



Drivers of Land Use Change

Dr Stephen Whitfield





Drivers of Change

- Complex combination of causes
- Often associated with clearance for agricultural production – related to growing food demand – or for infrastructure and urbanisation
- Geographic variability in clearance reflects role of politics, land value, technology, markets and population pressures – underlying drivers that are difficult to disentangle



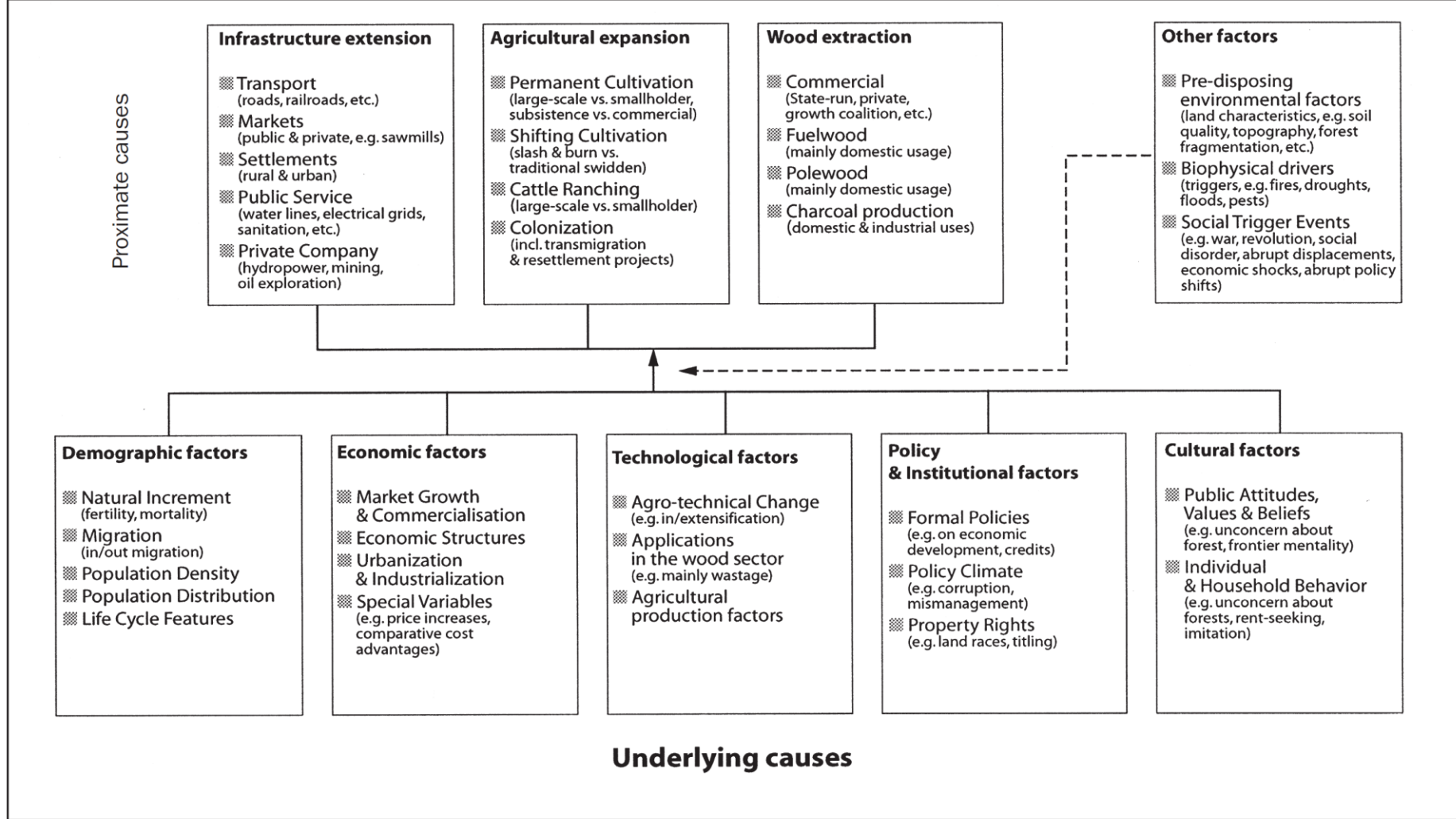


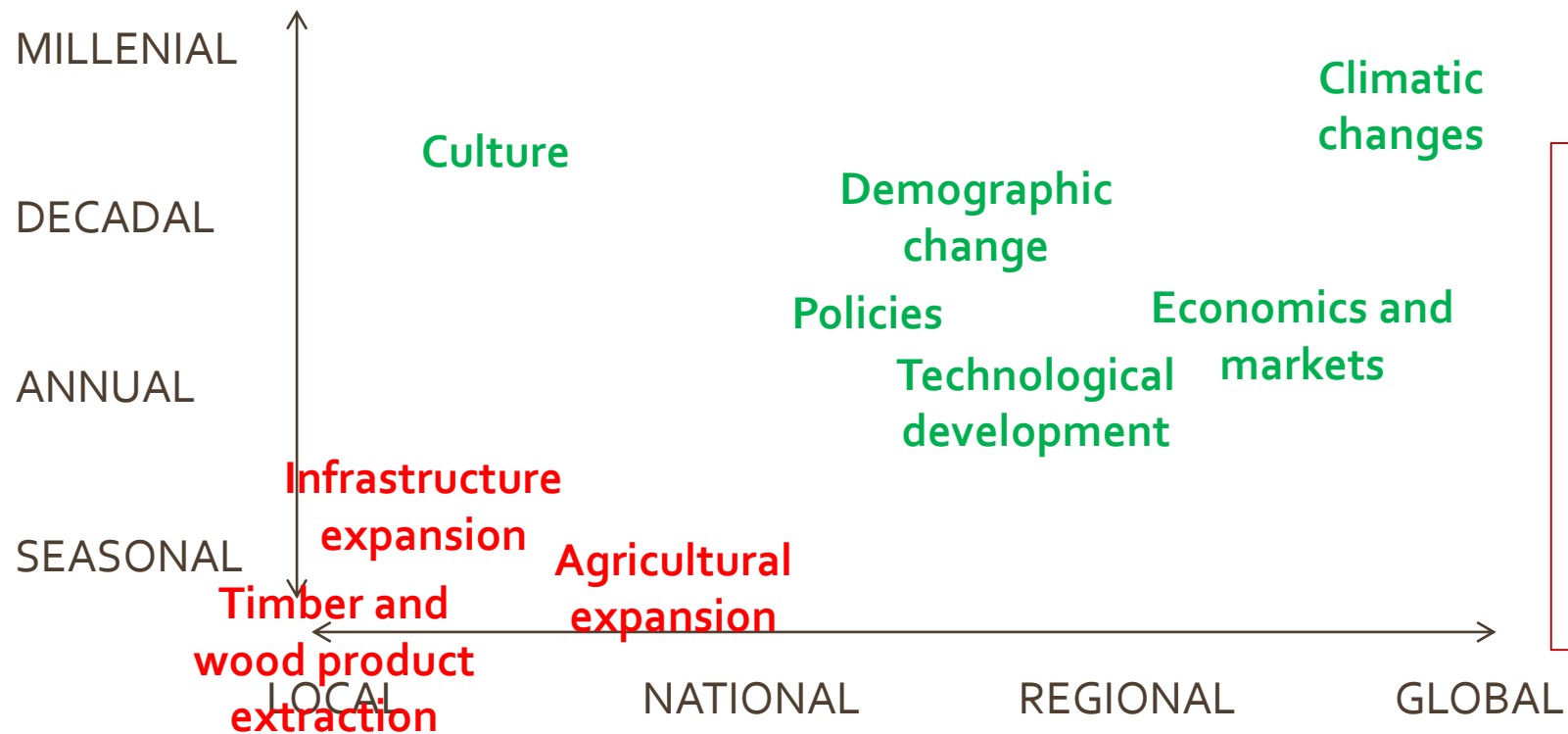
Figure 1. Causes of forest decline. Five broad clusters of underlying driving forces (or fundamental social processes) underpin the proximate causes of tropical deforestation, which are immediate human actions directly impacting forest cover.

Geist, H.J. and Lambin, E.F. (2002) Proximate Causes and Underlying Driving Forces of Tropical Deforestation. *Bioscience*. 52(2): 143-150

