



The Return of the Forest: A critical analysis of traditional explanations for forest resurgence

Jan Breitling

- The relationship between environment and peace and conflict are manifold. At the most basic level the environment can be identified as both a provider and precondition for peace and well-being, and as a source of conflict and misery. Natural resources play and have played an important role in contributing to the outsets and prolonging and financing of violence and military conflicts in all continents. The depletion of natural resource, through direct destruction, degradation, pollution, e.g. climate change or through preventing access to them has contributed to the suffering and violence of local and often indigenous communities, who depend on those resources for their livelihoods and basic survival. Military conflicts directly impact the environment and contribute to long term suffering of all species including the human one.
- Deforestation, the conversion of forest to other land uses, is considered one of the main global environmental challenges of our times (McCarthy and Tacconi, 2011, McLennan and Garvin, 2012; Leichenko and O'Brien, 2008; Angelsen and Rudel, 2013). Since 1990, the world has lost some 5 million hectares of forest each year (FAO 2015). Nevertheless, the rate of global deforestation seems to be decreasing and there is a growing recognition that forest area is expanding in certain regions (Angelsen and Rudel 2013, Hecht et al 2014).
- Forest transition theory is a highly contested framework that combines demographic, economic growth, and market based approaches to explain forest cover change (Robbins, 2011, Hecht et al. 2014, Peet et al., 2011). This theory claims that after an initial period of deforestation, correlated with population and economic growth, later economic growth, and shifts in economic activity and demographic changes, lead to forest resurgence (Angelsen and Rudel 2013, Mather and Needle 1998, Perz 2007). The Return of the Forest:





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Introduction

Deforestation, the conversion of forest to other land uses, is considered one of the main global environmental challenges of our times (McCarthy and Tacconi, 2011, McLennan and Garvin, 2012; Leichenko and O'Brien, 2008; Angelsen and Rudel, 2013). Since 1990, the world has lost some 5 million hectares of forest each year (FAO 2015). Nevertheless, the rate of global deforestation seems to be decreasing and there is a growing recognition that forest area is expanding in certain regions (Angelsen and Rudel 2013, Hecht et al 2014).

Forest resurgence or the increase of forest area on land that formerly was not under forest cover is complex phenomenon that has attracted increased interest from researchers in the recent past (Mather and Needle 1998, Rudel 2001, Lambin and Meyfroidt 2010). Since the early 1990s geographers started noting a pattern in forest cover change apparently related to the process of economic development in several industrialized countries (Rudel 2001; Mather, Needle and Fairburn 1999; Mather 1992). This pattern has been named as forest transition referring to a change at a national or regional scale from decreasing to expanding forest areas (Mather and Needle 1998, Rudel 2001, Lambin and Meyfroidt 2010; Pfaff and Walker 2010). Under this perspective it is stated that over time a nation's forest cover declined, but that at a certain point this decline started to slow down, eventually stopped, and lastly reversed, showing an increase in total forest are. This forest transition followed a U-shaped curve of forest cover plotted against time (Perz 2007).

Forest transition theory is a highly contested framework that combines demographic, economic growth, and market based approaches to explain forest cover change (Robbins, 2011, Hecht et al. 2014, Peet et al., 2011). This theory claims that after an initial period of deforestation, correlated with population and economic growth, later economic growth, and shifts in economic activity and demographic changes, lead to forest resurgence (Angelsen and Rudel 2013, Mather and Needle 1998, Perz 2007).

Critical engagement with this theory has started driving research into providing descriptions of similar trends in developing countries, e.g. India, Vietnam (Meyfroidt and Lambin, 2008a, b), Costa Rica (Kull et al 2007), El Salvador (Hecht et al. 2006), Puerto Rico (Grau et al 2003) among others. Meyfroidt and Lambin (2010) raise the important point that even though the similarity in the pattern of forest

cover change over time seems striking, it does not imply that the causes of the forest transition are the same.

The forest transition literature has been criticized for being too general, not taking historic context and national and local realities into account. It can also be attacked for essentially decreasing the concern of the matter of deforestation, and by willingly or unwillingly promoting further economic growth as a solution to the environmental crisis, like deforestation (Perz, 2007; Robbins, 2011; Angelsen and Rudel, 2013). This paper presents an analysis of this ongoing debate.

