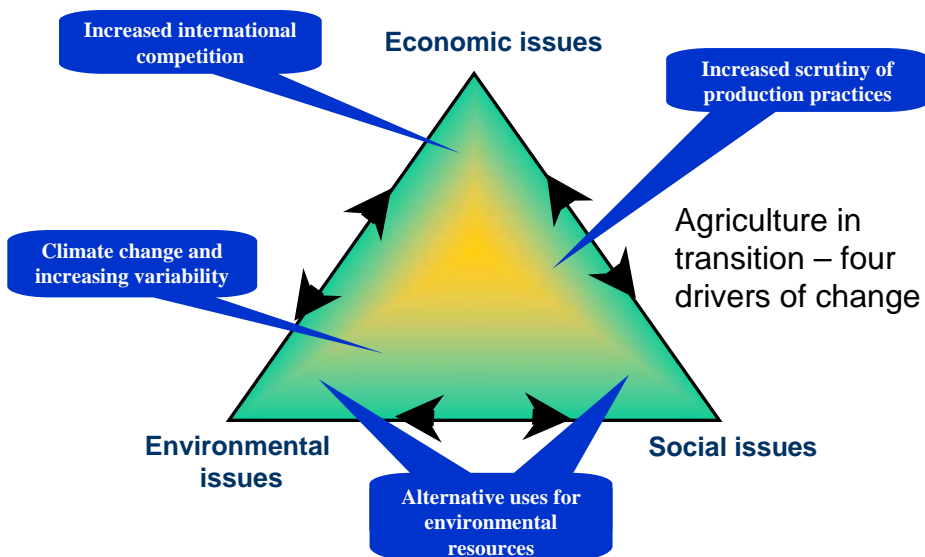


## History of Australian agriculture in 2 minutes Part 1: 1830 – 1970

- From subsistence to a market economy
- “Taming the bush”
- Area of crops increased from c. 1 M ha to 16M ha
- Increasing global exports



## History of Australian agriculture in 2 minutes Part 2: 1970s- present



## History of Australian agriculture in 2 minutes Part 2: 1970s- present

- The tide turns
- Area of crops increased from 16M to 24M ha, but
- The land and the markets bite back.....



Salinity

### Societal concerns



Invasive species

## Agriculture and conservation in Australia

- **Agriculture:**
  - totals 58% of the land (447 M ha)
  - Employs 376 000 people
  - 9-12% GDP [including food & beverage sector]
  - 23-25% merchandise exports = ~\$26B/annum
- **Conservation:**
  - Protected areas total 10% of the land (77.5 M ha)
  - Privately owned sanctuaries <1% of the land (0.9 M ha)

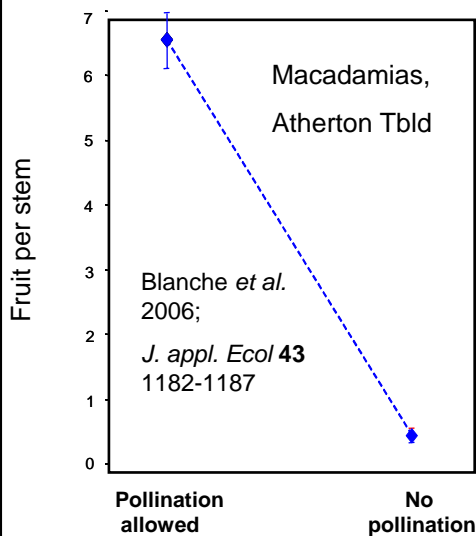
From ABS 2004 "Year Book Australia"

