University of Puerto Rico Mayaguez Campus Combined Research and Extension Plan of Work
2020-2024

Status: Final
Date: 11/25/2019

I. Plan Overview

1. Executive Summary

This five-year plan of work (POW) covers the period from October 1, 2019 to September 30, 2024. This 2020-2024 POW has been prepared in collaboration between the Puerto Rico Agriculture Experimental Station (PRAEX) and the Puerto Rico Agriculture Extension Service (PRAES). Attention will be paid to six (6) critical issues, which are as follows: 1. Food Security, Plant & Animal Systems; 2. Extreme Weather, Environment & Sustainable Energy; 3. Food Safety & Science Technology; 4. Community Economy for Sustainable Development; 5. Family Well-Being; and 6. Positive Youth Development. The first four critical issues are common for both units while the last two are exclusively for PRAES.

The selection for these critical issue areas was based mainly on priorities set by the stakeholders as well as a result of the Merit Review meetings and discussions with collaborating personnel from government and non-government agencies. They were also consulted with the State Program Area Leaders as well as with the specialists that assist in the plan of work preparation / accomplishment reports and who keep track on the important issues concerned in their area of expertise and who also can identify future trends. Information was also gathered from the local Agricultural Agents and Family & Consumer Science local personnel who are in close contact with the clientele: farmers, homeowners, housewives, youth and community leaders. After experiencing Hurricane Maria, there is general agreement to strengthen our educational effort on natural disaster preparedness through all Extension program areas. As well as research efforts to develop resiliency.

FOOD SECURITY, PLANT AND ANIMAL SYSTEMS

This critical issue covers crop and animal production, as well as pest management to ensure sustainability while seeking food security. Puerto Rico produces less than 20 percent of the food it consumes. Local agricultural systems face environmental and socio-economic challenges that, if not adequately addressed, will disrupt the balance among farm profitability, farm sustainability and food security. Research and Extension efforts have and will focus on seeking improvement of biological efficiency of crop and livestock.

Puerto Rico’s 2014 gross agricultural income generated $946,758 M; comprised of 48% from animal production and 43% from crop production. In order of economic relevance, the sectors in animal production that contributed the most were dairy cattle, poultry, beef cattle, pigs, fish and other aquaculture, rabbits, bees, goats and sheep. While crop production is led by starchy crops such as plantains and bananas, followed by vegetables, fruits and coffee.

Research and Extension should continue their efforts to increase local food availability by farm production and urban agriculture. To increase food accessibility, marketing studies and the establishment of market networks among farmers and food chain distribution members are needed. Extension’s Family and Consumer Science specialists should continue

promoting the importance of consuming nutritious meals, safe food handling, food preparation and promoting healthy lifestyles. In order to strengthen the food system, extension personnel should continue promoting the adaptation of strategies for resilient agricultural production, post-harvest crop management and improve marketing efficiency.

Local urban agriculture is primarily related to vegetable production. Vegetables are important cash crops for the local farmer's markets and as exports to the US during winter season. Limitations for vegetable production are associated with the lack of seed availability or disease resistant varieties for local production. In addition, there is limited information on sustainable soil management practices to alleviate soil fertility problems. The limitations and the high cost of inputs have forced a significant number of farmers to abandon their farming operations.

The evaluation of new varieties of lettuce, tropical pumpkin, sweet pepper and tomatoes, resulted in recommendations for adapted cultivars to the local environmental conditions. Educational methods to be included such us: field days, workshops, short courses, webinars and creation of factsheets and handbooks will continue. New research will continue to be directed in providing local farmers with efficient production systems. As an example of new technologies is the use of high tunnels and improving marketing strategies while maintaining collaboration with federal and government agencies. Information generated by research will be disseminated to growers and agronomists about best performing varieties and appropriate cultural practices that include integrated pest management as well as market feasibility and consumer preference studies.

Fruits including mango, pineapple, citrus, papaya and avocadoes are important local crops. Recent research and extension efforts towards the local citrus industry consisted in producing Huanglongbing (HLB) citrus greening-tested plants and developing educational materials about the nutritional management and control of the insect psyllid vector. As part of the initiative with the Citrus Clean Plant Network, testing citrus plants for systemic diseases will continue. Research on mango production will focus on evaluation of pollinators and disease management. These efforts will be conducted in collaboration with private industry. Extension personnel where growers will be trained in accordance to these efforts.

