

LOUISIANA Agriculture

Assuring Our Future Through Scientific Research and Education

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Globalization:
Louisiana agriculture
reaches around the world



LSU AgCenter Global Network takes on new mission

John S. Russin

The LSU AgCenter has enjoyed much historical success with capacity-building projects around the world. Our researchers, educators and students have labored to innovate, educate and improve lives for citizens not only of Louisiana and the United States but also those of emerging countries. Fittingly, these international programs largely have been supported by competitive federal and private sector initiatives.

Changing federal funding strategies, coupled with increased need for value return to Louisiana, have highlighted the importance of sustained program development in selected, strategic global regions. We believe that regionally focused programming that plays to our strengths and leverages our private sector and diplomatic relationships will enable development of partnerships with key universities and companies.

The LSU AgCenter Global Network, formerly the Office of International Programs, will showcase the international components of our four-fold mission (teaching, research, extension and economic development) within a growing network of university and private sector partners. Further, we will serve LSU faculty, staff and students who have interest to work and study internationally. The following new vision and mission statements will guide toward our goals.

VISION: LSU will become the premier U.S. university in Central and Eastern Europe and Central America and the Caribbean Basin for agriculture and related sciences.

MISSION: We will develop enhanced international opportunities for faculty, students and staff; leverage partnerships for improved value return to LSU and Louisiana; cultivate opportunities for international research and technology development; and recruit international students and scholars at all levels.

Program activities will focus on growing the strongest possible partnerships in two target regions: Central and Eastern Europe and Central America and the Caribbean Basin. Partnership efforts will bring opportunities to LSU faculty, staff and students and engage industry and embassy partners to promote value return to Louisiana.

In recent years, we have leveraged our strengths to craft a network of international partnerships that we believe will establish LSU as the premier U.S. university in these target regions. Successes achieved thus far arise from our unique approach to capacity building. Like many universities, we train international undergraduate and graduate students to lead 21st century initiatives in agriculture, food, natural and renewable resources and the environment. But we take these foundational programs a step further. We work alongside current and emerging university leaders to provide mentorship and training in areas that will be key for relevance and engagement in their respective regions of the world.

Our efforts will be multifaceted and include joint research and technology projects, administrative mentoring and capacity building, student and faculty exchanges, and appropriate private sector partnerships that we will leverage to develop opportunities for international internships that will produce a globally engaged workforce. We will focus further on recruitment of LSU undergraduate and graduate students for study abroad programs and internship and practical training opportunities. Long-term goals also include dual degree programs with selected partner universities based on mutual academic interests.

We will internationalize the LSU AgCenter and the LSU College of Agriculture through strategic reciprocal partnerships and to establish our identity as the premier U.S. university in Central and Eastern Europe and Central America and the Caribbean Basin for agriculture and related sciences.



John S. Russin. Photo by Olivia McClure

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Blanchard, Elma Sue McCallum,
Olivia McClure, Johnny Morgan,
Karol Osborne and Bruce Schultz

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Linda Foster Benedict, Editor
Louisiana Agriculture
115 Knapp Hall
110 LSU Union Square
Baton Rouge, LA 70803
(225) 578-2263
lbenedict@agcenter.lsu.edu



www.LSUAgCenter.com

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John S. Russin is the director of the LSU AgCenter Global Network.

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ON THE COVER: The ports of south Louisiana allow the Mississippi River to serve as a low-cost option for shipping bulk agricultural commodities from America's breadbasket to destinations around the world. This UBC (United Bulk Carriers) ship stops at the Port of Baton Rouge. Photo by Bruce Schultz

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St. Helena Parish residents take advantage of revamped park

Residents of St. Helena Parish are enjoying new amenities at a local park thanks to Healthy Communities, an initiative led by the LSU AgCenter. Charlie Overton Park, just west of Greensburg, was rededicated on March 31 with an event featuring games, a petting zoo and informational exhibits. One group of visitors played basketball as others met Hershey, a goat who has a chocolate-colored coat.

Bianca Plant, the AgCenter area nutrition agent in St. Helena Parish, used a grant from the U.S. Centers for Disease Control and Prevention to make improvements at the parish-owned park.

"We have been able to upgrade this park with new bleachers and picnic tables," she said. "We have also started a farmers market, and we are developing a community garden."

This is the second year of the \$1.45 million grant, which funds programs in St. Helena, Madison, West Feliciana and Tensas parishes that encourage people to make healthier food and lifestyle choices. Each parish has an obesity rate of more than 40 percent.

"Events like this and others that we have planned are designed to get our people moving more and to help improve their health," Plant said. **Johnny Morgan**



LSU AgCenter area nutrition agent Bianca Plant, right, helps Hershey the goat make friends at the rededication of Charlie Overton Park near Greensburg on March 31. The event was part of the Healthy Communities project, which is funded by a U.S. Centers for Disease Control and Prevention grant. Photo by Johnny Morgan

Culinary workshop pairs 4-H'ers with local celebrity chef

Northeast Louisiana 4-H members learned culinary tricks of the trade from Chef Cory Bahr at a culinary workshop in March at Bahr's catering kitchen in Monroe. Eighteen 4-H'ers from eight northeast Louisiana parishes donned aprons and gloves to join Bahr for a two-hour, hands-on cooking lesson.

Bahr, an award-winning chef and Monroe native, said he sponsored the workshop to inspire the next generation of hospitality professionals to eat better, live longer and enjoy a healthier lifestyle.

The student chefs-in-training worked in teams to prepare Louisiana Gulf Coast shrimp and grits, one of Bahr's signature recipes.

"I loved how his energy filled the room and made me feel so welcome," Morehouse Magnet School seventh-grader Vincent Winston said.

Bahr, a Food Network "Chopped!" champion and recent

runner-up on the "Next Food Network Star" cooking show, is a former winner of the Great American Seafood Cook-Off and continues to host the annual competition held in New Orleans. **Karol Osborne**



Chef Cory Bahr shares cooking tips with 4-H members Renata Jones, center, of East Carroll Parish, and Averie Austin, of Madison Parish, at a culinary training workshop held at Bahr's Catering Kitchen in Monroe. Photo by Karol Osborne

National rice group tours research station

Members of the Rice Leadership Development Program toured the LSU AgCenter H. Rouse Caffey Rice Research Station and visited the crawfish farming operation of Christian and Julie Richard in Vermilion Parish in March.

Steve Linscombe, who retired last year as the station's director, is director of this program, which gives young men and women a comprehensive understanding of the U.S. rice industry, with an emphasis on personal development and communication training.

One of the presentations made at the research station was by leadership class member Adam Famoso, an AgCenter rice breeder.

"It's been a great experience to see the different practices at the station," said Zach Urrutia, a class member from Maxwell, California. He works for California Family Foods, and his family has a rice farm.

Another class member, Matthew Sligar, a rice farmer from Gridley, California, is making videos of the tours for YouTube and his website, rice-farmingtv.com.

Other members of the class are Brad Doyle, of Weiner, Arkansas; Brian McKenzie, of Plumas Lake, California; Scott Savage, of Bay City, Texas; and Zach Worrell, of Hornersville, Missouri.

The group also toured a grain-loading facility south of New Orleans. Other visits as part of this program are to rice-growing areas of Arkansas, California, Mississippi and Missouri as well as a trip to Washington, D.C., to meet with lawmakers who represent rice-growing states. They also will tour the John Deere combine-manufacturing facility and the Chicago Board of Trade.

John Deere Company, RiceTec Inc. and American Commodity Company are sponsors of the Rice Leadership Development Program through a grant to The Rice Foundation. USA Rice manages the program. **Bruce Schultz**



Dustin Harrell, fourth from the left, tells members of the Rice Leadership Development Program how a research plot is configured on the LSU AgCenter H. Rouse Caffey Rice Research Station. Photo by Bruce Schultz

Seed program supports sweet potato industry

When Louisiana sweet potato farmers begin planting later this spring, many of them will use transplants grown from seed from the LSU AgCenter Foundation Seed Program.

The AgCenter annually produces 10,000 to 15,000 bushels of foundation seed — sweet potato roots that farmers use to sprout the “slips” they cut and transplant to grow their crop. Each batch of seed roots originates from about a dozen plants that have passed rigorous screening for viruses, mutations and other problems.

There’s no way to tell if the plants are totally virus-free. But scientists make sure there are no signs of a few key viruses that pose significant threats to yields.

“We test for the viruses that we know about and provide evidence that they’re not there,” said AgCenter plant pathologist Chris Clark.

Plants to be used for foundation seed are checked for six viruses. Four are potyviruses, which are common on American sweet potato farms. The other two are not normally found in the commercial sweet potato industry. But they are devastating, Clark said, causing 80- to 90-percent yield losses if they show up alongside the standard potyviruses.

“We think it’s important to provide the service of keeping potential problems out,” he said.

Plants that prove to be “clean” are stored in glass containers to keep them safe from virus vectors. Each fall, the clean plants are transferred to greenhouses at the AgCenter Sweet Potato Research Station in Chase, where they grow into the next crop of foundation seed.

Planting virus-tested seed doesn’t guarantee farmers won’t run into trouble during the growing season.

“But we’ve found that even despite the low levels of reinfection we get, the seed is much better quality than it would be if we were not doing anything,” Clark said. **Olivia McClure**



LSU AgCenter plant pathologist Chris Clark is pictured in a lab where sweet potato plants that have been tested for viruses are stored on April 5, 2018. Photo by Olivia McClure

12 named to Louisiana 4-H Hall of Fame



A dozen new members for the Louisiana 4-H Hall of Fame were recognized April 28 at the 4-H Museum in Mansura, Louisiana. They were, left to right, front row, Deborah Gissel, of Jefferson Parish; Leonard Eisenstein, of St. Martin Parish; Rosanne Williams, of Livingston Parish for her late husband, David; Gayla Crum, of Concordia Parish; Brenda Foster McCoy, of Bienville Parish; and Mary Ann Sagrera, of Acadia Parish; back row, from left, Andrea Alday, of St. Charles Parish; Blue Rolfes, of Lafayette Parish; Elizabeth Jordan, of Caddo Parish; Kathy Landry, of St. Mary Parish; Gwen Broussard, of Vermilion Parish; and Sharon Nabours, of Calcasieu Parish. Photo by Bruce Schultz

Wheat success may offset depressed prices

LSU AgCenter experts, speaking at the annual wheat and oat field day on April 18 at the LSU AgCenter Tom H. Scott Research, Extension and Education Center in Winnsboro, Louisiana, reported impressive wheat production this year, which could offset depressed prices.

AgCenter plant pathologist Boyd Padgett said disease issues are the lightest he has seen in more than 30 years working with wheat.

Wheat acreage in Louisiana continues to decline. Growers planted 15,000 acres this year, which is lower than last year’s then-record low of 20,000 acres. Padgett said this is primarily because of scab disease, low market prices and several years of inclement weather.

AgCenter plant pathologist Trey Price said Fusarium head blight, or scab disease, has devastated the wheat industry over the past three years, resulting in yield losses from 15 to 20 percent.

To optimize disease control, Price said timing fungicide applications during flowering is critical. “You have only about a five-day window, and even with the best fungicide, only 50 percent control can be expected,” he said.

Karol Osborne



LSU AgCenter plant pathologist Trey Price provides treatment recommendations based on wheat fungicide trials at the AgCenter wheat and oat field day held April 18 in Winnsboro. Photo by Karol Osborne

Toby Lepley named new 4-H head

Toby Lepley, formerly with Texas A&M AgriLife Extension Service, began serving as the new associate vice president and program leader for 4-H youth development at the LSU AgCenter on April 1. He replaces Mark Tassin, who will be retiring July 31, 2018. Lepley was with Texas A&M AgriLife for the past 24 years, the past four as assistant state 4-H leader. Before that, he served as associate professor, county 4-H extension agent and 4-H program specialist in various locations in Texas. **Johnny Morgan**



College of Ag NEWS

College offers mentoring program

Mia Baker, a senior majoring in nutrition and food sciences, was one of the participants in the College of Agriculture's new mentorship program, which pairs students with alumni and supporters of the college for professional development and networking opportunities. Tara Smith, LSU AgCenter Northeast region director, served as Baker's mentor and introduced her to career opportunities in the AgCenter. Baker visited Smith in Winnsboro, Louisiana, at the Sweet Potato Research Station, where she met AgCenter nutrition agents and learned about the sweet potato industry. Baker will be working as an intern in community nutrition with the AgCenter this summer.



Students spend spring break in Nicaragua

College of Agriculture students spent spring break learning about agriculture in Nicaragua, and they visited the Laguna de Apoyo water crater. Back row, left to right, are faculty members Kristin Stair and Mike Kaller and students Chloe Christmas, Brooke Comeaux, David Baudoin, Preston Dumont and Adam O'Malley. Front row, left to right, are students Olivia Soler, Caitlin Holder, Hayley Jackson and Ashlyn Sak and John Russin, director of LSU AgCenter Global Network. The trip, organized by Go Abroad Nicaragua, was aimed at freshmen in the college from any major to give them an initial week-long international experience with the expectation that they would take part in another international experience later in college.

College honors students, faculty, alumni at awards ceremony

The College of Agriculture recognized outstanding alumni, faculty, students and donors at a ceremony on April 12. From left to right, below, are Chinmay Tikhe, Claudia Husseneder, Tara Smith, Jeff Hoy (in back), Madelyn Easley (in front), Michael Salassi, Reynold Minsky, Meghan Roberts, Krishna Paudel, Jerry Peters and Emily Kraus.

Outstanding Alumni awards were presented to horticulture alumnus Reynold Minsky, owner of Minsky Pecan Market and Providence Foods LLC., and dairy science alumnus and farmer Jerry Peters.

LSU AgCenter Northeast and Central region director Tara Smith received the Early Career Outstanding Alumni award. Smith received her doctorate in entomology from LSU in 2006.



Natural resource ecology and management senior Meghan Roberts received the Gerald and Norma Dill College of Agriculture Alumni Association Outstanding Senior Award.

Agricultural and extension education junior Madelyn Easley received the K.C. Toups Memorial Les Voyageurs Award. Easley is the Les Voyageurs social chair and public relations officer and president of Collegiate FFA at LSU.

Chinmay Tikhe, entomology alumnus and postdoctoral researcher at John Hopkins Bloomberg School of Public Health, received the LSU Alumni Association Distinguished Dissertation Award in Science, Engineering and Technology. Tikhe received his doctorate in entomology from LSU in 2017. This award goes to the top dissertation at LSU in the science, engineering and technology category.

Entomology doctoral student Emily Kraus received the Ray and Dorothy Young Endowed Assistantship in Louisiana Row Crop Integrated Pest Management.

Other awards went to Claudia Husseneder, entomology, the Paul K. Adams Professorship; Krishna Paudel, agricultural economics, the Gilbert Durbin Professorship; Jeff Hoy, plant pathology, the Floyd S. Edmiston Sr. Professorship; and Michael Salassi, head of the Department of Agricultural Economics and Agribusiness, the A. Wilbert's Sons Professorship.

Ecology junior gives TEDx Talk on coastal land loss

Two million Louisiana residents have homes along the coast, and their livelihood is threatened by the encroaching Gulf of Mexico, said Madelyn Smith, a junior in natural resource ecology and management in the College of Agriculture and one of 12 speakers during the TEDx Talks on campus in March.

Smith spent two years documenting and photographing the stories of threatened and soon-to-be threatened Louisiana coastal communities. The project resulted in "Louisiana Gone," a book filled with black and white photography accompanied with short stories aiming to humanize the experience of Louisiana's biggest challenge: coastal land loss.

The book was the focal point of Smith's TEDx Talk in which she told of the struggle for some coastal communities to survive. A staggering 40 percent of the world's population lives within 60 miles of a coastline. "Ultimately, the stories of Louisiana's disappearing coastline are not just Louisiana stories, they are American stories. They are global stories," Smith said.



New Faculty PROFILE

Kristin Stair helps students get broad view of agriculture

Tobie Blanchard

Kristin Stair is one of the few faculty members in the LSU College of Agriculture who gets a broad view of the college's students in all majors.

