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Center for International Trade in Forest Products

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The Impact of Green Building Programs on the Japanese Residential Construction Industry

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Similar to many economies around the world, Japan has been buffeted by the global economic downturn. Housing starts, the largest driver of wood demand in Japan, were down by 28%, reaching their lowest level since 1965. This decline, while largely attributable to the sluggish economy, is also a reflection of the demographic trends of the declining population in Japan. Despite the dramatic decline in total housing starts in 2009, wood housing starts fell by a lower 16.8% and the market share of wood housing as a component of total housing starts increased from 47% in 2008 to 55% in 2009. Interestingly, 2x4 housing fared the better than traditional post and beam housing falling by 15.2% compared to a 17.1% drop for post and beam. As a result, the share of 2x4 homes increased to a record 21.3% of total wooden housing starts in Japan in 2009. While wooden housing is faring better than non-wood housing in Japan, the combination of a sluggish economy and declining population will continue to be a drag on the demand for wood products into the future.

Two recently adopted programs in Japan have the potential to boost wood demand with the residential construction sector. These programs include the green building program (known as CASBEE-Sumai) and a program designed to improve the quality and longevity of residential homes (know as the 200 Year House program). The extent of their impact on the demand for wood will be influenced by the degree to which they are accepted and utilized by architects, home builders and home buyers. However, it is important to note that these programs have been deliberately designed to promote the use of domestic over imported wood and therefore they have a strong potential to adversely impact the import of wooden building materials. For example, an early draft of the Japanese green building program (CASBEE-Sumai) de facto defined Japanese forests as being sustainably managed while requiring imported wood to be third-party certified as having been harvested from sustainably managed forests. This article is based on a research project commissioned by the Evergreen Building Products association on behalf of its membership

To assess Japanese architects' and home builders' attitudes towards green building programs and their perceptions of the environmental attributes of wooden building materials relative to non-wood materials, a survey of 281 construction professionals (222 home builders and 59 architects) in Japan was conducted during the

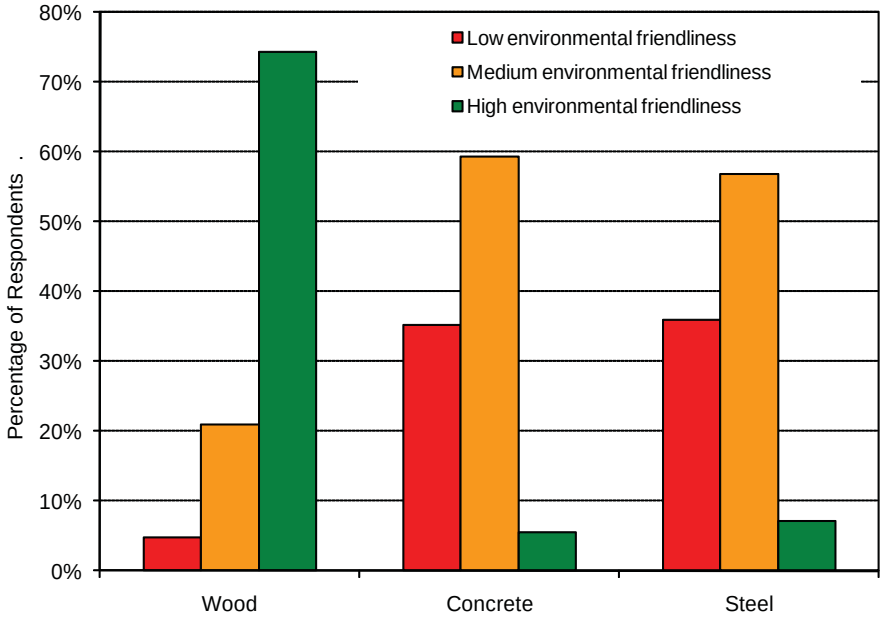

Figure 1. Japanese home builders and architects overwhelmingly perceive wood as being the most environmentally friendly building material relative to steel and concrete.

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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 Forest Resources 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.

