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The Effects of the 2008 Lacey Act Amendment on Chinese Companies in the Forest Products Industry

By: Ziyi (Zoe) Lu, Ivan Eastin and Indroneil Ganguly

Illegal logging is a serious problem threatening tropical and temperate forests around the world, and is currently in the spotlight of global forest policy. The 2008 US Lacey Act Amendment is one of the most important consumer country timber legality regulations that has been implemented to tackle illegal logging within the global forest products trade. It requires that timber imports be sourced from legally harvested wood and could have profound impacts on China's exports of manufactured wood products. The results of a study seeking to assess the effect of the Lacey Act Amendment on the perceptions and actions of Chinese wood products manufacturers are presented in this article, and are based on a total of 226 surveys that were completed by Chinese wood manufacturers during two furniture trade shows held in Shanghai, China, in 2013

Results

The survey respondents were located in 20 provinces and main cities out of a total of 34 administrative regions in China (**Figure 1**). They covered the five forest product manufacturing centers in China: (1) the Pearl River region forest products manufacturing center based in Guangzhou province, (2) the Yangtze River region forest products manufacturing center based in Jiangsu Province, Zheliang Province and Shanghai City, (3) the Bohai Sea region forest products manufacturing center based in Tianjin and Beijing City, (4) the Northeastern forest products manufacturing center based in Liaoning Province, and (5) the Western forest products manufacturing center based in Sichuan Province.

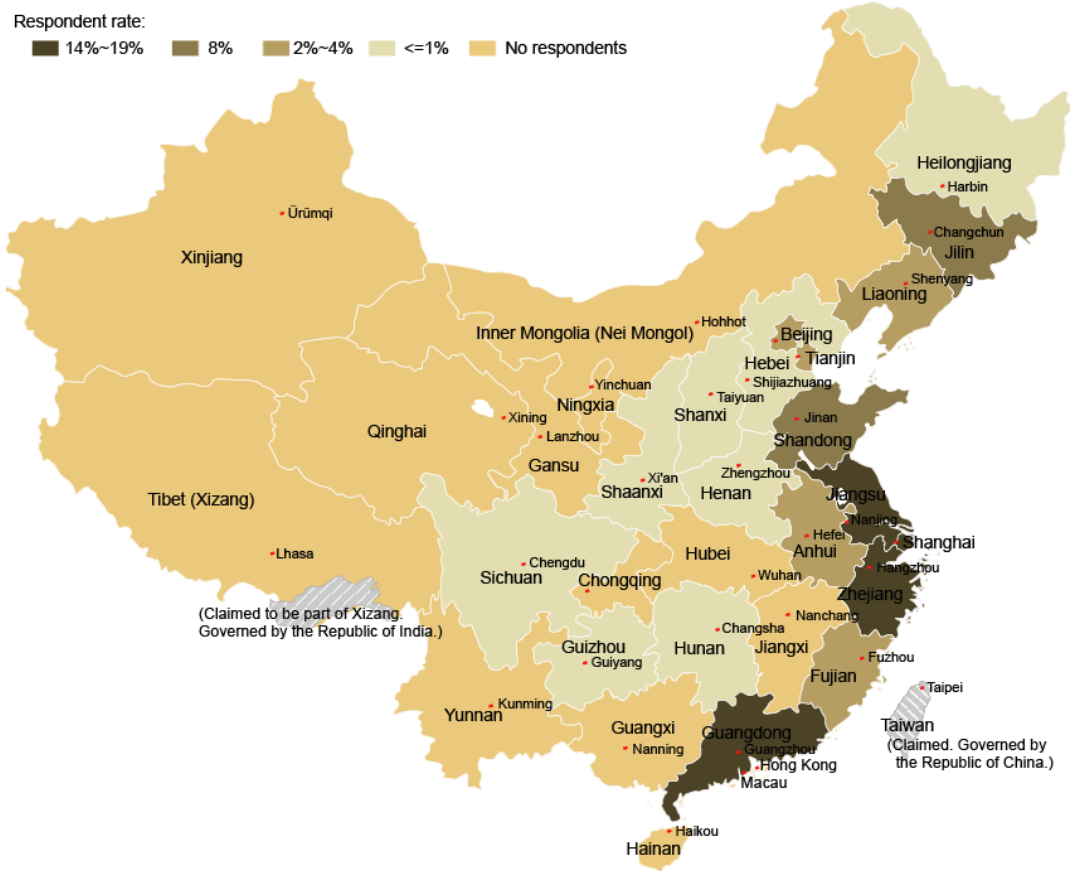

Figure 1. Distribution of survey respondents by province

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Director's Notes

Timber Legality Regulations: How Effective Can They Be?

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The Center for International Trade in Forest Products addresses opportunities and problems related to the international trade of wood and fiber products. Emphasizing forest economics and policy impacts, international marketing, technology developments, and value-added forest products, CINTRAFOR's work results in a variety of publications, professional gatherings, and consultations with public policy makers, industry representatives, and community members.

Located in the Pacific Northwest, CINTRAFOR is administered through the School of Environmental & Forest Sciences at the University of Washington under the guidance of an Executive Board representing both large and small companies, agencies, and academics. It is supported by state, federal, and private grants. The Center's interdisciplinary research is carried out by university faculty and graduate students, internal staff, and through cooperative arrangements with professional groups and individuals.