Stair, an assistant professor in the Department of Agricultural and Extension Education and Evaluation, is one of two rectors for the college's Agriculture Residential College. First-year agriculture students can participate in ARC. The students live in the same residential hall and take some classes together, including AGRI 1001, which Stair teaches. The class introduces students to many issues in agriculture.

"Our ARC program encourages a deeper understanding of agriculture and the importance of research. Through the AGRI course and the ARC program, students visit academic departments and research stations, participate in community service, are exposed to numerous clubs and organizations, and attend a wide variety of college activities," Stair said.

Stair has been instrumental in growing the agriculture and extension education program at LSU. She was hired in 2014 when the major moved from the College of Human Sciences and Education back to the College of Agriculture.

The department has seen an increase in students majoring in agriculture and extension education. Stair said it is vital to have qualified professionals who can educate youth and adults about agriculture.

"We are seeing new agriculture programs being added across the state, and so we are working harder than ever to recruit students. Our numbers have grown significantly during

the past four years, and we are gaining the reputation for putting out excellent students who have received a well-rounded agricultural education."

Stair recently took a group of students, including students from the residential college, to Nicaragua during spring break to learn about that country's agriculture.

The excursion was marketed to freshmen as a way to introduce them to international experiences while allowing them to travel with Stair and Mike Kaller, the other rector of the residential college — both faculty members they knew and trusted.

"This was a safety net experience for most of them — it was just a week and most of them knew each other, but that way they can see it's not so big and scary to travel to another country." Stair added that most of the students left Nicaragua planning international internships or research projects.

That was the point, Stair said, to get the students to see the value of international experiences early and perhaps encourage them to participate.

Stair also serves as the Louisiana program leader for the Go Teach Ag program — an initiative of the National Association of Agricultural Educators.

"As a former high school teacher, teaching others about the ag industry is really important to me," Stair said. "Getting to help students see the connections and experience agriculture is such a great part of my job."

Tobie Blanchard is the assistant director of LSU AgCenter Communications and the communication coordinator of the LSU College of Agriculture.



Kristin Stair, assistant professor in the Department of Agricultural and Extension Education and Evaluation, wears her FFA jacket from when she was a member.



Stair ziplines in Nicaragua, where she took a group of students to learn about agriculture in that country.

Globalization and Louisiana: Selected Perspectives on a Complex Issue

Mark Schafer

This issue of Louisiana Agriculture focuses on globalization and its connection to the state, industries and people of Louisiana. Consistent with the LSU AgCenter's mission to provide research-based educational information that serves the people of Louisiana and improves their lives and well-being, the articles in this issue provide a deeper understanding of how global processes influence our lives and well-being in multiple ways. Globalization entails much more than trade in food and fiber, but agricultural industries played a key role in the emergence of a global economy and continue to shape its transformation. For that reason, land-grant universities and agricultural research stations continue to have strong international and global programs that both understand and adapt to changing global systems and structures with powerful influences on society.

Maps like Figure 1, a hypothetical division of the world into five groups of nations, each with one-fifth of the world's population in 2014, can encourage a more global perspective. Deep-purple represents one nation, China, and blue includes only India, Bangladesh, Nepal and Bhutan. The other colors represent many nations with large and small populations added together to match China.

This special issue of Louisiana Agriculture includes articles that represent only a fraction of all possible perspectives on globalization and its implications. We do not claim to be comprehensive, but we hope to provide our readers with some insights to share and discuss with others.

Definitions of globalization have evolved with new perspectives. For many, the dimensions of globalization are economic, political and cultural. Economic perspectives explore the implications of increasing global economic integration, interconnectedness and interdependence. Often, economic perspectives ask how global processes shape economic inequality and opportunity within nations. Political perspectives explore the role of governments, military alliances, trade agreements and nongovernment organizations in the global system. Cultural perspectives explore how increased and changing flows of people, ideas, technologies, goods and services shape our ideals, beliefs and values. All these more social perspectives have been re-evaluated in light of ecological perspectives aimed at increasing understanding of human interactions with other species and the environment.

GLOBAL NETWORKS, EXPERIENCED STUDENTS, INTERNATIONAL EXCHANGE

As the world changes, the LSU AgCenter adjusts to better understand and take advantage of new opportunities and to gain the most value for our clients. John Russin, former vice chancellor for the AgCenter and now director of the Global Network, describes the process of retooling the former Office of International Programs into this new program. A driving motivation behind the change is to seek connections that add more value for AgCenter clientele, including opportunities for international public-private partnerships.

Robert "Bobby" Soileau, director of the Agricultural Leadership Development Program, reflects on the importance of international experiences in developing Louisiana's agricultural leaders. He shares a few selected insights and images that he and some program participants gained from their travel experiences and interactions around the world.

LSU AgCenter clientele include the students trained in the College of Agriculture who will become leaders in agricultural industries in Louisiana, nationally and globally. Leslie Blanchard, Rocio Lopez and Ivana Tregenza describe the College of Agriculture's efforts to provide students opportunities to gain valuable international experience, as well as opportunities for visiting students and scholars to both interact with our students and both learn about and contribute to agricultural research in Louisiana.

Susan Karimiha and David Picha describe the vigorous scholar and fellow programs in international agriculture. These programs foster scholarly collaboration and cultural understanding between AgCenter personnel, visiting international scholars, officials and private sector partners from numerous countries around the world. Visiting scholars typically stay for a year or less, but the collaborations often lead to longer-term, mutually beneficial research projects and exchanges.



Illustrated by Ana Iverson

AQUACULTURE, RICE, SUGAR, FORESTRY

Greg Lutz and Chris Green's article examines the global aquaculture industry, the role of the United States, and some implications for Louisiana. For example, Lutz and Green note that the use of Gulf of Mexico menhaden, a small forage fish, for fish oil and fish meal in global aquaculture has potential environmental consequences because these fish are also critical to the natural ecosystem.

Michael Deliberto, Huizhen Niu and Brian Hilbun focus on the global rice industry, arguably the most important food in the world today. Their article details the position of the United States and Louisiana in the global rice trade and concludes with a discussion of policy issues affecting Louisiana rice producers that govern trade with China, Mexico and Cuba that LSU AgCenter researchers continue to monitor as they develop.

Michael Deliberto and Mark Schafer in their article explain the role of global

and local temporary foreign labor markets. They discuss incentives that have led to a global temporary labor force and then describe trends in temporary labor in the United States and Louisiana, with a specific focus on Louisiana's sugar industry.

Richard P. Vlosky, Eric Hansen and Rajat Panwar examine the global nature of forestry and the forest product industry. The authors describe changes in the industry as a result of both increased global trade and increased global environmental awareness and marketing. They discuss implications of global trends for Louisiana.

TRADE INFRASTRUCTURE, THE ENVIRONMENT

Lynn Kennedy's article explores the key role Louisiana's ports in the world system of agricultural trade and explains why increased investment in port infrastructure may be required to ensure that Louisiana and the United States can

maintain a competitive advantage in agricultural exports moving forward.

Naveen Adusumilli in his article defines three key components of sustainable agricultural systems: meeting present needs, preserving capacity for the future, and preserving natural systems. The article discusses some key ideas in more detail — increasing productivity, the importance of trade, and minimizing environmental impacts — drawing examples that are particularly relevant to Louisiana, the United States and various other parts of the world. He explains the LSU AgCenter's critical role in promoting new ways of thinking and new practices to achieve sustainable systems and profitable enterprises.

Mark Schafer is an associate professor in the Department of Agricultural Economics and Agribusiness.

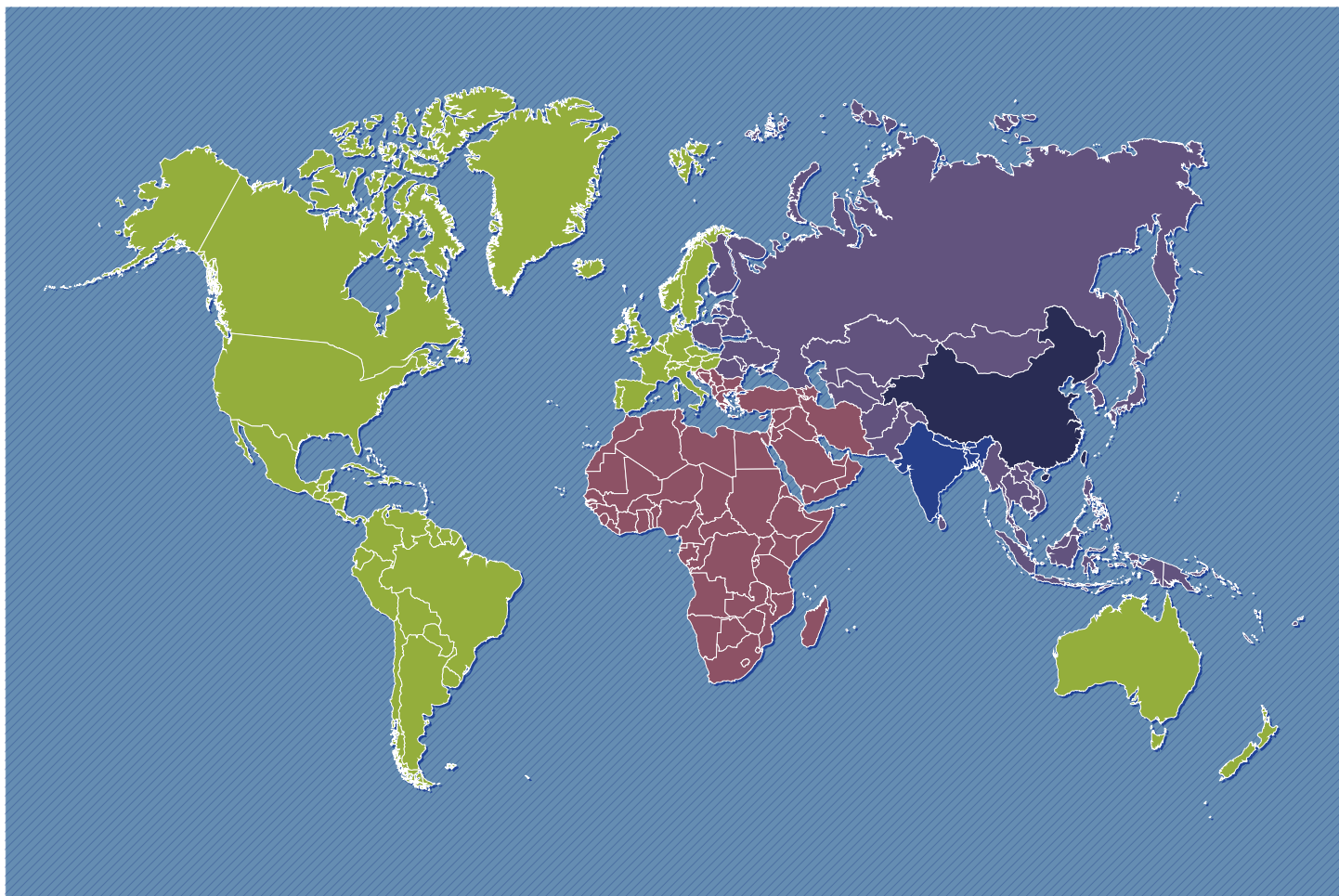


Figure 1. Map of five world regions with the same population as China, in deep-purple, in 2014.

Agricultural Trade and the Ports of South Louisiana

P. Lynn Kennedy

The Mississippi River is a unique resource that enhances the competitiveness of Louisiana and U.S. agriculture. Since the early history of the United States, investment in the infrastructure of both the upper and lower portions of the Mississippi has served to make the river the conduit of trade it is today. Current and future generations must continue to invest in this resource if it is to continue to serve as the primary artery for U.S. agricultural commerce.

The Mississippi River serves as a low-cost option for shipping bulk agricultural commodities from America's breadbasket to destinations around the world. The southward flow of the Mississippi River makes barge transportation a relatively inexpensive way to transport bulk commodities to export terminals in Louisiana. The U.S. agricultural sector benefits from this efficient river complex and the competitive advantage it provides. This advantage increases as sustainability is included in the mix and as fuel costs rise.

The Mississippi River serves another important purpose because shipping via barge removes trucks from our highways and reduces the number of railcars needed. These realities

serve, alternately, to lessen the congestion on our highways and roads and to decrease traffic at rail crossings and on the railroads, thus improving societal welfare. Perhaps more importantly, increased bulk commodity transportation via barge serves to decrease transportation fatalities because fewer trucks are on the road and frequency of railroad crossings is lowered.

These advantages result from the natural existence of the river and have been enhanced by historic and ongoing investment in this complex transportation system. In the case of the Upper Mississippi River system, the steep slope of the river has necessitated the creation of a system of locks and dams stretching from the Twin Cities in Minnesota to St. Louis, Missouri. This infrastructure allows the Upper Mississippi to be navigable by the barges that carry bulk agricultural commodities as well as other commercial products. As the river passes south of St. Louis, the relatively flat grade of the river allows for navigability without the need for locks and dams. Instead of investment in locks and dams, upkeep of the lower portions of the river requires continual investment in dredging and levee maintenance.

Table 1. New Orleans Customs District (NOCD) agricultural commodity exports, 2017

Commodity:	Share of U.S. ag exports passing through NOCD by volume	Distribution of ag commodity exports passing through NOCD by value
Soybeans	59.19%	50.97%
Corn	56.59%	20.12%
Wheat	15.92%	3.67%
Rice	58.13%	3.05%
Soybean Oil	57.48%	1.97%
Vegetable Oils (except soybean)	30.32%	1.52%
Soybean Meal	50.40%	0.63%
Feeds & Fodders NESOI	29.47%	1.82%
Distillers Grains	39.84%	2.91%
Ethanol (nonbeverage)	22.62%	2.18%
Biodiesel & Blends > B30	20.06%	0.37%
Other	-	3.78%
Total Ag & Related Products	38.39%	100.00%

Source: USDA/FAS, Global Agricultural Trade System Online Database



■ Loading soybeans at the
Port of Baton Rouge.

Photo by Bruce Schultz

The ports of south Louisiana stretch from Myrtle Grove at mile marker 61 northward through New Orleans, the Port of South Louisiana (which includes Convent, St. Elmo, Reserve, Destrehan, Ama and Westwego), Gramercy to Darrow and, finally, the Port of Baton Rouge at mile marker 228. This vast complex of port facilities and grain elevators links the United States with agricultural markets around the world through an intermodal transportation system accessible via truck, rail, barge and ocean-going vessel.

The ports of south Louisiana are of vital importance for the export of U.S. soybeans and corn. The New Orleans Customs District (NOCD) accounts for over half of United States exports of soybeans, corn, rice, soybean oil and soybean meal (Table 1). At the same time, these products constitute the lion's share of NOCD export volume as corn, soybeans and soybean-derived products account for over 80 percent of agricultural exports going through Louisiana ports. In 2017, soybeans accounted for over half the volume of agricultural exports going through Louisiana.

In contrast to the dominant position the ports of south Louisiana hold with respect to agricultural exports, the NOCD plays a much smaller role in U.S. agricultural imports. In 2017, only 2.87 percent of U.S. agricultural imports passed through the New Orleans Customs District, as compared to 39 percent of U.S. agricultural exports. One reason for this divergence is that the concentration of U.S. agricultural production in the Midwest makes the ports of south Louisiana the logical point of embarkation for agricultural commodities being shipped to markets around the globe. A higher concentration of U.S. population on the coasts, away from the Mississippi River, results in a decreased importance of the NOCD for agricultural imports.