In his State of the Union Address, President Obama noted that: "…we need to export more of our goods. Because the more products we make and sell to other countries, the more jobs we support right here in America. So tonight, we set a new goal: We will double our exports over the next five years, an increase that will support two million jobs in America. To help meet this goal, we're launching a National Export Initiative that will help farmers and small businesses increase their exports, and reform export controls consistent with national security."
Source: http://www.whitehouse.gov/the-press-office/remarks-president-state-union-address

A renewed emphasis on exports and export competitiveness should come as good news to the forest products industry which has been battered by the collapse of the US economy over the last three years. The past year in particular has been devastating for the forest products industry, both in the US and the Pacific Northwest, as housing starts fell from 906,000 in 2008 to 554,000 in 2009 (their lowest level since 1945). In response, US production of softwood lumber plummeted from 40.5 billion board feet in 2005 to just 21.2 bbf in 2009. In the US west, softwood lumber production declined from 19.3 bbf in 2005 to just 9.5 bbf in 2009 while the number of sawmills operating in the western region fell from over 240 in 2006 to below 175 in 2009. With anemic growth in the US economy expected for the next two years, it would indeed be wise for forest products manufacturers to look offshore for growth opportunities.

The President's call to expand US exports will benefit from the renewed weakness of the US dollar, Figure 1. Between 2002 and 2008, the dollar weakened substantially against both the Canadian dollar and the Euro, resulting in a resurgence of US forest products exports from $4.9 billion in 2002 to $6.5 billion in 2008. The dollar strengthened briefly between March 2008 and March 2009, before continuing its decline through the remainder of 2009. The last 9 months of 2009 saw the dollar weaken 17% against the Canadian dollar, 14% against the Euro and 8.1% against the Japanese yen. The persistent weakness of the US dollar has dramatically improved the competitiveness of US wood products in international markets and provides an excellent opportunity for US forest products exporters to explore new opportunities in international markets. This observation is reflected in the trade data which shows that US exports of all wood products increased 14% in January 2010, with log exports up 9% and lumber exports up 23%.

Despite the economic crisis that has crippled the economies of most developed countries, there continues to be strong economic growth in a number of developing countries. Recent economic projections suggest that the Chinese economy will grow 9.6% in 2010 and again by 8.1% in 2011. Economic growth in India is projected to be 7.7% in 2010 and 8% in 2011 and in Vietnam it should reach 5.3% in 2010 and 6% in 2011. Each of these countries is highly dependent on imported wood, suggesting that there are good export opportunities for US wood products in these off-shore markets.

The competitiveness of US wood products is further enhanced by the continued imposition of a 25% tax on Russian log exports. Russia, which just a couple of years ago provided over two-thirds of the softwood logs and almost half of hardwood logs traded globally, has seen its share of global exports decline substantially in recent years. This is particularly true in Japan and China where Russian log exports declined by 65% and 32%, respectively in 2009. Furthermore, recent legislation in the US, the EU and Japan requiring that imported wood products be produced from legally harvested logs should further bolster demand for US wood products, particularly in the export oriented economies of China and Vietnam. The most recent export data shows that exports of US logs to China and Vietnam were up by 77% and 69% in January 2010 while lumber exports to these countries jumped by 75% and 93%, respectively.

Clearly, the bottom line is that more small and medium-sized forest products need to become engaged in export markets. Not only do export markets provide a strategy to diversify a company's market portfolio and reduce their exposure to risk, but they also provide an opportunity to improve productivity and develop new products. For companies and managers who are new to the export market and hesitant about doing business overseas, numerous programs exist to help. For example, the highly successful US-China Build program, which is jointly managed by CINTRAFOR and the Evergreen Building Products Association, brings EBPA member companies on trade missions to a variety of Chinese cities to promote their products and meet qualified Chinese buyers and agents. Since the start of the program in 2001, 614 US companies have participated in US-China Build programs and these companies have reported receiving over $50 million in sales of US building materials.

More information on this program is available online at: http://www.uschinabuild.org/.

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fall of 2009. The surveys were supplemented with personal interviews of homebuilders that were conducted in the fall of 2008 and 2009. The survey results show that almost two-thirds of respondents had not heard of the CASBEE-Sumai program despite the fact that the program was introduced almost three years ago. Only 10% of respondents indicated that they have used the CASBEE-Sumai to certify a home whereas 41% reported that they have built a house under the 200 Year House program . Follow up discussions in Japan in December 2009 suggest that less 500 houses have been built under the CASBEE-Sumai program to date while the number of houses built under the 200 Year House program exceeds 25,000.