The latest research and extension efforts for coffee production have been focused in the management of the “coffee berry borer”, emphasizing on the biological control and the search of new parasitoids. Additionally, social economics studies were conducted engaging the coffee industry and small growers. New directions will move towards the validation of coffee rust resistant cultivars against the new race of Hemileia vastratix. Outreach will highlight research findings and provide training for extension personnel and stakeholders.

PRAES and PRAEX have initiated the use of vegetative propagation methods and tissue culture to produce high quality yam and arracacha plants. Continuing research in taro irrigation management studies will be conducted. Disease detection and identification methods by the Plant Disease Clinics will continue with early disease detection methods and molecular tools.

There is consensus on the need to revive local crop production in order to reinforce Puerto Rico’s food security. Strategies to increase crop production will focus in empowering small farmer’s knowledge through research and extension. Such efforts will provide them with high-quality seeds, new varieties, and the necessary technology to adopt new sustainable management practices, which will be crucial for the sustainability of local food production. Dissemination of information about new disease and pest reports will be available through social media and extension website.

In terms of animal production, challenges such as heat stress, inadequate adaptation of breeds for tropical production,

farm and employee's management, elevated costs of production (especially feed imports), poor forage management and utilization, imports of animal products, and more recently, natural disasters, negatively impact livestock production. Goat and sheep, pork and beef cattle farmers, and dairy farmers are re-organizing and creating cooperatives to develop more competitive agricultural enterprises. More than ever, these farmers will need our technical assistance to develop proposals to bring resources, understand how to comply with applicable laws and regulations and develop strategies to encourage added value and marketing to their products. Impact at the farm level relies on education, research and training methods to encourage adoption of recommended management practices of either a traditional or innovative nature. More alliances with innovative and successful farmers and the creation of more demonstrative farms should be considered strategies to increase adoption of recommended practices by PRAES and PRAEX. Farm visits should be intensified to better capture the success of our farmers (associated with our technical assistance) and use this information to strengthen our credibility and relevance to our clientele. Research and Extension efforts should focus on seeking improvement of biological efficiency of livestock production, economic returns to the producers and practices that promote extreme weather resilience.

EXTREME WEATHER, ENVIRONMENT & SUSTAINABLE ENERGY

The climate is changing and no group will be impacted more than farmers. Between diseases, pests, wildfires, floods, droughts, and increasingly severe weather patterns, each growing season seems to come with more challenges than the last. Extreme weather undermines the ability of farmers to grow food in a productive and environmentally sustainable way. To be successful addressing weather change, we need to encourage farmers to use practices such as cover crops, no-till, rotational grazing, and others. Such practices are recommended for soil conservation and to use the land to serve as a sink for carbon sequestration in the soil. Also, to encourage the use of better soil management practices for a long-term production. To encourage an agriculture that is both resilient and sustainable, radically new approaches for agricultural production are needed.

The approach must build on a diversity of solutions that maintain and enhance the adaptive and transformative capacity needed to respond to disturbances and avoid critical thresholds. Identifying these approaches will require that we encourage experimentation, innovation, and learning, even if they sometimes reduce short-term production efficiency. After hurricane Maria, renewable energy became an important issue. Our educational plan coveys using workshops and meetings as well as demonstrations. Establishing collaborations and providing assistance to farmers, families and 4H members promoting renewable energy and improving energy efficiency.

Puerto Rico has a diversified agriculture, characterized by (on average) small family production units, often with a myriad of tropical crops and animal production. The US Soil Classification System has recognized 10 soil orders in Puerto Rico from the established 12 Soil Orders, which distinguishes our island as a very diverse area in terms of soils. The island is exposed to extreme weather events such as hurricanes, where one of the main impacts is soil erosion with its negative consequences on the watersheds.

To achieve those goals, we will be maintaining and strengthening collaborations with USDA agencies such as NRCS, Forest Service, as well as state such as the Department of Natural Resources and Environment, the Environmental Quality Board, the State Department of Agriculture, and other non-government agencies. Since some of the agricultural critical issues may be similar to other ecological areas within the tropical region, collaboration with other land-grant universities will be encouraged.

The research effort will be directed to identify successful adaptation to weather extreme events based on assessed risk exposure and agricultural biodiversity practices, identifying best soil and water management practices, and conservation. Similarly, it is intended to identify and preserve melliferous plants needed for pollinators conservation, leading to crop production recovery. Successful adaptation requires government support for traditional seed systems to conserve and extend agricultural biodiversity with climate adapted traditional crops.

