

HIGH AND DRY: RAISED-WOOD FOUNDATIONS CAN AVERT FLOOD DAMAGE

By Andrea Ward, University of Wisconsin, Graduate Journalism Student

Nearly three years ago, most of the world watched from a distance while Hurricanes Katrina and Rita ravaged millions of homes in the Gulf Coast region of the southern United States. In the weeks and months that followed, residents and volunteers from across the country began a massive reconstruction effort that continues today—an effort that has prompted some serious rethinking about how communities and homes are built in areas of the country that are vulnerable to hurricanes and other natural disasters.

With such a large-scale rebuilding effort taking place, the Forest Products Laboratory (FPL) and partners in the wood products research community have seen opportunities for their work to make a positive impact on the disaster resistance of homes built in hurricane-prone areas.

For one former FPL employee, however, the work is more than just business. Cathy Kaake, who was at FPL in the 1980s, now works as a director of marketing at the Southern Forest Products Association in Kenner, Louisiana. She is lead author of *Raised Floor Systems: Design and Construction Guide*, a publication promoting and explaining a wood-based foundation design that, among its other advantages, elevates homes above destructive floodwaters. When she speaks about the benefits of raised wood foundations and wood-frame construction for disaster-resistant housing, her recommendations come not only from professional opinion but also from powerful personal experience. Kaake and her family live just outside New Orleans. When the news came that Katrina was approaching, they weren't interested in taking chances.

"We were fortunate enough to get out of there before Katrina hit," Kaake recalled.

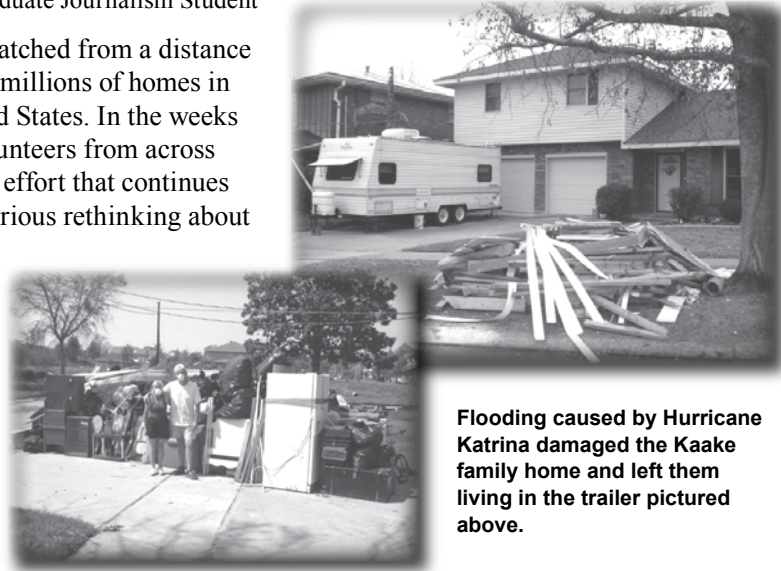
When the Kaake family returned to their home eight days after the storm, it wasn't flooded. But a telltale water line ran along the walls throughout the first floor of the house about a foot above floor level. They dragged everything from the first floor out to the curb and moved themselves into a FEMA trailer. It was the beginning of an ordeal that left Kaake with strong opinions about what to do when considering building a home in a flood- or hurricane-prone area.

Kaake knows that she and her family are among the luckier ones. "We were on the 'good' side of the hurricane," she said, explaining that their home is located at least 30 miles west of the path followed by Katrina's eye. They escaped the highest winds and had only a foot of water in their house, but that was enough to cause some serious damage.

Just after Labor Day that year, Kaake and her husband spent five long days working on the first floor of their home, using shovels to remove the moldy drywall and fiberglass mat insulation. Another setback came when they got down to the studs and found that mold had grown on the wet wood while the floodwaters sat stagnant in their house. "I called up Anton TenWolde [of FPL] and said 'Anton, here's a real-life situation—what do we do?'"