Survey respondents consistently perceived that the 200 Year House program was more effective than CASBEE-Sumai, with 28% rating the 200 Year House program as being highly effective versus just 11.3% for CASBEE-Sumai. Perhaps more significantly, almost half (46.5%) of the builders surveyed thought that effectiveness of the CASBEE-Sumai program was low compared to just 21.1% for the 200 Year House program. Similarly, 22% of the home builders reported that their customers were highly interested in the 200 Year House program while just 8.3% of customers were highly interested in the CASBEE-Sumai green building program. Home builders also reported that almost 60% of their customers had little interest in CASBEE-Sumai as compared to just 27.8% for the 200 Year House program. Finally, 31% home builders felt that the future outlook for the 200 Year House program was good while less than 20% were optimistic about the future of CASBEE-Sumai.

Builders were also asked a number of questions regarding the environmental performance of relative to steel and concrete in terms of energy use during the manufacturing process, pollution generated during the manufacturing process, CO2 emissions generated during the manufacturing process, the sustainability of the resource and the overall environmental friendliness of each material. The survey results show that builders and architects perceived that wood required less energy to manufacture, generated less CO2 during the manufacturing process, required much less energy to manufacture and was a more sustainable material than either steel or concrete. As a result, Japanese builders and architects overwhelmingly felt that the environmental friendliness of wood was vastly superior to either steel or concrete, Figure 1. Perhaps more importantly, Japanese home builders ands architects felt that wood frame houses were much more energy efficient than either steel or concrete homes, Figure 2.

It seems clear that builders and architects in Japan have a more favorable view of the 200 Year House program relative to the CASBEE-Sumai green building program. To a large extent, their perceptions of the two programs are influenced by several factors. First, there are a variety of subsidies available to home builders and home buyers who participate in the 200 Year House program. These subsidies typically are large enough that they offset the additional material cost of building a house that meets the 200 Year House program guidelines. In addition, home owner's perceive that houses built under the 200 Year Houses are higher quality, more structurally sound and more durable than other new houses. Since the price premium of a 200 year house is small (thanks to government subsidies), 200 year houses are perceived as being a better value by home owners.

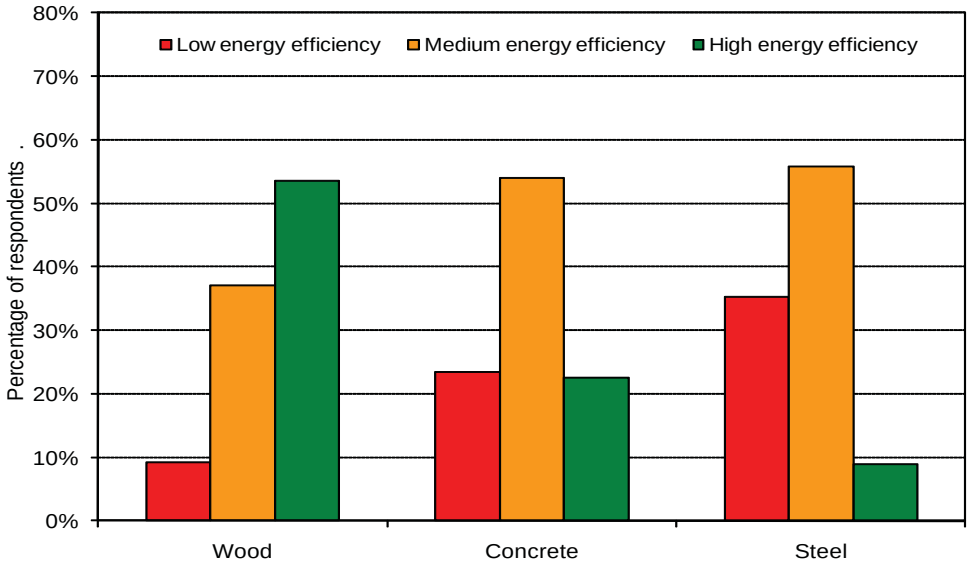

Figure 2. Japanese home builders and architects perceive wood frame houses as being more energy efficient than homes built from either steel and concrete