FOOD SAFETY SCIENCE AND TECHNOLOGY

The Center for Disease and Prevention (CDC) estimates that each year, roughly, 1 in 6 Americans (or 48 million people) becomes sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases. According to CDC (2017) 60% of the outbreaks occurs in restaurants. To reduce the number of outbreaks, public health agencies require that food managers take and approve a food safety course. Such is the case of Puerto Rico, which adopted the Food Code since the year 2000.

The Food Code requires that food managers demonstrate food safety knowledge. Brown, G., et al (2014) concluded in their investigation that food safety certification improves food safety knowledge. Among restaurants, the major difference between those with foodborne disease outbreaks and those with non-outbreaks is the presence of a certified kitchen manager (CDC, 2016). Accordingly, Puerto Rico Agricultural Extension Service (PRAES) priorities remain to offer the Food Safety Certification Course (FSCC) to persons in charge of retail food establishments, and to continue offering formal education to professionals that enforce compliance regulations.

On the other hand, homes are also at risk. The majority of the food that people consume is prepared at home, therefore there is a great opportunity for unsafe food handling practices. Studies have found that behavioral change in consumers are related to the knowledge they have (Lossasso, C. et. al, 2012). PRAES will continue to offer food safety short course: Families Be Food Safe. This curriculum is adapted to the clientele's needs and lessons are added to meet them.

In 2011, President Barack Obama, signed the Food Safety Modernization Act (FSMA). This law allows the development of 7 rules, which enables FDA to better protect public health by strengthening the food safety system. This new food safety system is based on prevention rather than reaction. Puerto Rico imports more than 90% of the food consumed, a reason why is so important to help small producers to add value and extend shelf life of fresh produce. In addition, the development of new products may increase food production in our country.

POSITIVE YOUTH DEVELOPMENT

According to the national initiative "Healthy People 2020", those adolescents that can manage changes and risks factors associated with this developmental growth stage will become successful, happy and healthy adults. The office of "Adolescent Health" pointed out that adolescents should have five essential components for a healthy growth; positive connections with support people, safe place to live, learn and play, access to high quality environment (resources), access to adolescent health services, a learning environment where the adolescents can be learners as well as leaders, team member; and education and public policy development facilitator in favor of the adolescent. Access to service centers that promote family and youth well-being.

The well-being index from the Youth Development Institute prepared an x-ray of the children and youth 0-21 years old situation and conditions in Puerto Rico, where continuously is graded D due to the high poverty levels and low academic achievement. Hurricane Maria worsen the situation dramatically increasing children poverty levels, accelerating family migration and cutting opportunities that can contribute to economic development in Puerto Rico during their adulthood. Another hurricane impact in children was on the mental health and academic achievement. Before the hurricane, 58% of our children live in poverty which is a stress element. Living under poverty could become into chronic stress for children which has a negative effect in learning, in memory and it is health related. Studies have shown that natural disasters cause stress post-traumatic disorders and that the disorder and other mental health problems could prevail for years. All of this plus the parent's ability to manage the situation could be compromised due to their own experiences.

Given this situation, efforts in the 4-H educational program and this critical issue will be focused on the creating safe learning spaces, establish positive contacts and offer opportunities and experiences for children and youth to develop skills and abilities to became healthy adults. We are proposing our plan of work based on:

-paying attention to the adolescent, who has shown to have more difficulty in transitioning to adult after experiencing a natural disaster,

-promote adult support which has been shown help youth cope with this kind of crisis and becoming successful.

-offer mentoring services, that help youth guide to seek post-secondary studies and been employed,

-develop internship and job related experiences, entrepreneurship education, life skills and finance management.

Community, Economy, and Sustainable Development

Puerto Rico has been experiencing an economic recession for more than a decade. Even before the onslaught of the hurricanes that devastated the island in September 2017, Puerto Rico's economy exhibited high unemployment rates (11.7%) and low job market participation (40%). According to the Census Information Center at UPR-Cayey, poverty levels increased from 44.3% before the hurricanes to 52.3% after it impact. Moreover, outward migration, responsible for an estimated 10% contraction in population. Data from 2010 to 2017 indicated that migration is expected to continue if economic recovery efforts are delayed.

The agricultural sector was particularly impacted by the hurricanes losing about 80% of the value of its crops. With no jobs readily available, many rural laborers migrated to other sectors where rebuilding efforts started, or to the US, where FEMA and state governments had implemented temporary relocation programs. The availability of the workforce needed to help with farm recovery became an additional challenge for the sector, stressing the importance of creating better paid, local employment opportunities, and of increasing labor efficiency.

