

INTERNSHIP AT CSIRO

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION
THE EXPERIENCE & OUTCOMES

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[1]

Structure of presentation

- 1) Internship program
(CSIRO's profile, internship
arrangements)
- 2) Research on biofuels, land-
use and Green House Gases.
- 3) Outcomes

[2]

The Internship Program

- CSIRO's profile
- Internship arrangements
 - supervision
 - reporting
 - intern's responsibilities
 - internship location, division

[3]

Research and Methodology

- Links amongst Biofuels, Land-use change and Green House Gases
 - Dimension and types of biofuels
 - Land-use and Land-use change
- Green House Gases and global warming
- Significance of study- climate change impacts our well-being (food security, health, flooding, desertification)

[4]

DIMENSIONS/TYPES OF BIOFUELS

- Fuel from living things vs fossil fuel
- First generation
- Second generation
- Third generation
- Fourth generation

[5]

DIMENSIONS CONTD...

Biodiesel



Jatropha,
Castor,
Neem...

lignocellulose
perennial grasses,
short-rotation
copice

Bioethanol



sugarbeet

sugarcane
cassava etc.

- Source: www.oeko.de/service/bio

[6]

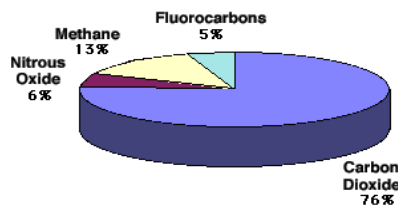
Land-Use & Land-Use Change

- **Land-use:** activity on land. Covers broad land-use categories. Vegetation covering earth's surface(IPCC,2003a)
- **Categories:**forest,cropland,grassland,wetlands,settlements and other land.
- **Direct Land-use change:** feedstock for biofuels displace existing land-use. May lead to change in carbon stock of land.
- **Indirect Land-use change (ILUC):**displacement of prior activity induces land-use changes elsewhere.

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Green-House Gases-GHG

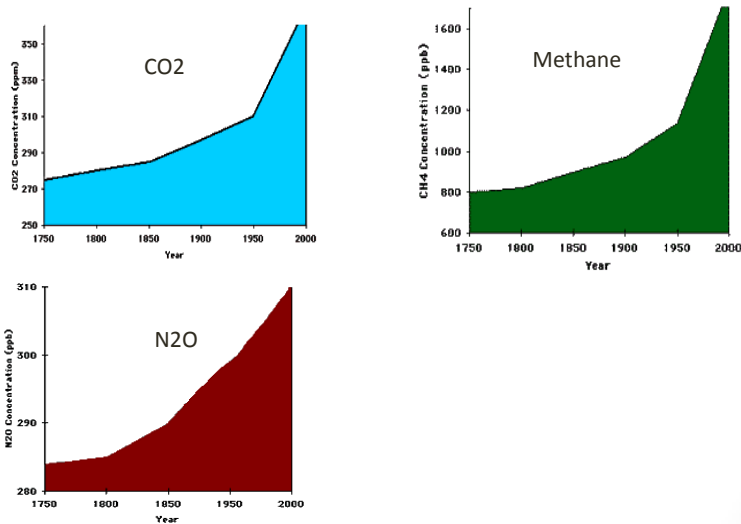
- GHGs, - water vapour*, NO₂, CO₂, Methane, fluorocarbons



- Importance of GHGs- keep earth 33 degrees Celsius warmer
- GHGs and the environment-climate change due to increased quantity

[8]

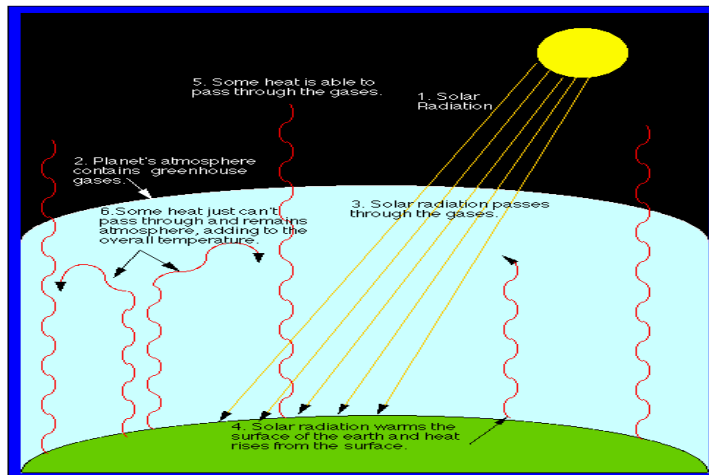
GHGs are increasing...