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Home owner's favorable perceptions of 200 year houses are also influenced by the fact that these houses qualify for reduced mortgage rates and for longer mortgage periods relative to a normal house. Second, home builders have begun to offer maintenance programs for 200 Year Houses where they contract with the home buyer to provide regular maintenance check-ups (usually every 5 years or so) to assess the condition of the house. Required repairs are covered by the home builder during an initial period with the home owner subsequently paying for maintenance and repairs in the future. The emergence of these home maintenance programs provide home builders with an additional revenue stream while assuring homeowners that housing quality and performance will not decline over time. Third, Japanese home builders appear to be less interested in using the CASBEE-Sumai green building program because they feel that home buyers will be unlikely to pay a large enough price premium to cover the higher cost of building a green home, particularly given the on-going economic malaise in Japan. Finally, home builders perceive that CASBEE-Sumai is unlikely to allow them to differentiate their homes from those of their competitors. Most home builders we talked with reported that if they were successful in developing a market for green homes, other home builders could easily respond by adopting green certification and offering similar homes. In other words, Japanese builders do not feel that the CASBEE-Sumai green building program would not provide them with a durable and defensible competitive advantage in the marketplace that would allow them to differentiate themselves from their competitors.

The results of this research suggest that Japanese home builders and architects perceive wood to be the environmentally preferred material for homes. Despite this, the market for certified wood in Japan will likely remain small in the short-term, although the market opportunity for certified wood could expand in the future if home builders and architects begin to increase their use of the CASBEE-Sumai green building program. In the short-term, the success of the 200 Year House program suggests that there could be substantial market opportunities for imported lumber manufactured from durable wood species such as western red cedar, Alaska yellow cedar and Douglas-fir. This is particularly true given that Japanese home builders and architects are already familiar with these species and they are regarded as having superior structural and durability characteristics. Finally, an increased emphasis on energy efficiency in residential construction suggests that there may be substantial market opportunities for increasing the use of imported energy efficient wood windows. However, restrictive fire code regulations and the high cost of conducting fire tests on wood windows will continue to pose a barrier to the increased use of imported wood windows in Japan (particularly in urban fire zones). Our discussions with Japanese homebuilders over the past several years clearly show that homebuilders would increase their use of imported energy efficient wood windows if the regulatory constraints against their use were relaxed or removed. Given the high cost of energy in Japan, Japanese commitments to reduce carbon emissions under the Kyoto protocol, and the relatively low fire risk posed by wood windows, reforming the fire regulations to allow the use of wood frame windows in fire zones could help home owners reduce their energy costs while helping Japan improve its environmental performance by reducing carbon emissions. This is an area where the US government and industry associations should continue to push for regulatory reform. One area of future research should look at the likely impact of the 200 Year House program on building material specifications in residential construction to identify potential market opportunities for US wood building materials as a result of this program. Another area of research should analyze the basis for the establishment of arbitrary transportation distances for building materials within green building codes. The arbitrary distances specified in some green building program can encourage perverse outcomes because they do not differentiate between types of building materials and their highly variable carbon footprints (e.g., steel vs. concrete vs. wood) or the transportation efficiencies derived from using different types of transportation modes with their corresponding difference in carbon emissions per unit of volume transported (e.g., ocean going vessels vs. railroads vs. trucks).

This article is based on a research project commissioned by the Evergreen Building Products Association (EBPA) on behalf of its membership.

Beyond Faustmann, A Real Options Approach to Harvest Contract Valuation

By: Stanislav Petrasek, Center for International Trade in Forest Products, School of Forest Resources, University of Washington

Why Real Options?

Traditional techniques used for the valuation of forestry assets rely on net present value analysis, with the Faustmann formula being the premier example. Although popular in forest economics and management, the net present value approach suffers from a serious drawback that limits its accuracy — namely, the assumption that future prices, costs and other quantities are known today. This assumption is often too simplistic, because many decision variables in forest management fluctuate unpredictably over time. By assuming a predictable environment, the net present value approach ignores the value of the opportunity to adjust harvest schedules in response to random changes in market conditions. An alternative approach is provided by methods based on the valuation of real options. The real options approach maximizes the value of a project by identifying optimal actions across a range of possible management scenarios. This formulation explicitly incorporates the value of managerial flexibility, and it is a natural choice in scenarios characterized by decision making under uncertainty.