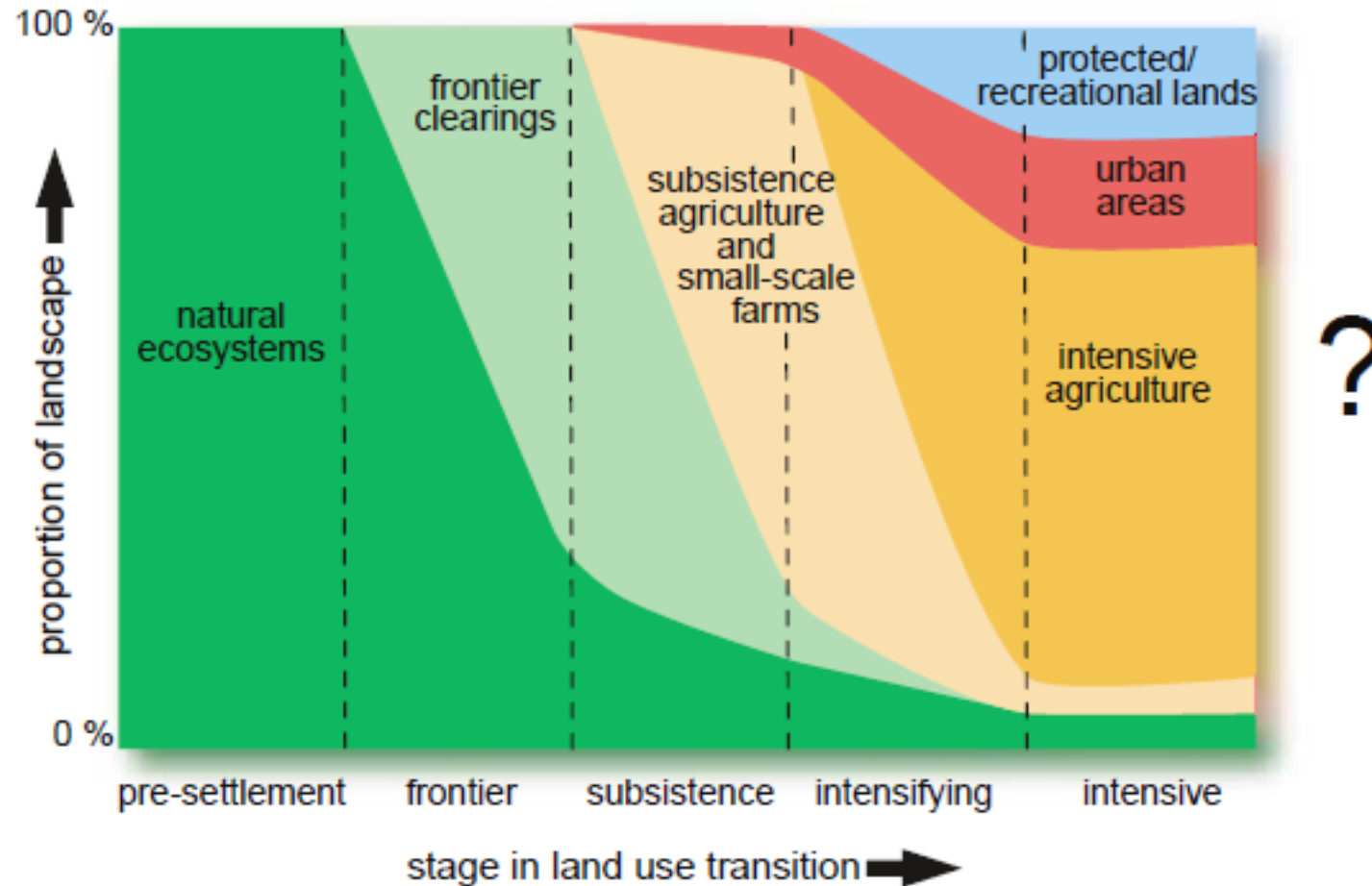


Causes of Forest Change

Red = Proximate causes of change
Green = Underlying drivers of change



Geist, H.J. and Lambin, E.F. (2002) Proximate Causes and Underlying Driving Forces of Tropical Deforestation. *Bioscience*. 52(2): 143-150



Foley, J.A., DeFries, R., Asner, G.P., Barford, C., Bonan, G., Carpenter, S.R., Chapin, F.S., Coe, M.T., Daily, G.C., Gibbs, H.K. and Helkowski, J.H., 2005. Global consequences of land use. *science*, 309(5734), pp.570-574



Urbanisation

Globally urban populations are increasing by over 2% annually resulting in urban expansion

- Developed countries - peri-urban settlements and landscape expansions
- Developing countries – high density settlements and less extensive sprawl

Complex relationship with land use change (can reduce land pressure rurally but may also be associated with higher rates of consumption – underlying driver)



Lambin, E. F., et al. (2001). The causes of land-use and land-cover change: moving beyond the myths. *Global environmental change*, 11(4), 261-269.



Biofuels

Increased pressure for non-food production, such as first generation biofuels

Market mechanisms have important role to play

Need to capture indirect land use change costs of biofuels

Indirect land use change risks negating the greenhouse gas savings that result from increased biofuels because grasslands and forests typically absorb high levels of CO₂.