Forest Transitions

General Explanations

Forest Transition Theory originally applied two main nonexclusive pathways to explain forest transitions (Angelsen and Rudel, 2013). First, the economic development path, which follows the environmental Kuznets curve model, argues that countries go through an initial period of industrialization and economic and population growth, causing increases in deforestation. At a later stage of development, economic activities shift from agricultural and resource extraction to an economy based on service industry, agricultural intensification, higher incomes, increased environmental awareness and migration from rural to urban areas, reducing pressure on forests, and finally leading to forest resurgence. The second path described by the Forest Transition Theory is the so called 'forest scarcity path'. Here, deforestation leads to a perceived decrease in the ability of forests to provide environmental services and goods. Rising timber prices and growing demand for environmental services from society and the private sector provide incentives for policies and activities geared towards tree planting, sustainable forest management, general reforestation and regeneration of forests and conservation of remnant forest areas (Hecht, et al., 2014; Rudel, et al., 2005; Angelsen and Rudel, 2013; Meyfroidt and Lambin, 2011).

The explanations put forward by earlier studies focusing on industrialized nations followed the logic of modernization theory (Mather 1992, Mather and Needle 1998, Rudel 1998, Perz 2007). Perz states that what he calls Forest Transition Theory sums up different explanations of forest transitions as follows. At the early stages of national development, nations encouraged forest clearing in order to assert their sovereignty over increasing areas establishing territorial claims. Simultaneously, processes linked to the displacement of religion by science and rationalization, the increases in technological knowledge facilitated further forest clearing for agricultural production. Additionally, this was needed by increased demand

for food through the decline in mortality rates, accelerating population growth, and the increased demand for timber and other natural resources stemming from increasing industrialization and economic growth. At this point the deforestation rate is high (Perz 2007).

The shift from high deforestation rates to decreases and finally the complete stop of deforestation and processes of recovery and growth of forest area is explained as follows. Once later stages of development have been reached, forest cover starts to increase. Again, technological advances in agriculture serve as an important driver. Technology raises productivity per land unit and reduces demand for additional cleared land. So, from a system of extensive land use agriculture is going through a process of intensification, focused on already cleared land, closer to market access, making it less profitable to clear new forest areas in faraway places. As industrial growth proceeds, the argument goes, populations start to migrate from rural to urban areas, which, in theory, reduces pressure on existing forests stemming from subsistence agriculture (Pfaff and Walker 2010; Grau et al 2005; Perz 2007).

Processes of urbanization combined with a growing demand for education and skilled labor together reduce fertility, which decelerates population growth. Additionally, the economy is gradually changing from industrial towards a more service based economy, decreasing demand for forest resources, direct products, land, and other forest resources. With these changes in social and economic lifestyles and activities, social norms tend to change towards environmental awareness and demand for the protection and conservation of environmental quality in general and forest in particular. Increasingly, policies are established to protect the environment, environmental organizations start appearing, together with national parks and other types of protected areas (Pfaff and Walker 2010; Grau et al 2005; Perz 2007).

Others claim that there is actually no unified theory of forest cover change (Meyfroidt and Lambin 2011, Lambin and Meyfroidt 2010). Contrary to what Perz (2007) describes as Forest Transition Theory, there exists a plethora of different explanations varying in their importance given to endogenous “socioecological feedbacks”, focusing on autonomous responses to forest and ecosystems services scarcity, and “socioeconomic changes” exogenous to the forest sector (Lambin and Meyfroidt 2010, Angelsen and Rudel 2013). They refer to earlier attempts in explaining forest transition (Rudel et al. 2005), where the authors describe two main drivers of forest transition: the forest scarcity path and the economic development path, and to the more segregated drivers put forward by Angelsen and Rudel (2013) and by Lambin and Meyfroidt (2010).