Illegal logging is both a scourge on the environment and a threat to the financial health of the global forest products industry. Illegally harvested timber creates a host of environmental, social and economic ills. In an effort to reduce the demand for illegally harvested timber, a number of countries have adopted timber legality regulations (TLRs) designed to halt the importation of illegally harvested timber including the US (2008), Australia (2012) and the EU (2013). Since 2013, CINTRAFOR has been conducting a series of surveys of wood manufacturers in China, Vietnam and Thailand to evaluate the impact of TLRs on their business practices, export markets and material sourcing within their supply chains. The results of the surveys conducted in Vietnam were reported in the Spring edition of the CINTRAFOR News, while the results of the surveys conducted in China are reported in this edition of the CINTRAFOR News. The results of these surveys are quite interesting and while they show some similarities between Chinese and Vietnamese wood manufacturers, they highlight some significant differences and provide some insights into how US industry associations might act to increase the effectiveness of timber legality regulations in reducing the demand for illegally harvested timber.

In the following paragraphs I'd like to compare the results obtained in China and Vietnam to highlight the differences and similarities we observed and then follow up with some suggestions on how US industry associations might work to increase the effectiveness of timber legality regulations. To start with, it is important to note that the overwhelming majority of wood furniture manufacturers who responded to our surveys in China and Vietnam (93% and 90%, respectively) agreed that illegal logging is a major environmental problem, while an even higher percentage (97% in both countries) responded that TLRs are an effective way to reduce illegal timber harvesting. Our results also show that Chinese wood furniture manufacturers have a significantly higher awareness of the Lacey Act (73% vs 49%) and the EU Timber Regulation (69% vs 56%) than do their Vietnamese counterparts. This is important to note, because while the Chinese are the largest exporter of wooden furniture in the world, the Vietnamese wood furniture manufacturing sector has been growing more quickly and the Vietnamese are now the second largest exporter of wooden furniture with an annual rate of growth exceeding that of the Chinese.

Our research also found that firm size has a significant influence on a firms' awareness and perceptions of timber legality regulations, as well as type of marketing strategy they adopt in response to timber legality regulations. Aggregating the survey respondents from both countries, we found that small and medium-sized wood manufacturers were significantly less likely to be aware of timber legality regulations, had a much more negative perception of them, were less likely to have adopted chain-of-custody certification within their supply chains and were more likely to withdraw from the regulated markets in favor of unregulated markets. Another interesting finding from this research is that those firms who have adopted chain-of-custody certification were more likely to report that they intended to increase their purchases of wood products from the US and the EU in order to help them reduce risk within their supply chains and more effectively comply with the timber legality regulations.

Small and medium sized Chinese firms were also significantly more likely to agree with the following statements than were their Vietnamese counterparts: TLRs cause timber prices to increase, increase the cost of exporting and are a trade barrier designed to protect foreign manufacturers. Experience with the Lacey Act shows that complying with the Lacey Act has very little impact on timber prices or the cost of exporting and provides little if any protection to US and European domestic wood manufacturers. However, these perceptions were cited by 43% of Chinese wood manufacturers as an important factor in their decision to reduce their exports to countries with TLRs, while 69% reported an intention to increase their sales of wood products into the domestic Chinese market, and to

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a lesser extent into unregulated markets (e.g., India and the Middle East), because of the TLRs that have been adopted in developed countries. This shift in wood exports towards unregulated markets, sometimes referred to as regulatory leakage, undermines the effectiveness of TLRs while continuing to support the demand for illegally harvested wood products within the Chinese forest products industry. For example, earlier this year the Myanmar authorities arrested 155 Chinese nationals who were found illegally cutting down trees in a huge logging camp, comprised of over 1,700 workers and 436 logging trucks, that was operating in a remote area of Myanmar.

CINTRAFOR's research in China and Vietnam suggests that if timber legality regulations are to be successful, it's important that the forest products industry and industry associations work to increase the awareness of these regulations among small and medium-sized wood manufacturers, particularly in China. Widespread misperceptions about the impacts of TLRs on timber prices and export costs are contributing to regulatory leakage and a shift towards unregulated markets. Providing workshops and seminars at Chinese and Vietnamese wood products trade shows can help to address some of these misperceptions, as can developing cooperative education programs with Chinese and Vietnamese wood furniture and flooring associations to better explain the specifics of the Lacey Act to their members, particularly small and medium-sized wood manufacturers. Finally, US industry associations should consider working with Chinese and Vietnamese industry magazines and journals on news articles that explain the intent and mechanics of the Lacey Act, while emphasizing the positive environmental and financial benefits resulting from the removal of illegally harvested timber from the global supply chain. Only through a concerted outreach and education strategy can the US industry offset widespread misperceptions about TLRs and hopefully reverse the regulatory leakage of wood products into unregulated markets, and associated environmental, social and economic impacts.

Announcing New CINTRAFOR Associate Director

Indroneil Ganguly

Dr. Indroneil Ganguly holds a joint faculty appointment with the School of Environmental and Forest Sciences (SEFS) and the Center for International Trade in Forest Products (CINTRAFOR) at the University of Washington. As an Assistant Professor, Dr. Ganguly is responsible for exploring and developing interdisciplinary research ties between various social and environmental science and business disciplines. Dr. Ganguly's teaching and student mentoring responsibilities are informed by his commitment to understanding complex issues of sustainability with a quantitative focus.

