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Conditions of forest transition in Asian countries

Yeo-Chang Youn ^{a,c,*}, Junyeong Choi ^b, Wil de Jong ^c, Jinlong Liu ^d, Mi Sun Park ^e, Leni D. Camacho ^f, Stoshi Tachibana ^g, Nguyen Din Huudung ^h, Padam Parkash Bhojvaid ⁱ, Ellyn K. Damayanti ^j, Phongxiong Wanneng ^k, Mohd Shawahid Othman ¹

^a Department of Forest Sciences, College of Agriculture and Life Sciences, Seoul National University, Republic of Korea,

^b Korea Rural Economics Institute, Republic of Korea,

^c Center for Integrated Area Studies, Kyoto University, Japan,

^d Renmin University of China, China,

^e Department of Environmental Planning, College of Life and Environmental Sciences, Konkuk University, Republic of Korea,

^f College of Forestry & Natural Resources, University of the Philippines Los Banos, Philippines,

^g University of Tsukuba, Japan,

h Vietnam Forestry University, Vietnam,

ⁱ Forest Research Institute, India,

^j Bogor Agriculture University, Indonesia,

k National University of Laos, Lao People's Democratic Republic

¹ Universiti Putra Malaysia, Malaysia,

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ABSTRACT

This study identifies the important factors that contribute to or inhibit forest transitions in nine Asian countries: China, India, Indonesia, Japan, Laos, Malaysia, Republic of Korea, Philippines, and Vietnam. A qualitative comparative analysis method was used to determine which conditions or combinations of conditions led to or prevented a forest transition. Under the condition of public ownership with no private forest tenure or ownership of forest land, there was no instance of forest transition among the nine countries studied. Under the condition of non-liberal timber trade policies, there was no instance of forest transition in the countries studied. The results of this analysis suggest that for a forest transition to occur, the country should liberalize timber import and provide forest tenure to the private sector. Based on these results, we argue that in order for a forest transition to take place or for REDD + to be effective, the state should allow for private sector to participate in forest management and create market conditions that meet the demand for timber via trade policy alignment.

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1. Introduction

The long history of civilization has seen the decline of forest cover on earth. Human population increase is considered to be the driving force behind deforestation (Clive, 1991). It is commonly understood that there is a strong negative correlation between population density and forest coverage within a country (Rosero-Bixby and Palloni, 1998). However, Japan and the Republic of Korea (ROK) are exceptions to

E-mail addresses: youn@snu.ac.kr (Y.-C. Youn), jheywai@gmail.com (J. Choi), dejongwil@gmail.com (W. de Jong), liujinlong@ruc.edu.cn (J. Liu), mpark@konkuk.ac.kr

(M.S. Park), camachold@yahoo.com.ph (L.D. Camacho),

tachibana.satoshi.gn@u.tsukuba.ac.jp (S. Tachibana), dungfuv@yahoo.com

(N.D. Huudung), ppbhoj@icfre.org (P.P. Bhojvaid), ellynk.damayanti@gmail.com

(E.K. Damayanti), phongxiong123@yahoo.com (P. Wanneng),

mohdshahwahid@gmail.com (M.S. Othman).

this global trend because both countries have experienced forest decline in the past, but experienced a forest transition in the 20th century. In recent years, a number of other countries have also been experiencing a transition in forest cover, including China, Vietnam, India, and the Philippines. Meanwhile, other countries in Asia are still experiencing deforestation, including Indonesia, Laos and Malaysia. Although several conditions, such as economic development, state policy and scarcity of forest resources, are major factors that result in forest transitions, there are several cases in Asia that require further explanation. In this study, we identify the conditions causing forest transitions with evidence from case studies of nine countries in Asia: China, India, Indonesia, Japan, Laos, Malaysia, Philippines, ROK and Vietnam (APAFRI, 2013).

Section 2 begins with a discussion on the theory of forest transitions and a review of the pertinent studies. Section 3 introduces the method of qualitative comparative analysis (QCA) used in this study. Section 4 describes the forest cover changes and related socio-economic, institutional and ecological factors of each of the nine countries included here. Section 5 presents the data used to prepare the truth table for

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^{*} Corresponding author at: Department of Forest Sciences, College of Agriculture and Life Sciences, Seoul National University, Republic of Korea.

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QCA and the results of the analysis. Finally, Section 6 presents the study's conclusions and recommendations for future research.

2. Forest transition theory and the underlying forces

Forests occupy approximately 30% of the world's total land area. Forests have dramatically declined since human societies began interacting with them. In certain countries, however, a shift from losses to gains in forest area has been reported. The term forest transition is defined as the sequential land use change from decreasing to increasing forest area (Mather, 1992). Forest transitions were first reported in developed countries in Europe (Mather and Needle, 1998; Mather and Fairbairn, 2000; Mather, 2004) and North America (Foster et al., 1998). New evidence of forest transitions have also been seen in developing countries in Latin America (Rudel et al., 2000; Aide and Grau, 2004) and Asia (Mather, 2007; Meyfroidt and Lambin, 2008; Bae et al., 2012). Since the first evidence of forest transition, researchers have tried to determine the fundamental causes and mechanisms that lead to forest transitions.