Forest Scarcity Pathways

After a period of high deforestation rates, when the forest area has been reduced significantly, a scarcity of forest products and/or a decline in the flow of services provided to societies by forest ecosystems prompts governments and land managers to establish effective afforestation programs. Under this perspective, proposed by Rudel et al. (2005), the forest transition can be explained due to a response by governments and private sector to a perceived scarcity of forests and their direct and indirect goods and services. The forest scarcity can also be perceived due to increases in perceived risks of landslides on deforested slopes, and floods in downstream watersheds. With rising timber and other forest products' prices and a perception of risks related to natural disasters, investments are made by governments and landowners in tree planting and more intensive forest management. Thanks to forestry intensification, timber needs can be satisfied from limited areas of forest plantations, thus saving the remaining forests from exploitation pressure.

Lambin and Meyfroidt (2010) mention examples from China, where the forest scarcity was very much linked to the perceived risk of flooding and soil erosion that can be the result of deforestation, and inspired the Chinese government to implement national reforestation policies. Similarly, in 19th century Europe, reforestation was promoted in the Alps and other regions due to these perceived threats, and logging bans were established in the Philippines and Thailand (Mather and Fairbairn 2000, Mather 2007).

In other words, the political and economic changes necessary to decrease deforestation and permit forest recovery arise only as a response to the adverse impacts of deforestation, permitting forest cover to increase again (Meyfroidt and Lambin 2011).

Angelsen and Rudel (2013) segregate the forest scarcity pathway into two distinct drivers of forest transition that initiate and are addressed through different processes, the scarcity of forest products and the scarcity of forest environmental services. The former explains how the scarcity of forest products due to shrinking forest areas and rising demand for forest products due to economic growth stimulates forest conservation, sustainable and better forest management, and the establishment of plantations in order to relieve pressure on natural forests, as was observed in India (Kohlin and Parks 2001). Similarly, Foster and Rosenzweig (2003) demonstrate how this higher demand and lower supply leads to higher prices and therefore incentivizes reforestation due to market pressures. The direct involvement of governments in creating policies to incentivize reforestation has also been observed in Niger during the 1990s leading to important increases in forest area (FAO 2010).

The second driver identified by Angelsen and Rudel (2013), the scarcity of forest environmental services, focusses on the dynamics that stem from the perceived environmental risks linked to this type of scarcity. Like mentioned above, floods, soil erosion, landslides, water scarcity linked to the shrinking forest areas in China, France, Switzerland and the USA have provided the reasoning for those governments to address deforestation and degradation of forest. Often the pressure from civil society on its governments is necessary for government action. The perceived link between loss of forest cover and some of these impacts, including the death of thousands of citizens in the Yangtze River Floods in China in 1998, and the alpine floods and erosion issues in the Alps, was a mayor rationale for these reforestation policies (Mather 2007, Angelsen and Rudel 2013).

The current efforts in addressing climate change and forest loss through REDD+ can be seen as a prime example of how the perceived scarcity of an environmental service, carbon sequestration and carbon stock services supplied by forests, lead to political responses on a global level. The direct scarcity of these services, combined with a higher demand for them, lies at the heart of this market based approach, making use of the supposedly increased global willingness to pay for this environmental service, translated in theory into incentives for landowners or decision makers to protect their forests (Angelsen and Rudel 2013).

Economic Development Pathways

The economic development pathway explains how shifts in the economy from traditional industry based to service industry activities, rural to urban migration, and agricultural technology intensification influence the forest regrowth (Pfaff and Walker 2010). Industrial development and newer and better paying jobs in the cities pull off rural labor force, inducing the recovery and increases of forest areas in in formerly agricultural lands. Angelsen and Rudel (2013) mention how the growth of nonfarm, or non-agricultural, sectors of the national economy raise the opportunity costs of labor in the agricultural and rural sector, leading to a scarcity of rural labor. They stress, however, that the processes of urbanization don't necessarily mean forest recovery in all cases (see next section below).

This pathway describes how after a period of deforestation, large areas of land only marginally productive agricultural land is abandoned and left to forest regeneration, due to scarcity of labor, caused by the pull of other economic sectors in the urban areas. In other words, the higher urban wages create rural labor shortages (Rudel et al. 2005).

The second factor, agricultural intensification due to increases in technology, in theory, concentrates agriculture in more suitable regions (Pfaff and Walker 2010).

