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# Impacts of China's Log Imports on the Ecological Sustainability of Forests in Source Countries

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**Abstract:** As the largest log import country in the world, China undoubtedly faces a severe challenge from the reduction in global forest resources. Based on the fact that a flow of ecological elements embodied in the process of import can cause extra ecological stress to the source regions, the authors assessed the ecological effect of China's log imports on the source countries' forest sustainability. The ecological footprints embodied in China's log imports from 1995 to 2010, and then introduce the model of ecological tension index to assess the ecological security status of the forests in major source countries. Results demonstrate that, overall, China's import of log has posed no serious threat to world forests. Most of the source countries have safe forest ecological states due to their huge forest bio-capacity, although China's log import has increased their forest ecological stress by more than 14%. While for some developed source countries, China has increased the ecological tension less than 1%. The risk of forests reduction was probably caused by its own resource consumption.

**Keywords:** Log Imports, Ecological Footprint, Ecological Stress Transfer

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## **1. INTRODUCTION**

Despite its vast land area and large population of over 1.3 billion, China is relatively forest-poor. Timber importation is considered to be the primary solution to fill China's timber supply-and-demand gap.

The importer can indirectly retrieve the ecological and environmental resource outside the national border, while the exporter has to bear the transferred ecological stress. So the international trade of resource-based products may damage the economic and ecological sustainability of the source countries. Given China's import and export structure changes, the international trade of log has appropriated a large number of forest ecological footprints in the export countries. China's import of log undoubtedly faces a severe challenge from the reduction in global timber resources. It is essential to make a quantitative study on the ecological effect of China's log imports on the source countries' forest sustainability.

## **2. RESEARCH METHODS**

Ecological footprint method is used to measure human appropriation of ecosystem products and services in terms of the amount of bio-productive land needed to supply these services. Different types of areas can be converted into a common unit of global hectares (gha) with world average bio-productivity. Bio-capacity represents the ability of the biosphere to meet human demand for material consumption. Ecological tension index model refers to the ratio of ecological footprints to bio-capacity of renewable resources of a given country.

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### **3. DATA ACQUISITION**

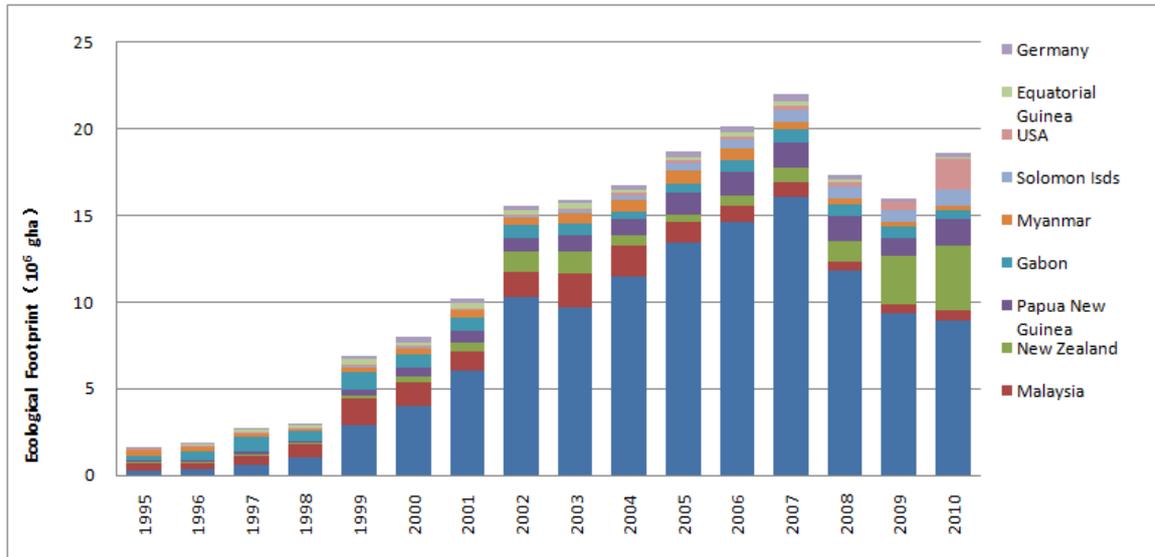
The domestic log supply data were taken from China's Forestry Development Report and the statistics of the State Forestry Administration. All the official log import and export data from world and top ten major source countries were obtained from the UN COMTRADE DATABASE. And the dynamic equivalence factors were acquired from the living plan report of World Wildlife Fund.

### **4. ANALYSIS OF FOREST ECOLOGICAL FOOTPRINTS**

The global forest ecological footprints implied in China's log imports had sustainable growth from year 1995 to 2007. In 1995 it was 1.65 million gha, accounting for 4.7% of that of China's total log demand, while in 2007 it increased to 36.7% or 23.5 million gha.