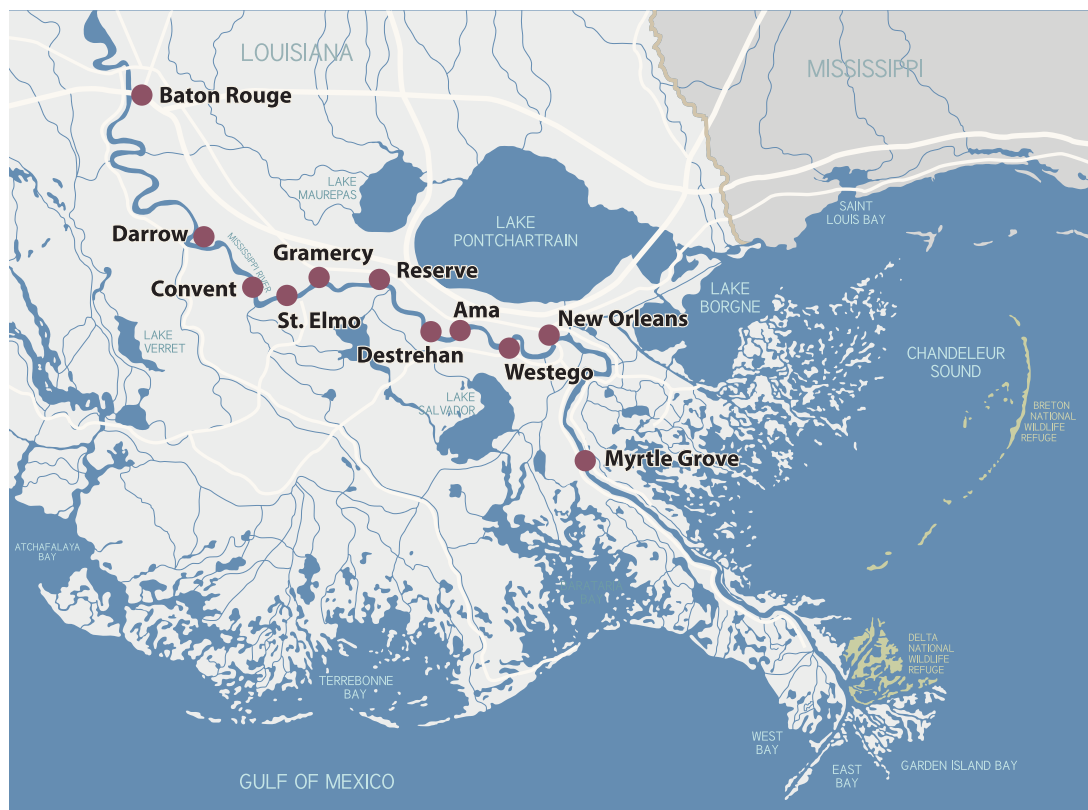
The current policy environment also plays an important role in determining Louisiana agricultural trade volumes. The U.S. withdrawal from the Trans-Pacific Partnership (TPP) and the announced renegotiation of the North American Free Trade Agreement (NAFTA) create uncertainties with respect to their implications for U.S. agriculture. The U.S. decision to withdraw from the Paris Accord creates uncertainties on the environmental front that will affect U.S. agricultural trade, both with respect to the reaction of countries that are markets for U.S. agricultural products as well as our ability to compete through the elimination or reduction of environmental regulations. While the U.S. treasury secretary has been directed to label China a currency manipulator, the tremendous economic growth in the United States only adds to U.S. purchasing power and exacerbates the Chinese trade surplus with the United States. At the same time, the commerce secretary and the U.S. trade representative have been directed to identify all foreign trading abuses that unfairly affect American workers and use every tool under American and international law to end those abuses immediately, which could potentially result in retaliation. These policy responses all affect the competitiveness of U.S. agriculture in the world market and will influence the volumes of agricultural trade passing through the mouth of the Mississippi River.

Another factor that will influence the future volume of trade passing through Louisiana ports is the recent expansion of the Panama Canal, which has doubled its capacity and allows for the passage of larger ships. This has resulted in the use of a new class of ships, known as New Panamax, or Neopanamax, which can carry over twice the cargo of previous Panamax vessels. These new, larger ships will allow for cargo to be

shipped more efficiently and at a lower cost through Louisiana ports. At the same time, they necessitate that port facilities be compatible with these new vessels, requiring increased investment in modernization and maintenance.

Forward-thinking, proactive measures taken by previous generations have created the Mississippi River infrastructure that makes U.S. agricultural exports as competitive on the world market as they are today. Without reinvestment in this resource to maintain its transportation efficiency, the U.S. risks losing this competitive advantage.

P. Lynn Kennedy is the Crescent City Tigers Alumni Professor in the Department of Agricultural Economics and Agribusiness.



Louisiana's Rice Exports and Share of Global Trade

Michael Deliberto, Huizhen "Jane" Niu and Brian Hilbun

For many people, rice is the principal source of caloric intake, with demand being highest in developing countries. In terms of a global perspective, rice production and consumption are highly concentrated in Asia.

The ability to secure a prominent share of the export market is important for all domestic rice producers because over half of the annual rice crop is destined for the global market. The United States is one of the leading exporters of rice, accounting for around 10 percent of the annual volume of global rice trade. The major U.S. rice-producing states are Arkansas, California and Louisiana, with a smaller share of the domestic grain produced in Texas, Mississippi and Missouri. Programs that address and promote the role of trade are critical to the long-term viability of the industry. Trade agreements, both existing and emerging, in addition to global food assistance shipments, seek to promote and grow the U.S. rice brand in the global marketplace. Examples would include efforts made by trade promotion boards and two public/private marketing tools: the Market Access Program and the U.S. Department of Agriculture Foreign Market Development Programs.

Rice exports include rough (unmilled), parboiled, brown and milled rice. Rough rice is rice that comes directly from the field after harvest and includes the husk and bran layer. Parboiled rice is rice that has undergone a steam process before being milled. This is done to gelatinize the starch contained in the rice kernel and increase nutritional value, as compared to milled white rice. Brown rice is rice that has only had its exterior hull removed, is highest in nutritional value, with a pleasing nutty flavor, but takes the longest to cook. Milled rice is rice that has had the husk and bran layer removed. The Western Hemisphere is the largest market for U.S. long-grain rice. Combined medium- and short-grain rice is exported to northeast Asia as part of World Trade Organization (WTO) agreements. Medium-grain rice is also exported to Africa and the Middle East. According to the U.S. Department of Agriculture, Mexico and Central America are regular purchasers of U.S. rough rice.

In 2016, the United States produced more than 7 million metric tons of rice (milled-equivalent), where milled-equivalent refers to rice that has had its husk and bran layers removed. Over the past five years, domestic production of rice has ranged between 6.1 and 7.1 million metric tons. Over the past half-decade, exports are typically more than 3 million metric tons, reaching a high of 3.4 million metric tons in 2016. Top international markets for U.S. rice include: Mexico, Haiti, Central America, Canada, Colombia, Peru, Hong Kong, Japan, South

Korea, Taiwan, Turkey, the European Union, Ghana, Jordan and Saudi Arabia. By class, a majority of long-grain rice exports are destined for the Western Hemisphere. Major medium- and short-grain rice export markets include: Canada, the Middle East and northeast Asia (as part of WTO trade commitments).

Seven countries (India, Thailand, Vietnam, Pakistan, the U.S., Burma and Cambodia) accounted for over 85 percent of global rice exports in 2016/2017 (Figure 1).

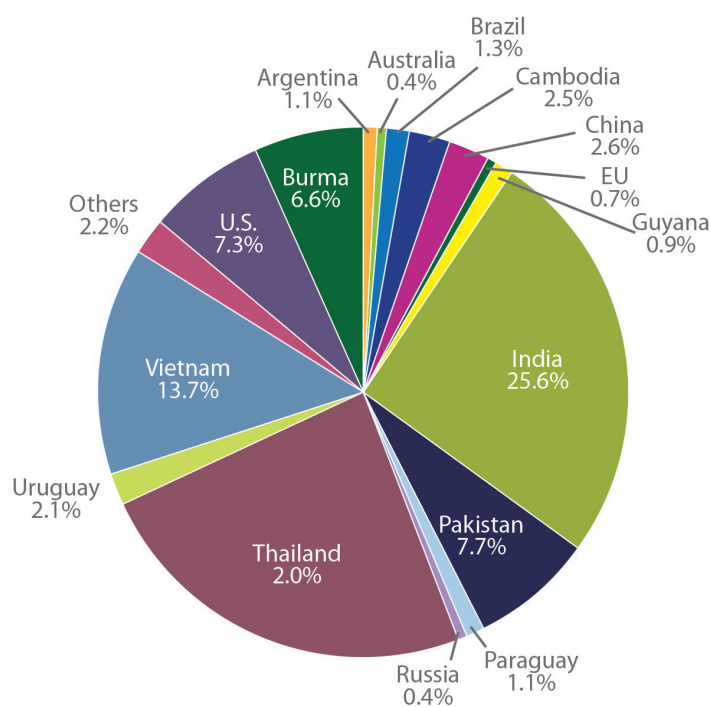


Figure 1. Global rice exports by country in 2016/17.

Although China and India are the two largest rice producers in the world, their respective export share of production can be misleading (Figure 2). Given the sheer size of the rice crop produced and harvested in China and India annually, it must be borne in mind that the rice produced both in China and India is primarily for domestic consumption. Even so, India's share of the export market is still almost 10 times that of China's. It is interesting to note that China holds 65 percent of world rice stocks. A possible explanation of this policy is that China is trying to build up its grain reserves. Thailand, Pakistan and the U.S. export approximately half of their domestic production.



These bags of Louisiana rice await being shipped out of the Lake Charles, Louisiana, port grain facility. Photo by Bruce Schultz



Adam Famoso, LSU AgCenter rice breeder, far right, shows different breeding lines to representatives of an Italian rice seed company during their visit to the H.R. Caffey Rice Research Station, Crowley, La. This station, regarded as one of the premier rice stations in the world, receives regular visits from officials around the world. Photo by Bruce Schultz

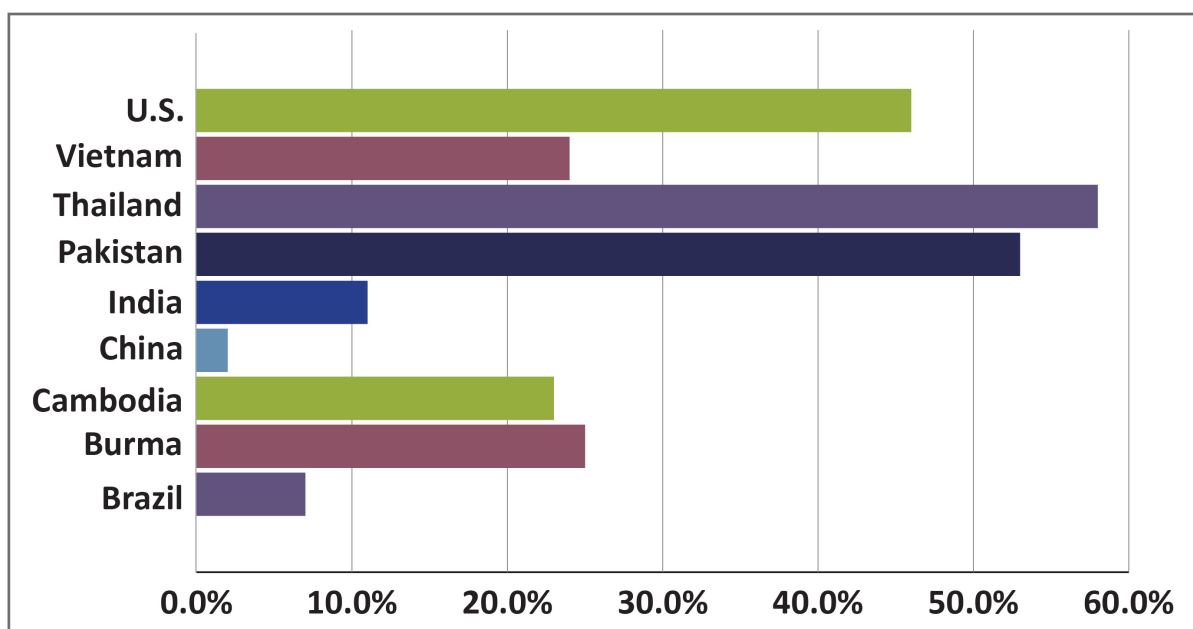


Figure 2. Exports expressed as a percentage of total rice production in 2016/2017 in selected countries.

Data from the U.S. Census Bureau provide export statistics for goods valued at more than \$2,500 per commodity shipped by individuals and organizations from the U.S. to other countries. The value of total rice exports (expressed in U.S. dollars) is presented in Figure 3. Mexico, Canada, Japan, Saudi Arabia, Columbia and Venezuela represent the lion's share of rice exports.

Specific to Louisiana, rice, rough or unprocessed, joins soybeans, soybean oil and corn as being in the list of the top 10 commodity exports. These agricultural exports represent slightly over a 36 percent share of Louisiana's total 2016 export sales. Data from Figure 4 illustrate the value of Louisiana's total rice exports. The nations of Mexico, Venezuela and Colombia represent major economic contributors to the state's export earnings.

Recent policy developments between China and the U.S. include a finalized phytosanitary protocol being signed, which is the removal of a key barrier to exports being sent into China, which has 1.4 billion people. China is the largest producer, consumer and rice importer in the world. A phytosanitary protocol is an agreement where two parties, such as China and the U.S., ensure that in the course of the transmission and transportation of a commodity, that it is in its natural state free from pathogens and any other agents deemed harmful to humans, such as pests.

Another top priority of the rice industry is emphasizing the importance of the North American Free Trade Agreement (NAFTA) to domestic rice producers because Mexico is a major rice-consuming market for the U.S.

Another policy consideration of interest to the rice industry is the possibility of establishing a vibrant rice trade with Cuba. Before the embargo, Cuba was one of the largest markets for U.S. rice.

In summary, rice is a staple agricultural commodity in the portfolio of products that Louisiana produces for export.

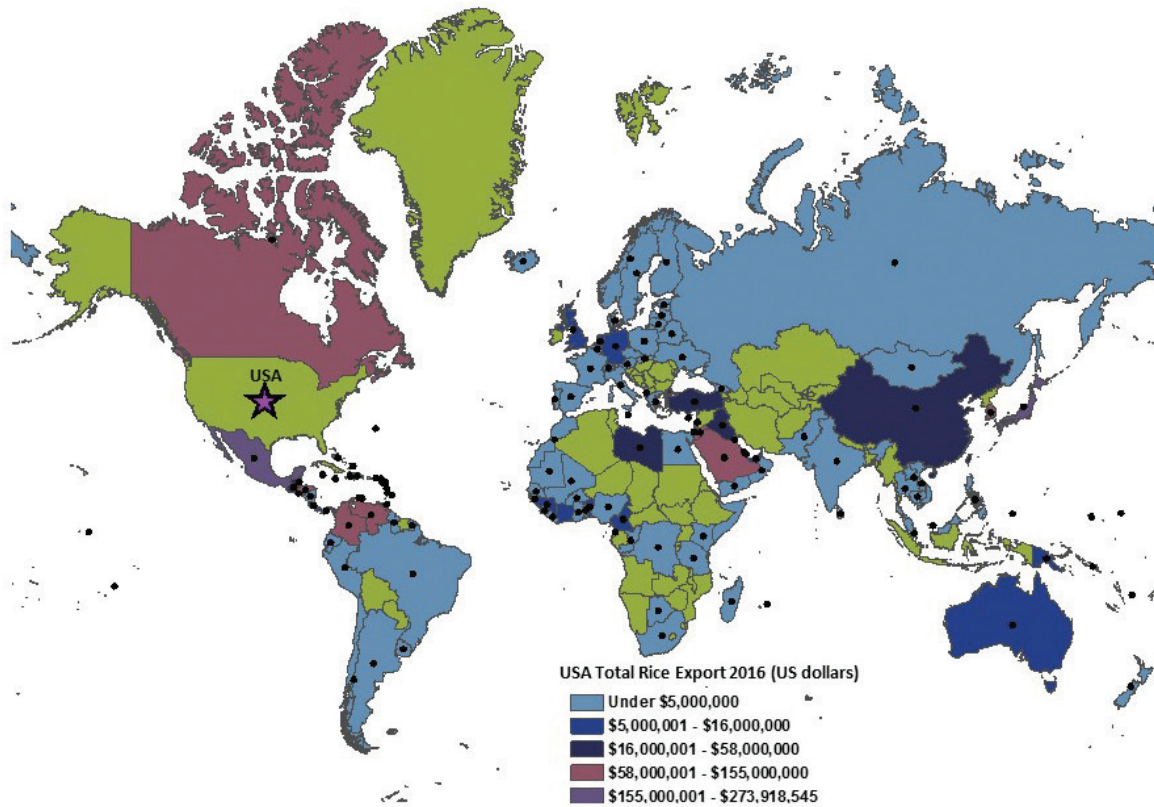
Trends in rice exports for Louisiana are encouraging when one looks at the period from 2011-2016. Louisiana's total rice exports were 11.38 percent higher in 2016 than they were in 2011, compared to 13.78 percent lower for total U.S. rice exports during that same period. Louisiana's exports of milled rice were 3.31 percent higher in 2016 than they were in 2011, compared to U.S. levels that were nearly 20 percent lower for 2016 than they were in 2011. A bit of bright news for both Louisiana and the total U.S. rice export markets are rough rice exports, with Louisiana enjoying a 19.12 percent increase in 2016 as compared to 2011 and the U.S. enjoying a 9.41 percent increase in 2016 over 2011 levels.

