PLAN OF WORK

Fiscal Years 2000-2004

College of Tropical Agriculture and Human Resources

University of Hawaii at Manoa

Research, Extension, and Education Programs

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VII. Plan of Work Contacts

I. OVERVIEW

Hawai'i is economically dependent on the quality of its environment. Separated by thousands of miles from other landmasses, the flora and fauna offer hundreds of species found nowhere else in the world. Of the species native to Hawai'i, 89% are endemic, occurring nowhere else on the planet. Urban encroachment, predators and population growth, and the sheer number of visitors enjoying scenic areas in the state pressure the environment. Hawai'i is noted for having the greatest number of endangered species in the United States. At the same time, the State has fallen victim to regular natural disasters which have devastated various rural areas including hurricanes and the long standing volcanic eruption on the island of Hawai'i. The delicate balance of Hawai'i's unique ecosystems makes the environmental impact of economic development a key issue in the State's future. Research, instruction and extension programs that emphasize and encourage agricultural activities and management policies which are environmentally friendly are being undertaken in order promote environmental stewardship by the agricultural sector.

Tourism is the State's number one industry and the environment is the major attraction, making the quality of the environment crucial to the Hawai'i's continued prosperity. The federal, state and local governments also play a large role in Hawai'i's economy with government providing an increasingly larger share of employment. The military is the State's second largest industry in terms of value, with agriculture the third largest sector in the State's economy. The most recent estimates of the impact of agriculture on the economy of Hawai'i indicate that 62,000 people are employed in agriculture and related industries, and $4.7 billion is contributed to the economy. The sugar and pineapple industries have declined dramatically over the last 8 years resulting in major transitions in traditionally rural communities. Every island has suffered closures of sugar plantations and pineapple is now produced primarily for the fresh market. These closures and corporate downsizing have resulted in high unemployment among agricultural workers, as well as economic, and social stress in rural communities. At the same time, the closures have released thousands of prime agricultural lands creating new opportunities for diversified agriculture.

Diversified agriculture is replacing a portion of the revenues generated by sugar and pineapple in the State's economy. However many former sugar workers are unprepared and lack critical skills required for success in diversified agriculture. Hawaii diversified agricultural operations have an average size of less than five acres. Thus, at a time when most of U.S. agriculture is moving toward larger corporate farms, Hawaii is dramatically increasing in small farm agriculture.

Urban and tourism uses for land and water compete with agriculture, causing land prices to rise and water availability to become an issue. To assist in the development of diversified agriculture, research and extension programs focus on enhancing profitability by reducing costs and expanding markets. The programs aimed at reducing costs determine the most efficient means of cost reduction (research) and assist operators in understanding how to incorporate this information into their existing management strategies (extension). In order to increase market prices, the research programs look for ways to increase added value of existing products and/or increase consumer demand for new or existing products, while extension programs disseminate this information to the relevant target audiences.

The state economy more accurately mirrors the economy of Japan than the U.S. mainland. This has caused a fiscal crisis for State and local government, the University and CTAHR. As a result, the College has lost more than 50 faculty at a time when demand for services is increasing. These severe budget restrictions have necessitated the development of a College Strategic Plan that consolidates and focuses existing resources to meet fewer, but more critical, University and community needs. This refocusing process, however, allows the College to develop selected areas of excellence that capitalize on its human and physical resources and to continue to build on our world-renowned reputation for the sciences and technologies relating to tropical agriculture, and natural and human resource management. State-of-the-art research that will benefit the State and broader community will be incorporated into undergraduate, graduate and outreach programs that reach across the State and beyond.