Dr. Ganguly's research focuses on several topics of high importance in the field of forest products and environmental science, including, (1) investigating the effects of legislation and environmental certification programs on the international trade of forest products; (2) the application of life cycle assessment methods to a wide variety of forest products, from cross laminated timber to bio-jetfuel; (3) the evaluation of environmental building programs and their impact on the material specification process; (4) the enviro-economic assessment of innovative building materials (such as cross laminated timber, thermally/chemically modified wood) in building construction applications, and (5) investigating the socio-economic and cultural consequences of natural resource management among Native American communities.

As a researcher, Dr. Ganguly has been very successful in acquiring external funding for his research through federal, state and industry funding sources. Over the last two years, Dr. Ganguly has published 7 peer reviewed journal articles and three non-peer reviewed articles. He has become actively involved in advising our graduate students and is currently mentoring two graduate students and one post-doctoral researcher. In his role as a faculty mentor, Dr. Ganguly has successfully worked to recruit minority and underrepresented students into the graduate program. Dr. Ganguly teaches biostatistics and environmental economics classes in the University's graduate and undergraduate level interdisciplinary education programs. During his tenure at CINTRAFOR, Dr. Ganguly has become an integral member of the core faculty and a huge contributor to the success of the Center. As a result, I am delighted to announce that Indroneil has agreed to become the Associate Director of CINTRAFOR.

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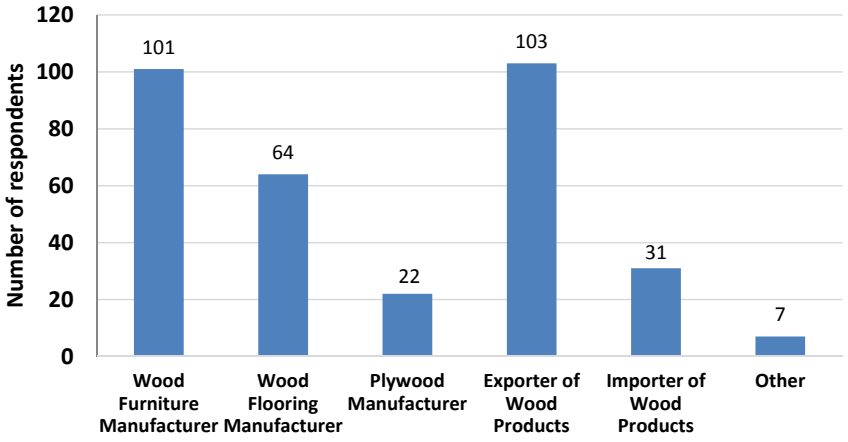

Figure 2. Frequency distribution of business types reported by survey respondents