For Louisiana, it is evident that Mexico, Central America and South America are vital export markets for Louisiana rice. These markets will continue to evolve with increases in demand that come about from increases in population growth; however, this increased demand will evolve at a slower rate due to changes in population dynamics in the Western Hemisphere. Markets must be developed and new demand sourced for Louisiana to maintain the rate of growth in the global rice export market. China remains a potential bright spot and hopeful target of Louisiana rice exports once agreement can be reached regarding Chinese phytosanitary requirements. Possible détente with Cuba may open that nation to Louisiana rice exports and with the highest per capita consumption of rice in the world (at roughly 132 pounds per person per year), it would be welcomed.

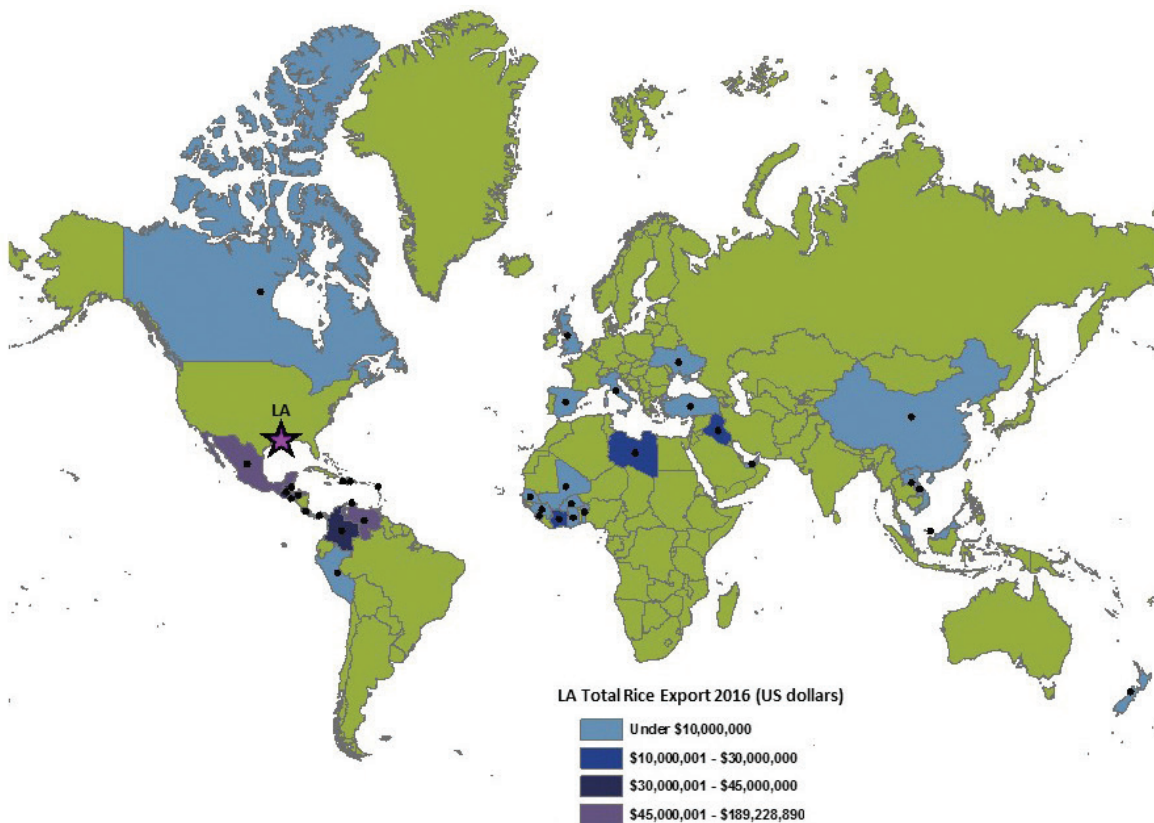
Michael Deliberto is an assistant professor; Huizhen "Jane" Niu, an instructor; and Brian Hilbun, a research associate, all in the Department of Agricultural Economics and Agribusiness.

Author's Note: Sales to Hong Kong and Macau appear in the boundary for the People's Republic of China. This is because Macau and Hong Kong are special administrative regions with their own currency, government and officials. They are not independent countries.

■ Figure 3. Total U.S rice exports in U.S. dollars in 2016.



■ Figure 4. Louisiana total rice exports in U.S. dollars in 2016.



Aquaculture:

A Global Perspective

Greg Lutz and Chris Green

Seafood is one of the most important sources of animal protein consumed by humans worldwide. Almost half a billion people depend on fish as their principal source of protein, and roughly half of the world's population rely on fish to supply some 20 percent of their protein needs. Increasingly, this demand is being met through aquaculture, the farming of aquatic species under controlled conditions. In 2012, aquaculture production (66 million tons) had already surpassed beef production (63 million tons) on a global basis, and people now eat more seafood raised within aquaculture farms than harvested from the wild (Figure 1). It is widely recognized that aquaculture will need to continue its current expansion trend to meet the protein demands of a growing global population (Figure 2).

Aquaculture was once the fastest growing segment of U.S. agriculture; however, a number of factors have contributed to a reversal in this trend in recent years. For example, shortly after mandates for ethanol in gasoline supplies were put into place in the 1990s, the cost of a ton of catfish feed in north Louisiana went from \$220 to \$485. Although feed prices have stabilized somewhat since then, the U.S. catfish industry has declined by more than two-thirds in less than two decades (from 189,700 acres in 2001 to 61,860 in 2018, according to the U.S.

Department of Agriculture National Agricultural Statistics Service). Other sectors of U.S. aquaculture have also struggled during this period. Globally, the U.S. ranks 15th in aquaculture production, representing only a 0.7 percent share of the total. Industry observers cite high costs, excessive regulations, difficulty obtaining farm financing and unfair competition from imported products as continuing threats to industry survival, let alone expansion.

Nonetheless, some bright spots remain in the domestic industry, and most of them can be found in Louisiana. Shellfish production is expanding in many coastal areas of the U.S., and regional industries like crawfish and alligator farming have so far bucked the national trend of decline. In addition to numerous minor species, the state accounts for 85-95 percent of U.S. crawfish production, is the top producing state for alligators and is home to a large number of oyster leases, operated by some 1,170 producers. In 2016, Louisiana led the nation in the production of eastern oysters, producing over 12 million pounds, while South Carolina was a distant second with roughly 4.8 million pounds.

Consumption of aquaculture products in the U.S. is steadily increasing. The top seafood commodities ranked by annual per capita consumption (pounds per person) include:

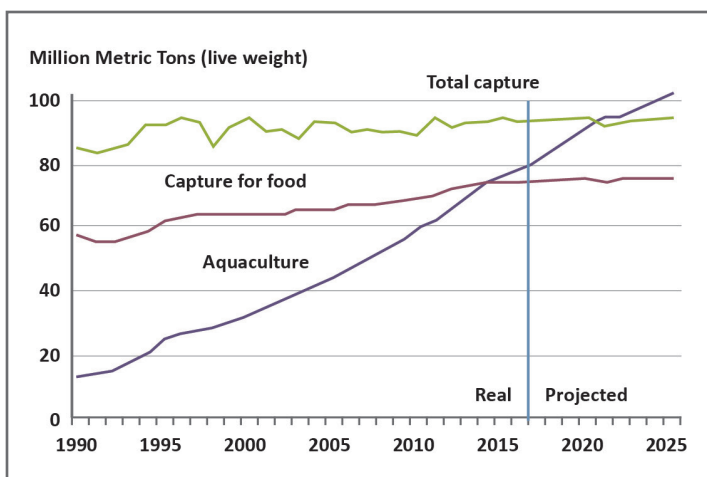


Figure 1. World aquaculture and wild capture fisheries production from 1990 to 2025 (real and projected). Total capture fisheries include harvests destined for food, fishmeal and industrial uses. Source: OECD-FAO Agricultural Outlook 2017-2026

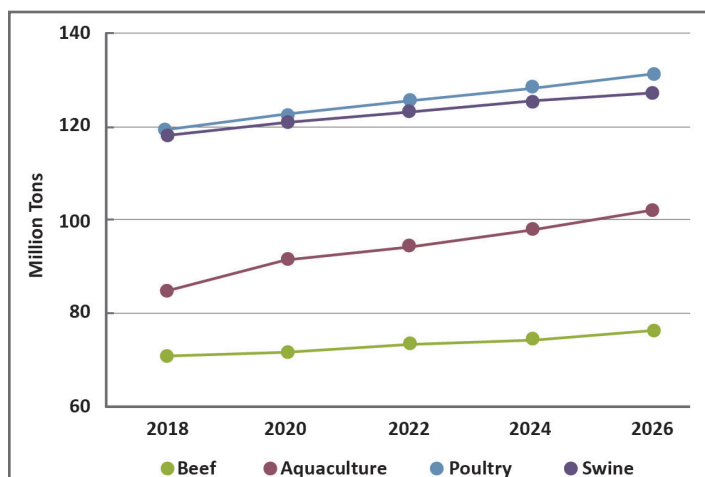


Figure 2. Global projections from the Food and Agriculture Organization of the United Nations for production (million tons) of beef, aquaculture, poultry and swine from 2018 to 2026.

shrimp (3.8), canned tuna (2.4), salmon (2.2) and tilapia (1.5). With the exception of tuna, aquaculture has grown to become the primary source for these favorite commodities.

More than 90 percent of the shrimp consumed in the U.S. are now farm-raised — elsewhere. Shrimp are farmed in many countries, with production concentrated in south and southeast Asia and tropical regions of the Americas. Global shrimp aquaculture production reached 2 million tons in 2015. New diseases seem to crop up every few years in shrimp aquaculture, and these pathogens often find their way around the planet. Recently, novel diseases have severely reduced shrimp production by traditional Asian suppliers such as Vietnam and Indonesia, but India has emerged as a new powerhouse in farmed shrimp markets.

Salmon are also farmed worldwide wherever temperatures are cold enough, with global production surpassing 2.3 million tons in 2016. In Europe, major producing nations include Norway, Scotland and Iceland, and in the Americas the industry is concentrated in Chile and along the Pacific coast of Canada. Production also occurs in New Zealand, Russia, China and South Africa. As has been the case with shrimp, salmon farmers have had to contend with disease problems caused by various viruses, bacteria and parasites.

Tilapia, like shrimp, are primarily farmed in Asia and the warmer regions of Latin America. Fast-growing, hardy and forgiving, tilapia are the second most-farmed fish on the planet, with harvests reaching 5.9 million tons in 2016. To date, tilapia producers have avoided major disease problems, but over the past four years a newly described virus that can decimate tilapia populations has spread from Israel to a number of countries in Latin America, Asia and Africa.

Although none of the tuna Americans currently consume originates in farms, that could be changing in the future. Significant resources are being devoted in a number of countries to close the life cycle of various tuna species and develop diets suitable for their unique metabolisms. A recent study by the United Nations Food and Agriculture Organization (FAO) concluded that the U.S. is the country with the greatest potential for offshore aquaculture when considering environmental and economic factors, and in December 2015, the Federal Office of Management and Budget gave approval for the National Oceanic and Atmospheric Administration's rule for implementation of an Offshore Aquaculture Fisheries Management Plan for the northern Gulf of Mexico.

Connectivity between Louisiana and global aquaculture can be seen in some unlikely places. Several Louisiana businesses have played a role in the development of innovative filtration technology that is sold around the world for recirculating systems. Gulf of Mexico menhaden serve as an important source of fish oil and fish meal in aquaculture feeds around the world. However, in recent years the industry has been increasingly using proteins from plant sources. Low-gossypol cottonseed is used for both protein and oil in aquaculture diets, and soybean meal and soy protein concentrate are the main ingredients in most manufactured diets for aquatic species. The U.S. Soybean Export Council expends considerable funds each year on research and extension projects to promote aquaculture in numerous countries across the world.

Aquaculture Research Station

The LSU AgCenter Aquaculture Research Station, south of Baton Rouge, comprises 178 acres, with a 22,000-square-foot facility housing laboratories, classrooms, offices, a hatchery building, an alligator research building and more than 200 outdoor fiberglass tanks, each with soil, a water supply and aeration for replicated production research. Faculty specializations include physiology, genomics, nutrition and selective breeding. Scientists conduct research on crawfish, catfish, oysters, alligators, baitfish, turtles and a variety of freshwater game fish and endangered species. The goal is to make Louisiana's aquaculture industry, currently valued at more than \$591 million, more competitive in the global economy. Research on coastal plants, bred to grow quickly and help Louisiana's receding coastline, is also conducted at this facility.



Scientists from around the world visit the LSU AgCenter Aquaculture Research Station. Robert Reigh, director of the station, at left, gives a tour in September 2017 to a group from China. Photo by Olivia McClure

Aquaculture may not be growing significantly in the U.S., but many research and academic disciplines within the AgCenter continue to have direct relevance in its ongoing global development. Some examples include animal nutrition, reproductive physiology, genomics, quantitative genetics and biological and mechanical engineering. Nutrition studies are focusing on identifying new dietary supplements and substituting conventional aquaculture feed ingredients to reduce costs while maintaining or improving performance. Physiological research is providing new insights into fish reproduction and immune function, and genetics and genomics are being combined to improve selection response in a number of aquatic species around the world.

Greg Lutz is a professor and Chris Green is an associate professor at the LSU AgCenter Aquaculture Research Station.

■ St. Mary Sugar Co-op,
Jeanerette, Louisiana.

Photo by Al Maclean

An aerial photograph of a sugarcane field. In the foreground, a large industrial mill with a grey roof and several smokestacks emitting white smoke is visible. A winding canal or irrigation ditch runs alongside the mill. The background shows vast green sugarcane fields stretching towards a distant treeline under a clear sky.

Temporary Foreign Labor and Sugar in Louisiana

Michael Deliberto and Mark Schafer

Louisiana's sugarcane growers and sugar processors use temporary foreign labor, mostly from Mexico, when they are unable to fill positions with U.S. citizens. These workers represent one part of a global network of millions of men and women from lower-income nations seeking temporary work in higher-income nations. The United States and Canada host temporary labor migrants primarily from Mexico and other Central American and Caribbean nations. Wealthier European nations host guest workers from Eastern Europe, Turkey, Africa and Asia. Japan and wealthier Asian nations (South Korea, Singapore, Malaysia and Thailand) host temporary laborers from India, Nepal, Indonesia, Bangladesh, and other poorer Asian nations. In Kuwait, Qatar and the United Arab Emirates, as

many as 90 percent of people living and working there are temporary workers from Asia and Africa.