Acting on TenWolde's advice, they left fans and air-conditioners running for days to dry out the moisture feeding the mold before they could even begin the rebuilding process. Four months had passed by the time the Kaake family was able to move back home.

Since Katrina, Kaake's professional presentations on raised wood foundations have acquired a personal element, often including pictures of her own home post-Katrina and a section entitled, "What Would Cathy Do?" At the



Flooding caused by Hurricane Katrina damaged the Kaake family home and left them living in the trailer pictured above.

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NEWSLINE TEAM

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UPCOMING EVENTS



SMALLWOOD 2008 AND BIOENERGY & WOOD PRODUCTS JOINT CONFERENCE: CUTTING EDGE TECHNOLOGIES TO OPTIMIZE UTILIZATION OF SMALLWOOD AND WOODY BIOMASS

May 13-15, 2008—Monona Terrace Convention Center, Madison, Wisconsin, USA. This conference provides state-of-the-art information on small-tree utilization and fosters peer-to-peer learning. An international slate of speakers including researchers, material and equipment suppliers, manufacturers, and end-users will attend. <http://www.forestprod.org/confsmallwood08.html>.

The Department of the Interior, in cooperation with the National Association of Conservation Districts, is making a limited amount of financial support available to assist with registration, travel, and lodging for the conference. The primary intended recipients are local officials from conservation districts, RC&Ds, and counties. For more information and scholarship application forms, please access the following internet connection <http://www.forestprod.org/smallwood08scholarships.html>.



2008 INTERNATIONAL CONFERENCE ON NANOTECHNOLOGY FOR THE FOREST PRODUCTS INDUSTRY: NANOTECHNOLOGY FROM RESEARCH AND DEVELOPMENT TO APPLICATION

June 25-27, 2008—Hyatt Regency Hotel, St. Louis, Missouri, USA. This conference provides (1) a forum for showcasing new equipment, services, and materials to the forest products industry and community, (2) opportunities for meeting and engaging industry leaders and innovators, developing collaborative relationships within the forest products sciences community, and providing input in research and development directions and technology development, and (3) gaining knowledge of the current priorities and state-of-the-art nanotechnology in the forest products sector.

<http://www.fpl.fs.fed.us/notices/events/2008jun25-27--nanotechnology-for-forest-products-conference.pdf>



10TH INTERNATIONAL CONFERENCE ON PROGRESS IN BIOFIBRE PLASTIC COMPOSITES

May 12-13, 2008—Toronto Airport Renaissance Hotel,

Toronto, Ontario. This conference provides the latest developments in the science, technology, economics, and applications of biofibre plastic composites. The conference will include technical and poster presentations, discussions, and tabletop exhibits, as well as ample opportunities for networking with friends and colleagues from around the world. The following major topics will be covered: materials, processing technologies, design and performance issues, marketing/ distribution, and many other special issues.

<http://www.biocomposites-toronto.com/fees-reg.html>



Houses with raised foundations recently constructed by Habitat for Humanity in New Orleans, Louisiana.

top of her list of recommendations: *Rebuild using wood-frame construction.*

“[Wood] is still the most cost-effective building material,” Kaake said. “We do know how to build wind- and flood-resistant wood buildings.”

Next on the list: *Elevate your home with a raised wood foundation.* On this point Kaake faces a significant challenge. More than 50% of new homes in the United States are built on concrete slab foundations, often with the first floor of the home at or near grade. That number jumps above 70% in the South, where risks from flooding are often greater.

Building codes and the National Flood Insurance Plan require that homes be built at or above base flood elevation (BFE)—a measure of the elevation to which floodwaters have a 1% chance of rising in any given year. But most existing homes in the South were built either before those regulations were in place or before technology existed to accurately gauge BFE. The Kaake home, built on a slab foundation in the early 1980s, lies 3 feet below sea level—considered BFE at the time, but now believed to be well below it. Because the cost of raising up an existing home and retrofitting it with a raised wood foundation can be prohibitive—the Kaake family was looking at estimates of \$100,000 or more—they chose to rebuild their home on its original slab foundation.