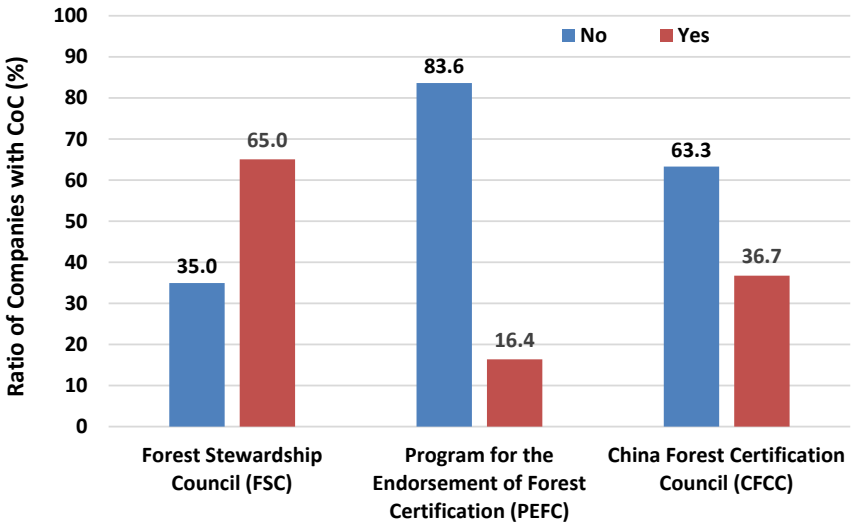

Figure 3. Percentage of companies with Chain of Custody certificates

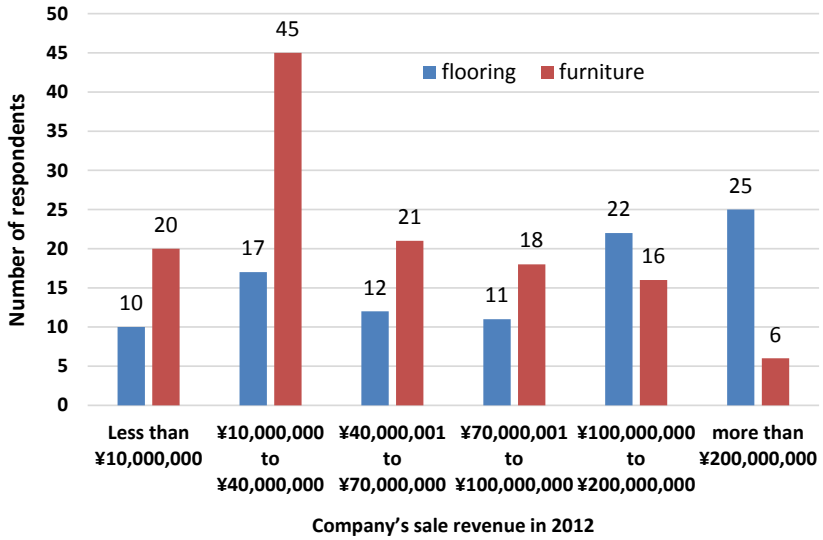

Figure 4. Annual revenue of respondents from different industries

The distribution of business types reported by the survey respondents is shown in **Figure 2**. Out of the 226 respondents, 82 respondents indicated that they had two types of businesses (primarily manufacturing and exporting) while 20 respondents indicated that they had three or more business types. Wood furniture manufacturers and wood flooring manufacturers dominated the business types from the survey sample: 163 respondents out of the 226 respondents were either wood flooring or furniture manufacturers or a combination of the two. Manufacturing businesses are frequently combined with exporting operations: 59 of the wood flooring or furniture manufacturers also conducted export operations.

A very high percentage of Chinese survey respondents (90.3%) reported that they had some type of chain of custody (CoC) certification to document the flow of wood materials within their supply chains, (**Figure 3**). The majority of respondents (65%) indicated that they had obtained Forest Stewardship Council (FSC) certification, while 36.7% reported that they had China Forest Certification Council (CFCC) certification and 16.4% reported having Programme for the Endorsement of Forest Certification (PEFC) certification. Only 22 respondents (9.7%) reported that they did not have any type of CoC certification. Interestingly, many respondents indicated that they had more than one type of CoC certification: 21 firms had both FSC and PEFC CoC certification, 31 firms had FSC and CFCC CoC certification, 18 firms had PEFC and CFCC CoC certification and 7 firms had all three types of CoC certification. In other words, 34.1% of respondents reported that they had 2 or more types of CoC certification. The number of firms with at least one type of CoC certification is quite high and it seems likely that this is in direct response to timber legality regulations that have been adopted in major developed economies.

Of the 223 Chinese companies who replied to both of the questions about their size and industry type, there are 97 flooring companies and 126 furniture companies (**Figure 4**). The furniture industry in the sample is dominated by small companies with an annual revenue below ¥40 million (approximately 65%). In contrast, the flooring industry is weighted towards large companies with revenues over ¥70 million

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(approximately 59%). The divergence in industry structure between flooring and furniture manufacturers may influence their perceptions and responses to timber legality regulations.

Respondents were asked about their use of tropical hardwood (THW) raw materials and their responses were segregated by firm size to help identify material usage trends (**Figure 5**). The results of this analysis clearly show that there is a strong positive correlation between firm size and the amount of THW raw material used in their raw material mix. The average ratio of THW in the raw material mix increased from 20% for the smallest firms to 45% for the largest firms. This result is significant. Not only is the ratio of THW in the raw material mix for the larger firms double that of the smaller firms, but the larger firms use a substantially higher volume of raw materials than the smaller firms.

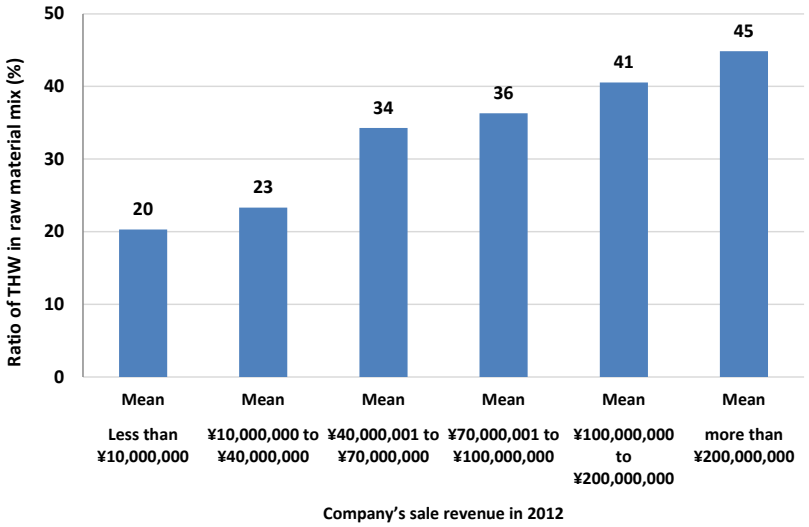

Figure 5. Percentage of tropical hardwood raw material

The percentage of CoC certified raw material included in the export mix of the survey respondents averaged 53.2%. This result was somewhat surprising, as it was not expected that the ratio of CoC wood in the export mix would be so high. The result was also independent of firm size, and while there was a slight trend for the larger companies to include more CoC certified raw material in their export mix, the difference between the big companies and small companies was relatively small, ranging from 51% for the smallest companies to 54% for the larger companies. This suggests that timber legality legislation has had an impact on material sourcing decisions in China.