## Key threats to Australian ecosystems (NLWRA 2002a)

Rank*	Threatened Species	Threatened Ecosystems	Riparian Zones	DIWA** wetlands
1	Feral Animals	Grazing Pressure	Grazing Pressure	Grazing Pressure
2	Changed Fire Regimes	Feral Animals	Exotic Weeds	Exotic Weeds
3	Grazing Pressure	Exotic Weeds	Feral Animals	Feral Animals
4	Exotic Weeds	Changed Fire Regimes	Changed Hydrology	Changed Hydrology
5	Other	Fragmentation	Fragmentation	Pollution
	Fragmentation	Vegetation Clearing	Changed Fire Regimes	Salinity
	Vegetation Clearing	Changed Hydrology		
	Changed Hydrology	Salinity		
	Pollution	Firewood Collection		
	Pathogens			
	Firewood Collection			
	Salinity			

\*Number sub-regions recorded \*\*DIWA: Directory of Important Wetlands in Australia

## What about the reverse effect?



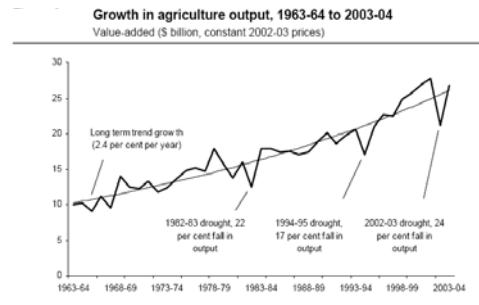
- Biodiversity provides services to agriculture
- Pollination a prime example: one in three mouthfuls of food globally comes from insect pollinated crops

So, environmental harm must be resulting in productivity losses....right?

## Er.....no! (not at the aggregated level)

- Australian output has more than doubled over the four decades to 2003-04
- Productivity growth in agriculture 1.5 - 3.3% pa (compare 0.6 – 1.3% p.a. 1980-2000 for the rest of the economy)

Productivity Commission 2005, *Trends in Australian Agriculture*, Research Paper, Canberra.



## Meanwhile, Australian farmers are trying to stem the tide of environmental harm

- Landcare: \$37 M in 2006-07 for enhanced NRM
- Involves 40% of farmers
- **Voluntary** community movement on a truly admirable scale
- But will it be enough?



1960s



1996

*Lyndfield Park, Gunning, NSW*  
Report of the Review of the National Landcare Program 2003

## The tension for farmers

- “NFF supports an operating environment that promotes **sustainable** and profitable production, and encourages farmers to reinvest in **enhancing** the diverse array of **values** (**natural**, cultural, agronomic) ....

**(NFF Land and Native Vegetation Policy – Sustainable Production 15 April 2004)**

But

- “The current native vegetation and biodiversity management framework **fails to .... address economic concerns** and disregards the importance of issues of social capital .....

**(NFF Submission to the Productivity Commission Inquiry into the Impacts of Native Vegetation and Biodiversity Regulations July 2003)**

(NB our farmers are among the least subsidized in the OECD)

## Can we have our cake and eat it?

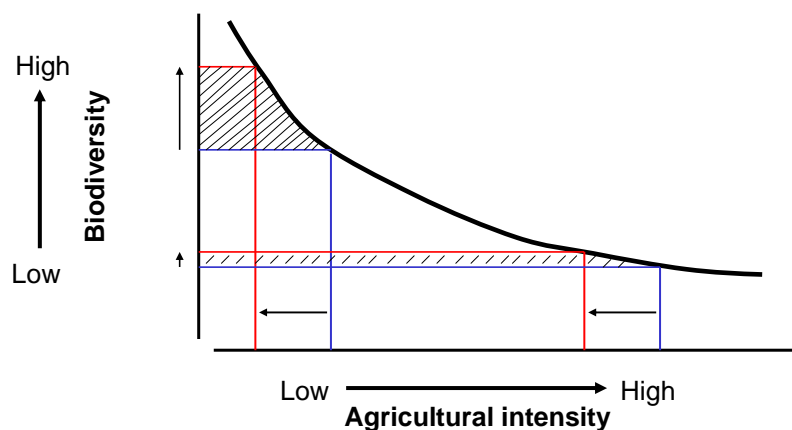
- Can we get better economic performance *and* enhanced biodiversity conservation?