Since this new technology increases the production increases with the consequence of declining crop prices, making agriculture less profitable in marginal less productive lands, or lands farther away from markets. This leads, under this theory, to forest regrowth on those lands (Lambin and Meyfroidt 2010; Grau et al 2005).

A third issue linked to the economic development path in explaining forest recovery is the fact that urbanization leads to a shift in energy demand and the sources for energy (Pfaff and Walker 2010). There is a decrease in dependence on charcoal and wood and a shift towards newer energy sources like kerosene, electricity and natural gas and other sources of energy that could in theory explain the decrease in forest degradation and even the regrowth of forests. De Fries and Pandey (2010) describe this process in India, where the increasingly urbanized population demands cleaner and more modern sources of energy decreasing the pressure on forests.

Finally, increased economic wellbeing and the linked changing societal preferences linked to an increased demand for environmental services and amenities from healthy ecosystems and natural areas also contributes, according to this theory to a recovery of forest areas (Pfaff and Walker 2010).

Challenges to Forest Transition Theories

Forest transition theory can be seen as problematic for its general tendency to oversimplify a very complex process leading towards a belief in simply focusing on more economic growth, downplaying the urgency to address root causes of environmental degradation, and deforestation in particular. In this sense, Perz (2007) states that the idea of a universal forest transition has been understood by some as “a conceptual palliative for widespread concerns about the loss of tropical forests”, since it seems as if there is nothing to worry about: forest areas decline with economic growth, and then, after more economic growth, they return. Critics from the forestry literature of the forest transition theory point out five main issues.

The first deals with the simplistic understanding of forests: Forest transition theory makes no distinction between forest types, in particular the ecology and composition of primary, mature, secondary and plantation forests (Perz 2007; Putz and Redford 2010). When a country or region is said to have gone through a forest transition, it is often times not clear what type of forest has disappeared, and which types of forests are coming back. Most often, the increasing forest areas have very little in common with the forests that were deforested or replaced originally, with regard to ecological complexity and biodiversity richness. This has serious consequences for the type and variability of biodiversity and services and ecosystem functions in the particular region or country (Angelsen and Rudel 2013; Robbins 2011).

Second, forest transition theory tends to universalize forests in economic processes (Perz, 2007). Forest transition is not an automatic and equal process for all regions or countries. Specific political and historical dynamics and political economic realities should be taken into account, both of which change over time and within specific political contexts (Calvo-Alvarado, et al., 2009). Forest transition theory is therefore critiqued for following simplistic logics of modernization theory, without taking into account differences in histories between colonial and colonized nations (Perz, 2007; Robbins, 2011; Angelsen and Rudel, 2013). As Fisher (2010) clearly demonstrates in Africa, the outmigration of rural population is quickly followed by industrial export oriented agriculture to provide products for urban and international markets, leading to further forest degradation and increases or ongoing levels of deforestation. This is linked to what Andersen et al (2002) and Angelsen and Rudel (2013) have described regarding changes of dietary demands of an increasingly urbanized society. They show how urbanization and economic growth can lead to increases in demand for meat, causing further or increased levels of deforestation in rural areas, even when those areas are abandoned by the original rural population. These two points go against the argument that processes of rural outmigration, and related increased urbanization necessarily leads to forest recovery, or decreases in deforestation.

Third, studies have shown that the supposed benefits for forest recovery stemming from intensification of agriculture can have very different outcomes, resulting in increased deforestation. This is explained through increases in profitability of agricultural land use. If agricultural production is made more profitable and more attractive, so the argument goes, agricultural activities will increase, and hence does deforestation (Phelps et al 2013, Morton et al 2008).

Fourth, several authors have come to the conclusion that in fact other factors might explain much better why some countries are experiencing forest transitions (Redo et al 2012, Hecht et al. 2006; Kull et al. 2007). For example, the outmigration to other countries and regions and the coupled increase in remittances flowing from these areas to the rural parts in Central America have provided new income, making agricultural activities on the local scale less profitable, taking pressure from forests (Hecht et al 2006, Kull et al 2007). Similarly, the elimination of agricultural subsidies in developing countries can decrease the incentive of local small scale farmers to clear forests for agricultural and cattle ranching purposes (Contreras-Hermosilla, 2000).