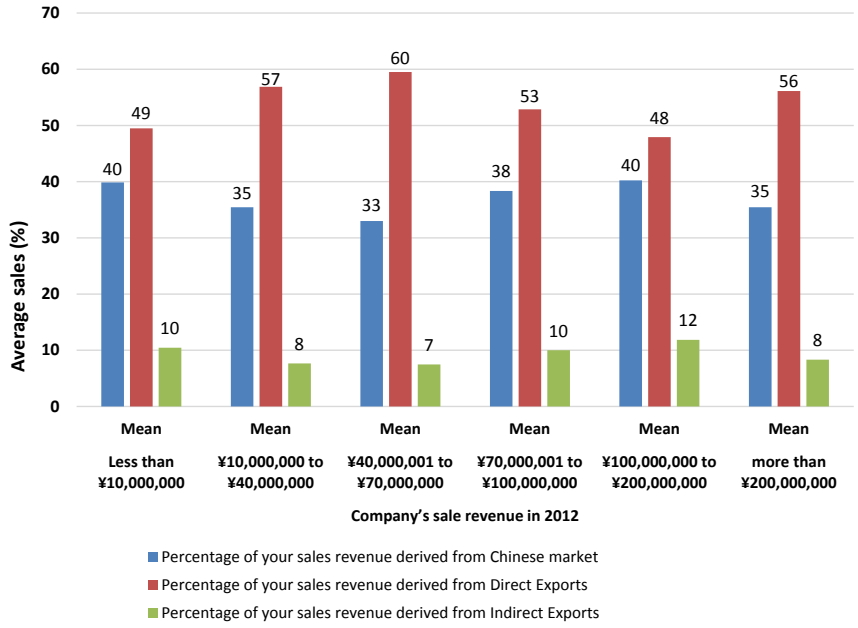

Figure 6. Percentage of sales revenue derived from different markets

Figure 6 displays the percentage of total sales revenue derived from direct exports, indirect exports and sales into the domestic market. The market mix is surprisingly similar for respondents across the range of company sizes. The mean ratio of direct exports was 54.4%, while the average ratio for domestic sales and indirect exports sales were 36.8% and 9%, respectively. This clearly shows that while the export markets are still a primary focus of wood manufacturers, the domestic market is becoming increasingly important to company sales strategies, regardless of firm size. The large number of small firms and their greater focus in the domestic Chinese market (which does not ban the use of illegal timber), means that these smaller firms could use a substantial volume of illegally harvested timber.

Survey respondents were asked about how their sales to various markets had changed over the past 5 years since the adoption of timber legality regulations in the US and the anticipated adoption of timber legality regulations in the EU and Australia (**Figure 7**). The results show that timber legality regulations have had little impact on Chinese company's exports into these regulated markets. Over the past 5 years, the survey respondents indicated that they have strongly expanded their exports into all three of these regulated markets. More importantly, the number of companies who indicated that their exports into these regulated markets had

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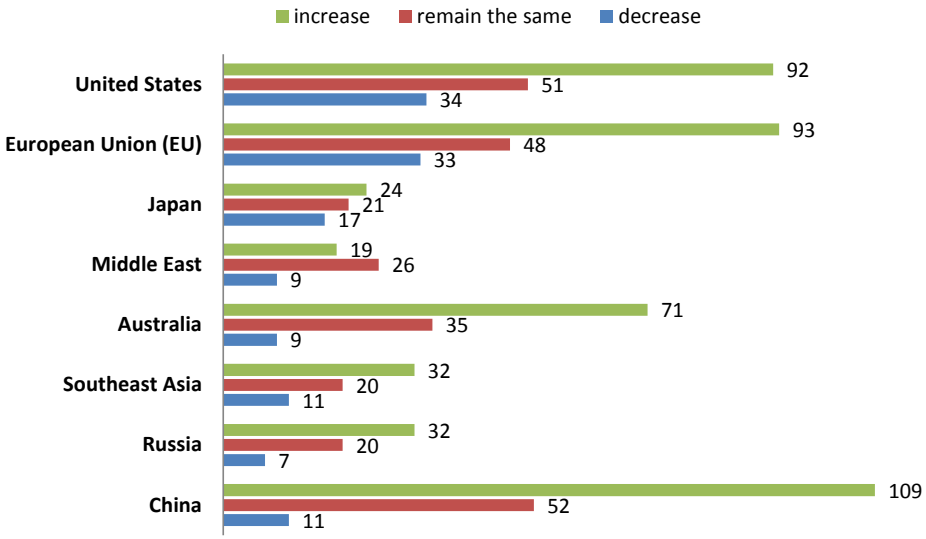