One reason employers may find it difficult to fill temporary positions is that most people desire more stable, permanent jobs. At the same time, guest worker programs can appeal to younger workers from lower-wage nations seeking higher incomes they can use to generate savings or to send a portion of their pay to family members in their native lands. Globally, guest worker programs vary widely in structure, but many offer employment opportunities eight to 10 months each year, and many workers seek to return to the same or similar position for consecutive years with the hopes of saving and investing back home. Employers also value returning workers for their training and experience.

Temporary foreign workers can be distinguished from migrants primarily by their intention to return to live and work in their country of origin. Although all types of migrants send remittances to their families, temporary migrants send a larger proportion of their pay back home because of their long-term intention of returning. Moreover, temporary migrants are less likely to bring family members with them when they go abroad to work. Guest worker programs require workers to secure their positions while still residing in their home country and pay recruitment and travel costs to contract labor organizations. Host countries pursue various policies, such as modifying wages and recruitment costs or instituting caps, to attract more temporary workers or to limit their numbers.

IMMIGRANTS AND TEMPORARY WORKERS IN THE UNITED STATES

The politics of immigration in the United States has generally focused on the large increase in the unauthorized (illegal) immigrant population, from about 3.5 million in 1990 peaking at around 12 million in 2007 and then declining to the current estimate of about 11 million. Roughly half of all unauthorized immigrants in the United States are Mexican nationals, while the other half come from other nations, but mostly from Central American and a few Asian countries.

Of the 34 million authorized foreign-born individuals living in the United States, about 20 million have become naturalized citizens, 12 million are lawful permanent residents, and 2 million are lawful temporary residents. Of these, about 1.4 million are legal temporary workers under various nonimmigrant visa categories. The other lawful temporary residents are students

or spouses and children authorized to stay in the United States. Many lawful temporary workers may be allowed, at some point, to transition to a permanent legal status. For example, some international faculty with the LSU AgCenter were initially awarded a temporary H-1B work visa and later obtained legal permanent residency. International agricultural researchers constitute a large and ever increasing proportion of all agricultural researchers in the United States. Certain categories of visas, however, are strictly for temporary foreign workers who are required to return home after a specified period.

H-2A AND H-2B WORK VISAS IN LOUISIANA AGRICULTURE AND SUGAR

Louisiana's agricultural producers may use the H-2A temporary guest worker program if they are unable to fill all needed positions in general farm or field work with U.S. citizens. Other Louisiana industries, such as sugar mills,

plant nurseries and seafood processors, may participate in the H-2B visa program to secure foreign workers for nonagricultural positions if they cannot fill those positions with U.S. citizens. In practice, employers that use both programs hire both U.S. citizens and temporary foreign workers to meet their labor needs. These two temporary foreign worker programs offer two protections for domestic U.S. workers. First, they prevent the displacement of domestic workers by temporary foreign workers. Second, the programs protect domestic workers' wages by insisting that all workers are paid an "adverse effect" wage rate — a minimum wage that must be offered to both foreign and domestic workers. Finally, labor certification under both programs is temporary, typically specifying a 10-month period. The H-2A agriculture worker program does not specify a yearly limit on the number of foreign workers who may be issued visas. However, the total number of foreign workers who can be certified under the H-2B nonagriculture worker program is limited.

Table 1. Labor costs per management stage of a Louisiana sugarcane crop.

Crop Stage	Total Direct Cost per acre	Total Labor Cost per acre*	Labor Share
Fallow Activities	\$123.50	\$28.74	23%
Cultured Seedcane	\$523.71	\$3.43	<1%
Hand Planting	\$213.26	\$96.49	45%
Mechanical Planting	\$179.76	\$68.06	38%
Wholestalk Seedcane Harvest	\$69.73	\$16.50	24%
Plantcane Field Operations	\$227.34	\$17.33	8%
First Ratoon Field Operations	\$277.44	\$18.61	7%
Second Ratoon Field Operations	\$274.05	\$17.36	6%
Third Ratoon Field Operations	\$274.05	\$17.36	6%
Harvest Operations	\$145.31	\$33.16	23%

Table 2. Labor costs per acre of major row crops and enterprises in Louisiana.**

Crop	Total Direct Cost per acre	Total Labor Cost per acre*	Labor Share
Corn	\$485.16	\$14.26	3%
Cotton	\$535.47	\$24.75	5%
Crawfish (single crop)	\$475.05	\$83.94	18%
Rice	\$534.65	\$14.83	3%
Soybeans	\$372.83	\$11.64	3%
Sweet Potatoes (less seed costs)	\$1,395	\$211.53	15%

Source: LSU AgCenter Department of Agricultural Economics and Agribusiness Sugarcane Enterprise Budgets 2018.

*The labor cost shares represent farm operator and hired labor.

**Does not include sugarcane because sugarcane is a multiyear crop.

H-2A

Agricultural producers have been more likely to seek H-2A workers if (1) they have high seasonal variability in labor needs and (2) their labor costs are a high percentage of their total costs. Figure 1 shows the increase in the number of H-2A visas issued in the United States from 1992 to 2016. The trends show a large increase over time, from fewer than 10,000 workers in 1992 to nearly 140,000 in 2016. In 2016, Louisiana ranked sixth in the nation in the number of positions certified (8,301) under the H-2A program. The top three position-certified states were Florida, North Carolina and Georgia. Nationally, the top 10 crops and occupations under the H-2A program include: berries, hay and straw, apples, tobacco, general farm workers, melons, sweet potatoes, lettuce, nursery and greenhouse workers, and corn. Sugarcane ranked 19th nationally (first in Louisiana) with 3,435 positions (2,954 in Louisiana) certified in 2016, according to the Office of Foreign Labor Certification. Louisiana employers also used H-2A labor for crawfish (1,436 positions certified), sweet potatoes (1,033), nursery and greenhouse workers (490), and rice (428). All these crops have high seasonal variability and labor costs.

Table 1 shows farm-level operator and field labor costs for multiple management phases of a Louisiana sugarcane crop. Sugarcane is a perennial crop, planted in early fall. One year of planting can result in up to four ratoon (or stubble) crops produced for raw sugar and molasses. The table shows that sugarcane crops have the highest labor share of costs overall, with the highest shares occurring for hand and mechanical planting activities, followed by harvest and fallow activities. Table 2 shows that crawfish and sweet potatoes also had a relatively high share of labor costs in comparison to other major Louisiana crops.

H-2B

Figure 2 shows the increase in the number of new visas issued annually in the United States from about 10,000 in 1992 to more than 130,000 in 2007, then sharply declining to 40,000 in 2009 and increasing again over the past eight years to about 85,000 in 2016. This graph does not include some returning workers exempted from the cap, so the total number of positions certified in 2016 reached nearly 120,000. Louisiana employers may use the H-2B temporary guest worker program to hire foreign

workers to perform temporary, nonagricultural services or labor on a one-time, seasonal, peak-load or intermittent basis. Unlike the H-2A program, the H-2B program contains a statutory cap on the total number of foreign nationals who may be issued an H-2B visa during a fiscal year. The cap is set at 66,000, with half permitted in the first half of the fiscal year (October to March) and the second half permitted in the remainder of the fiscal year (April to September). Further, Congress had enacted temporary statutes that allowed the number of visas issued to exceed the cap for several years from 2003 to 2008, and then again in 2016 and 2017.

Louisiana ranks fifth in the nation with 4,434 H-2B certified positions. Texas, Florida and Colorado are the top three by certified positions. Nationally, the top occupations for the H-2B program, by number of positions certified, include: landscaping and groundskeeping, forest workers, maid and housekeeping cleaners, amusement and recreation attendants, meat, poultry and fish cutters, construction laborers, waiters and waitresses, restaurant cooks, production workers, and nonfarm animal caretakers. In Louisiana, the top H-2B visa programs in 2016 included: landscaping and groundskeeping (1,416

positions certified), meat, poultry and fish cutters (662), hand packers and packagers (370), laborers and freight stock movers (315), and fishers and related fishing workers (303). The average wage offer varies by occupation under the H-2B program. On an hourly basis, fishers and fishing workers earn \$17.62, laborers earn \$12.29, hand packers receive \$10.79, landscaping and groundskeepers receive \$10.99, and meat, poultry and fish cutters earn \$9.98. According to the Office of Foreign Labor Certification, the state average H-2B wage rate is \$12.20 per hour.

The Louisiana sugar processing industry makes use of the H-2B visa program by providing work for sugar



Mexican workers at the Dana and Gerard Frey farm in Acadia Parish peel crawfish. The Freys rely heavily on Mexican labor to harvest and process crawfish. Photo by Bruce Schultz

boilers. The temporary nature of sugar processing makes the position of boilers unappealing to domestic workers compared to permanent positions in other industries. Although there are fewer than a dozen sugar mills in the state, the reliance on this visa program to maintain an adequate labor force is paramount in processing sugarcane into raw sugar and molasses.

CONCLUSION

Although their numbers are much smaller than permanent migrants, temporary foreign workers and guest workers play a significant role in both agriculture and nonagricultural industries in Louisiana, the United States and the world. Experts expect the U.S. immigration debate to continue to focus on permanent migrants, but they also

expect continued debate over the temporary foreign worker programs. Sugar mill operators, for example, have expressed particular concerns with the timing of the H-2B program. They prefer to hire workers for grinding operations beginning in September, but because this is the end of the fiscal year and due to H-2B program caps, they may be forced to delay grinding until they can get workers in late October (the next fiscal year). Lawmakers regularly consider revisions to the temporary worker programs. For example, in October 2017, the House Judiciary Committee proposed a new H-2C program to replace both the H-2A and H-2B programs, with updated caps and several new provisions.

More recently, however, the debate over temporary workers in the United States has been subsumed under the

larger debates about immigration reform. Similarly, debates about guest worker programs in Europe have taken a back seat to the more pressing issue of refugees from war-torn nations. In Kuwait, Qatar and the United Arab Emirates, global human rights organizations have reported widespread violations of labor rights and human rights of temporary migrant workers, and global organizations have emerged to try to protect migrant workers from abuses. Despite these concerns, most experts see a continuing demand for temporary foreign labor programs.

Michael Deliberto is an assistant professor and Mark Schafer is an associate professor in the Department of Agricultural Economics and Agribusiness.

H-2A and H-2B are provisions within the Immigration and Nationality Act that allow for the lawful admission of nonimmigrant workers to temporarily fill vacant positions within the agricultural and nonagricultural sectors of the U.S. economy. These provisions were made for those industries not able to source sufficient domestic labor for their particular industry needs. While H-2A and H-2B aim to provide for the filling of vacant positions within agriculture and other industries, H-2B differs from H-2A in that the H-2B program statutorily limits the total number of H-2B visas issued during any fiscal year. The H-2A program within Louisiana supplies temporary laborers for the crawfish, sweet potato, nursery, rice and sugarcane industries. The H-2B program within Louisiana supplies temporary laborers for landscaping; meat, fish and poultry processing; and sugar processing industries.

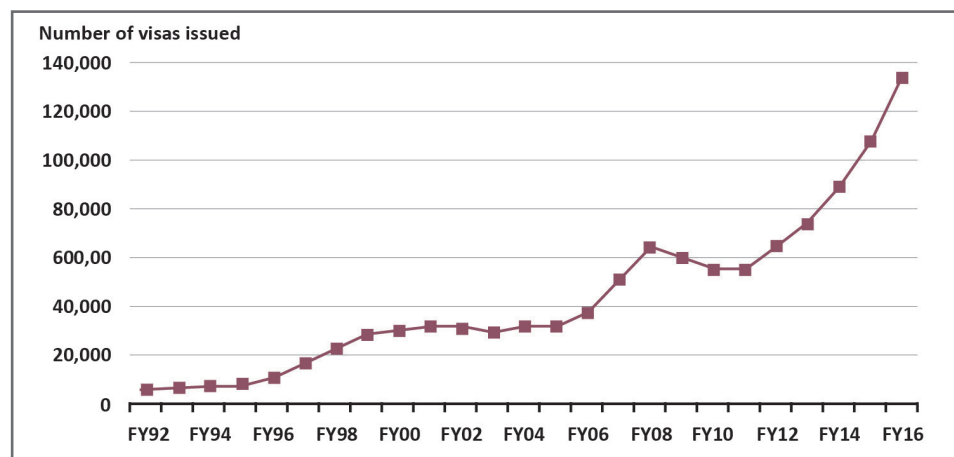


Figure 1. H-2A Visas Issued, FY1992-FY2016

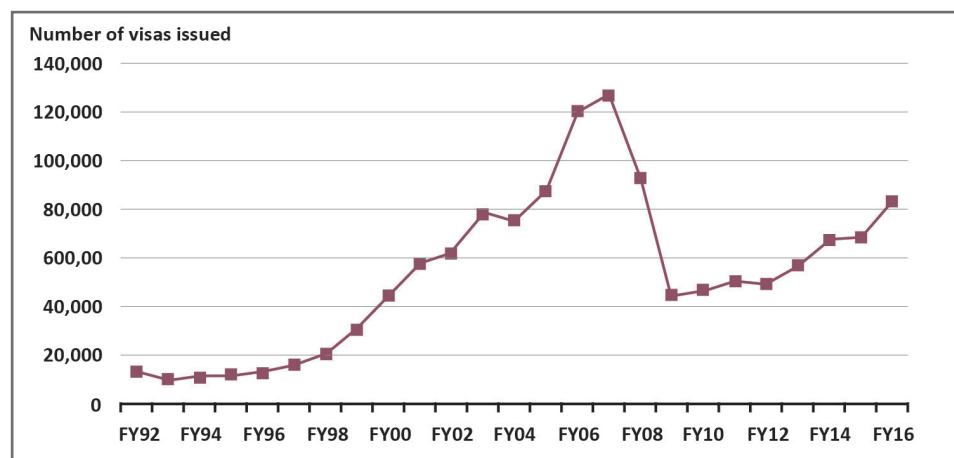


Figure 2. H-2B Visas Issued, FY1992-FY2016

Source: Congressional Research Service presentation of data from U.S. Department of State, Bureau of Consular Affairs

Sustainable Development and Globalization: Natural Resources and Ecosystems

Naveen Adusumilli

Human population growth and globalization have led scholars to think more deeply about the connections between meeting people's food and fiber needs and the natural environment. Over the past two decades, scholars and global organizations have been developing the concept of sustainable agricultural systems that provide for present needs, preserve capacity for future needs and minimally affect natural ecosystems. The sustainability concept has powered its way to the top of the priority list of many national and global agricultural organizations as concern increases over the profound implications of rapid globalization on natural resource use and the environment.

FARMLAND, FARM SIZE AND YIELD

Key to sustainable agriculture, farm productivity — producing more while using fewer inputs — has increased substantially in the United States and around the globe. With research support from organizations like the LSU AgCenter in areas such as improved crop varieties, pest and weed management and conservation, farm productivity (crop yields) increased faster in the United States than in many other nations. According to a U.S. Department of Agriculture report, corn yields in the U.S. improved from 20.5 bushels per acre in 1931 to 176 bushels per acre in 2017. To put that into perspective, it would have required 580 million acres (17 times the size of Louisiana) using 1931 production practices to produce the 2017 corn crop. With modern practices, however, only 84 million acres (2.5 times the size of Louisiana) were needed.

The USDA reports that a typical U.S. farmer in 1960 produced enough food for 26 people, while the latest USDA Census of Agriculture indicates a typical U.S. farmer could feed 165 people. Similarly, soybean yield in the U.S. increased from 13 bushels per acre in 1931 to 49 bushels per acre in 2017. Globally, total production of several staple crops needs to increase substantially from current levels by 2050 to meet the demand of the growing population, but the global production is projected to fall short under current production practices.

It is estimated that global agricultural production would, on average, increase by 1.5 percent per year in the next decade. Production in the U.S. has increased significantly in major grain crops and less in other crops. Corn, rice and soybean production has improved, on average, 2.9 percent, 1.1 percent and 3.1 percent, respectively, over the past two decades. Similarly, in Louisiana, corn and soybean production has increased, on average, 4.2 percent and 3.6 percent, respectively, during the same period, which is much higher than the national average. Any increase in current production, with an assumption that

production practices remain the same, could come at the expense of bringing less suitable land into production, which can have negative impacts on input use, natural resource management and overall profitability. The current situation calls for other nations to improve their use of better production methods and inputs as well as programs that support natural resource conservation.