Fifth, the effects of globalization should not be understated. Socioeconomic changes at scales beyond forest governance and policies can have both positive and negative impacts on forest cover change (Lambin and Meyfroidt, 2010; Calvo-Alvarado et al, 2009, McLennan and Garvin 2012, Leichenko and O'Brien 2008, Angelsen

and Rudel 2013). National scale analyses of forest cover change have to be looked at from wider scales, down to regional or local ones (Hecht et al 2006). Considering the increasingly connected, globalized, world, it is argued that forest recovery in one region depends on their disappearance or degradation in others (Robbins 2011, Meyfroidt et al 2010). Economic globalization can facilitate the displacement of deforestation from one region or country that goes through a forest transition to other forest rich regions or countries, which is referred to as leakage in the REDD+ and PES literature (Pfaff and Walker 2010, Meyfroidt and Lambin 2008b).

Related to this, traditional forest transition theory assumes that a national economy functions as a close system, which in the present times of increasing globalization hinders our understanding of current forest transitions (Angelsen and Rudel 2013). Most economies are not closed but part of a globalized system, an open economy, where any given good that might be affected by scarcity and increased costs can be offset by import of that good. Agricultural and forest commodity prices are very much influenced by international markets (Lambin and Meyfroidt 2010). Foster and Rosenzweig (2003) clearly demonstrate how in an open economy the relationship between forest growth and economic growth is in fact weakly negative.

Lambin and Meyfroidt (2010) explain, based on Rudel (2002), how national economies are increasingly integrated into global markets and processes of globalization linked not only to commodities, but also to labor, financial capital, tourism and even ideas (Lambin and Meyfroidt 2010). For example, the increasingly global markets for forest and agricultural products and for aesthetic and other environmental services for foreign tourists and international society greatly influence forests in quantity and quality in many developing countries (Lambin and Meyfroidt 2010; Kull et al. 2007). Private investments, land privatization and the growth of international tourism, combined with land acquisition by foreigners make forest conservation increasingly possible on private lands. The idea of how a landscape or a forest should look like is also changing through the ideas and worldviews inherent in foreign investors and land owners. These ideas and their conservation ethics also are reflected in the influence of international environmental NGOs, multilateral environmental conventions and programs and projects of aid agencies in globalizing sustainable development ideas and objectives and related forest management practices (Lambin and Meyfroidt 2010; Kull et al. 2007).

Conclusion

Summarizing, forest cover change, understood here as deforestation or forest cover loss and forest resurgence, is a complex and hotly debated issue in international environment and conservation literature, and a key issue in sustainable development (Robbins 2011, Robbins et al 2011, Redo et al 2012, DeFries et al 2010). Deforestation remains a main global environmental challenge (McCarthy and Tacconi 2011). The main underlying causes of deforestation are different forms of agriculture, with industrial agriculture being the main cause of forest cover loss (Meyfroidt and Lambin 2011). However, the net rate of deforestation appears to be declining since 2000, partly due to decreases in forest loss, but also due to increases in forest area in several countries (FAO 2015, Hecht, et al., 2014; García-Barríos, 2009; Angelsen and Rudel, 2013).

With regard to forest transition, here understood as a “national-scale shift from a shrinking to an expanding forest area” (Meyfroidt and Lambin 2011, p. 344), it is a phenomenon that has been occurring in several temperate and wealthy nations, as well as in various tropical “developing” countries (Pfaff and Walker, 2010). The reasons for this forest recovery, or forest transition, are still hotly debated. In general, forest transitions are seen as complex outcomes of both globalized forest and non-forest sector related socio-economic, as well as bio-geographic processes, and of local and national policies (Angelsen and Rudel, 2013; Hecht, et al., 2014).

In this sense, early and simplistic notions of the Forest Transition Theory could be seen as one more voice, promoting more economic growth as a solution to environmental deterioration, ignoring that the same economic growth has caused this deterioration in the first place (Muradian et al 2013, Wanner 2015, Arsel and Büscher 2012). This contradiction of encouraging more economic growth to deal with environmental problems, and its possibly dangerous consequences, needs to be analyzed in more detail, in order to prevent heading into the wrong direction, and to assure that the observed cases of countries going through a forest transition and processes of forest resurgence are indeed sustainable over time.