Figure 7 . Sales destination change in the last 5 years

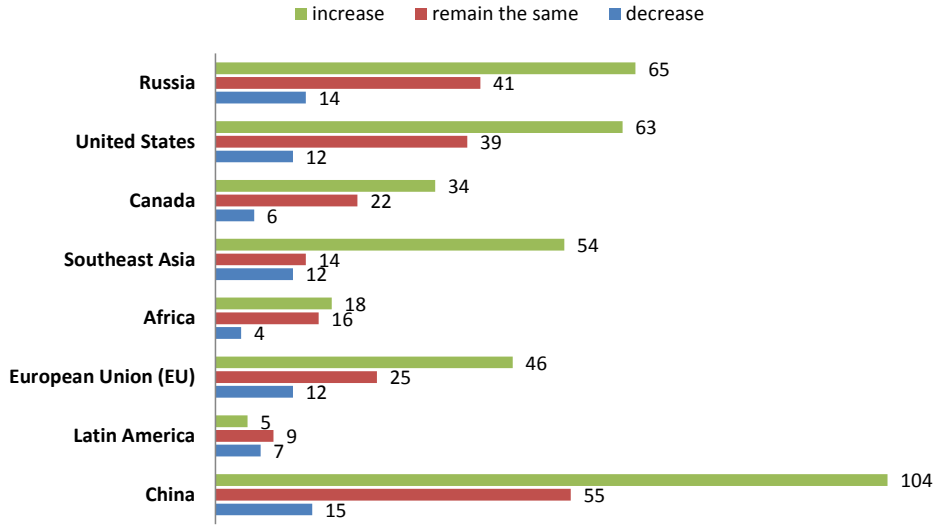

Figure 8. Raw material source changes in the last 5 years

increased far exceeded the number of the companies who reported a decrease in exports to these regulated markets, despite their adoption of timber legality regulations. However, the greatest sales increase was reported for China's domestic market, which implies that firms of all sizes are responding to the growth of the middle class in China. Finally, while the vast majority of respondents (over 75%) indicated that they sell products into the US, EU or Chinese markets, a large proportion reported that they do not sell into the Japanese (73%), Middle Eastern (76%), southeast Asian (72%) and Russian (63%) markets.

The literature clearly shows that wood production in temperate regions is largely regarded to be legal whereas a substantial percentage of the timber produced in tropical countries is suspect at best and illegal at worst. One anticipated impact of timber legality regulations was that wood manufacturers in China would increase their use of temperate wood in an effort to demonstrate compliance with timber legality regulations in those markets. The results in this area appear to be somewhat mixed (**Figure 8**). Chinese companies have increased their use of wood materials sourced from temperate regions. However, the same can be said for imports sourced from Russia, Southeast Asia and, to a lesser extent, Africa where illegal timber harvests remain problematic. Finally, the largest increase in

Table 1. General perceptions towards timber legality regulations

	Agree	Disagree
Illegal logging is a major environmental problem	210	14
Legality regulations are an effective way to reduce illegal timber	218	7
I plan to increase my use of CoC certification to help me comply with legality legislation	178	45
I intend to decrease my exports to countries that have timber legality regulations	98	125
I intend to increase my exports to countries that do not have timber legality regulations	94	130
I intend to sell more products within China because of timber legality regulations	147	76
Timber legality regulations cause timber prices to increase	166	58
Timber legality regulations increase the cost of exporting	186	39
Timber legality regulations are a trade barrier designed to protect foreign manufacturers	128	97

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raw material sourcing was reported for China itself which is surprising given the widespread timber harvest bans and reduced harvests. While the survey did not look at the type of timber being sourced, it is thought that much of the increased harvest in China is coming from bamboo forests and plantations although it would be useful to follow up on this question in the future.

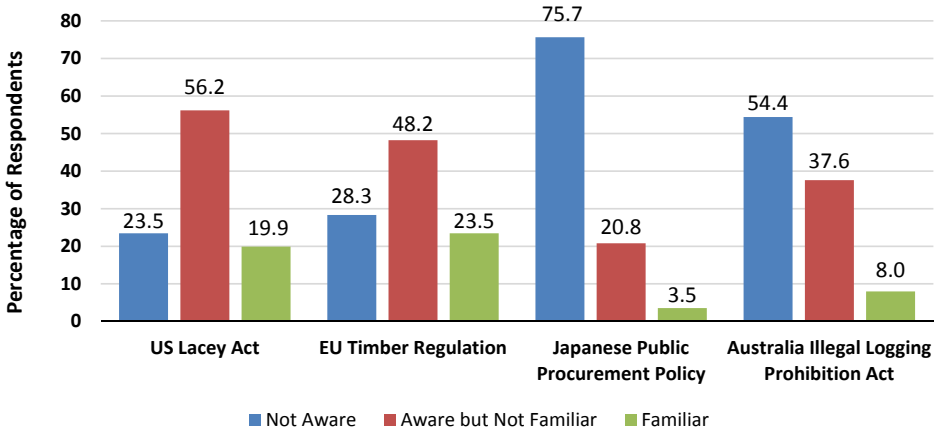

Figure 9. Respondents' awareness of Timber Legality Regulations

Chinese wood manufacturers were asked a series of questions in order to better understand their general perceptions regarding timber legality regulations (**Table 1**). These questions have been grouped into similar topics to aid the discussion. The vast majority of the survey respondents agreed that illegal logging is a problem and that timber legality regulations are an effective way to reduce illegal timber trade and that they plan to increase their use of certified wood to help comply with timber regulations. Despite this recognition, almost 60% of respondents indicated that they intend to reduce their exports to countries that have these regulations in favor of those that do not, including within China. To some degree, this may be a reflection of the fact that most respondents perceived that timber legality regulations cause timber prices to rise, increase the cost of exporting and are a trade barrier designed to protect foreign manufacturers.

We were also interested in understanding respondent's awareness of the various timber legality regulations that have been adopted: the US Lacey Act, the EU Timber Regulation, the Japanese Public Procurement Policy, and the Australian Illegal Logging Prohibition Act. The results clearly show that less than a quarter of the respondents felt that they were familiar with any of the regulations (Figure 9). Generally speaking, awareness of the US Lacey Act Amendment and EU Timber Regulation were highest, while awareness was very low for the Japanese and Australian policies. A majority of the respondents reported that they were aware of, but not familiar with, the Lacey Act while almost a quarter of the respondents (23%) were not even aware of it. Considering that the Lacey Act was adopted in 2008, it appears that there is a need for US companies and industry associations to work with Chinese companies and industry associations to increase their awareness and understanding of the goals and requirements of the Lacey Act. This would not only help ensure compliance with the Lacey Act, but would offset misperceptions of the Lacey Act and perhaps provide an opportunity to expand exports of US wood products into China to help Chinese firms reduce the risk of including illegal timber within their supply chains.