THE STRATEGIC PLANNING PROCESS

The people of CTAHR are committed to working with students, clients, alumni, and other stakeholders to strengthen the College to be the place to learn about tropical agriculture, and human and natural resource management and enhancement. CTAHR is positioned to make learning in these areas more appropriate, relevant, and accessible than ever before. In 1996, a steering committee of faculty and staff from the college and leaders from our clientele groups was established. Meetings of the steering committee were held on a regular basis and communication with the faculty and staff was frequent. Faculty, staff, students, and the community were involved in these deliberations. A number of college meetings were held on the Manoa campus. In addition, the Dean and many of the steering committee members attended off-campus "town hall" meetings on all major islands.

Since this strategic planning process is client-focused and CTAHR-directed, it was critical to work with partners for a shared future through shared leadership and responsibility. Notices of "town hall" meetings were sent to industry groups and leaders, and advertised in local newspapers. During the months of October, November, and December 1996, eight public meetings were held on Moloka'i, Maui, Kaua'i, Hawai'i, and O'ahu, with a total of more than 650 people attending. Over 100 written comments and letters were received. The College's newsletter, Ko Ka Aina, was used to keep everyone informed on the planning progress. During all of these interactions, information was collected on needs and perceptions. As part of the strategic planning process, the steering committee and planning participants examined both the external and internal factors affecting CTAHR in order to make an accurate assessment of the environment in which the College functions. This information helped formulate the new Vision and Mission statements, Initiatives, Goals, and Objectives.

Our Vision: CTAHR will be the premier resource for tropical agrarian systems and resource management in the Asia-Pacific region.

Our Mission: CTAHR is committed to the preparation of students and all citizens of Hawai'i for life in the global community through research and educational programs supporting tropical agrarian systems that foster viable communities, a diversified economy, and a healthy environment.

The plan presents the College's three Strategic Initiatives and organizational Goals, Objectives and Actions. The initiatives for the next five years are as follows:

1. Improving learning environments-provide superior quality education to learners participating in the College's formal (Academic) and non-formal (Extension) instructional programs on all Islands.
2. Creating new opportunities for the State of Hawai'i through research, develop innovative opportunities for economic, social, environmental and resource management and enhancement options that meet existing and future State needs.
3. Outreach to the citizens of Hawai'i through outreach processes that enhance opportunities for clients to participate in the College's programs.

DISTINCTIVE ROLE AND RESPONSIBILITY OF CTAHR

The Hawai'i Agricultural Experiment Station was established in 1901. Six years later (1907) the College of Agriculture and Mechanical Arts of the Territory of Hawai'i was founded, marking the beginning of the University of Hawaii. This connection to the federal Land Grant system has benefited Hawai'i's people for nearly 100 years through the College's instruction, research and extension activities. CTAHR continues to be the Land Grant college of the University of Hawai'i and an integral part of University of Hawai'i at Manoa, a Carnegie I Research Institution. No other college at the University of Hawai'i at Manoa has such an extensive mandate or scope.

CTAHR's major focus is on diversified agriculture. The definition of "agriculture" has evolved significantly since 1862. In the Strategic Plan, agriculture, a managed natural system, includes all the traditional aspects of the food and fiber system-from the microscope to the table, and embraces environmental concerns that address the sustainability of the entire system. CTAHR's environmental focus will be on understanding agriculture's role in using land, air, water, and plant and animal resources for the benefit and well-being of Hawai'i's people.

Human capital is essential in any economy, an educated and empowered populace is crucial to the success of a modern economy. People need to think globally, act creatively, value diversity, behave responsibly, respond appropriately, and

interact cooperatively. CTAHR professionals build human capital by infusing these characteristics into learning environments. This infusion into the economy occurs through our undergraduate and graduate students and our off-campus learners, including businesses, individuals, families, leaders, and communities. As Hawai'i citizens become more concerned about the maintenance of our natural resources, native plants and animals, and traditional crops, CTAHR anticipates problems and continues to use all available resources to be responsive to these concerns.