Why Monte Carlo?

Traditionally, obtaining the value of a project using real options has been achieved by solving a partial differential equation subject to appropriate boundary conditions with the use of finite difference methods. The technique is powerful, but often complex. This complexity has limited the use of real options methodology on a wide scale in forest management. However, finite difference methods are not the only approach suitable to real options valuation. A viable alternative is provided by techniques based on Monte Carlo simulation. Monte Carlo simulation is flexible and easier to implement than finite difference methods, particularly in scenarios with many sources of risk, such as commonly occur in forest management and economics.

A Two-Part Solution

Applying real options methods to a forest management problem yields a two-part solution: the project value, and an optimal harvest rule that guides managers to optimal decisions under prevailing market conditions.

A Case Study

The following discussion and figures provide an illustration of a Monte Carlo simulation that highlights the key insights gained by applying real options methodology within a forest management context. In this example, the approach was applied to a timber harvest contract of a type administered by the Washington Department of Natural Resources. The main source of risk influencing the value of these contracts is unpredictable timber prices. The results of the analysis demonstrate the impact of price volatility and contract length on contract value and optimal harvest timing, and they underscore the utility of real options methodology for decision makers managing projects characterized by the presence of risk.

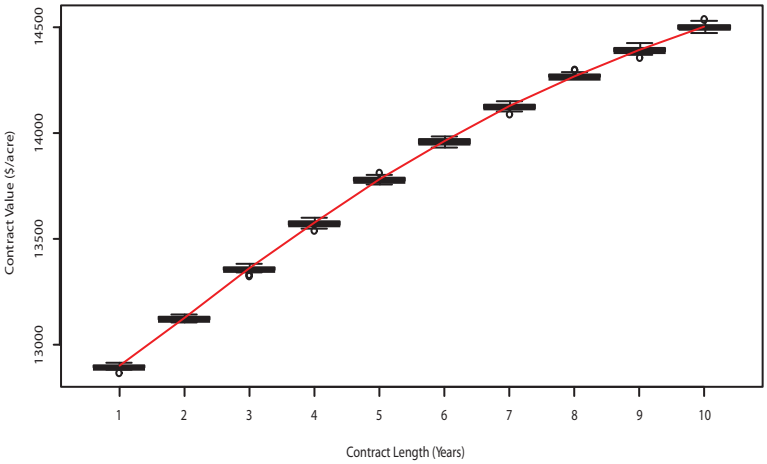

Figure 1. Harvest contract value as a function of its contract length.

The real options approach shows that the present value of a Washington Department of Natural Resources timber harvest contract is positively related to the contract length (Figure 1). The relationship between the length of a harvest contract and its value is positive, because longer contract durations offer the contract holder more flexibility with respect to harvest timing. The longer the contract length, the higher the likelihood of harvesting the timber during a period of high timber prices and realizing a higher rate of return.

The present value of a timber harvest contract is also positively related to timber price volatility (Figure 2). When timber prices fluctuate widely over time, they are very likely to reach high levels at some point during the time span of a harvest contract. This increases the value of harvest contracts to their holders, because a temporary increase in timber prices can be captured by appropriately adjusting harvest schedules, thereby increasing harvest revenue.

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The optimal harvest boundary presents contract holders with a decision-making rule that maximizes their rate of return (Figure 3). In order to achieve the maximum rate of return, the harvest of the timber stand should be delayed if the timber price is below the optimal harvest boundary. The forest stand should be harvested when the timber price crosses above the optimal harvest boundary. Figure 3 shows the location of the optimal harvest boundary for several values of discount rate. The boundaries with high rates of discount are above those calculated with low discount rates. This indicates that contract holders with higher capital cost should be willing to harvest at lower timber prices.