With respect to the Lacey Act specifically, the vast majority of respondents reported that the Lacey Act had made them more careful about sourcing their raw materials and that they had acquired CoC certification in order to comply with the Lacey Act (**Table 2**). Similarly, a large majority of respondents (71.4%) felt that it was easy to meet the requirements of the Lacey, while about half responded that they would increase their use of US wood to help them comply with the Lacey Act. Similar to the previous question, a majority of respondents (63.8%) reported that their export costs had increased because of their efforts to comply with the Lacey Act and as a result 58.6% reported that they would reduce their exports to the US.

Since our preliminary conversations with Chinese exporters had suggested that timber legality regulations have increased their export costs, we asked them to estimate the amount of increase that their firms had incurred in complying with the Lacey Act. The largest group of respondents, 38.4%, reported

Table 2. General perceptions towards the Lacey Act

	Agree	Disagree
The Lacey Act has made me more careful about sourcing logs/lumber	145	24
I acquired chain-of-custody certification to help me comply with the Lacey Act	158	13
It is easy to comply with the Lacey Act	120	48
I will increase my use of wood from the US to help my company comply with the Lacey Act	85	83
Compliance with the Lacey Act has increased the cost of exporting to the US	104	59
The Lacey Act will cause me to reduce my exports of wood products to the US	97	69

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that they did not see their export costs increase at all. For those who did experience a rise in export costs, 9.7% reported that the increased cost was less than 5%, 15.6% experienced a cost increase of 5% or more but less than 10%, 19.5% reported a cost increase of 10% or more but less than 15% and 16.9% had a cost increase of 15% or more.

Table 3. Variables that affect the probability of a respondent changing their exports to the US

Variable	Probability of decreased sales to the US	Probability of increased sales to the US
Familiar with the Lacey Act	.11	.62
Unfamiliar with the Lacey Act	.21	.24
Large companies	.13	.54
Small companies	.205	.305
Ratio of domestic sales decreased	.135	.52
Ratio of domestic sales increased	.205	.305
Material sourcing from US increased	.14	.51
No material sourcing from the US	.22	.16

To better understand how the different variables might have affected respondent's exports to the US, an ordinal-probit analysis of the survey data was conducted. The modeling results reveal that the Chinese companies' awareness of the Lacey Act Amendment played a significant role in their export behavior to the US following the implementation of the Lacey Act Amendment (**Table 3**). Companies with a higher awareness of the Lacey Act Amendment were significantly more likely to have increased their sales to the US over the past 5 years. The respondents who were very familiar with Lacey Act were 62% more likely to have increased their sales to the US over the last five years, while just 11% were likely to have decreased their sales to the US. A similar result was found based on firm size, with larger firms being 54% more likely than small firms to have increased their sales to the US.

The Chinese companies' domestic sales have a negative relationship with their sales to the US market. Those Chinese companies whose domestic sales declined were significantly more likely to have increased their sales to US. Finally, we found a significant positive relationship between a companies' sourcing of wood raw materials from the US and their increased sales to the US. Over the past 5 years, those Chinese companies who increased their sales to the US were significantly more likely (51%) to have increased their sourcing of wood raw materials from the US.

Conclusions

The results of this research indicate that increasing the awareness and understanding of timber legality regulations among Chinese wood manufacturers would be highly beneficial for global trade, tropical forests and US wood manufacturers. Considering the Lacey Act, the vast majority of Chinese wood manufacturers report that the Act has made them more careful about material sourcing and caused them to acquire chain-of-custody certification. Similarly, a large majority reported that it is easy to comply with the Lacey Act while more than half report that they have increased their use of US wood products in an effort to comply with the Lacey Act. These are all positive outcomes that reflect the policy goals of timber legality legislation and should help to expand US wood exports into China. However, at the same time, many Chinese wood manufacturers, particularly small manufacturers, mistakenly perceive that timber legality regulations act as trade barriers that raise export costs and timber prices. Expanding demand for US wood products means that the US government and industry associations need to aggressively work together to develop and implement an effective strategy for communicating with and educating, Chinese wood manufacturers, about the true nature of timber legality legislation in general and the Lacey Act in particular. This would not only benefit US wood exporters but also help to reduce Chinese demand for illegally harvested wood products.

Acknowledgements

We gratefully acknowledge the support of the USDA Federal State Marketing Improvement Program (FSMIP), award no. 12-25-G-1519 and the McIntire-Stennis Formula Fund for providing financial support to this study. We also thank the Softwood Export Council for funding the international travel, and the American Hardwood Export Council for their help with the data collection. The authors would also like to acknowledge the support provided by Tait Bowers throughout the study.