References

- Andersen, Lykke E., Clive W. J. Granger, Eustaquio J. Reis, Diana Weinhold, and Sven Wunder. (2002). *The dynamics of deforestation and economic development in the Brazilian Amazon*. Cambridge, UK: Cambridge University Press.
- Angelsen, A., & Rudel, T. K. (2013). Designing and implementing effective REDD+ policies: A forest transition approach. *Review of Environmental Economics and Policy*, 7(1), 91-113.
- Arsel, M., Büscher B. (2012). Nature™ Inc.: Changes and Continuities in Neoliberal Conservation and Market-based Environmental Policy. *Development and Change* 43 (1): 53-78. International Institute of Social Studies. Blackwell Publishing.
- Calvo-Alvarado, J., McLennan, B., Sánchez-Azofeifa, A., & Garvin, T. (2009). Deforestation and forest restoration in Guanacaste, Costa Rica: Putting conservation policies in context. *Forest Ecology and Management*, 258(6), 931-940.
- Contreras-Hermosilla, A. (2000). The underlying causes of forest decline (No. CIFOR Occasional Paper no. 30, p. 25p). CIFOR, Bogor, Indonesia
- DeFries, R. S., Rudel, T., Uriarte, M., & Hansen, M. (2010). Deforestation driven by urban population growth and agricultural trade in the twenty-first century. *Nature Geoscience*, 3(3), 178-181.
- FAO (2010). *Global Forest Resource Assessment 2010*. FAO forestry paper 163. Rome: FAO.
- FAO (2015). *Global Forest Resources Assessment 2015: How have the world's forests changed?* Rome, Italy.
- Foster, Andrew D., and Mark R. Rosenzweig. (2003). Economic growth and the rise of forests. *Quarterly Journal of Economics* (May): 601–37.

-
- García-Barrios, L., Galván-Miyoshi, Y. M., Valsieso-Pérez, I. A., Masera, O. R., Bocco, G., & Vandermeer, J. (2009). Neotropical forest conservation, agricultural intensification, and rural out-migration: The Mexican experience. *Bioscience*, 59(10), 863-873.
- Grau, R.H., Aide, T.M., Zimmerman, J.K., Thomlinson, J.R., Helmer, E., Zou, X. (2003). The ecological consequences of socioeconomic and land-use changes in postagricultural Puerto Rico. *Bioscience* 53 (12), 1159–1168.
- Grau, H. R., Gasparri, N. I., & Aide, T. M. (2005). Agriculture expansion and deforestation in seasonally dry forests of north-west Argentina. *Environmental Conservation*, 32(02), 140-148.
- Hecht, S.B., Kandel, S., Gomes, I., Cuellar, N., Rosa, H. (2006). Globalization, forest resurgence, and environmental politics in El Salvador. *World Development* 34 (2), 308–323.
- Hecht, S. B., Morrison, K. D., & Padoch, C. (Eds.). (2014). *The social lives of forests: past, present, and future of woodland resurgence*. University of Chicago Press.
- Kohlin, G., and P. Parks. (2001). Spatial variability and disincentives to harvest: Deforestation and fuelwood collection in South Asia. *Land Economics* 77: 206–18.
- Kull, C.A., Ibrahim, C.K., Meredith, T.C. (2007). Tropical forest transitions and globalization: neo-liberalism, migration, tourism, and international conservation agendas. *Society and Natural Resources* 20 (8), 723–737.
- Lambin, E. F., & Meyfroidt, P. (2010). Land use transitions: Socio-ecological feedback versus socio-economic change. *Land use policy*, 27(2), 108-118.
- Leichenko, R., & O'Brien, K. (2008). *Environmental change and globalization: Double exposures*. Oxford University Press.
- Mather, A. S. (1992). The forest transition. *Area* 24 (4): 367–79.

