**UNDERGRADUATE DISSERTATION PLAN**

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**Title**: Can land intensification and abandonment in Latvia be linked to key socio-economic events?

**Introduction**

Land-use, as defined by human employment of land (Meyer and Turner, 1992), is undoubtedly an important part of all civilisations, due to the provision of natural resources (Foley *et al.*, 2005; Turner *et al.*, 2007). However, this is often at the environment’s expense. Human-driven land-use change through urbanisation, deforestation and agricultural expansion has placed pressure on the functioning of several ecological processes, as well as ecosystems themselves (Foley *et al.*, 2005; Turner *et al.*, 2007). Since 1850, roughly 35% of anthropogenic carbon dioxide (CO2) emissions have resulted directly from human land-use, altering the global carbon cycle (Foley *et al.*, 2005; Turner *et al.*, 2007). Fragmentation and destruction of natural habitats through land conversion is also one of the largest threats to terrestrial biodiversity, causing extinctions and range reductions (Foley *et al.*, 2005; Jetz *et al.*, 2007).

Such fragmentation and destruction has primarily occurred through changes in agricultural practices (Foley and Ramankutty, 1999), with croplands and pastures covering over 40% of Earth’s land surface (Foley *et al.*, 2005). Expansion is largely made possible through technologies produced during the ‘Green Revolution,’ an agricultural revolution during the mid-twentieth century that increased global food production (Foley *et al.*, 2005). However, modern practices may be risking long-term ecosystem services (e.g. air quality and nutrient cycling) for short-term yield increases (Foley *et al.*, 2005). Global concern is therefore placed on land-use change, with a focus on mitigating its effects (Foley and Ramankutty, 1999).

Countries and regions appear to follow similar trajectories of changing land-use regimes, moving from subsistence to intensive agriculture at differing rates depending on their social and economic contexts (Lambin *et al.*, 2001; Foley *et al.*, 2005). However, a study in Ethiopia indicates that not all countries follow this pattern, as Ethiopia experienced deintensification within a changing socio-economic environment (Reid *et al.*, 2000). Rapid socio-economic changes are said to accelerate land-use change, with land abandonment rates especially high with regulation change and the establishment of new institutions (Prishchepov *et al.*, 2012). Agricultural abandonment, which can be defined as the cessation of agricultural activities on farmland, is linked with the shift towards more intensive agriculture, with smaller farms more likely to be abandoned (Prishchepov *et al.*, 2012).

The extent to which socio-economic events can have a marked influence on trends in land-use change has seldom been quantified through the use of satellite imagery, with notable studies considering only one socio-economic event (Reid *et al.*, 2000; Prishchepov *et al.*, 2012). Analysing if the signature of a socio-economic shift can be detected through land-use change would shed light into the importance of socio-economic events as drivers of agricultural transitions on a country scale.

In this study, I will be focusing on Latvia due to its quick-changing economic status, making it an appropriate case study to examine if land-use change can be linked to socio-economic events. The two events I will be examining are (1) the Soviet Union collapse in 1991 and (2) the addition of Latvia to the European Union (EU) in 2004 (vote in 2003). After the Soviet Union, there was an increase in abandoned land, tree cutting and percent coverage of protected areas (Prishchepov *et al.*, 2012). After joining the EU, the share of large farms (intensive) increased, while the share in small farms (extensive) decreased (Csaki and Jambor, 2009). Ultimately, this type of analysis could be replicated for other countries to outline the impacts of shifting economic status on land-use and thus, have implications for wider aspects such as ecosystem services, the economy and human movement/urbanisation across Europe and other regions around the world.

**Objectives**

Focusing on Latvia, this study aims to investigate the importance of socio-economic events as drivers of land-use change through the use of satellite imagery. Although the importance of socio-economic events on land-use change is acknowledged (Prishchepov *et al.*, 2012), it remains unclear whether a recognisable, country-scale signature is left on the landscape. Using satellite imagery, pixel-scale analysis can be completed to determine specific land-use transitions over time, potentially unveiling a link between socio-economic events and land-use change. My findings will give insight into the homogeneity, or lack thereof, of the effects of socio-economic events on a country-scale. Results will further unveil the transition patterns between each land-use type, including extensive, intensive and abandoned land. Ultimately, the importance of socio-economic events as a driver of land-use change will be obtained, permitting predictions about land-use under changing socio-economic conditions to be made.

**Research questions**

To answer my overarching question, I will specifically be examining the following aspects:

1. Is there a clear, marked link between key socio-economic events and land-use change in Latvia?
2. Is the strength and direction of land-use change different with extensive, intensive and abandoned land types?
3. Is there a time lag between socio-economic events and the occurrence of land-use change? Does this differ between land-use type?

**Hypotheses and predictions**

*Hypotheses*

I hypothesise that there will be a clear link between the collapse of the Soviet Union and land-use change in Latvia, as shown through satellite imagery. However, I hypothesise that a marked link will not be observed following Latvia joining the EU. I hypothesise that the strength and direction of land-use change will be different for extensive, intensive and abandoned land types. I hypothesise that there will not be a time lag on land-use change following the collapse of the Soviet Union. However, I believe there will be a time lag following Latvia joining the EU. I hypothesise time lags will differ between land-use type. These hypotheses will be tested against null hypotheses stating no uniform relationship between socio-economic events and land-use change.

*Predictions*

Proposed methods of working

Proposed methods of sampling and data analysis

Stats and anticipated results and their likely importance in terms of the bigger picture

Risk mitigation

Anticipated problems and what will you do to minimize their effect

Challenges that you anticipate having to overcome

Proposed timetable

References

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