Current and planned research and extension efforts at the College of Agricultural Sciences (CAS) address these issues through their programs' activities and projects. From the research side, priorities include the identification and development of new, profitable niche markets for Puerto Rico's commodities through valued added alternatives and creation of differentiated products; and the study of consumer's attitudes and demand for these types of products. Projects evaluating technologies that can potentially improve labor productivity, particularly in coffee harvest, are also being planned and implemented. Finally, projects following methodological approaches that facilitate interdisciplinary collaborations and integrated perspectives in support of local food systems are also being explored and applied.

On the Extension side, the approach followed to target the critical issues identified is to join efforts with other educational program areas to foster self-employment, community microenterprises, small businesses, and the development of third sector entrepreneurs in communities. Community outreach is essential to develop a culture of resilience. In the aftermath of Hurricanes Irma and Maria communities were forced to take a proactive approach towards their physical and economic recovery. The government proved to be unable to meet people's needs during a crisis. The community self-management approach allows for the development of community resources to shorten the recovery response period, and better prepare people to handle an emergency. Following this process, the Puerto Rico Agricultural Extension Service (PRAES) was able to identify five areas in which capacity building is needed to enhance resiliency and sustainable development levels: community food systems, emergency plans, volunteer program, alternative energy, radio communication, and entrepreneurship.

The Agriculture and Family and Consumer Sciences programs provides training on marketing and family finance helping

participants to create business. Combined with the entrepreneurship training available under the Community Resources Development (CRD) educational program, it allows for the development of business plans that follow the requirements and recommendations of the Small Business Administration.

The second area of emphasis in CRD aims to broaden the educational offerings in disaster management and emergencies plans to cover for the organization, planning and development of practical activities before, during and after an atmospheric phenomenon, earth movement, or human origin emergency. In this way, we can be pioneers in community resiliency development that allows people to overcome these challenges in the future.

The third area of emphasis is the promotion and development of the volunteers' program. Volunteers are an essential component of community projects' success. Puerto Rico counts, since 2004, with Law 261 that establishes volunteers' duties and responsibilities. After the hurricanes, the volunteer culture has been growing; they have been an excellent resource during the recovery period. PRAES is in the process of creating protocols to integrate and to work with volunteers as a community resource.

The fourth area of emphasis is in radio communications and alternative energy or solar energy. The vulnerability of the island's electric infrastructure was evident after 100% of families experimented a total blackout during months after the hurricanes' crisis. PRAES is working towards implementing a radio communication network with solar energy across its five regional offices. During emergencies, these centers will serve as resilience centers helping communities and first responders to stabilize and start recovery efforts.

A fifth area of emphasis, an ongoing trend of great concern, is focused in the loss of farms, community food systems, and ecosystem value to other irreversible uses. In the last 30 years, Puerto Rico has experienced a loss of 43.54% of the land area in farms. Twenty percent (20%) of this loss occurred in just a 5-year period (between 2002-2007). Despite the fact that Puerto Rico has a "Land-Use Plan" approved in 2015, it only protects 600,000 cuerdas of farmland from an estimated total of close to a million cuerdas needed to guarantee food security. For this reason, it is necessary to continue promoting the identification and encourage community action around the conservation and development of the land area in farming, and of ecosystem value. This is of utmost importance given the interest in recent years in the development of economic initiatives through vegetable gardens and small scale farm production.

FAMILY WELL-BEING

Family Well-Being focused on the improvement of family lives with the purpose to empower them to be able to make informed decisions on health, nutrition, family relations and the elderly. The educational efforts in this critical issue is vital for the community growth and development. Families who were trained on better decision making are capable of properly attend their basic needs and manage their individual and community problems. Every day, families faces unique challenges that require education to increase their knowledge and skills for a better quality of life.

In 2017, Puerto Rico was impacted by two hurricanes which resulted in an estimated 2,975 to 4,645 deaths. The impact on human life, property, infrastructure, and medical care access was huge. Recovery efforts will certainly take years.