Forest transition theory is an explanatory theory that investigates the pathways of forest transitions. Investigations of different instances of forest transitions in developed countries have suggested that forest transitions arise from economic growth or deficiency in forest resources. These theories are termed the economic development and forest scarcity pathways, respectively (Rudel, 1998; Rudel et al., 2005; Lambin and Meyfroidt, 2010). An economic development pathway occurs when after a period of deforestation, large areas of land that are only marginally suitable for agriculture are abandoned and restored to a forest state either naturally or through reforestation. A forest scarcity pathway occurs when the scarcity of forest products or a decline in forest ecosystem services prompts governments and land managers to establish effective reforestation or afforestation practices. These pathways typically explain the early evidence of forest transitions in developed countries. It turns out, however, that this bimodal forest transition pathway is not sufficient to explain the occurrence of forest transitions in developing countries. Certain countries exhibit relatively low per capita Gross Domestic Product (GDP) and relatively abundant forest resources when the forest transition occurs. China, India, and Vietnam are examples of countries in which the forest transition cannot be explained by neither the economic development pathway nor the forest scarcity pathway (Mather, 2007). These countries intervened with forest-related policies to promote forest rehabilitation. A third forest transition pathway assumes policy instruments rather than economic growth or forest scarcity driving forest transition (Mather, 2007). Forest policies have distinctive features that are radically different than pre-transition policies. Among them are extensive reforestation programs, decentralization of forest management, and logging bans (McElwee, 2009, Park and Youn, 2016).

As modernization continues, more countries are being influenced by globalization, and the forest sector is no exception. The globalization pathway explains forest transition when external impacts are determining the state of the forest in a country (Rudel, 2002). It is well-known that international conservation agendas have a significant impact on the occurrence of forest transitions (Kull et al., 2007). Finally, the smallholder, tree-based, land use intensification pathway describes forest transitions derived from land-use adjustments by smallholders (Lambin and Meyfroidt, 2010). This pathway indicates that smallholders promote the forestation of lands in the margin between forest and cultivated land. The motivation behind this behavior is to decrease their vulnerability to economic or environmental shocks and guarantee their livelihood through ecological and economic diversification.

The occurrence of forest transitions can be explained by the interplay of two underlying forces: socio-ecological feedbacks and socio-economic dynamics (Lambin and Meyfroidt, 2010). First, negative socioecological feedbacks take place when natural resources face depletion due to overexploitation. The socio-ecological feedbacks occur endogenously at the local scale to deter further deforestation and induce stabilization of forest cover. Second, socio-economic dynamics directly intervene in forest land use decisions, potentially changing the trend in forest cover from deforestation to forest restoration. The socio-economic dynamics entail exogenous forces and take place at the national scale. While socio-ecological feedbacks seem to better explain the acceleration or stabilization of deforestation, socio-economic dynamics explain reforestation. The forces included in these two categories of dynamics are so complicated that the pathway to forest transition cannot be explained by a single underlying factor. Table 1 shows the relationship between pathways and explanatory frameworks.

3. Qualitative comparative analysis

Qualitative comparative analysis (QCA) is an analytical tool used for rigorous meta-analysis of a limited number of case studies. The method emerged from extensive debates on the analytical merit of using both qualitative and quantitative analysis methods. The qualitative method, which is also called the small-*n* technique, is a case-oriented analysis that handles cases using holistic perspectives to consider specific situations. Conversely, the quantitative method, which is referred to as the large-*n* technique, refers to variable-oriented analysis. The quantitative method is based on two fundamental assumptions, namely, causal competition and causal homogeneity. Causal competition means that factors have independent influences on an outcome, while causal homogeneity implies that single factors work the same way in all cases (Ragin, 1989). OCA combines the quantitative and qualitative analysis methods to try and draw on the advantages of each. It attempts to capture the essential meaning of a single case, and then derives noticeable features by synthesizing larger and broader cases. It relies on two core ideas: (1) causal combination, which means the effects of individual conditions may depend on the presence or absence of other conditions, and (2) equifinality, which means that there may be multiple causal paths with the same outcome.

QCA became prominent as a method to analyze research observations through the work of Ragin (1987, 2000). Ragin's original version

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Relationships between pathways and frameworks.

	Forest transition pathways					
Explanatory frameworks	Forest scarcity	State policy	Economic development	Globalization	Smallholder intensification	
Socio-ecological feedbacks						
Recourse-limited growth	0					
Land scarcity, intensification	0				0	
Land use adjustment		0	0		0	
Socio-economic changes						
Economic modernization			0	0		
Market access		0	0	0	0	
Land ownership		0		0	0	
Global trade				0		
Diffusion of conservation ideas		0		0		

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