The Forest Transition theory under scrutiny.

Towards a Degrowth-inspired Land-Change Science

1. Introduction

Degrowth has recently entered the academic world. International congresses, peer-reviewed papers and special issues are increasingly attracting the attention of scholars and journals worldwide. Under the degrowth paradigm, old research issues are reframed and new questions emerge. So far, published research on degrowth has –incipiently– dealt with its intellectual and activist sources (Latouche, 2010); (Martínez-Alier et al., 2010; Demaria et al., 2013); its link to questions of democracy (Cattaneo et al., 2012; Asara et al., 2013); and its contribution to answering issues ignored by standard economic theories (Kallis et al., 2012). Other papers look at specific policies or practical implementations of degrowth (Lietaert, 2010; Cattaneo and Gavaldà, 2010; Johanisova et al., 2013); develop indicators to measure progress in the degrowth transition (O'Neill, 2012); and analyse the relationship between unpaid work and energy consumption (D'Alisa and Cattaneo, 2013). As an emerging new paradigm, degrowth both influences and is influenced by different research fields and theoretical frameworks such as the steady-state economy (Kerschner, 2010) or property economics (van Griethuysen, 2012).

In this paper I explore how degrowth may engage with a key area of the research agenda on sustainability: land-change science (Turner et al., 2007). A recent review critically shows how land-change scientists have long suffered from the limitations of applying neoclassical economic concepts in their inquiry, and argues in favour of moving beyond economic rationality for a more nuanced understanding of the complexity of land-change processes (Munroe et al., 2014). Here I explore how this call can be operationalized with contributions from the degrowth paradigm. In particular, I focus on the Forest Transition (henceforth FT) framework, one of the main theoretical bodies of land-change science, and use it to illustrate some of the conceptual and empirical weaknesses of this research field. First, a brief description of FT is given as defined by its own proponents. Second, a critical review is presented relying both on studies within the FT literature and studies that –even if outside such theoretical

framework– deal with the drivers and impacts of forest recovery at different scales. Based on the review, I then suggest that a *forest fetishism* permeating the research on FT tends to obscure the complexity of land-change processes. I hypothesize that such forest fetishism is to be related to the hegemony of economic growth and modernization. Finally, I explore how degrowth can contribute to rethink land-change science towards a more nuanced understanding of land-change processes.

2. What is a Forest Transition?

A FT is described as a national or regional shift from a shrinking to an expanding forest area. After a historical period of forest decline due to agricultural expansion, and as an industrial economy develops, farmers leave the land in search for better paid non-farm jobs. Agriculture is relocated to the most suitable and productive areas, and the abandoned fields and pastures revert to forest both through spontaneous regeneration and promoted tree plantation. Many developed countries ranging from Europe to the United States experienced FTs during the 19th and 20th centuries (Mather et al., 1999; Rudel et al., 2005). Recently some developing countries in Asia and America have been reported to be experiencing FTs too as their national economies become increasingly integrated into global markets (Klooster, 2003; Mather, 2007; Kull et al., 2007). This has boosted scholar interest in examining the prospects and policy options for a global FT that would eventually halt worldwide deforestation (Meyfroidt and Lambin, 2011).

The idea of a FT was first proposed by Mather (1992). Since then it has undergone notable improvements in terms of theoretical framework, methods and explanatory pathways (see the review by (Meyfroidt and Lambin, 2011). This notwithstanding, prominent criticisms have been raised, both from within FT scholars and from other scientists dealing with the drivers and impacts of forest recoveries.

