Mission: Michigan State University’s (MSU) Center for Latin American and Caribbean Studies facilitates activities in this core region of the Americas. It is the nexus between the university curriculum, functional pathways that bring together students and faculty from diverse colleges, and fruitful multinational collaborations. Principal sub-regions for our multidisciplinary efforts—from the humanities to the sciences—are southern Mexico, north and northeastern Brazil, the Andes, and the Caribbean.

Collaborative actions: Signature symposia\(^1\) in 2010-11 convened scholars mainly from Mexico and Brazil to examine equity-gap challenges and problem-solving potentials using a community engagement approach. Our goal is to build alliances and to cultivate a global community of engaged public and private sector organizations.

Key issues and matters of inequality are: family health and quality of care, especially women and children; rural livelihood, natural resource and community strategies; and nutritional diversity and health education. Gaps include access to food, to education at all levels, to health services, land and water, justice, markets, credit, capital, and earned income.

Malnutrition remains the frequently obscured, non-income face of poverty. Vulnerable groups are especially discriminated by gender, stunting rates, ethnicity and reproductive status. Two key access domains affecting nutritional status are:

- Water quality (linked to environmental health without pollution risk) and
- Nutrition education.

Mexico

Collaborations in Chiapas and Yucatán target these and related issues. Principal partners include El Colegio de la Frontera Sur (ECOSUR), Centro de Investigación y Estudios Superiores en Antropología Social del Sureste (CIESAS), Universidad Autónoma de Yucatán (UADY), Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP), and Fundación para la Conservación Ambiental, la Salud Humana y el Desarrollo Social de Comunidades Mayas en Pobreza de la Península de Yucatán (FUNCASY).

A decade of health care in Yucatán: Starting with children

In 2000 Professor Peter LaPine initiated collaborations in Playa del Carmen, where MSU faculty and students served the health care needs of children and families in the Yucatán Peninsula.

- A behavioral project launched originally in a school for the hearing impaired, community needs soon led to the delivery of surgical, behavioral and educational services. With continued success and public demand the municipality also provided a clinic.

• This community effort became a program of 46 projects serving over 10,000 patients with over 60 professionals from speech-language pathology, audiologists, physicians, nurses and 500 MSU graduate students.

Questions arose concerning the high incidences of birth defects, hereditary syndromes and losses in the quality of life.

• Subsequent interactions with UADY researchers resulted in a working hypothesis: consumption of adulterated water over time may cause environmentally-based genetic changes and an arresting number of birth defects, including cleft lip and palate.

• Quality of life is a focus of cooperation with UADY and FUNCASY to evaluate child-related health issues across Yucatán linked to the fundamental source of fresh water, the aquifer.

Biosensor detection of disease and water- and food-borne pathogens

Evangelyn Alocilja, professor of biosystems and agricultural engineering uses nanotechnology to identify pathogens causing infectious diseases threatening public health, the food supply, and the environment. Better detection using biosensors can control and reduce contagious diseases like pulmonary tuberculosis (PTB).

• PTB is one of the world’s deadliest diseases (~1.7 million people die annually from PTB with ~9.2 million new cases annually). Global hotspots of this disease constitute health threats, especially from multi-drug resistant strains. Chiapas is a leading state in PTB incidence.

• A prime limitation to PTB prevention and control is lack of accurate, rapid and low-cost screening that is field deployable. One-half of active PTB cases go undetected using traditional sputum microscopy, a test from the 19th century.

A biosensor diagnostic tool with enormous potential for point-of-care detection has been developed through its proof-of-concept by Professor Alocilja’s team.

• The next step is to test a simple, handheld bio-sensor to quickly, accurately and cheaply detect PTB infections in vulnerable populations in Chiapas.
Detection using traditional techniques can take from two to seven days to get results. "For PTB, it's even longer," says Alocilja. "Culturing the tuberculosis bacterium takes at least six weeks. Our DNA sensor for PTB has results in two to six hours…, so people can start treatment much faster," Alocilja explains.

Brazil
Key collaborators with broad ranging expertise include the Universidade Federal da Bahia (UFBA), Universidade Federal do Pará (UFPA) and Universidade de São Paulo (USP), including its agriculture college, Escola Superior de Agricultura Luiz de Quieroz.

“Science without Borders” initiative
The Government of Brazil is implementing a large-scale scholarship program to strengthen science and technology, innovation and competitiveness in Brazilian higher education. Undergraduate and graduate students and researchers across Brazil are coming to US universities, including MSU, for training and reciprocal faculty exchanges.

- In fall 2012, 23 undergraduate students from 12 universities enrolled at MSU, especially engineering.
- Eight UFBA undergraduate students enrolled in James Madison College studied international relations and globalization issues.

Environment and sustainability
Collaborations with UFPA, in particular, are aimed at the impacts of globalization on the Amazon region. Research topics include tropical forests, the cattle industry, environmental conservation, economic development and the social consequences of these interactions.

Andes and Caribbean
Several institutions in these sub-regions work with MSU in educational and research projects. Partners include Universidad Nacional Agraria La Molina (UNALM), Universidad Nacional de Colombia, Palmira (UNC-P), Universidad de Costa Rica (UCR), Universidad Autónoma de Chiriquí, Panamá, Universidad Nacional Autónoma de Nicaragua and Universidad de las Regiones Autónomas de la Costa Caribe Nicaragüense (URACCAN).

Community engagement in Perú
Students enrolled in a field study carry out projects with public and private organizations in cooperation with a highlands community. These problem-solving and training activities are aimed at improved livelihoods and welfare of local residents.

Livelihood dynamics and land use systems in Colombia and Perú
Collaborations with colleagues at UNC-P and UNALM have been aimed at educational programs and better understanding the biophysical and livelihood dynamics of effective land use systems, including economic and social dimensions.

- Land use change lies at the core of our approach: the ecological, social and economic benefits from all land use systems can be increased through better decisions.
- Beyond protecting flora, fauna and their supporting nutrient foundation, we also emphasize the need to reduce poverty with greater family incomes.

Solar bio-power generation in Costa Rica, Panamá and Nicaragua
Our Energy and Climate Partnership of the Americas Initiative, funded by the U.S. Department of State, is built upon a consortium of universities.

- The project goal is to deploy an integrated, distributed clean energy system to produce electricity and fertilizer, and to reclaim water by sustainably transforming agricultural wastes for rural communities. Benefits include the reduced contamination of streams.
- Five UCR graduates are pursuing postgraduate degrees under this and related projects in the Department of Biosystems and Agricultural Engineering.
Nicaraguan rainforests: Biodiversity, conservation and communities

Our Coupled Natural and Human Systems National Science Foundation project, *Globalization and the Connection of Remote Communities: Environmental, economic and social impacts along the Caribbean “Mosquito” coast of Nicaragua* integrates theoretical and real-world learning in biodiversity science, conservation and land management.

- This project is a multi-year research collaboration with URACCAN to assess hotspot connections between human activity and natural systems.
- Students at all levels, abroad and at MSU, are engaged in the analysis of these themes and issues.

**Enabling Problem-solving by MSU Students**

Funding from multiple sources helps support the field experiences of MSU students in developing and conducting hands-on research with our partners. In 2011-12:

- Ten doctoral students from nine departments won Tinker Field Research Grants to explore pre-dissertation opportunities in six countries.
- Thirty-five scholarships were awarded to graduate and undergraduate students from 11 departments to carry out research in 10 countries.
- Nine students of Mexican descent received research fellowships under an Instituto de los Mexicanos en el Exterior Becas program through the Mexican Consulate in Detroit.