Conventional wisdom has it that slab-on-grade or slab-on-fill foundations dominate the market because they are simply more cost effective to build. But for those considering building new homes in flood-prone areas, evidence suggests that any initial expense for a raised wood foundation may be offset over the years by a reduction in flood insurance premiums, which have been higher across the board since Katrina. Kaake cautions new home builders to elevate their homes to at least +2 (2 feet above) BFE.

“I’ve learned that at +2 BFE, flood insurance premiums can fall by half,” Kaake said.

Research in the works at FPL may lend more support to this argument. FPL’s David McKeever and a research partner from the National Association of Home Builders are analyzing costs associated with raised wood foundations compared with those of building on a slab. The results, expected to be published later this year, could call into question the assumption that a concrete slab foundation is always the more cost-effective option.

Using a raised wood foundation to elevate homes above BFE is critical in all flood-prone areas, Kaake stresses. Other techniques used to raise the floor of a home above BFE, especially the common practice of slab-on-fill, may keep that particular home high and dry, but they tend to have detrimental effects on neighboring homes and the surrounding community because they merely displace floodwaters—so much so that some communities participating in the National Flood Insurance Program have enacted ordinances prohibiting the use of fill to elevate homes above BFE. Raised wood foundations, on the other hand, allow floodwaters to flow freely through the crawlspaces underneath the house without causing damage to living spaces or the structural integrity of the foundation, and without raising the level of the flood for the surrounding community.

In areas of the country where basements are the norm or flooding is not an issue, the concept of a raised wood foundation may be difficult to visualize. Rather than digging a basement or pouring a concrete slab, builders will work with a system of piers or pilings and wood beams to elevate the floor of the house off the ground, leaving a crawlspace underneath. The piers may be left exposed, the crawlspace enclosed by a screen and latticework, or a stem wall may be constructed around the perimeter of the foundation, closing the crawlspace off to animals or other unwanted guests, but leaving “flood openings” for floodwaters to flow through and preventing the water displacement that contributes to greater flooding of neighboring buildings. In extremely flood-prone areas, homes may be elevated 8 feet or more—high enough for cars to park underneath.

The technique is not a new one, and many of the Southern Pine Council’s tools for educating builders and the public about its benefits were developed before the devastating hurricanes of 2005. But the havoc wreaked by the storms on homes built at or below BFE provided new impetus for using wood to elevate homes out of harm’s way.

“We are seeing some changes,” Kaake said. “We have new building codes and better enforcement. Builders are paying attention to techniques required for wind and flood resistance. People are learning about elevation—they want to do the right thing. I feel like I have this great job because I get to help teach them.”

BUILDING A COMMUNITY OF RESEARCH

FPL SCIENTIST HEADS TO PURDUE TO PROMOTE PARTNERSHIPS

By Rebecca Wallace, Public Affairs Specialist

The Forest Products Laboratory (FPL) and Purdue University have joined forces in the interest of promoting and establishing cooperation in forest products utilization education, research, and development. Specifically, the partnership will have an emphasis on nanotechnology, forest biomass-to-energy, and forest biorefinery.

A five-year Memorandum of Understanding was signed in December 2006. Since then, FPL Materials Research Engineer Robert Moon has relocated to Purdue to establish joint research programs on nanotechnology between FPL scientists and Purdue faculty.

Nanotechnology in forest products is currently the emphasis area being most actively pursued. Purdue is home to the Birck Nanotechnology Center, a nanoscale science and engineering research center, but the University has yet to delve into forest products in this arena.

“Currently, Purdue does not have any programs in nanotechnology that focus on forest products,” says Moon. “This fact presents a great opportunity to start research programs with a clean slate.”



Robert Moon, FPL Materials Research Engineer, relocated to the Birck Nanotechnology Center at Purdue University to facilitate joint research.