While the U.S. has led the way, a similar trend has been reported among some nations where productivity has increased more than 100 percent. Farming practices vary among countries, with some nations using resources efficiently while some others not so much. Globally, twice as much food is grown today by farmers using less land, energy and water than in 1960. Given that the Food and Agriculture Organization of the United Nations (FAO) estimates that global food production must increase by 70 percent to feed the 9 billion people forecast to occupy the planet by 2050, the pursuit of attaining higher productivity will continue. While the U.S., according to the USDA, has about 915 million acres (40 percent of the total mainland) of farmland, the share of land devoted to agriculture in other countries is much higher. In 2014, according to the World Bank, Uruguay is at the top of the list with 82 percent of its land devoted to agriculture. The United Kingdom is second with 71 percent, while India devotes 60 percent, China uses 54 percent and Germany devotes 50 percent. This suggests that productivity is much lower in these countries relative to the U.S. Moreover, with urban areas growing at a tremendous rate in some developing nations, productive farmland could face competition from other sectors. Thus, relying on efficient input use and improving productivity per acre both become more relevant.

TRADE AND SUSTAINABLE FOOD SYSTEMS

For many nations around the world, trade is an essential method to meet their food demand. In practice, nearly all nations around the world produce some of their food and import the rest. Still, a small number of nations are considered by the FAO to be self-sufficient because they produce enough food to feed all their people. The “self-sufficient” label, however, does not mean they actually feed their entire population. In terms of food, the United States is the most self-sufficient nation in the world. Other self-sufficient nations include Canada, Australia and several European countries.

The vast majority of nations rely on trade to sustain their national food systems. Therefore, trade and partnerships among nations can be key to sustainable food systems. For some of the world's poorest nations, the United States is critical



■ Rice fields near Eunice.
Photo by Bruce Schultz

to ensuring that they can provide enough food for their citizens. In 2016, the U.S. Agency for International Development reported that the U.S. provided \$2.79 billion in food assistance, supplying 2.2 million metric tons through 233 programs in 55 countries. In addition, the USDA reported that more than 1,900 million bushels of U.S. soybeans were exported as value-added products, more than enough to fill New Orleans' Mercedes-Benz Superdome.

AGRICULTURAL SYSTEMS AND NATURAL ECOSYSTEMS

Production of food and fiber for human needs can place tremendous pressure on the planet's natural resources. When production increases come at the expense of natural resources (e.g., converting more natural systems to managed agricultural or agroforestry systems), there can be negative consequences for biodiversity and for the ecosystem services provided by natural environments. For example, wetlands across the planet suffered significant declines during the early period of industrial development. In the United States, wetlands areas decreased from 200 million acres in the early 1800s to 110 million acres in 2009. Wetlands loss occurred partly because the nation failed to recognize the valuable ecosystem services that they provide, such as protection from storm surge, prevention of soil loss and habitat for wildlife. Wetlands are close to Louisianians' hearts. The Pelican State accounts for 41 percent of the nation's wetlands.

In recent decades, several policies have been put in place to protect wetlands and other natural systems. The most well-known policy, the Clean Water Act, included a program for mitigation of wetlands that has played a major role in bringing back the role of wetlands in providing myriad ecosystem services.

Sustainable agricultural systems must also carefully consider the critical role of natural water resources. Currently, about 600 million acres worldwide are irrigated. At current levels of water use for irrigation, a 25 percent increase in withdrawals will be needed for achieving the necessary 70 percent increase in food production, which puts global water resources under pressure of depletion or disappearance, at least economically. In the United States, farmers have embraced the concept of conservation and efficiency in agricultural water use. Irrigation water use has decreased by about 10 percent on most U.S. farms. In Louisiana, regional initiatives such as the Sparta Ground Water Conservation District and the Capital Area Ground Water Conservation Commission, in collaboration with technical assistance from conservation agencies and LSU AgCenter specialists, have resulted in improvements to water levels while marching toward sustainable use of the resource. Unfortunately, the United States is the exception to the rule, as many countries are currently struggling to sustain adequate water supplies for agriculture. Among many examples, Lake Chad, one of the largest water bodies in Africa, has shrunk 90 percent compared to its size in the 1960s because of overuse and poor enforcement of policies to conserve the resource.

A critical component of water and other natural resource use is efficiency. Countries need to embrace policies and tech-

nologies that promote resource use efficiency and implement government mechanisms that enable the availability of alternatives, such as promoting capture and reuse of water, irrigation water-saving technologies and weather prediction tools.

Similarly, the United States and several other nations have recently implemented initiatives to conserve and protect soils, perhaps the most important component of sustainable agricultural systems. Soils play a key role in agricultural production, and once lost, this valuable resource is not replaceable. It is widely believed that it would take a century to build 1 inch of soil. In the Mississippi Delta region of the U.S., soil loss through natural phenomena is 2 to 3 tons per acre per year. Conservation practices and farm-based incentives to adopt these practices have been on the rise. In 1990, 25 percent of the U.S. farm acres used conservation tillage, whereas in 2008 that number increased to 41 percent, according to the USDA Natural Resources Conservation Service. In countries where there is little opportunity for expansion of arable cropland, protection of this natural resource gains top priority; however, several countries lack government mechanisms for soil management. Farmers and farming systems around the world should be on a continuous path of exploration and validation to identify the best suite of practices to mitigate resource depletion.

FINAL NOTE

Sustainable agricultural systems are those that produce with low impact on natural resources and the environment and contribute to present and future generations' needs. Once lost, resources are hard to replenish and replace. Practices that exacerbate the resource base need to be reevaluated. New policy initiatives should account for supporting sustainable production systems and a good standard of practices. For example, soil, which is a crucial medium needed for plants to grow, is subject to loss in both quantity and quality through human and natural causes. This jeopardizes the productivity of lands and exacerbates the world's ability to achieve self-sufficiency in food.

While natural systems are transformed to managed enterprises to meet the global demand for food, it is equally important to monitor and respond to natural resource use, conservation and efficiency initiatives. Global partners need to make fundamental shifts in production not only to achieve food security but also to save natural resources and ecosystems, as they are subject to tremendous pressure because of urban development, inefficient use, and a lack of policies to monitor and protect both their use and their users. The LSU AgCenter is working to improve worldwide food security through its programs dedicated to variety development, weed and pest management, conservation alternatives and agricultural economics. The AgCenter plays a critical role in developing, evaluating and promoting local, regional, national and global initiatives that encourage adopting agricultural practices that enable managed systems to remain profitable while resources are efficiently used and conserved.

Naveen Adusumilli is an assistant professor in the Department of Agricultural Economics and Agribusiness.

Globalization and Forestry: Environmental awareness changes an industry

Richard P. Vlosky, Eric Hansen and Rajat Panwar

Globally, the timber sector employs more than 13.2 million people. It also produces more than 5,000 types of wood-based products and generates a gross value-added of more than \$600 billion each year. However, the timber sector's economic contribution is actually much larger because its value remains largely unreported in many countries. Factoring that into gross domestic production calculations could double the contribution of the timber sector to the world economy and quadruple the number of related full-time jobs.

A combined effect of accelerating globalization and the global recession of 2008 has produced dramatic changes in the forest sector. Consumer preferences have evolved, and their purchasing power has changed. Accordingly, there have been changes in product offerings and prices, changes in technology and changes in competition among industry

players. More notably, however, the nature and extent of industry engagement in social and environmental issues have been transformed, especially with evolving environmental awareness. Emergence of low-cost producers from developing countries and resulting shifts in trade flows are other major factors driving change in the industry. Many argue that the forest industries now operate in a "green economy." This transition presents challenges and opportunities for forest sector companies as they navigate into the future.

Today's forest products industry presents a complex blend of historical characteristics and changed attributes. On one hand, the industry continues to produce products such as lumber, plywood and oriented strandboard. Still, many new products such as cross-laminated timber (CLT) have also been introduced to the market in some countries. A CLT panel consists of several layers

of kiln-dried lumber boards stacked in alternating directions, bonded with structural adhesives, and pressed to form a solid, straight, rectangular panel. Finished CLT panels are exceptionally stiff, strong and stable, handling load transfer on all sides. A number of multistory tall buildings have been erected in the U.S. and Canada using CLT where steel and concrete were traditionally used. CLT is a fast-growing industry in Europe but is in its infancy in the U.S. The potential domestic markets for CLT are enormous if architects, builders, contractors and building owners accept the product as a substitute for steel and concrete construction.

Globalization has become the norm for all industrial sectors. Finished products, component parts and intermediate manufacturing occur in widely dispersed regions while final consumer or supply-chain partners are often geographically distant from their suppliers. The forest products sector is no different and has become increasingly globalized over recent decades. Global trade of forest products has grown steadily in recent years. According to United Nations data, the value of total world exports of forest products grew 1.7 times between 1997 and 2010. The growth in overall value of trade is associated with dramatic shifts in trade flows. China is the largest importer of hardwood lumber from the United States, and the European Union is the major importer of wood pellets for power generation.

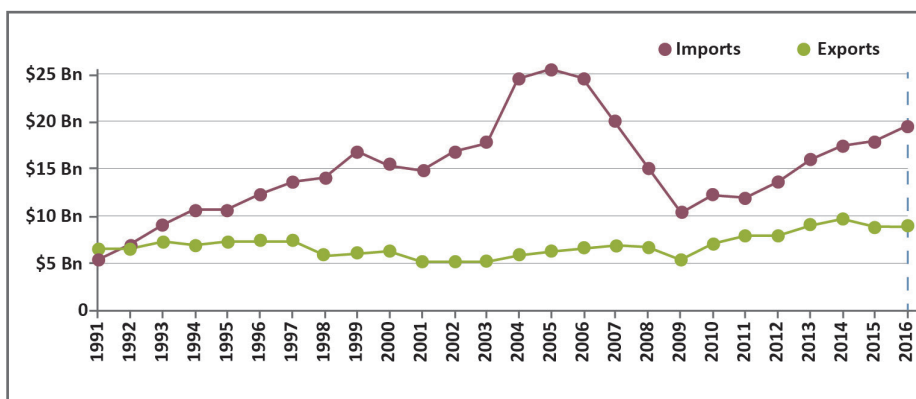


Figure 1. U.S. Trade in Forest Products (1991-2016) in billions of dollars.

Loading logs at RoyOMartin timber cutting site near Oakdale, Louisiana.

Photo by Olivia McClure



In addition to increased world trade, the emergence of a number of new economies has contributed to the globalization of the forest products industry. For example, over the past decade, countries with lower costs of production and relatively minimal safety and environmental constraints have become major manufacturers of finished and semifinished wood products. Over time, however, low-cost producers lose their low-cost advantage because of increased labor costs and general economic development, leading manufacturing units to move to places with a newly gained lower-cost advantage. The shift in furniture production from China to Vietnam illustrates this phenomenon.

The emergence of environmental awareness has also created new market opportunities for companies, so much so that a sub-field called environmental, or “green,” marketing has emerged. This environmental marketing opens up unique opportunities for forest sector companies because these products have a potential to be viewed as more environmentally friendly than many competing products. Many countries and regions, such as the European Union, require imported wood products to be sourced from environmentally sustainable forests. This has had significant impacts on which companies and countries can satisfy this demand.

The U.S. Census Bureau reports that United States imports more than it exports (Figure 1). The top five forest products exporters to the U.S. in 2017 were China, Canada, United Kingdom, Japan and Mexico, while the top five importers were Canada, China, Chile, Germany and Indonesia.

What does this mean for Louisiana? The harvest of timber, which is Louisiana’s No. 1 agricultural crop both in terms of gross income and value-added processing, supports a solid wood forest products industry that consists of around 450 primary and sec-

ondary manufacturing establishments. Primary products are produced directly from logs, such as lumber, plywood and chips. Secondary products use primary products as input for remanufacturing and include furniture, cabinetry, doors, flooring and millwork. The pulp and paper industry uses small-diameter trees called pulpwood as a raw material. All products from Louisiana compete in the global marketplace.

U.S. Census Bureau data show that Louisiana timber export value was about \$27 million in 2017, down from \$47 million before the Great Recession of

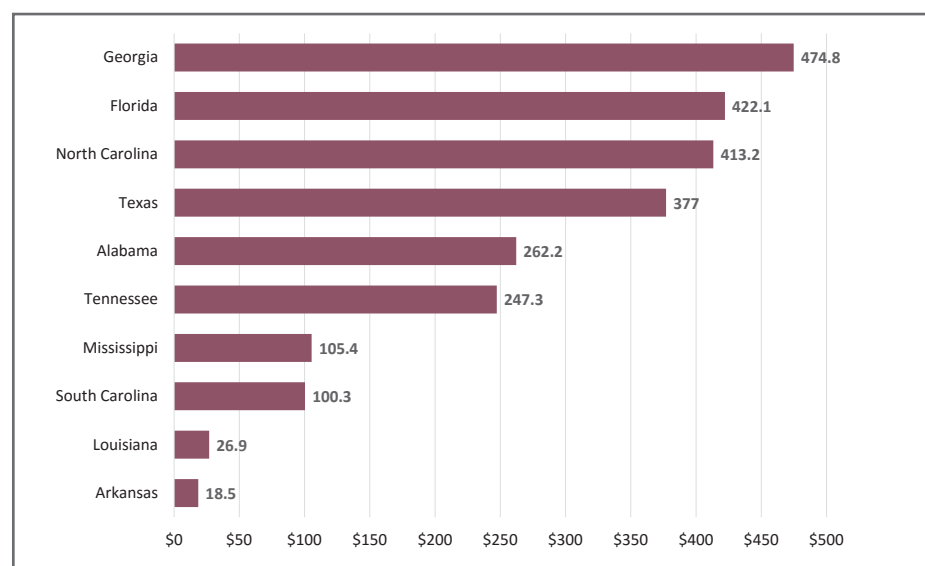


Figure 2. Exports of Forest Products by Value in Selected Southern States (2017)

2008. The 2017 figure is low relative to neighboring southern states (Figure 2). However, Louisiana exports are growing, led by wood pellets. Pellets, which are made from southern pine, are seeing high demand in the European Union as feedstock for generating electricity in converted coal-fired power plants. Drax Biomass International has two pellet manufacturing facilities in Louisiana — one in Bastrop and the other in Urania — and a wood pellet storage-and-ship-

ping facility at the Port of Greater Baton Rouge.

Even though southern pine lumber is a significant part of the state's wood products production, it is not unusual to see lumber from Chile, Eastern and Western Europe, Canada and other countries used to build houses right here in Louisiana. The global marketplace for lumber and most other wood products is strongly competitive. Louisiana has a substantial transportation infrastructure

network, including deep-water ports, interstate highways and rail, which may facilitate increased exports of the state's forest products in the future.

Richard P. Vlosky is the Crosby Land & Resources Professor of Forest Sector Business Development in the School of Renewable Natural Resources and director of the Louisiana Forest Products Development Center. Eric Hansen is a professor of forest products marketing at Oregon State University. Rajat Panwar is an associate professor of sustainable business management in the Department of Management at Appalachian State University.

Drax Biomass Produces New Louisiana Products

Rick Bogren

Drax Biomass, a subsidiary of Drax Group PLC, of the United Kingdom, is using wood products to change the way energy is generated, supplied and used.

Drax Biomass has three U.S. manufacturing facilities: two in Louisiana and one in Mississippi. Morehouse BioEnergy in Bastrop, Louisiana, can produce up to 575,000 tons of pellets annually; LaSalle BioEnergy in Urania, Louisiana, can produce approximately 500,000 tons of wood pellets annually; and Amite BioEnergy in Gloster, Mississippi, can produce up to 575,000 metric tons of pellets annually.