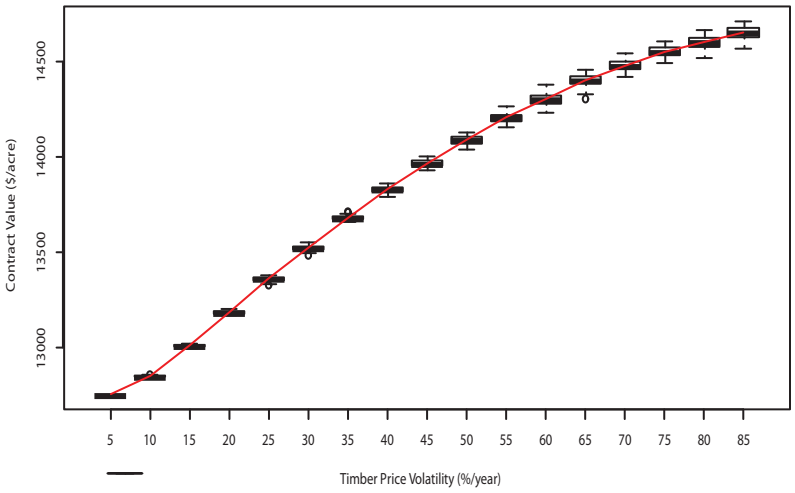

Figure 2. Harvest contract value as a function of timber price volatility.

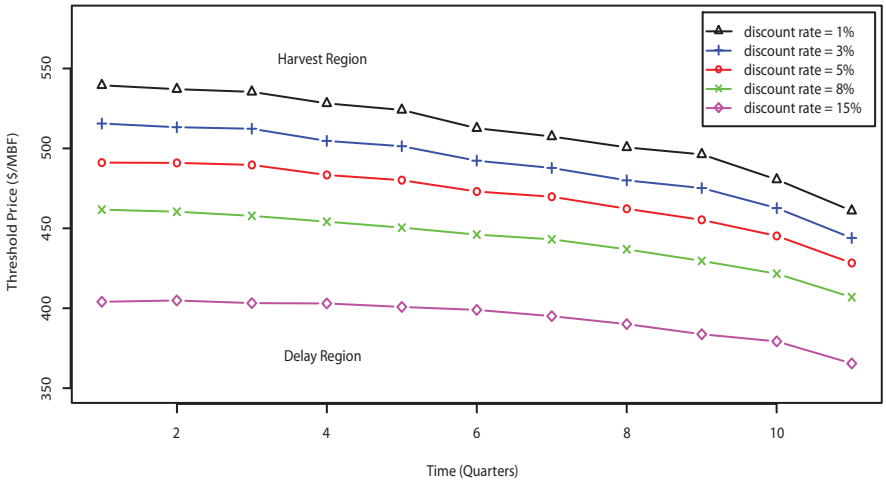

Figure 3. Optimal harvest boundaries for various levels of discount rate.

Advances in economic theory provide powerful tools for the valuation of timber harvest contracts in the presence of price risk. Real options methodology maximizes rate of return by fully incorporating the value of managerial flexibility. It is applicable to a wide range of forest management scenarios.

School of Forest Resources Peace Corps Master's International Program Update

For many people it comes as a surprise that the University of Washington is the largest source of regular Peace Corps volunteers in the US and is the second largest source of volunteers into the Peace Corps Master's International program. The Peace Corps Master's International Program represents an extraordinary opportunity for forestry graduate students to use their technical and analytical skills to benefit local communities in developing countries around the world. PCMI students display a high degree of motivation in undertaking an extremely challenging program that combines 27 months of PC service with four quarters of intense coursework and the completion of a professional paper related to a project completed during their PC assignment.

The Peace Corps Master's International Program in International Forestry was established in the School of Forest Resources in early 2005. To date, the program has had three students complete their Peace Corps MI Service: Erik Peterson (PC service in Tanzania 2005 – 2007), Michelle Gerdes (Tanzania 2006 – 2008) and Brian Bragg (Cameroon 2007 – 2009). We currently have two students serving overseas as Peace Corps volunteers: Grover Yip has been working in Cameroon since mid-2008 while Jake Grossman has been serving in Paraguay since mid-2009. There are currently two PCMI students in the School who are completing their coursework and are slated to depart for their PC assignments later this summer: Peter Gill will be departing for Senegal while Seth Kammer will be leaving to work in Ethiopia. Finally, we have just accepted three new students into the PCMI-International Forestry program for next year. The PCMI in International Forestry has been very successful in helping the School to recruit high quality graduate students and to broaden the exposure of all students in the School to forestry issues in developing countries. For more information on the PCMI in International Forestry in the School of Forest Resources, please contact Dr. Ivan Eastin (eastin@uw.edu).

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