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Testing a multi-scale scenario approach for smallholder tree plantations in Indonesia and Vietnam

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ABSTRACT

Smallholder tree plantations are seen as promising routes to alleviating poverty and increasing forest area among the countries in Southeast Asia. However, implementation has been disappointing, which led scientists at the Center for International Forestry Research (CIFOR) to consider a scenario exercise as a way to mitigate the risk of unwanted outcomes. The study had a characteristic that it shares with many other studies: close interaction of larger-scale processes and trends (global markets, national policy) with smaller-scale systems (regional and local policy, farmer livelihoods). The authors therefore felt than an explicitly multi-scale approach was called for. To keep close to the well-known practice, we made a modest extension to a conventional scenario logic approach, and introduced a nested, and multi-scale scenario logic. While modest, we believe that the modification is useful, and the method could be used in other studies, in particular climate adaptation studies. We applied the method during two scenario workshops held to explore the use of smallholder tree plantations in efforts to improve rural livelihoods; each workshop considered two different localities. While the scenario frameworks resulting from the workshops were similar between the localities, we believe that the nested scenario framework served to structure the process and revealed meaningful contextual differences. From these experiences, we discuss and critique the method.

1. Introduction

Indonesia and Vietnam are prominent among the countries in Asia that have chosen industrial tree plantations as a route to development and poverty alleviation. The choice is driven by several considerations: national targets for forest rehabilitation; the need to generate employment and increase community access to forest resources; and rising demand for industrial timber, both domestic and international. In Indonesia, the government plans to establish 9 million hectares (ha) of new timber plantations by 2016. This is in addition to the 5 million ha target of timber plantations to be reached in 2009, where it was reported that 4.3 million ha have been established. Of the 9 million ha, about 5.4 million ha would be allocated to communities, with the remainder allocated to large scale corporate actors. It is expected that some 360,000 rural households will be directly involved in developing plots of 15 ha each, with several hundred thousand more providing wage labor for forestry companies [1,2]. In Vietnam, the "Five Million Hectare Reforestation Program" (5MHRP), initiated in 1998, aims to increase the nation's forest cover to 43 percent by 2010 (which was successfully achieved), as well as increase the role of forests in the national economy and provide livelihood opportunities for smallholders [3]. Large numbers of farmers are now engaged in tree-planting schemes [4]. In both countries, the governments

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are promoting smallholder plantation development as a strategy for alleviating rural poverty. They are providing farmers with access to state-controlled forestland, discounted credit, technical extension, and subsidized inputs (such as seedlings and fertilizer) [1,3]. If well implemented, such programs could provide income opportunities for large numbers of rural households, while also increasing (or restoring) the productivity of degraded lands and developing sustainable raw material supplies for wood processing industries.

1.1. Drivers at multiple spatial scales

However, timber plantations are also facing different forces that operate at different levels, which could influence the success of these programs. In Indonesia, timber plantations are in the midst of the climate change debates about their contribution in carbon emissions [5]. In addition, the smallholder timber plantation (Hutan Tanaman Rakyat — HTR) program is facing difficulties in achieving its targets due to market and policy conditions [1]. Similarly, Vietnam's 5MHRP has also been facing significant challenges, both in policy formulation and implementation phases [3,6,7].

The smallholder forest sector is driven by highly uncertain forces with potentially significant impacts—such as international timber prices, global timber demand, and climate change—that will shape the future of timber plantations. When future possibilities are influenced by large but highly uncertain driving forces, a scenario approach is an appropriate tool. As with any scenario exercise, it is important to delineate the boundaries of the system. However, in this case there are multiple systems and multiple boundaries. Specifically, farmers make local decisions, typically on small farms; local and regional government planning bodies are interested in how their local policies may influence farmers; and national governments are considering policies that must be relevant across the country. Meanwhile, as noted above, actors at each of these spatial scales are operating under the influence of global markets and within global policy frameworks.

Such a multi-level decision space is not unusual. Social, technological and ecological systems are driven by forces that originate and operate at diverse spatial scales [8,9]. Moreover, in some situations, the fact that the driving forces operate at different scales affects technology adoption or decision-making; such situations call for an explicitly multi-scale method [10,11]. The question of how to link scenarios across scales (spatial and temporal) has emerged as an explicit topic in the literature on global environmental assessments, including climate change assessments. Such studies require linked analyses at radically different scales—from global to landscape, and from a century to a day. In response to this challenge, the authors see a need for foresight techniques that explicitly take into account drivers at different scales. A further, specific, motivation for this approach is that the study of which the scenario activities were a part included two locations in each country; the areas shared a national policy context, but were quite different in other respects.

In the study described in this paper the authors piloted a nested scenario logic to explicitly capture driving forces at different spatial scales. Multi-scale assessments have been a topic of concern, interest, and discussion since they were brought into focus by the Millennium Ecosystem Assessment [12]. The assessment required analyses that linked global processes to landscape (or smaller) scale ecosystem processes, which then fed back upon the global system. The problem is also acute with human systems, in particular the relationship between global drivers of climate change and adaptive responses to climate change [13,14]. Some of the researchers involved in these studies engaged in a "dialog" on multiscale scenarios, the results of which are summarized in a paper published in *Ecology and Society* [10]. The authors of the present paper share many of the concerns and conclusions of the authors of [10], but our method falls outside the range of options that they envision. Specifically, we propose that a scenario framework be constructed at several scales in one exercise, rather than leaving them to different exercises; thus, while the spirit of our approach is closest to the "loosely coupled" approach of Biggs et al. [10] in that it allows great flexibility in the way that drivers at different scales are represented, it also has some of the flavor of a "tightly-coupled" approach, in that it results in a single, coherent framework. Zurek and Henrichs proposed a classification of different approaches to scenario development at multiple geographic scales [11]. The method described in the present paper best fits Zurek and Henrichs' category of being "complementary" across scales, in that the scenario logics at different scales can be quite different from one another, while providing a unified picture. We note that although we use the term "coherence" throughout this paper, our method does not fit into Zurek and Henrichs' category of "coherence across scales", because we do not require that scenario logics be the same at different scales and so, for example, a global "breakdown" scenario would not require a local breakdown scenario.

Our proposed methodology therefore fits within the (currently wide) range of existing approaches. It has two important conceptual characteristics: first, a coherent multi-scale scenario logic is constructed during a single exercise, rather than being transferred from a different exercise; second, the way that the nested scenario logics at different scales cohere is a matter for discussion among those who create the scenario logic. It also has an important procedural characteristic, in that it is a relatively modest departure from popular methods, and is therefore easily adapted to existing practice. While foresight methodologies in general and scenarios in particular have a long history of development, the specific problem posed by multi-scale scenarios is relatively new and active. We believe that new methods should be welcome, and the method we present in this paper in such studies could lead to greater cross-scale consistency. We discuss our method and present some critical reflections based on our experiences.

1.2. Description of the study

We applied our method in a pair of scenario workshops that explored the use of smallholder tree plantations as a way to improve rural livelihoods by diversifying farmer incomes. The workshops formed part of a larger project initiated by the Center for International Forestry Research (CIFOR) to address the increase in industrial tree plantations in Southeast Asia, propelled largely by a growing demand for timber and timber products in China [15]. The project focuses on Indonesia and Vietnam. While each of these countries is making ambitious efforts to improve rural livelihoods through smallholder tree