Moon is working to identify areas of research at Purdue that might be applicable to wood science research or forest products development and then tying them in with the active research areas at FPL. This will lead to the development of a series of research programs that will be strongly influenced by the needs of the forest products industry.

“The initial goal of my work is to build a community at Purdue interested and active in nanoscale science and engineering of forest-based materials,” says Moon.

And in that respect, he has already been successful. Moon’s research on cellulose nanocrystals (nanoparticles derived from trees) involves Purdue faculty from several different departments (physics, mechanical engineering, materials engineering, and agronomy), none of which has previously considered forest-based materials.

Building on that interest, FPL scientists are now participating in joint research with Purdue that Moon initiated, and he is pleased with the cooperation thus far.

“I have been impressed by the open-mindedness of both FPL scientists and Purdue faculty, and by their willingness to work on these research projects,” says Moon. “I am encouraged by the level of support I’m seeing from both sides of this partnership and think it bodes well for the future of the program.”

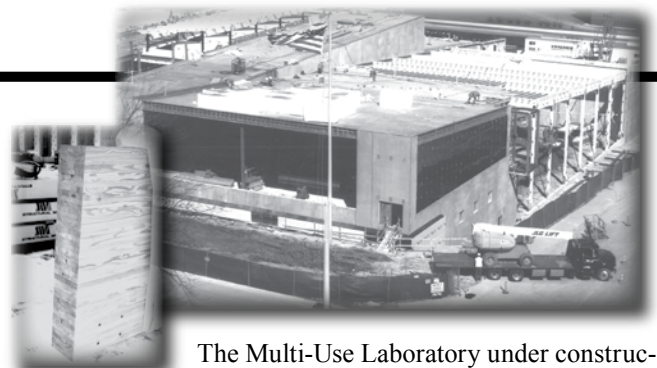
The long-term goal of this initiative is the establishment of a Forest Products Nanotechnology Center located at Purdue University. Over the next few years, Moon and many others will work to put the mechanisms in place needed to initiate the center. Until then, he will continue to focus on building communities at Purdue and the Forest Products Laboratory to bring nanotechnology to the forefront of forest products research.

ARE THEY USING WOOD?!

By Rebecca Wallace, Public Affairs Specialist

Although most people think of wood as a primary material for house construction, it is also very well suited for commercial buildings because of its excellent performance characteristics and economics.

“Currently, approximately 15% of commercial buildings in the United States are constructed with engineered wood components,” says Mike Ritter, Assistant Director for Wood Products Research at FPL. “This number is expected to increase substantially over the next five years through an education, technology transfer, and research program that has been initiated by the wood products industry.”



The Multi-Use Laboratory under construction at FPL (pictured above) is a shining example of wood in commercial construction; a multitude of engineered wood products are being used, including glulam beams, I-joists, plywood, and oriented strandboard.

MEETING THE PRESIDENT'S ENERGY CHALLENGE

A CONVERSATION WITH...FPL DIRECTOR DR. CHRIS RISBRUDT

By Gordie Blum, Office of Communications Director

The Forest Products Laboratory (FPL) has long been involved in research aimed at fermenting wood sugars into liquid fuels. In fact, during World War II, FPL had developed a workable solution to some of our military fuel shortages, but before the technology was employed, fortunately the armistice was signed, bringing the war to a close. Today, research on turning cellulose into liquid fuels focuses on refining those technologies to make them more efficient and cost competitive.

The President's Advanced Energy Initiative (AEI), first delivered in the 2006 State of the Union Address, is designed to help break America's dependence on foreign sources of energy. The AEI sets several goals:

- Cellulosic ethanol to be cost competitive by 2012
- 20 billion gallons of alternative fuels to be produced annually by 2017
- 75% of our Middle East oil imports to be replaced with alternative fuels by 2025
- 30% of our nation's fuel needs to be met with alternative energy sources by 2030

Recently, FPL Communications Director Gordie Blum sat down with FPL Director Chris Risbrudt for a few minutes to get his thoughts on how the Forest Service could be uniquely positioned to be a leader in meeting the President's goals.