Before these hurricanes, Puerto Rico already faced a number of economic and public health challenges. The island was already in an economic recession where almost half of the families lived at or below the federal poverty level. Poverty is known to have a negative impact on vulnerable individuals such as children, teenagers and the elderly. Natural disasters

such as hurricanes, disproportionately affected these populations, who's families have fewer resources to recover and rebuild. Outbreaks of mosquito-borne viral diseases: dengue, chikungunya and zika were in high proportions. Similarly, higher flu rates among susceptible populations also occurred. High prevalence of chronic diseases and mental health conditions such as obesity, diabetes, cancer, Alzheimer, hypertension, cardiovascular diseases, depression, anxiety, suicide attempts among Puerto Ricans were also documented. Infectious diseases including elevated rates of sexually transmitted diseases and HIV were reported, especially in young adults.

Obesity has been associated with major causes of mortality in the US and PR: cancer, cardiovascular diseases and diabetes. Data from the Behavioral Risk Factor Surveillance System of the Centers for Disease Control and Prevention (CDC, 2017) indicated that the prevalence of adult obesity (18 years and over) in PR was between 31.7 and 33%. The analog survey for youth, Youth Risk Behavior Survey, showed that 11.2% of youth between 9th and 12th grade were obese. Data also indicated that 14.3% of Puerto Rican adolescents in high school did not eat fruit, and 16.4% did not eat vegetables "during the 7 days before the survey". Moreover, 30% did not participate in at least 60 minutes of physical activity "on at least one day" of the week. PRAES interventions focus on healthy eating and increase physical activity to promote positive behavior changes towards the prevention of adult and childhood obesity.

The obesity can be prevented by healthy life styles which includes a good nutrition and physical activity. The recent data from the YRBS-2015 indicated that only 29% of the high school adolescents in PR do 60 minutes' physical activity five days a week. According to this study, 26% of the adolescents do not eat fruit nor vegetables and 53% do not eat breakfast, detrimental unhealthy practices.

The aftermath of Hurricane Maria exacerbated the socioeconomic and public health issues that already exist while introducing new ones. Infectious diseases such as scabies and leptospirosis emerged as a consequence of heavy flooding, crowding and inadequate sanitation. Respiratory diseases increased due to mold contaminated houses. A limited access to food and safe water occurred due to public systems interruption such as shelter, food, water, electrical, transportation and communication. A growing burden of chronic disease care needs appeared because of service disruptions at hospitals, clinics and other health care facilities. Mental health issues were aggravated in our population due to exposure to stressful factors associated with the hurricane including loss of their homes and personal belongings, being forced to evacuate; friends and family leaving the island, having a family, friend, or neighbor experience injury or die; or fearing death or injury. A higher number of individuals experienced posttraumatic stress disorder, depression, and anxiety. Suicide attempts and suicide increased after the disaster. Poverty levels have risen which have implications for public health, because people won't have enough income to satisfy their basic needs. Thus, Hurricane Maria was, and continues to be, a public health crisis for Puerto Rican families.

Collaboration with federal, state and nongovernmental agencies will continue to support and provide education as part of the public health response activities after hurricane Maria. The proliferation of mold in water-damaged homes caused and increase in respiratory conditions, including asthma. In order to help families affected by indoor household mold, a memorandum of understanding (MOU) was signed between PRAES and the Asthma Program of the Puerto Rico Department of Health (PRDOH) to train health professionals on mold mitigation. More than 300 health professionals are already trained. We expect to conduct home visits with PRDOH personnel to develop home environmental assessments as well education about reduction of indoor mold and allergens. A collaboration was obtained with the Comprehensive Cancer Center-University of Puerto Rico (CCCUPR) and with the Non-Communicable Diseases Alliance for outreach and education of families and their relatives on chronic disease management and prevention. Also, there is a collaboration with the Food and Nutrition Commission of Puerto Rico for the development of a disaster preparation guide for citizens, PRepárate. This guide summarizes the basics aspects of disaster preparedness before, during and after natural disasters.

Some of the lessons learned from Hurricane Maria pointed out the need to emphasize Family Resiliency, Mental Health and Crisis Management, before, during and after a natural disaster. Outreach and education on health management and

wellness, family relations, housing and personal and family finance will be areas of emphasis for capacity building. Emergency preparedness trainings, healthy lifestyle habits and healthy homes promotion and education as well educational resources to cope with mental health issues will be a priority. Development and implementation of evidence-based educational interventions not only at the individual, but also, at the community level to improve and sustain healthy environments will be addressed.