Baton Rouge Transit on the Mississippi River at the Port of Greater Baton Rouge in Port Allen, Louisiana, is the closest deep-water port to Drax Biomass plants and was custom-built to process and ship up to 2.2 million tons of pellets annually,

including pellets manufactured by other producers. At peak operation, the transit facility is capable of loading approximately 40 vessels per year.

"Our pellets allow electric utilities to reduce their dependence on coal, lower carbon emissions and provide new sources of safe, reliable and affordable power," said Richard Peberdy, Drax vice president for sustainability.

Biomass is renewable fuel made from organic matter that can be burned to generate energy. "In our case, we create wood pellets that we supply to Drax Power Station – the largest power plant in the UK and the world's largest individual consumer of pellets," Peberdy said. On any given day, Drax generates roughly 7 percent of the UK's total electricity.

The company supports the communities in which it operates by promoting sustainable forestry and investing in local economic development.

"Our operations are regularly audited by independent third-party bodies to certify compliance with our sourcing policies, long-established forestry standards and regulatory requirements," Peberdy said. Drax Biomass only sources low-grade wood, such as thinnings, mill residues, wood chips and smaller or diseased or misshapen trees with little commercial value that may have few or no alternative markets.



Pellets being prepared for export to Europe. Photo provided by Drax

Rick Bogren is a professor in LSU AgCenter Communications.

LSU AgCenter Innovations Flow Beyond Louisiana Boundaries

Alana Fernandez

Innovations created by LSU AgCenter scientists flow beyond the boundaries of Louisiana. As of April 2018, AgCenter innovations are licensed on six of the world's seven continents – all but Antarctica. Those licenses generate royalty revenue not only to help build the AgCenter's network across the world but also to further the AgCenter's mission of serving Louisiana through research and extension programs.

The AgCenter's farthest reaching and most financially successful inventions are rice varieties. The rice research program has generated over \$60 million in royalty revenue, and LSU AgCenter rice varieties are known and grown across the world. A key factor in the rice varieties' success is the herbicide-tolerant trait being bred into the right varieties that have been tested and trialed through the AgCenter's expert guidance. The AgCenter has left its mark on the rice world over the past 20 years with its herbicide-tolerant rice varieties and commitment to excellence, and the researchers are constantly striving to increase the breadth and depth of the AgCenter's impact with new innovations such as hybrid rice varieties, embracing technological advances in genomics and breeding, and partnering with other institutions.



A new long-grain hybrid rice, LAH169, with high quality and competitive yield potential is being released by the LSU AgCenter. It was developed at the H. Rouse Caffey Rice Research Station during the past seven years. Rights to commercial development will be sold at a later date, according to Alana Fernandez of the LSU AgCenter Office of Intellectual Property. LSU AgCenter hybrid rice breeder Jim Oard, above, said LAH169 has 50 percent less chalk than the commercial hybrids currently available, along with a respectable yield. Photo by Bruce Schultz

In addition to rice, the LSU AgCenter has developed a reputation worldwide as the leader in sweet potato innovation, both breeding and development. Over the past 10 years, AgCenter scientists have released sweet potato varieties that have improved yield, taste, color and other desirable characteristics. Unlike rice, which is licensed to one entity, sweet potatoes are licensed to dozens of entities, and the royalty revenue numbers are far less concrete but, in fact, are in the millions. These varieties have allowed the Sweet Potato Research Station, in Chase, Louisiana, to flourish as a center for knowledge and insight for the growers of Louisiana and beyond. As the reputation of the sweet potato breeding program has grown, so has its footprint throughout the world. The AgCenter has sweet potato licensees and partners in Africa, Asia, Australia, Europe and South America. In addition, AgCenter sweet potatoes are grown across the United States and in Canada. The sweet potato program continues to expand with new varieties, innovative approaches to partnerships, and expanded markets to territories once considered unsuitable for sweet potato growth.

Beyond traditional crops, the AgCenter is the source of innovations in agricultural engineering, agricultural chemistry, renewable natural resources, and many other areas. It is in the School of Renewable Natural Resources where TigerBullets was invented. This unique material is used in drilling fluid to reduce lost circulation in oil-drilling wells. This technology created a new business and jobs in Louisiana, and the TigerBullets technology has been used by multinational corporations from Vietnam to the Gulf of Mexico, including BP, Chevron, Exxon and Schlumberger.

The LSU AgCenter strives to improve sustainability and search for more effective solutions to local and world problems while being good stewards of resources. Through the AgCenter's Global Network, the AgCenter Intellectual Property Office has had the privilege of working with the Visegrad University Association, a conglomerate of universities from Eastern Europe and surrounding areas devoted to advancement in agriculture. The AgCenter has orchestrated partnerships between AgCenter researchers and Visegrad University Association members to facilitate joint innovation, and those research efforts will bring AgCenter innovation to even more places across the globe.

From drilling fluids in Vietnam to sweet potato fields in South Africa to rice fields in Italy, the LSU AgCenter has extended its reach around the globe and will continue to live its mission of educating, innovating and improving lives at home and abroad.

Alana Fernandez is the associate director of the LSU AgCenter Office of Intellectual Property.

Visiting Scholar and Fellow Programs in International Agriculture

Susan L. Karimiha and David H. Picha

The LSU AgCenter is among the nation's leading land-grant institutions in training and mentoring visiting scholars from around the globe. AgCenter faculty have incorporated international undergraduates, graduate students, professors, government officials and industry representatives in their research and extension activities across the state. The contributions of international scholars to Louisiana agriculture-related challenges have been significant, ranging from field research support to laboratory analyses.

Professional linkages established between AgCenter personnel and the visiting scholars have led to continued collaborative research and long-term institutional partnerships. The U.S. Department of Agriculture Foreign Agricultural Service has recognized the successful international training activities of the AgCenter through continued support and competitive grant award funding.

AgCenter faculty, staff, students and the university community have been enriched from the diversity of ideas, experiences and perspectives brought by visiting scholars. The visiting scholar programs have been beneficial in improving Louisiana agriculture.

BORLAUG FELLOWSHIP PROGRAM

Borlaug Fellows are university scientists or government researchers who conduct research and receive training for eight to 12 weeks under the guidance of an AgCenter faculty member. This mentor later visits the fellow's home institution to continue the collaboration.

Approximately 38 Borlaug Fellows from 17 countries have received training at the AgCenter on a wide array of topics, including agricultural biotechnology, agronomy, horticulture, food safety, veterinary science and natural resource management. The countries represented by the Borlaug Fellows include Bangladesh, Colombia, Ethiopia, Ghana, Guatemala, Guyana, India, Indonesia, Kosovo, Malaysia, Nigeria, Philippines, Russia, Tunisia, Uganda, Ukraine and Vietnam.

Examples of projects include:

- A Vietnamese scientist, Tran Thi Dinh, is developing value-added sweet potato products with her mentor, David Picha, professor in the School of Plant, Environmental and Soil Sciences.
- An Ethiopian scientist, Mihiretu Cherinet, is identifying ways to improve storage of sweet potato roots and

developing techniques that prevent roots from sprouting too early or too late with his mentor, Arthur Villordon, professor at the Sweet Potato Research Station in Chase, Louisiana.

- An economist from the Philippines, Rowell Dikitanan, is studying how climate-smart agriculture techniques affect income, crop yields and economic inequality. His mentors are Naveen Adusumilli and Michael Deliberto, both assistant professors in the Department of Agricultural Economics and Agribusiness.

COCHRAN FELLOWSHIP PROGRAMS

Cochran Fellows are government or private sector individuals who receive training under the guidance of an AgCenter faculty member for about two weeks on a topic that will facilitate trade and increase U.S. agricultural product imports. Approximately 80 Cochran Fellows from 17 countries have participated in training programs on horticultural crop production and postharvest care, food safety, trade facilitation, dairy products and poultry production. The countries represented by the Cochran Fellows include Albania, Armenia, Brazil, China, Colombia, Dominican Republic, Egypt, Ghana, Guatemala, India, Indonesia, Jordan, Kenya, Mexico, Peru, Senegal and Tanzania.

SCIENTIFIC COOPERATION RESEARCH PROGRAM (SCRCP)

The SCRCP scholars are university or public sector individuals who receive training on a topic that will overcome constraints in the production, postharvest care or marketing of agricultural products. Each scholar receives training for about three weeks in the U.S., followed by a visit from an AgCenter faculty mentor in the scholar's country for several weeks. Two SCRCP scholars from Kenya have participated in a training program focused postharvest care and marketing of horticultural products.

SCIENTIFIC COOPERATION EXCHANGE PROGRAM

This program is for Chinese scholars, who receive about two weeks of training on topics that include food safety and import protocols at U.S. ports. So far, 10 scholars from China have participated.

LSU AGCENTER VISITING SCHOLAR PROGRAMS

The LSU AgCenter offers visiting scholar training awards for students and alumni of Kasetsart University in Thailand, the Escuela Agrícola Panamericana (Zamorano) in Honduras, the National Agriculture University of Honduras, Mendel University in the Czech Republic, and Slovak University of Agriculture in Slovakia. Each scholar receives training for three months within an AgCenter department or at an AgCenter research station. Approximately 200 visiting scholars from 11 countries have participated in training programs focused on a range of agriculture-related topics. Some of these scholars are also accepted into LSU College of Agriculture graduate degree programs.

Susan L. Karimiha, formerly a coordinator with LSU AgCenter International Programs and lead principal investigator of USDA FAS capacity-building programs, is a doctoral candidate and research associate in the LSU School of Leadership and Human Resource Development. David H. Picha is a professor in the LSU AgCenter School of Plant, Environmental and Soil Sciences.

Global Network hosts second international symposium

The LSU AgCenter Global Network's second international symposium, April 16-20, 2018, began in Baton Rouge, moved to other locations in south Louisiana, and wrapped up at the Hungarian embassy in Washington D.C. Co-sponsors were the LSU College of Agriculture, Visegrad University Association and the Embassy of Hungary.

Entitled "Diversifying Revenue and Private Sector Support: Successful Case Studies," the symposium included sessions on public-private partnerships with the American Sugar Cane League, in Thibodeaux, Louisiana; A. Wilbert's Sons, an agricultural company in Plaquemine, Louisiana; and the Louisiana Nursery and Landscape Association, in Hammond, Louisiana.

A Memoranda of Understanding was signed with the National University of Life and Environmental Sciences, Kiev, Ukraine; Vinnytsia National Agrarian University, Vinnytsia, Ukraine; the Ukrainian Scientific Educational Consortium; and the University of Veterinary Medicine and Pharmacy, Košice, Slovakia.

"Benefits to Louisiana agriculture from this symposium include expanded opportunities for LSU student international experiences, faculty exchanges and technology development at several universities, including Mendel University, Brno, Czech Republic, and the University of Life Sciences, Warsaw, Poland," said John S. Russin, LSU AgCenter Global Network director.

Borlaug Fellow from Vietnam develops nutritional beverages from sweet potatoes

David H. Picha

A recently completed Borlaug Fellowship training program in food compositional analyses and value-added product development has set the stage for future commercialization of smoothies and nutritional beverages using sweet potatoes, Louisiana's leading vegetable crop.

The fellow is Tran Thi Dinh, head of the Department of Food Processing Technology, Faculty of Food Science and Technology, at Vietnam National University of Agriculture in Hanoi. Dinh is engaged in teaching and research in postharvest technology and food processing that will support the Vietnamese food industry.

During the Borlaug Fellow training program, a series of analytical tests were conducted to delineate the sugar composition, carotenoid content, nutritional value and flavor profile of multiple sweet potato cultivars and breeding lines. This basic information will be useful in optimizing nutritional and flavor attributes desired by consumers of smoothies, purees and natural food product beverages.

U.S. and Vietnamese consumers are becoming increasingly concerned about the nutritional value and composition of the foods they eat, and sweet potato-based products score high in positive health-related ingredients. The Borlaug Fellow training work revealed the AgCenter-developed Evangeline and Bayou Belle sweet potato cultivars have superior taste and flavor and are among the highest in vitamin A content compared to other cultivars.

David H. Picha is a professor in the School of Plant, Environmental and Soil Sciences.



Borlaug Fellow Tran Thi Dinh, second from right, and LSU AgCenter faculty mentor David Picha, left, meet with Vietnamese vegetable growers and researchers in Ben Tre Province, Vietnam.

Fellowship program brings international scientists to study at LSU AgCenter

Olivia McClure

Kwame Ogero was working on his master's degree in Kenya when he came across some research papers written by LSU AgCenter scientists Chris Clark and Arthur Villordon. He found their work helpful, so he cited them in his thesis, which focused on tissue culture in sweet potatoes and cassava.

Six years later, Ogero now counts Clark and Villordon — both known for their sweet potato expertise — as mentors. He worked alongside them in Louisiana from January to March 2018 as part of a fellowship program.

"These are people I was quoting in my first publications," said Ogero, an agronomy research associate at the International Potato Center office in Tanzania. "It was really a great opportunity working with them. They are so humble. They've been so helpful."

Ogero and Rowell Dikitanan, an economist from the Philippines, were able to study under AgCenter scientists through the Borlaug Fellowship Program. Funded by the U.S. Department of Agriculture, the program aims to foster collaboration among researchers around the world.

The AgCenter has hosted 36 visiting scholars from 16 countries through the Borlaug program and similar USDA-funded programs since 2011.

Ogero worked with Clark, a plant pathologist, to learn more about the AgCenter foundation seed program, which provides Louisiana farmers sweet potato planting stock that has been tested for viruses.

Viruses are a major problem in Tanzania and other countries in eastern Africa, Ogero said, often causing farmers to lose up to 98 percent of sweet potato yields.

"Farmers in Tanzania are not used to clean seed," he said. "They recycle seed from their previous crops, and that means the virus will continue in the field for a long time."

With help from Villordon, Ogero also examined how nutrients like phosphorus affect storage root initiation in virus-infected sweet potato plants.

AgCenter economists Naveen Adusumilli and Michael Deliberto mentored Dikitanan, who works at the International Center for Tropical Agriculture.

Dikitanan, who was here from February to May 2018, is interested in the impact of climate-smart agriculture techniques. At the AgCenter, his mentors helped him develop ways to evaluate how those practices affect income, crop yields and economic inequality, among other factors.

He also went to Campti in Natchitoches Parish to attend a meeting for small farmers.

"It's really good to know the on-the-ground situation — what it's like here in the U.S., and comparing it with the Philippines," Dikitanan said.

He, Adusumilli and Deliberto hope to eventually write a paper comparing conservation policies and incentive programs in the two countries.

Jonathan Hubchen, assistant director of the AgCenter Global Network, said the fellowship program benefits the AgCenter as much as it helps similar institutions in other countries.

"Agriculture is not a national system. It is an international, global system with international, global interdependencies," Hubchen said. "The adoption rates and resulting policy implications for climate-smart agriculture are going to be about as relevant here in Louisiana as they are in the Philippines. By the same token, getting virus-free planting stock is something that is always a concern here."

He said the program complements ongoing efforts at the AgCenter to form international research partnerships.

"We anticipate that when Kwame and Rowell go home, they will continue their collaboration with their respective mentors indefinitely," Hubchen said. "This will relate both in their professional development and the professional development of people here — basically a win-win situation."

Olivia McClure is an assistant communications specialist with LSU AgCenter Communications.



Kwame Ogero, left, and LSU AgCenter plant pathologist Chris Clark set up an experiment with sweet potato plants in a greenhouse on the LSU campus. Clark is mentoring Ogero, an agronomist from Tanzania, through the Borlaug Fellowship Program. Photo by Arthur Villordon

Brazilian Science Without Borders Program brings students to the LSU College of Agriculture and AgCenter

Rick Bogren and Lawrence Datnoff

Five doctoral students from Brazil are studying in the LSU College of Agriculture through a program called Brazilian Science Without Borders.