The President's AEI is very aggressive. It would seem that alternative and more sustainable sources of energy and fuel are going to have to be further developed in order for us to meet those ambitious goals. What do you see as the Forest Service's role in helping us meet those demands and the needs of America?

I think everyone sees the need to produce liquid fuels from biomass. We are reaching the limits of what we can produce from food sources without causing problems such as rising food prices.

If you look at the numbers, woody biomass presents vast, virtually untapped potential. As the nation's largest forestry organization, the Forest Service must play a leading role in providing the technology necessary to convert woody biomass into liquid fuels.

How much potential do our forests hold for producing energy and fuel?



Forest Products Laboratory Director Chris Risbrudt discusses the Forest Service's role in the President's Advanced Energy Initiative.

The Billion Ton report put out jointly by the Department of Energy and the USDA stated that 1.3 billion tons of biomass was available to convert to liquid fuels and chemicals. About 40% of that total is woody biomass. That is a tremendous amount of material and theoretically could replace about one-third of our current total liquid fuel consumption in this country. So in the end, we could reduce our dependence on foreign oil, increase our national security, and improve the overall health of our forests by reducing forest fire fuel loads. That is high-impact, to say the least.

What are the major research hurdles we need to overcome?

We (the Forest Service) will need to focus our research program in three major areas. One is developing trees that grow fast. Even though we have a lot of biomass available in our forests, there is still room for plantation-grown species, such as fast-growing willows and poplar. Second, the big cost of using woody biomass is transporting it out of the forest. We need to find ways to reduce that cost. And third, FPL researchers need to figure out more effective ways of more efficiently converting the very tough cellulose molecule in order to reach wood's full potential as a biofuel.

What will it cost to carry out a research program to address those issues?

The Chief set the goal of replacing 15% of the nation's transportation fuel demand with woody biomass. What

(continued on pg. 6)

Meeting the President's Energy Challenge (continued from pg. 5)

we need to meet that goal is a 10-year program costing about \$70 million per year, which I've presented to the Chief and several members of the Forest Service National Leadership Team. That sounds like a lot of money, but the return on investment to the American public is potentially huge. Some of that money would go to the Lab, but some of it would go to other stations, industry partners, and universities.

What role do you see for the Forest Products Laboratory?

We've had a program on how to modify organisms to better ferment wood sugars for the past 25 years, essentially since the energy crisis of the 1970s. If we had placed more significant resources into this research for the past two decades, we'd be much further ahead now. At the same time, we have eight patents on one organism to convert wood sugars to ethanol that shows great promise, and we are viewed by the rest of the world as the world leader in this type of research.

Ultimately, for us to be successful, the work of the Lab has to benefit American's quality of life, rural economies, and the health of our forests. How do you see this happening through the energy initiative you've outlined?

First of all, we will be reducing the number of devastating forest fires occurring in our nation's forests by reducing the fuel loads. Second, we'll be supporting rural, forestry-based businesses by finding an economic outlet for the material that needs to be thinned. On the other end of the spectrum, there is also tremendous potential for job growth by incorporating biorefining principles into existing, large-scale wood products industries (see NewsLine, Spring 2006, <http://www.fpl.fs.fed.us/resources-products/newline/newline-2006-2.pdf>). Both of those items will also greatly improve the overall health of our nation's forests. And we'll also be reducing our dependence on foreign oil and improving our national security. Perhaps that's enough for one research initiative!

ASK FPL WE GET THOUSANDS OF INQUIRIES EACH YEAR. WE PRINT WHAT WE FEEL ARE SOME OF THE BEST QUESTIONS. HERE IS ONE WE RECENTLY RECEIVED.

Questions?

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WHAT TYPE OF WOOD ARE UTILITY POLES USUALLY MADE FROM, AND HOW LONG DO THEY LAST BEFORE THEY NEED TO BE REPLACED?