2. FTE Estimates

Year	1862 Extension	1862 Research
2020	147.0	52.5
2021	146.3	52.5
2022	145.7	53.0
2023	145.0	53.0
2024	145.0	53.0

II. Merit / Peer Review Process

The Extension Merit Review process continues to be conducted through four committees representing each of the four major program areas: Agriculture, Marketing and Natural Resources; Family and Consumer Sciences; 4-H and Youth Development; and Community Resource Development. Each committee is composed of at least five members: Internal University members (the program leader, two specialists--one from the Planning and Evaluation Office and one from the major subject area), a researcher from the Agricultural Experiment Station and other faculty members, and external non-University members (representatives of the major government agencies or organizations that work with similar audiences). External Members in the different committees include representatives from government agencies at the regional or state level, such as: Department of the Family, Department of Education, Department of Agriculture, the Mayor's Office, the Governor's Office for Youth Issues, Rural Development Corporation, the Farmers' Association, Farm Service Agency, Consumer Department, Head Start, Police Department, as well as representatives from non-governmental organizations, the religious sector and the private sector, among others. Each committee meets at least twice during the fiscal year to evaluate the proposed plan of work. External committee members evaluate the quality and relevance of the activities and programs to the State goals and offer recommendations in order to continue emphasizing critical areas in our programs. A written report is prepared at the end of each fiscal year by the program leader, in accordance with the committee members. The report is presented to the committee and describes how the committee's recommendations will be addressed and incorporated in the Plan of Work.

No significant changes are expected for the PRAEXS merit review process. Part of the Hatch funds will be allocated for competitive project grants. The competitive funded proposals will be selected on the basis of the year's revised priorities published in our annual call for proposals. The annual call for proposals will be prepared and distributed by the recently integrated Research and Extension Office. This new office combines the research activities for both, Agriculture Experiment Station and Cooperative Extension Service. This new approach will force a close collaboration between agencies concentrating our combined efforts in one common good. Another part of the budget will be allocated for specific signature projects of the PRAEXS. These signature projects encourage emerging or incipient agricultural research areas that need to be developed in Puerto Rico. At the same time, it will be promoting the management of tropical agroecosystems under changing climatic conditions. All the proposals (competitive and signature projects) will be submitted to the Assistant Dean for Research with the endorsement of Department Heads.

III. Stakeholder Input

1. Actions to Seek

In order to seek input from the stakeholders the PRAES will make use of traditional media to announce public meetings and listening sessions. In addition, targeted invitations to stakeholder groups or individuals and surveys of stakeholder groups and individuals. Extension's stakeholder input process conveys mainly traditional participants or regular program's

clientele who are members of the Local Advisory Committees. This clientele has vast experience on the four major Extension program areas and include farmers, homemakers, youth as well as community leaders. State agencies' representatives with similar clientele, who are also members of the local advisory committees are invited to participate in the stakeholder input process.

The PRAEXS will continue with commodity meetings where stakeholders can participate by stating their opinion on research priorities. We have identified a total of 7 commodity groups of importance to Puerto Rico's economy: Coffee, Farinaceous crops, fruits, Vegetables and basic grains, Milk and forage, Environment, natural resources and renewable energy and Meat production. Each commodity has a meeting each year. In addition, workshops, seminars and symposiums will be periodically held for scientists and extension personnel. It will be a requirement from the administration that each project leader organize at least, one workshop or a seminar per year related to their project. The use of social media such as Facebook and Twitter will also be used to reach a wider and more varied community. PRAEXS personnel have develop a podcast called DESDE LA EEA (uprm.edu/desdelaeea) where they discuss subjects related to agricultural projects in the PRAEXS. The program has also invited prominent figures in Puerto Rico's agricultural development and will continue to do so in the future.

2. Methods to Identify

PRAES methods to identify the stakeholders entails the use Advisory Committees, Internal Focus Groups or Needs Assessments. In some instances, the use of a survey could be employed. Extension's stakeholders are mostly the local (municipal) advisory committee members.

PRAEXS uses commodity meetings to identify groups and individuals from which to collect information. In addition, the use of workshops and symposium where farmers and the scientific community meet is another method of identifying stakeholders.

3. Methods to Collect

The methods to collect information most often used by PRAES are meetings with traditional Stakeholder groups or individuals, survey of traditional Stakeholder groups or individuals, survey specifically with non-traditional groups or individuals, focus groups and or electronic communications.

Input from Extension's stakeholders is collected at the local advisory committee's meetings. Stakeholders are asked about the issues affecting their livelihood within the areas included in our educational program areas that covers: agriculture, families, youth and communities. They are also asked to prioritize these needs or issues. Focus groups is commonly conducted to ensure the priorities identified. A written report is prepared by the local Extension personnel in collaboration with the committee members and sent to the PRAES Planning and Evaluation Office at the State level, which collects and analyzes the written information and data collected.