## 1. Environmental trade

- **Barriers:** Environment-related trade barriers (ETB) increasingly prevalent globally:
  - Of 4917 products, 3746 (75%) faced an ETB somewhere in the world (Fontagné *et al.* 2001) by the late 90s
  - Perhaps 13% of global trade directly affected
  - ETBs so far include
    - Animal and plant health barriers
    - Endangered species protection
    - Environmental protection *in the importing country*
  - Future barriers based on sustainability of production?
- **Price:** Organic agriculture as an example of price premiums (30-100%) – based on perceived health benefits and sustainability of production

## 2. Farms as conservation areas – in theory

“Set-aside” schemes



Kleijn & Sutherland 2003 *J. app. Ecol.* **40**: 947-969

## 2. The big question

**Q:** Can Australian farms be profitable if they are managed for biodiversity?

**A:** A qualified yes, e.g. Victoria:

- positive impacts on profitability through managing vegetation for shelter belts,
- improved grazing regimes,
- better targeted fertilizer applications

But...

- Globally, schemes are still in their infancy
- Data are lacking →

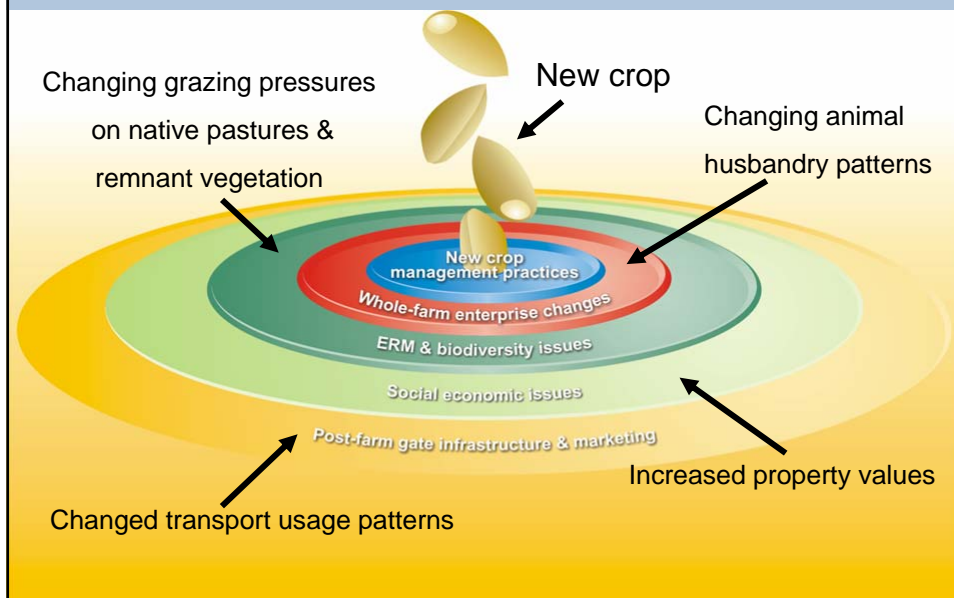
## 2. In practice.... measuring the benefits is difficult

How effective are agri-environment schemes in conserving biodiversity?

- EU: has spent €24.3 billion on such schemes 1994 -2003
- Only 62 evaluation studies (76% from UK and Holland)
- Overall, 54% of species studied increased in response to schemes
- However, experimental design and analysis an issue:
  - No statistical analysis (31% of studies)
  - Layout and biased site choice (37% of studies)
  - Lack of baseline data (66% of studies)

(see Kleijn & Sutherland 2003 *J. app. Ecol.* 40: 947-969)

### 3. New products will require us to develop an integrated view



### Conclusions

- Farming is a major threat to biodiversity globally
- The challenge is to devise systems that create a virtuous circle between environment and agriculture
- Some science/policy questions:
  - Can we quantify the environmental and economic benefits of sustainable systems?
  - Can we devise **profitable** systems that will benefit the **environment** on a scale sufficient to make a real difference?
  - Can we assess the trade-offs between production of conventional commodities and the provision of ecosystem services from alternative land uses?

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