By Rebecca Wallace, Public Affairs Specialist

More than 160 million utility poles are in service in North America, and most of them are made from softwood species.

The Southern Pine lumber group (including loblolly, longleaf, shortleaf, and slash pines) are commonly used for three main reasons: they have thick sapwood that is easily treated with preservatives, they have the necessary strength and form (relatively straight and free of large

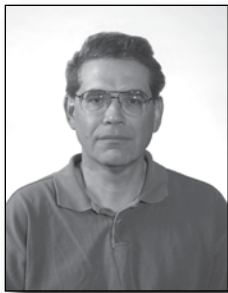
knots), and they are available in popular pole sizes. Douglas-fir, western redcedar, ponderosa pine, and western larch are also used, based on end-use requirements and availability.

The lifespan of poles can vary widely, depending on the properties of the pole, preservative treatments, service conditions, and maintenance practices. Properly treated poles can last 35 years or longer; however, their service life is often limited by the lines they support becoming obsolete, rather than the physical life of the pole.



FPL CHEMIST RECEIVES FULBRIGHT SENIOR RESEARCH AWARD

By Rebecca Wallace, Public Affairs Specialist



Dr. Kenneth E. Hammel, research chemist at the Forest Products Laboratory, has been named recipient of a Fulbright Senior Research Award by the German-American Fulbright Program.

Hammel will be studying mechanisms of lignin-degrading fungi, focusing on newly discovered enzymes that have an important role in carbon cycling in forest soils. These enzymes also have potential applications in biotechnology for selective oxidations of chemicals.

Professor Martin Hofrichter at the International Graduate School in Zittau, Germany, is hosting Hammel, whose 10 months of research abroad begin October 1, 2008.

The Fulbright Program, sponsored by the U.S. Department of State, Bureau of Educational and Cultural Affairs, provides exchanges between the United States and over 180 countries and territories worldwide. The program implements former Arkansas Senator J. William Fulbright's visionary concept of promoting mutual understanding between the United States and other countries of the world through academic and bicultural exchange.

NEWLY-CREATED POSITION FACILITATES BUSINESS DEVELOPMENT THROUGH PARTNERSHIPS

By Rebecca Wallace, Public Affairs Specialist

The Forest Products Laboratory (FPL) will be creating new partnerships with other organizations (including industry representatives, other government agencies, and universities) to enhance technology transfer in areas of wood products research.

In support of this effort, FPL is conducting outreach for a newly-created position, a Partnership Liaison Specialist (Development Officer).

According to Lee Nightingale, Assistant Director of Administration at FPL, the role of this new position is to:

- Strengthen and expand partnerships between FPL, the wood products industry, other federal agencies, and universities.
- Identify potential for joint research (for example, in the areas of nanotechnology, bioenergy, wood fiber/plastic composites, wood structures, and recycling).
- Seek opportunities to establish a business incubator between FPL, other federal agencies, and industry and university research scientists. There is potential to work with the Department of Defense, for example, on wood construction and recycling research.
- Establish the business incubator to provide innovations in wood products science.

“We are looking for strong leadership in starting up a national program which will link opportunities in Forest Service Research and Development with wood product research interests of other organizations,” says Nightingale. “Knowledge of or experience with the wood products research science community and a keen understanding of the interests and needs of industry research science are also important.”

The Partnership Liaison Specialist (Development Officer) position will be advertised soon at <http://www.usajobs.gov>

Watch for a feature story on the development of a business incubator at FPL in an upcoming issue of NewsLine.



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Published quarterly by
USDA Forest Service

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Spring 2008

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WOOD YOU BELIEVE...



Smokey Bear's famous slogan is one of the most recognized advertising phrases in the world, and is protected by federal law?

Smokey was the first individual animal to ever be honored on a postage stamp? This stamp commemorated Smokey's 40th birthday in 1984.

Information courtesy of http://www.fs.fed.us/r9/wayne/facts/smokey_bear.html

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