Overgrazing

- Temporal dynamics (short term high intensity grazing may be part of sustainable land management strategy)
- Vegetation may adapt to grazing regimes – change may be more important than absolute levels
- Vegetation cover, grazing behaviours, climate factors
- Rotational and nomadic strategies
- Tragedy of the Commons narratives and enclosures/sedantization narratives





Rates of Use





Rates of Use





Climate Change

- Direct loss of land due to sea level rise
- Melting and erosion of permafrost (and erosion of rock through freeze-thaw)
- Acidification of water and soils
- Salinization
- Forest fires
- Pest and disease impacts on vegetation
- Changing productivity of agricultural land (drives expansion of production to marginal land)



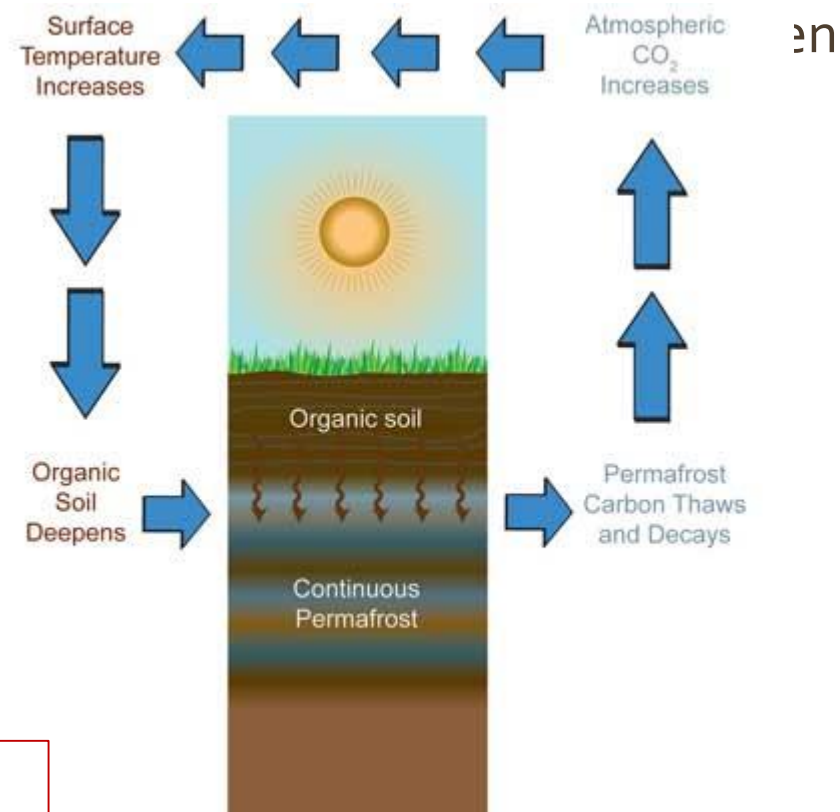
Climate Extremes : Drought and Flood in Malawi

- 2015/16 El Nino associated with uneven distribution of rainfall
- Severe flood followed by drought in Malawi – causes loss of vegetation and fertile soil



Climate Change/Land Degradation feedback

Permafrost melting releases soil carbon
climate change and land degradation



Schuur, E.A.G., McGuire, A.D., Schädel, C., Grosse, G., Harden, J.W., Hayes, D.J., Hugelius, G., Koven, C.D., Kuhry, P., Lawrence, D.M. and Natali, S.M., 2015. Climate change and the permafrost carbon feedback. *Nature*, 520(7546), pp.171-179



Land Grabbing

- Commercial acquisition of large land areas (100,000ha +) for investment in food and non-food (biofuels) production
- Particularly since 2007-8 world food price crisis (over 20 million ha)
- Investments good for development, but – exported profit; displacement and loss of access (particularly in systems of weak tenure); environmental impact; corruption
- Applied to a variety of deals, and managements, and contexts – some good, some bad.





- Land grabbing and land use change :
- increase in the number of large scale farms

Type A Food to food	Type B Food to biofuels
Type C Non-food to food	Type D Non-food to biofuels

Source: Borras, J. and Franco, J. 2013 Global land grabbing and trajectories of agrarian change. JAC vol. 12, no.1, pp. 34-59.



'land acquisitions..'

Supporters refuse the politically charged label of 'land grabs'

Arguments:

- 1) vacant land : abundance of vacant – laying idle - under-utilised
- 2) vacant land can be put into use through capital injection (FDI)
- 3) This will reduce poverty and enhance food security.

Potential benefits:

- i) infrastructures
- ii) employment
- iii) more market access
- iv) accelerated modernisation of farming

Deininger, K. et al. (eds.) 2011. Rising global interest in farmland...

..or land grabs?

- Opponents adopted the politically charged label of 'land grabs'.
- Arguments:
 1. No land is vacant: people are being evicted and dispossessed because they do not have formal land titles
 2. Private investors are not interested in development but in profit. Lots of investments are
 - i) speculative (role of finance)
 - ii) jobless
 - iii) not building infrastructures
 - iv) endangering local food systems
 3. National investors in poor countries are losing out to international capital or becoming «partners»