The information collected in a report at the local (municipal) level for the Stakeholder Input is designed for this purpose. It shows the date of the meeting or activity, attendance, summary of needs and priorities selected, procedure to determine and set priorities, limiting factors and suggested research needs. Another tool at the local level is a form to collect demographic data which is updated every five (5) years. This document provides for a broad picture of the local situation regarding the following items: population (changes, ages, gender); economy (agriculture, industries, tourism), social factors (employment, education, families, social programs), and environmental factors (water supply, contamination sources, recycling programs, natural reserves)

In the PRAEXS, stakeholder input is collected through personal communication in meetings, workshops, field days, seminars and symposiums. After each activity, an evaluation form will be provided to each attendant with six basic questions that will aid in the identification of the priorities of our stakeholders. One of the questions asks for them to provide recommendations not only on future activities, but on new areas of research they believe the PRAEXS should address. Another method of collecting stakeholder input is through social media (Facebook, Twitter), and podcast (uprm.edu/desdelaeea) statistics.

4. How Considered

All the information collected from the stakeholders is considered in the budget distribution, identification of emerging issues, redirection of extension programs, staff hiring process, action plans and to set priorities. In order to set priorities for our educational programs, input collected from the Extension's stakeholders will be received at the state level and discussed with program leaders, the Planning and Evaluation Office, and the Associate Dean. Data collected from the

stakeholders at local level, will also be shared with the specialists, according to the area of need. Needs related to the area of agriculture will be collected in a report to be sent to PRAES specialists that participated in the commodity joint meetings with PRAEXS. When there are issues that required attention, the programs are redirected to address these issues. Also, new emerging issues are identified through these processes and analyzed according to the staff and resources available to address. At the local level, input offered by the stakeholders is used to set priorities for their local plan of work. Statistical data from the State Health Department, Agriculture Department, Social Services, School of Family Science and Consumer Education, are also considered to respond to public policy issues. When there are issues which need to be emphasized, programs are redirected to address these issues. This process may also be used to make decisions about recruitment of new faculty members.

Research activities subsidized through the Hatch funds are partially aligned with the priorities exposed by the stakeholders. In cases where the need expressed by the stakeholders cannot be met by the PRAEXS an internal evaluation will be ensued to evaluate the possibility of hiring additional personnel to address the issue. In other cases, research specific activities could be assigned to a researcher in order to meet stakeholders request.

IV. Critical Issues

1 Food security, plant & animal systems

Description:

Puerto Rico imports over 80% of the food consumed, which travel thousands of miles from its place of origin. During the last 5 years Puerto Rico has faced many challenges including hurricanes, earthquakes and now the COVID-19 pandemic, among other risks that underscore the vulnerability of our food chain. For this reason, PRAES and PRAEXS will collaborate on increasing public awareness of the vulnerability of our current food system. Improving the system's biosecurity will demand that well planned programs are adopted by farms that supply food products. The focus of this effort will be to increase local animal and crop production and consumption. Research and Extension approaches will target the adequate use of inputs and efficient use of energy and water for a sustainable local animal and crop production system that promotes food security. Crop production systems research will focus on the availability of quality seeds; characterization, evaluation, and development of crop germplasm; identification and management of key pests and diseases; and on the adoption of sustainable practices. Animal science research will remain focused on strategies to improve production in warmer climates, particularly through studies of a slick hair phenotype/gene that appears to be an adaptation of cattle to heat stress; production strategies to add value to cattle raised grazing tropical grasses; and studies to improve the production, management, and well-being of small ruminants and add value to their sub products such as goat milk.

Term: Long

Science Emphasis Areas

Human Nutrition
Sustainable Agricultural Production Systems

2 Extreme weather, environment & sustainable energy

Description:

IPCC findings showed that the tropics and islands are most vulnerable to extreme weather events, increasing the risks for agricultural production. With extreme weather events becoming more common, we face the challenge of generating a food system that can absorb and recover from such stressors. Vital resources such as soil and water are especially susceptible; invasive species threats and urban sprawl complicate the island's outlook.

Recent weather events forced PRAES to assist with and encourage the adoption of renewable energy options in agriculture. Our educational plan conveys workshops, meetings, and demonstrations. Research efforts continue to focus on issues related to soil quality and best management practices, mitigation of threats to water quality, microirrigation technologies, and on the identification and protection of natural enemies of harmful insect pests. Lessons learned from Hurricane Maria's impact on agriculture and forest resources are being integrated into projects that research and facilitate the creation of a sustainable forestry industry in Puerto Rico, sustainable power generation after natural disasters and agroecological practices adapted to extreme weather conditions.