3. Forest Transition under scrutiny

3.1. Utility of forest area as a proxy for land-change processes

As already pointed out by Mather (1992) in his pioneering work on FT, the best available data at that time –FAO assessments of the world's forest resources– were imperfect in terms both of reliability of

estimations for individual countries and of general definitions, which could be inconsistent across nations or regions in terms of forest characteristics. The 'forest' category employed in FT studies often includes either natural or planted stands of trees, which perform rather differently from an ecological point of view (Chazdon, 2008). Even if the use of remote sensing data resulted in more accurate and consistent estimations, it was shown that using forest area alone had severe limitations in diagnosing meaningful changes in forest sustainability (Bae et al., 2012). Indeed, several processes such as forest regeneration, forest degradation and deforestation may that take place simultaneously within the forest area of a given region (Klooster, 2003; Shi et al., 2011), which may undergo non-linear changes and multiple reversals (Yeo and Huang, 2013). Walker (2012) pushed this critique forward and argued that by restricting their focus to forest ecosystems, many FT studies tend to underestimate the ecological importance of non-forested habitats such as wetlands or savannas, which as forests are vulnerable to agricultural encroachment. This bias towards forested habitats also seems to obscure the ecological and social importance of human-made non-forested habitats such as dry farming land and meadows, which show declining trends in many developed countries (Otero et al., under review).

3.2. Ecological and social impacts of FTs

FTs after rural outmigration have been considered to enhance the recovery of natural ecosystems and hence contribute to biodiversity conservation (Aide and Grau, 2004). But the relationship between forest recovery and the changes in landscape structure, landscape functioning and biodiversity remain poorly understood. Contrastingly, landscape ecologists have shown that forest recovery in cultural landscapes might result in less landscape diversity as long as it occurs at the expense of meadows and dry farming land, leading to negative repercussions for those species benefiting from open habitats and edge environments (Marull et al., under review). FTs also show important trade-offs with other ecosystem services, even if it is often deemed to improve them. For instance, hydrological science has clearly shown that reforestation of basins leads to lower water yields as forest water consumption is generally higher than that of other vegetation types (Andréassian, 2004; Bosch and Hewlett, 1982). Tree plantations aimed

at carbon sequestration, for instance, reduce stream flow and may salinize and acidify some soils (Jackson et al., 2005). In fire-prone biomes such as the Mediterranean, the uncontrolled expansion of unmanaged forests leads to increased wildfire hazard with many negative social and ecological impacts (Pausas et al., 2008). Finally, massive reforestation programs may have negative repercussions for livelihoods as long as they target and transform large areas of land used by locals as pastures or to collect non-timber forest products (McElwee, 2009).

3.3. Global wood trade, forest cover and modernization theory

Even if a notable diversity of possible pathways of FT have been identified (Meyfroidt and Lambin, 2011), the underlying hypothesis of the FT framework still posits a universal pattern of transition through which countries inevitably move in their way to modern economy. Its analogy with modernization theory has been critically pointed by Perz (2007; see however Walker, 2008). The history of mid-latitude forest use, where the FT theory was first tested, may not play out similarly in other areas or biomes of the world where the bulk of the global deforestation is occurring nowadays (Rudel et al., 2002; Turner and Robbins, 2008). Importantly, lower pressures on forests in transition have often been achieved, at least in part, by importing wood products from countries with declining forests, thus the potential of global forest return may be lower than suggested by national trajectories (Kastner et al., 2011; Meyfroidt et al., 2010). Hence the restorative character of FTs needs to be revisited by taking into account both issues of scale (Walker, 2012) and the global patterns of social metabolism. We will return to this in the next section.

4. Preliminary conclusions and some ideas for a degrowth-inspired land-change science

I have presented a preliminary review which critically revisits some of the weaknesses of the FT theory. As argued above, its exclusive focus on 'forests' might obscure the social and ecological importance of non-forest habitats and landscapes. More than this, underlying its very same analytical aim –explaining the ways in which forests 'recover'– there is the assumption that forest recoveries are good per se. This in turn makes it difficult for the FT framework to take into account the insights of

hydrologists, landscape ecologists and political ecologists showing the social and ecological impacts of forest expansion. Based on this preliminary review I would suggest that a *forest fetishism* permeates the research on FT obscuring the complexity of land-change processes. I would hypothesize that the FT's assumption that forest recoveries are good per se is to be related to the widespread assumption that growth is the ultimate and inevitable goal of any society. The analogy between FT and modernization theory is telling in this regard.