The students and their professors are: Natasha Ruschel Soares, with Gregg Pettis in the Department of Biological Sciences and Chris Clark in the Department of Plant Pathology and Crop Physiology; Tiago Lelis, with Jong Ham in the Department of Plant Pathology and Crop Physiology; Monique Ferreira, with Jeff Davis in the Department of Entomology; Flavia Bastos Agostinho, with Brenda Tubana in the School of Plant, Environmental and Soil Sciences; and Joseph Mikhae, with Jim Wang in the School of Plant, Environmental and Soil Sciences. Each student is working on an important agricultural problem in their respective discipline to provide new knowledge that will be of benefit to Louisiana producers.

The Brazilian Science Without Borders Program is a nationwide scholarship program primarily funded by the Brazilian federal government. The program seeks to strengthen and expand Brazilian education in science and technology by providing opportunities for international study to undergraduate and graduate students and researchers. The program is a joint effort of the Brazilian Ministry of Education and the Ministry of Science and Technology.

This program is managed by Laspau, a nonprofit organization affiliated with Harvard University that works with partners to provide higher education opportunities to individuals from Latin America and the Caribbean,

and the National Council of Scientific and Technological Development, an agency of the Brazilian Ministry of Science, Technology, Innovations and Communications.

Rick Bogren is a professor in LSU AgCenter Communications, and Lawrence Datnoff is a professor and head of the Department of Plant Pathology and Crop Physiology.



Several doctoral students from Brazil have come to LSU AgCenter departments to conduct research through the Science Without Borders program. Three of the students participating now are, from left, entomology student Monique de Souza; School of Plant, Environmental and Soil Sciences student Joseph Elias R. Mikhael; and plant pathology student Tiago Lelis. Not pictured are: Natasha Ruschel Soares, in plant pathology, and Flavia Bastos Agostinho, in agronomy. Photo by Olivia McClure

Kenyan scientists work to reduce postharvest loss

David H. Picha

Faculty in the LSU AgCenter and Egerton University in Nakuru, Kenya, have initiated a global outreach and capacity-building program on reducing postharvest loss and improving market quality of horticultural crops. This mutually beneficial effort was recognized by the U.S. Department of Agriculture Foreign Agricultural Service as an important component in helping farmers improve the quality and economic value of perishable food products.

The USDA awarded a Scientific Cooperation Research Program grant to David Picha, professor of horticulture in the School of Plant, Environmental and Soil Sciences, to develop a training program for farmers and students in Kenya on proper postharvest care for fruit, vegetables and floral products. Lack of knowledge on proper product harvesting, handling, cooling, packing and marketing typically results in perishable product

market losses exceeding 30 percent of the entire crop harvest volume. In addition, product quality deterioration due to improper storage and handling practices results in significant nutritional value losses of the food products.

Egerton University professors Antony Kibe and Mariam Mwangi are championing the postharvest horticulture training to their students and growers, building on the laboratory and practical training received at the AgCenter.

A series of reciprocal capacity-building and training activities is occurring under the USDA-funded grant. The information and training materials being developed under this international partnership are also of benefit to Louisiana growers and LSU College of Agriculture students.

David H. Picha is a professor in the School of Plant, Environmental and Soil Sciences.

Madelyn Smith, an LSU College of Agriculture student studying natural resource ecology and management, participated in a study abroad program in the summer of 2017 focused on sustainable agriculture in Thailand.



Global Opportunities for LSU College of Agriculture Students

Leslie Blanchard, Rocio Lopez and Ivana Tregenza

Studying abroad can provide students with valuable experiences that expand their worldviews and lend them valuable experience in the job market. The LSU College of Agriculture provides a variety of opportunities that allow students to gain this international experience. The college works closely with the LSU AgCenter Global Network to expand the range of experiences available to students in the form of study abroad, semester abroad and international internships.

Students and parents have responded with increased applications to the college and increased interest in the expanding global offerings. During freshman orientation, about 70 percent of students and parents expected international experience to be included within their under-

graduate studies. They realize these experiences will benefit graduates who pursue careers with farms and firms in Louisiana as much as those who pursue their careers elsewhere in the United States or abroad.

Over the past two years the LSU College of Agriculture substantially increased international opportunities for students. The College of Agriculture strengthened existing shorter-term programs targeting Swaziland, Mozambique, Thailand, Nepal and Greece, while also introducing new innovative programs to Nicaragua, Slovakia and Poland. The college has also been engaged in expanding relevant, longer-term semester abroad and year abroad programs that can provide significant benefits for students with specific majors. The number of students

taking advantage of longer-term programs increased from two in 2016-17 to nine in 2017-18.

The LSU College of Agriculture offers degree programs that vary widely and include a broad menu of opportunities. For example, textiles and apparel merchandising majors learn in the fashion capitals of Paris and Milan. Nutrition and food sciences majors explore the native cuisine of the Mediterranean while immersing themselves in the culture and ancient history of Greece. Agricultural economics and agribusiness students investigate the fundamentals of agriculture in Central Europe through study abroad and semester internships in Slovakia and the Czech Republic. Wildlife ecology majors research the species and ecosys-

tems of the southern African nations of Swaziland and Mozambique. As the college continues to expand students' opportunities, enthusiasm for international programs and the transformational knowledge they provide continues to grow along with the partnerships that have been established.

The college's ultimate goal is to bring international experiences to all its students. The college invites all interested students to participate in the Global AgAmbassadors organization on LSU's campus. Global AgAmbassadors serve as hosts and guides for incoming international students, faculty and visitors who are guests at LSU here in Louisiana.

To assist those students for whom cost is a deterrent to pursuing global study, the College of Agriculture has established a scholarship program to help offset the expenses. These scholarships vary in amount as the duration and fees for each opportunity is different. Last

year, 12 students were awarded financial assistance in the form of study abroad scholarships that totaled more than \$7,500.

Students who participate in these opportunities gain valuable experiences that will lend them an advantage in the job market after graduation. Global, national and local industries will also benefit from hiring students with international experiences who can better monitor, understand and cope with changing global conditions. In partnership with the LSU AgCenter Global Network, the College of Agriculture stands ready to serve students and stakeholders with an expansive list of cultural opportunities that enrich the lives of students and help to prepare the agricultural leaders of tomorrow.

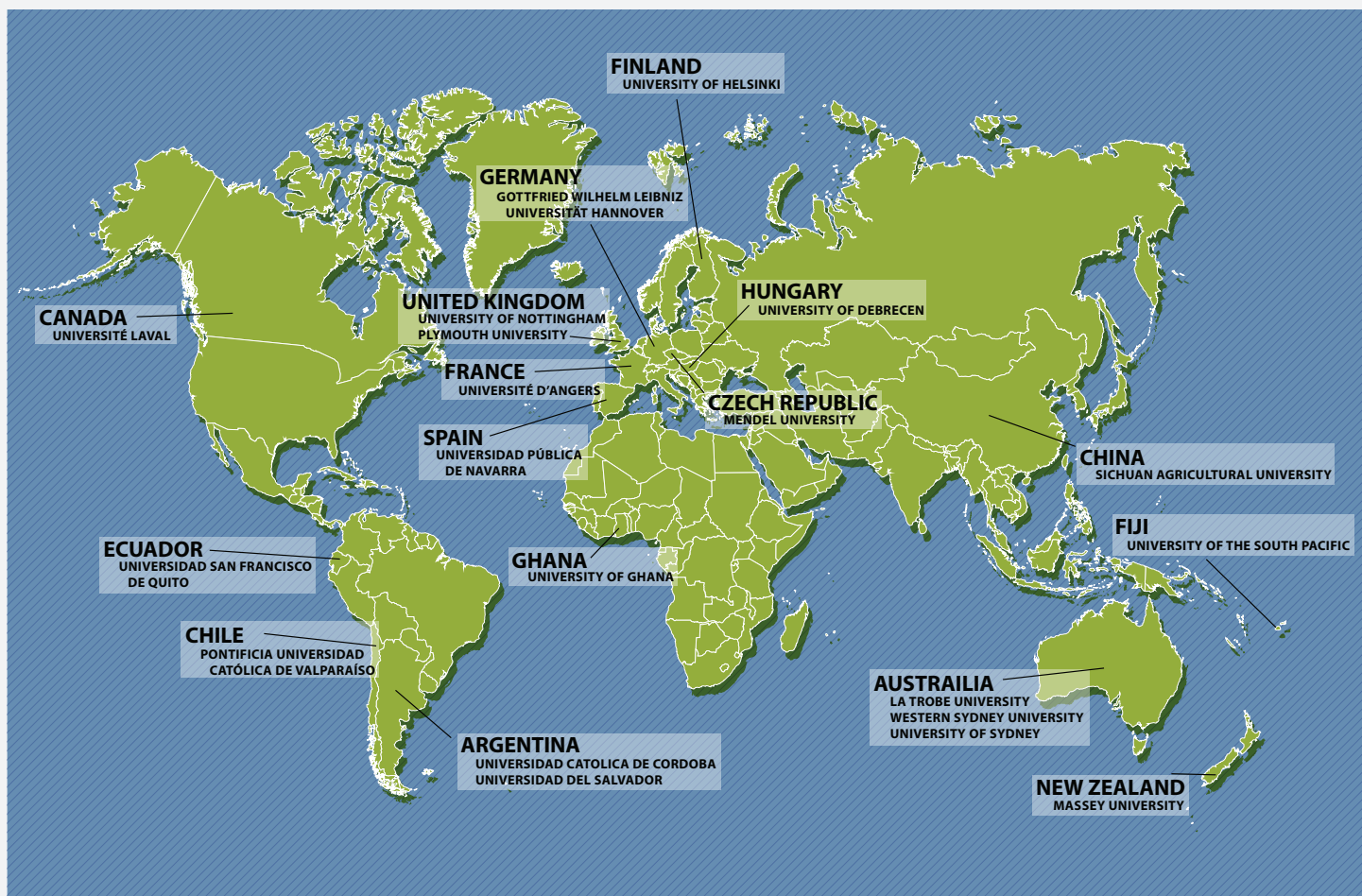
Leslie Blanchard is the assistant dean of the LSU College of Agriculture. Rocio Lopez is coordinator of international relations and Ivana Tregenza is director of international relations.

LSU Study Abroad Opportunities

College of Agriculture students may spend a semester at a university in an exchange program, or they can learn from LSU faculty in one- to three-week courses at one of seven locations around the world.

NICARAGUA
POLAND
THAILAND
MOZAMBIQUE
GREECE
LONDON
MENDEL

SEMESTER-ABROAD EXCHANGES INCLUDE THE FOLLOWING:



Developing Leaders with an Agricultural Worldview

Bobby Soileau

Noted journalist and author Walter Lippmann wrote about the stereotypical images each of us has in our minds. In his book “Public Opinion,” he stated, “We imagine most things before we experience them. And those preconceptions, unless education has made us acutely aware, govern deeply the whole process of perception.”

One of the purposes of the LSU AgCenter Agricultural Leadership Development Program is to educate farmers, ranchers, foresters and agribusiness professionals about the issues that can impact their lives and broaden their worldview. One of the tenets of the program is preparing participants for global influences and opportunities.

The program is a combination of lecture and travel seminars that culminates with an international trip. It is an opportunity for many of the class members to see the diversity of U.S. agriculture and to see agriculture in another country. For many of our participants it is their first time to travel overseas.

I have been fortunate to travel internationally with seven classes. We have visited five of the seven continents in the world — Asia, Africa, North America, South America and Europe — and 10 countries — Argentina, Brazil, Chile, China, Costa Rica, Nicaragua, Panama, Portugal, Spain and South Africa. Each country is a unique experience. In addition, each provides lessons about markets and issues.

INFRASTRUCTURE

Practically every country our program visits has infrastructure problems. However, two countries come to mind with respect to agricultural infrastructure — Panama and Brazil.

When Class XIII visited the Panama Canal in 2014, the expansion was still under construction, but the future impacts were obvious.

“We were able to see how international trade and travel are affected by the Panama Canal,” said Ashley Peters, a crop consultant in Crowville. “We are blessed to have the agricultural infrastructure that we have in the U.S. It definitely gives one a different perspective on something that maybe they have seen all their lives.”

In Brazil we discovered that our infrastructure is the primary reason we are competitive with them. While visiting several large farms in the Mato Grosso state, we learned that 38 percent of their cost is transportation. They transport their grains by truck more than 1,100 miles one way to the ports.

MARKETS

China is a large consumer of U.S. agriculture. According to the U.S. Department of Agriculture, China imported \$19.6 billion in U.S. agriculture products in 2017. In addition, many products sold in the U.S. are made in China.



A truckload of carrots and corn waiting to be unloaded at the Lo Valledor fruit and vegetable wholesale market near Santiago, Chile.

Photo by Jim Monroe

"I still remember the \$5 a day pay that workers were receiving," said Marty Wooldridge, a beef cattle producer in Oil City. Wooldridge was a graduate of Class IX, which visited several clothing factories in 2006. "We watched young women making shirts for Banana Republic and Victoria Secret that had tags of \$95 already on them."

While today's political environment has everyone looking at the current trade relationship with China, Chile has been one of the best trade partners of the U.S. in recent years. In 2016, they were our ninth largest supplier of agricultural imports, according to the Office of the U.S. Trade Representative. A trip to your local grocery store will reveal numerous fruits, vegetables and nuts from Chile.

The most recent trip for the program was the Class XV visit to Spain and Portugal. The U.S. is the top importer of each country's most important agricultural product. Spain is the top producer in the world of olives, and the U.S. imports mostly olive oil. Portugal is the world's top producer of cork, and the U.S. imports more than \$1 billion annually.

LARGE VERSUS SMALL

Depending on the crop, many of the farms in the U.S. are large. It is common to see a 1,500- to 2,000-acre farm in Louisiana. That doesn't compare to the large-scale farms witnessed in Brazil. The first visit for Class XI was a 67,500-acre farm that produced corn, cotton, soybean and cattle. They also had their own grain mill and cotton gin facilities on the farm.

"I am accustomed to large-scale precision agriculture," said Arron Pierre, who is a controller for A. Wilbert's Sons L.L.C., a land management group in Plaquemine. "While in Spain, I learned that the average farm size was approximately 57 acres. It was even smaller in Portugal."

South Africa had both ends of the spectrum. They had large farms like the U.S. and small farms for many of the emerging producers.

"A major take-away I had from our time in South Africa was how similar their production practices are to ours," said Lance Bruce, a banker out of Oak Ridge who raises beef cattle. "The row crop operations had newer equipment with large-scale implements. The cattle producers were using excellent genetics along with forages and intensive rotational grazing."

LEADERSHIP

Our experiences in other countries also reveal the leadership challenges we have worldwide. One memory that stands out is from South Africa. We met a gentleman named Frans "Khombi" Malela from Limpopo. He is a former electrician who wanted to become a farmer. When Class XIV visited his cotton farm, they were impressed by his dryland crop of approximately 300 acres. But when they found out he only has one 1970s tractor, they were more impressed. When they discovered his crop is hand-picked, they were shocked. When asked why, his answer was simple. He gets a better price and it gives the people in his isolated community much-needed work. It is one of the few opportunities they have to earn enough money to feed their families.

In the end the participants in our Ag Leadership program realize how connected agriculture is worldwide. Every country we visit is a new adventure. We also begin the process of eliminating the stereotypical images in our minds.

Bobby Soileau is the director of the LSU AgCenter Agricultural Leadership Development Program.



Workers at a clothing factory in Wuxi, China. Photo by Bobby Soileau



Iberian pigs at the Jamones Eiriz farm in the Huelva province in southern Spain. The Jamon Iberico hams are air-cured for two to four years. Photo provided by Bobby Soileau

Inside:

Increased investment in port infrastructure may be required to ensure that Louisiana and the United States can maintain a competitive advantage in agricultural exports moving forward.

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Almost half a billion people depend on fish as their principal source of protein, and roughly half of the world's population rely on fish to supply some 20 percent of their protein needs

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Louisiana's agricultural producers use the H-2A temporary guest worker program and the H-2B visa program if they are unable to fill positions with U.S. citizens.

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Louisiana's transportation infrastructure, including deep-water ports, interstate highways and rail, may facilitate increased exports of the state's forest products in the future.

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LSU AgCenter
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