- www.envirolink.org/orgs/edf/sitemap.html

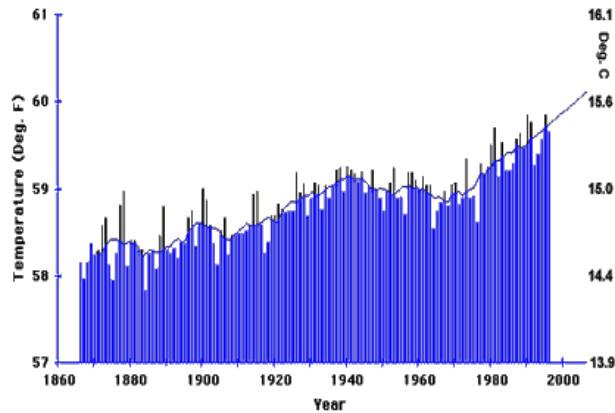
[9]

The Greenhouse effect



Source: www.eecs.umich.edu/mathscience/funexperiments/agesubject/lessons/images/diagrampage.html

[10]



Average yearly temperature rise: 1860-1998

Average yearly temperature rise: 1860-1998

Source: www.evirolink.org/orgs/edf/sitemap.html

[11]

EXPLORING THE LINKS...

- Increasing Biofuels mandates lead to LUC and ILUC
- LUC and ILUC increases GHG emission through deforestation (international leakages)
- Increased GHG emission (carbon emission) accelerates climate change
- **Massive acquisition of land (Land grab) in global south as negative externality of increasing Biofuel mandates**

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THE LINKS CONTD...

Table 1. Comparison of corn ethanol and gasoline greenhouse gases with and without land-use change by stage of production and use (grams of GHGs CO₂ equivalents per MJ of energy in fuel) (28). Figures in total column may not sum perfectly because of rounding in each row. Land-use change was amortized over 30 years. Dash entries indicate "not included."

Source of fuel	Making feedstock	Refining fuel	Vehicle operation (burning fuel)	Net land-use effects		Total GHGs	% Change in net GHGs versus gasoline
				Feedstock carbon uptake from atmosphere (GREET)	Land-use change		
Gasoline	+4	+15	+72	0	—	+92	—
Corn ethanol (GREET)	+24	+40	+71	-62	—	+74	-20%
						+135 without feedstock credit	+47% without feedstock credit
Corn ethanol plus land use change	+24	+40	+71	-62	+104	+177	+93%
Biomass ethanol (GREET)	+10	+9	+71	-62	—	+27	-70%
Biomass ethanol plus land use change	+10	+9	+71	-62	+111	+138	+50%

- Source: Searchinger et al (2008)
(GREET-Greenhouse gases Regulated Emissions and Energy use in Transport) MODEL

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LINKS CONTD...

- Leakage = unintentional side-effect(s)
- • Biocropping may cause shift of current land-use
- (e.g., soy, wheat...) to **other** areas; **indirect**
- land-use **cannot be „traced back“** to project
- • Carbon release from indirect land-use change
- impact **may offset** GHG benefits from biofuels
- (depending on time horizon)

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WAY FORWARD...

- Utilise fourth generation biofuel to meet global energy needs in an environmentally sustainable manner
- Use of crop species that thrives on marginal land e.g. *Jatropha curcas* to biodiesel.
- Entrench truly free and fair trade relationships

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METHODOLOGY

- Desk Research
- Literature Review
- Guidance and discussion with CSIRO Supervisor

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INTERNSHIP OUTCOMES

- Development of thesis topic.
- Deeper and broader awareness of biofuel , land-use and GHG issues.
- Attendance at training, workshops, seminars .
- Improved technical and administrative skills
- Enhanced personal network.
- Access to CSIRO physical and virtual libraries

[17]

CONCLUSION

- ❖ The internship gave an excellent opportunity for developing my research skills, improving personal networks and identifying topic for my research project.
- ❖ There is a need to further explore the Land Grab phenomenon as a form of international leakage and its impact on rural sustainable livelihoods.

[18]

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