According to FT scholars, forest recovery is to be enhanced by the very same driver of worldwide deforestation –economic growth. The degrowth paradigm can contribute to move land-change science forward, at least in two ways. First, freeing land-change scientists from the "growth imperative" might open their minds towards otherwise unconceivable pathways of and research questions on land-change. Which changes in land-use patterns and landscape features may be expected as a result of a transition to lower material and energetic throughput? How is land-change related to changes in the patterns and intensity of social metabolism at different spatial and temporal scales? How is global forest cover affected by the trade of forest and non-forest products? Second, a degrowth-inspired land-change science could contribute to move beyond the *Homo economicus* rationality in explaining how stakeholders make decisions regarding land and resource use. As one of the sources of degrowth point out, the conception of human beings as economic agents driven by self-interest and utility maximization is only one representation of the world. Other representations of the human nature instead emphasize economic relations based on gifts and reciprocity, where social relations and conviviality are central (Demaria et al., 2013). How are decisions regarding land-use shaped by such alternative mental models? How are land-use patterns and land-change processes influenced by anti-utilitarian representations of the human nature?

References

Aide, T.M., Grau, H.R., 2004. Globalization, migration and Latin American ecosystems. Science 305, 1915–1916.

Andréassian, V., 2004. Waters and forests: from historical controversy to scientific debate. Journal of Hydrology 291, 1–27.

Asara, V., Profumi, E., Kallis, G., 2013. Degrowth, Democracy and Autonomy. Environmental Values 22, 217–239.

Bae, J.S., Joo, R.W., Kim, Y.-S., 2012. Forest transition in South Korea: Reality, path and drivers. Land Use Policy 29, 198–207.

Bosch, J.M., Hewlett, J.D., 1982. A review of catchment experiments to determine the effect of vegetation changes on water yield and evapotranspiration. Journal of Hydrology 55, 3–23.

Cattaneo, C., D'Alisa, G., Kallis, G., Zografos, C., 2012. Introduction. Degrowth futures and democracy. Futures 44, 515–523.

Cattaneo, C., Gavaldà, M., 2010. The experience of rurban squats in Collserola, Barcelona: what kind of degrowth? Journal of Cleaner Production 18, 581–589.

Chazdon, R.L., 2008. Beyond Deforestation: Restoring Forests and Ecosystem Services on Degraded Lands. Science 320, 1458–1460.

D'Alisa, G., Cattaneo, C., 2013. Household work and energy consumption: a degrowth perspective. Catalonia's case study. Journal of Cleaner Production 38, 71–79.

Demaria, F., Schneider, F., Sekulova, F., Martinez-Alier, J., 2013. What is Degrowth? From an Activist Slogan to a Social Movement. Environmental Values 22, 191–215.

Jackson, R.B., Jobbágy, E.G., Avissar, R., Roy, S.B., Barrett, D.J., Cook, C.W., Farley, K.A., Maitre, D.C. le, McCarl, B.A., Murray, B.C., 2005. Trading Water for Carbon with Biological Carbon Sequestration. Science 310, 1944–1947.

Johanisova, N., Crabtree, T., Fraňková, E., 2013. Social enterprises and non-market capitals: a path to degrowth? Journal of Cleaner Production 38, 7–16.

Kallis, G., Kerschner, C., Martinez-Alier, J., 2012. The economics of degrowth. Ecological Economics 84, 172–180.

Kastner, T., Erb, K.-H., Nonhebel, S., 2011. International wood trade and forest change: A global analysis. Global Environmental Change 21, 947–956.

Kerschner, C., 2010. Economic de-growth vs. steady-state economy. Journal of Cleaner Production 18, 544–551.

Klooster, D., 2003. Forest Transitions in Mexico: Institutions and Forests in a Globalized Countryside. The Professional Geographer 55, 227–237.

Kull, C.A., Ibrahim, C.K., Meredith, T.C., 2007. Tropical Forest Transitions and Globalization:Neo-Liberalism, Migration, Tourism, and International Conservation Agendas. Society & Natural Resources 20, 723–737.

Latouche, S., 2010. Degrowth. Journal of Cleaner Production 18, 519–522.

Lietaert, M., 2010. Cohousing's relevance to degrowth theories. Journal of Cleaner Production 18, 576–580.