- Mather, A. S., and C. L. Needle. (1998). The forest transition: A theoretical basis. *Area* 30 (2): 117–24.
- Mather, A. S., C. L. Needle, and J. Fairbairn. (1999). Environmental Kuznets curves and forest trends. *Geography* 84 (1): 55–65.
- Mather, A.S., Fairbairn, J. (2000). From floods to reforestation: the forest transition in Switzerland. *Environment and History* 6 (4), 399–421.
- Mather, A.S. (2007). Recent Asian forest transitions in relation to forest-transition theory. *International Forestry Review* 9 (1), 491–502.
- McCarthy, S., Tacconi, L. (2011). The political economy of tropical deforestation: assessing models and motives. *Environmental Politics*. Vol. 20, No. 1, February 2011, 115–132.
- McLennan, B., & Garvin, T. (2012). Intra-regional variation in land use and livelihood change during a forest transition in Costa Rica's dry North West. *Land Use Policy*, 29(1), 119-130.
- Meyfroidt, P., Lambin, E.F. (2008a). The causes of the reforestation in Vietnam. *Land Use Policy* 25 (2), 182–197.
- Meyfroidt, P., Lambin, E.F. (2008b). Forest transition in Vietnam and its environmental impacts. *Global Change Biology* 14 (6), 1319–1336.
- Meyfroidt, P., T. K. Rudel, and E. F. Lambin. (2010). Forest transitions, trade, and the global displacement of land use. *Proceedings of the National Academy of Sciences of the United States of America* 107 (49): 20917–22.
- Meyfroidt P, Lambin EF. (2011). Global forest transition: Prospects for an end to deforestation. *Annual Review of Environmental Resources*, 36:343–371.
- Morton, D. C., Defries, R. S., Randerson, J. T., Giglio, L., Schroeder, W., & Van Der Werf, G. R. (2008). Agricultural intensification increases deforestation fire activity in Amazonia. *Global Change Biology*, 14(10), 2262-2275.

- Muradian, R., Arsel, M., Pellegrini, L., Adaman, F., Aguilar, B., Agarwal, B., ... & Garcia-Frapolli, E. (2013). Payments for ecosystem services and the fatal attraction of win-win solutions. *Conservation letters*, 6(4), 274-279
- Peet, R., Robbins, P., & Watts, M. (Eds.). (2011). *Global political ecology*. Routledge.
- 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(1), 105-111
- Phelps, J., Carrasco, L. R., Webb, E. L., Koh, L. P., & Pascual, U. (2013). Agricultural intensification escalates future conservation costs. *Proceedings of the National Academy of Sciences*, 110(19), 7601-7606.
- Pfaff, A., & Walker, R. (2010). Regional interdependence and forest "transitions": Substitute deforestation limits the relevance of local reversals. *Land Use Policy*, 27(2), 119-129.
- Putz, F. E., & Redford, K. H. (2010). The Importance of Defining 'Forest': Tropical Forest Degradation, Deforestation, Long-term Phase Shifts, and Further Transitions. *Biotropica*, 42(1), 10-20.
- Redo, D. J., Grau, H. R., Aide, T. M., & Clark, M. L. (2012). Asymmetric forest transition driven by the interaction of socioeconomic development and environmental heterogeneity in Central America. *Proceedings of the National Academy of Sciences*, 109(23), 8839-8844.
- Robbins, P. (2011). *Political ecology: A critical introduction* (Vol. 16). John Wiley & Sons.
- Robbins, P., Hintz, J., & Moore, S. A. (2011). *Environment and society: a critical introduction* (Vol. 13). John Wiley & Sons.
- Rudel, T. K. (1998). Is there a forest transition? Deforestation, reforestation, and development. *Rural Sociology* 63 (4): 533-52

Rudel (2001). Did a green revolution restore the forests of the American south? In *Agricultural technologies and tropical deforestation*, ed. A. Angelson and D. Kaimowitz, 53–68. New York: CABI/CIFOR.

Wanner, T. (2015) The New ‘Passive Revolution’ of the Green Economy and Growth Discourse: Maintaining the ‘Sustainable Development’ of Neoliberal Capitalism, *New Political Economy*, 20:1, 21-41, DOI: 10.1080/13563467.2013.866081.