Term: Long

Science Emphasis Areas
Environmental Systems
Sustainable Agricultural Production Systems

3 Food safety, science and technology
Description:
To reduce food borne disease outbreaks, public health agencies require that food managers take and approve a food safety course. The Food Code, adopted in 2000, requires food managers to demonstrate food safety knowledge. PRAES continues offering courses to people in charge of retail food establishments, and to professionals on compliance regulations. Homes are also at risk. The PRAES will continue to offer food safety short courses to family participants. To implement the new Food Safety and Modernization Act, the FDA has developed a series of regulations that local food industries must comply with in order to achieve a safe food supply. Compliance with these rules is the only way that local farmers and food industries can become fully competitive in current markets. To help farmers and local food companies comply with the applicable rules, PRAEXS will continue providing food safety training to food industries and local farmers. Research efforts that address local producer needs related to adding value, extending the shelf life of fresh produce, and maintaining products' distinctive characteristics in differentiated markets, will also continue to be important in our research program.

Term: Intermediate

Science Emphasis Areas
Food Safety
Human Nutrition

4 Community, economy & sustainable development
Description:
The regeneration of agriculture and employment are long term issues exacerbated by the devastation that Hurricanes Irma and María inflicted on Puerto Rico in 2017. A 6.4 earthquake in 2020 and the COVID-19 pandemic further challenge ongoing recovery efforts. New research and extension activities will continue to focus on the promotion of potentially profitable markets for local products, value-added alternative to increase the price of agricultural commodities, best practices and models for addressing complex food-system issues, sustainable employment creation through entrepreneurship and self-management skills training, and community participation organizational skills training to better address community needs. Research and extension initiatives targeting resiliency, land tenancy, financial, labor market participation, and public policy issues, will also be explored.

Term: Intermediate

Science Emphasis Areas
Bioeconomy, Bioenergy, and Bioproducts
Education and Multicultural Alliances

5 Family well-being
Description:
The current COVID-19 pandemic has disproportionally affected our communities due to a variety of factors including: high number of older adults with comorbidities, poverty, deteriorated essential service infrastructure (power, water, health, education), inadequate housing, and recent natural disasters. After the catastrophic hurricanes of September 2017, the earthquakes of early 2020 and now the COVID-19 pandemic, the socioeconomic and health disparities are increasing among vulnerable populations in many parts of the island, in particular the elderly. Older adults are more likely to have diabetes, hypertension, and obesity and consequently

are at high-risk for COVID-19 outcomes. Also, people with obesity are at risk of COVID-19 severe disease and other health conditions. Puerto Ricans have higher rates of obesity that affects not only the older adults but young people including children. Another challenge is the all-year round presence of arboviral diseases that complicates the ongoing COVID-19 situation. On the other hand, COVID-19 impacts not only the physical health but also the mental health of our populations. It is important to reinforce our efforts into community educational interventions to promote the overall physical and mental wellbeing. Our educational prevention efforts will be focused to encourage healthy habits such as COVID-19 protection, physical activity initiatives, chronic and infectious disease management, and healthy family relations not only to senior adults and their caregivers but also attending younger populations.

Term: Intermediate

Science Emphasis Areas
Family & Consumer Sciences
Food Safety
Human Nutrition

6 Positive youth development

Description:
Youth in the Caribbean archipelago have faced emergencies caused by hurricanes, earthquakes and now a pandemic. The lack of educational opportunities and inaccessibility to food, due to closing of schools, and the increase in domestic violence, associated with the lockdown, increase youth vulnerability. These challenges are a potential physical and emotional threat to children and adolescents.

Youth and 4-H Program will direct their efforts to create safe spaces for learning, establish positive contacts and offer opportunities and experiences for children and young people to develop skills and abilities that allow them to become healthy and committed leaders and adults. Cultivating youth and adult partnerships will be our milestone. Positive youth development initiatives and theories consistently agree that youth who receive mentoring and adult support can achieve healthy and affirmative relationships. When adults express interest in the well-being and care of the young they provide them with opportunities for growth, it inspires, and provides a genuine environment to raise the voice of the young people allowing new opportunities of working relations and joint projects.

Term: Long

Science Emphasis Areas
Youth Development