The forest ecological footprints transferred from the top ten major source countries accounted for 91% of that embodied in China's total import. The forest ecological footprint inputted from Russia accounted for 96% of Europe's total export. After impacted by the recent worldwide economic downturn in 2008, the ecological footprint from Russia was still as high as 8.9 million gha in 2010. New Zealand, Papua New Guinea and Solomon islands are the top-three major source countries in Oceania. The amount of forest ecological footprints from the three countries had sustainable growth. Malaysia is the largest log export country in Asia. The amount of forest ecological footprint inputted from Malaysia reached its peak point 2.0 million gha in 2003, while in 2009 it decreased to 4.6 million gha with a share of 2.6% of China's total imports. Finally we find that the amount of forest ecological footprint

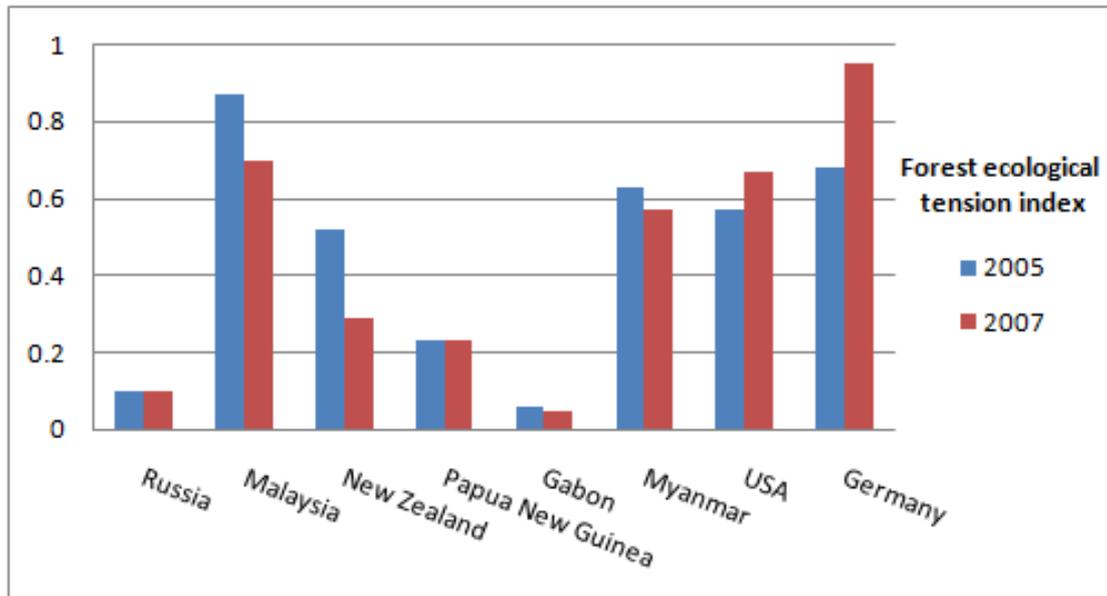
from USA began to surge from 2008, and in 2010 it increased to 1.8 million gha, which accounted for 70% of the total ecological footprints from the continent of North America.



**Fig. 1.** Transferred ecological footprints of major source countries.

## 5. ANALYSIS OF TRANSFER OF FOREST ECOLOGICAL STRESS

In 2005 and 2007, the ecological footprints of the major source countries were less than the normal bio-capacity. They are all in a state of ecological surplus. We analyzed the forest ecological condition with and without China's log demand according to the scientific evaluation indicator: the ecological tension index (0.04–4.00), which taken from the report released by the World Wildlife Fund (WWF) in 2004. The criterion of ecological tension index was classified into six grades: At risk(>2.0), Unsafe (2.0-1.51), Relatively unsafe (1.5-1.01), A bit unsafe (1.0-0.81), Comparably safe (0.80-0.51) and Quite safe (<0.5).



**Fig. 2.** Forest ecological tension index of major source countries.

Most of the source countries have safe forest ecological state after considering the impact of China's log imports (Fig. 2). China's import of log has increased Russia's forest ecological tension by 25%, but Russia's ecological tension index was 0.1, indicating its forest state is quite safe. For Gabon, the forest tension index was just 0.06 in 2005 and 0.05 in 2007, including 33% of the ecological stress transferred from China. In 2005, the forest ecological state was at comparably-safe-grade after considering the added 10% of the ecological stress transferred from China. While in 2007, the ecological tension index decreased to 0.29, illustrating that the forest resource was quite safe. Though China had transferred and increased approximately 40% of the ecological tension of Papua New Guinea, the domestic forest in Papua New Guinea was in quite-safe-grade. Myanmar's forest was at comparably-safe-grade. China's import of log had just increased Myanmar's forest ecological tension by 3%. Then we turn to analyze source countries with unsafe ecological condition. The forest ecological tension index of Malaysia in 2005 was 0.78, and then it slide to a

bit-unsafe-grade after plus 10% of the ecological stress transferred from China. For USA and Germany, China had just increased their ecological tension by less than 1%. And it is worth noting that the entire ecological state of the two developed countries was unsafe or even at risk.

## **6. CONCLUSIONS**

We can put forward the conclusion that China's import of log didn't pose any serious threat to the forest security and sustainability of major source countries. Due to the huge forest bio-capacity, most of the import countries have safe-grade forests. The unsafety of forests in developed countries was probably caused by their own consumption.

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