This article is partially based on an article published in the Forestry Chronicle. The entire article can be found at: http://pubs.cif-ifc.org/doi/pdf/10.5558/tfc2014-131

People News

It's the season for travel and exploration, and some are heading out on new adventures:

Taking Off for New Adventures

Benjamin Roe

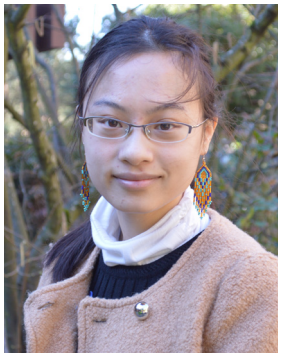
Ben has recently concluded his studies at the University of Washington, where he completed a demanding concurrent master's program and graduated with a Master of Public Administration and a Master of Science in Forest Resources. His research primarily focused on policies which attempt to restrict the trade of illegally harvested timber, required interviewing manufacturers in Ho Chi Minh City, Vietnam to determine their awareness and attitudes towards timber legality regulations. His thesis is: *The Influence of Timber Legality Regulations on Chinese and Vietnamese Wood Products Manufacturers*. He has had two publications with CINTRAFOR: *The impact of timber legality regulations on business practices in Vietnam* published in the **Forest Chronicle**; and *Timber legality regulations: Assessing the attitudes and practices of Chinese and Vietnamese manufacturers* published in the **Electronic Journal of Applied Multivariate Statistics**. He was also lead author for the main article in the Spring 2015 CINTRAFOR newsletter focusing on business practices in Vietnam as impacted by timber regulations.

While with CINTRAFOR, Ben interned with the US Forest Service in the remote ponderosa pine forests on Mt. Lassen's high volcanic mountains serving as an inspector on timber stand improvement projects. He also interned with the US Agency for International Development (USAID) in Jakarta, Indonesia on a project designed to strengthen collaboration between universities in Indonesia and the United States, and he was able to tour a USAID forest restoration project aimed at converting illegal palm oil plantations back to tropical rainforest in Leuser National Park.

Having completed his studies at the University of Washington, Ben has been hired to work as a pre-sales forester with the Quinault Indian Nation in Tahola, WA, where he will gain hands-on forestry experience working in the temperate rainforest of the Olympic Peninsula. He is looking forward to learning the skills to effectively manage timber harvests as a member of an interdisciplinary team, working to balance economic goals with environmentally sustainable forest management practices. His job will allow Ben to develop a better understanding of tribal forestry, experience the rich cultural heritage of the Quinault Nation and broaden his experience in implementing environmental policies that support sustainable forest management practices.

Ben received his bachelor's degree from the University of North Carolina at Chapel Hill, in 2012 and he served as a Peace Corps Volunteer in Bulgaria from 2010 to 2012.

Ziyi (Zoe) Lu



Zoe recently finished her Master of Science in Forest Resources with a focus on statistics and programming. During her graduate studies she looked at the impacts of the US Lacey Act on China-US wood products trade, including conducting surveys and collecting data during two trade shows in Shanghai, China. She had two peer reviewed publications with CINTRAFOR on this project, *Changes in Chinese wood-based exports to the US: Post Lacey Act amendment* published in the **Forest Chronicle**; and *A Categorical Modeling Approach to Analyzing the Impacts of the Lacey Act 2008 Amendment* published in the **Canadian Journal of Forest Research** (forthcoming).

During her time with CINTRAFOR, Zoe held a summer internship

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with the UNECE of the United Nations in Geneva, Switzerland, where she developed an Industrial Round Wood Balance Model for the UNECE region and built an Excel-based balance tool for future updates. She was a regular volunteer as a conference interpreter for the Tacoma World Trade Center in Tacoma and participated in the Tacoma-Fuzhou Trade Project, meeting Chinese delegations, translating formal web content and documents, and assisting local officials with presentations to the delegations.

Zoe is currently pursuing a PhD degree at the University of Wisconsin Madison, in both AAE (agricultural and applied economics) and Forestry, combining her passion for forest research with rigorous economics methods. For her PhD studies, she is investigating the impact of risk and uncertainty on forest planning decisions for joint economic and ecological benefits in Wisconsin. Given the risks and uncertainties associated with disturbances threatening forest resources in Wisconsin, she is interested in better understanding the balance between forest carbon sequestration, optimal forest tree value and harvest age.

She received her Bachelor's degree from Beijing Forestry University, China, with a background of interdisciplinary coursework ranging from classical economics and management theories, marketing analysis and finance, agriculture, and forestry and forestry policies.

Just Returned for a New Adventure

Francesca Pierobon

In this case the adventure is with CINTRAFOR. Francesca originally joined the CINTRAFOR group in May 2013 as a visiting scholar from Italy for a one-year internship. She worked on the Life Cycle Assessment of Bio-Energy Systems, focusing on the incorporation of carbon sequestration into the LCA framework through the evaluation of the radiative forcing.

Upon returning to Italy, Francesca received her PhD in 2015 in Land, Environment, Resources and Health (L.E.R.H.) from the University of Padua. She had previously completely her Master's Degree in Chemical Engineering for Sustainable Development, as well as a Specializing Master's in Strategic Environmental Management from the same university.

Francesca has returned to CINTRAFOR as a Post-Doctoral researcher working with the NARA Project on the Life Cycle Assessment of woody biomass for bio-jet fuel. She is also involved in the development of a geo-spatially nuanced tool to assess the environmental and human health impacts associated with prescribed fires in the PNW region.

She has also had publications while with CINTRAFOR: *Evaluation of environmental impacts of harvest residue-based bioenergy using radiative forcing analysis*, published in **The Forestry Chronicle**, 90 2014, and a CINTRAFOR newsletter article in Winter 2014, *Environmental assessment of woody biomass based jet-fuel*.

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