Martínez-Alier, J., Pascual, U., Vivien, F.-D., Zaccai, E., 2010. Sustainable de-growth: Mapping the context, criticisms and future prospects of an emergent paradigm. Ecological Economics 69, 1741–1747.

Marull, J., Otero, I., Stefanescu, C., Tello, E., Miralles, M., Coll, F., Pons, M., Diana, G.L., under review. Exploring the links between forest transition and landscape changes in the Mediterranean. Can forest recovery lead to lower landscape quality?

Mather, A.S., 1992. The Forest Transition. Area 24, 367–379.

Mather, A.S., 2007. Recent Asian Forest Transitions in Relation to Forest-Transition Theory. International Forestry Review 9, 491–502.

Mather, A.S., Fairbairn, J., Needle, C.L., 1999. The course and drivers of the forest transition: The case of France. Journal of Rural Studies 15, 65–90.
McElwee, P., 2009. Reforesting "Bare Hills" in Vietnam: Social and Environmental Consequences of the 5 Million Hectare Reforestation Program. AMBIO: A Journal of the Human Environment 38, 325–333.
Meyfroidt, P., Lambin, E.F., 2011. Global Forest Transition: Prospects for an End to Deforestation. Annual Review of Environment and Resources 36, 343–371.
Meyfroidt, P., Rudel, T.K., Lambin, E.F., 2010. Forest transitions, trade, and the global displacement of land use. PNAS 107, 20917–20922.
Munroe, D.K., McSweeney, K., Olson, J.L., Mansfield, B., 2014. Using economic geography to reinvigorate land-change science. Geoforum 52, 12–21.
O'Neill, D.W., 2012. Measuring progress in the degrowth transition to a steady state economy. Ecological Economics 84, 221–231.
Otero, I., Marull, J., Tello, E., Diana, G.L., Pons, M., Coll, F., under review. Questioning the suitability of a forest transition in Mediterranean cultural landscapes. Implications for land-use planning and biodiversity conservation.
Pausas, J.G., Llovet, J., Rodrigo, A., Vallejo, R., 2008. Are wildfires a disaster in the Mediterranean basin? – A review. Int. J. Wildland Fire 17, 713–723.
Perz, S.G., 2007. Grand Theory and Context-Specificity in the Study of Forest Dynamics: Forest Transition Theory and Other Directions. The Professional Geographer 59, 105–114.
Rudel, T.K., Bates, D., Machinguiashi, R., 2002. A Tropical Forest Transition? Agricultural Change, Out-migration, and Secondary Forests in the Ecuadorian Amazon. Annals of the Association of American Geographers 92, 87–102.
Rudel, T.K., Coomes, O.T., Moran, E., Achard, F., Angelsen, A., Xu, J., Lambin, E., 2005. Forest transitions: towards a global understanding of land use change. Global Environmental Change 15, 23–31.
Shi, Z.-H., Li, L., Yin, W., Ai, L., Fang, N.-F., Song, Y.-T., 2011. Use of multi-temporal Landsat images for analyzing forest transition in relation to socioeconomic factors and the environment. International Journal of Applied Earth Observation and Geoinformation 13, 468–476.
Turner, B.L., Lambin, E.F., Reenberg, A., 2007. The emergence of land change science for global environmental change and sustainability. PNAS 104, 20666–20671.
Turner, B.L., Robbins, P., 2008. Land-Change Science and Political Ecology: Similarities, Differences, and Implications for Sustainability Science. Annual Review of Environment and Resources 33, 295–316.
Van Griethuysen, P., 2012. Bona diagnosis, bona curatio: How property economics clarifies the degrowth debate. Ecological Economics 84, 262–269.
Walker, R., 2008. Forest Transition: Without Complexity, Without Scale. The Professional Geographer 60, 136–140.
Walker, R., 2012. The scale of forest transition: Amazonia and the Atlantic forests of Brazil. Applied Geography 32, 12–20.
Yeo, I.-Y., Huang, C., 2013. Revisiting the forest transition theory with historical records and geospatial data: A case study from Mississippi (USA). Land Use Policy 32, 1–13.