INTERNAL FACTORS WITHIN CTAHR

CTAHR faculty are a state resource for sharing information and technical expertise with learners and clients throughout Hawai'i. Some departments have strong undergraduate programs, while others have strong graduate and research programs. In a recent survey of on-campus college learners, respondents said they are getting a good education in CTAHR. Yet there is always room for improvement. Students want more applied experience and internships, faculty need more assistantships and updated equipment, off-campus clients want more Extension agents to service them, and administrators want greater accountability for resources allocated.

CTAHR is a "graying" college. Twenty-eight percent of the faculty have over 25 years of service, with a mean age of 50 in the academic departments. Eighty-seven percent of the faculty are tenured. While this faculty provides a resource base of experience and perspective, the infusion of new vigor is equally essential to the College's mission. At a time of rapidly changing needs and new technologies, a new breed of scientist is required to adapt and apply biotechnology, satellite telemetry, genetic engineering, electronic information exchange, product processing and marketing, and environmental considerations to Hawai'i's agriculture and communities. Since 1993 CTAHR has been authorized to hire 12 faculty and 56 staff for the 36 and 81, respectively, it has lost. This is a net loss of 49 persons or virtually a vertical cut. As a result, CTAHR needs many new faculty, staff in the next few years to enable the University and the College to meet all three aspects of the Land Grant mission.

ADDRESSING PREVIOUSLY STATED GOALS

CTAHR never had a primary responsibility for sugar research and only assumed pineapple research after the closing of the industry-funded Pineapple Research Institute in 1974. Rather, CTAHR professionals provided the science that made all other forms of agriculture successful, including production of macadamia, orchid, anthurium, tropical fruits, coffee and many other crops. They have also developed a number of value-added agricultural products. CTAHR scientists produced the first genetically engineered commercial tree fruit crop (papaya) by a United States public institution. Agriculture constantly faces new or evolving pests, changing regulations, environmental stresses, market opportunities and international policy changes that require new solutions or approaches to improve and maintain business viability. CTAHR has repeatedly responded to these needs by providing timely and effective research-based solutions to keep agriculture viable and Hawai'i green. No other college at the University of Hawai'i serves these types of needs. The decline of sugar and pineapple has meant large areas of excellent land have become available for diversified agriculture, thereby increasing the need for CTAHR expertise. Although there are private and public institutions that serve some of CTAHR's clients, there are no other entities in Hawai'i with CTAHR's broad mandate.

Another aspect of the Land Grant mission has focused on the importance of research-based information to enhance the quality of life for families and communities. The human resources unit in the College has addressed this focus. This unit has played a significant role in the undergraduate instructional program by preparing professionals to support families as they deal with economic and social challenges. Some students have moved into careers in family service and childcare immediately after graduation. The program has provided a strong foundation for graduate studies for those students who want administrative or clinical careers. In the area of outreach, human resources faculty have developed educational programs and materials that serve to strengthen and educate families. These materials have been used by human service agencies and community organizations in Hawai'i, nationally, and internationally. In addition, over 65 percent of the nutritionist/dietitians trained by CTAHR in the past five years are now working in the health care system to improve the health and nutrition of Hawai'i's citizens.

STUDENT ENROLLMENT

The College currently serves 473 undergraduate majors and 134 graduate majors. Undergraduate enrollment is steadily increasing with the development of more forward-looking instruction programs, and faculty committed to serving the greater UHM student population through campus core options. The CTAHR Fall 1997 entering student number is 95, a 15% increase over Fall 1996. This increase reflects a heightened recruitment effort; working with high school science teachers and counselors to attract the best and brightest to the College through our NSF Young Scholars programs, and outreach activities to high school students. The College undergraduate program currently enrolls four Regents Scholars, one Sterling Scholar, one Presidential Scholar, and eight Multicultural Scholars. Graduate education provides advanced education to citizens of Hawai'i as well as to those of the Mainland and the Asia-Pacific region. It also remains an essential component in helping the College and University meet its research mission. CTAHR faculty are developing ways to incorporate more research experience into our instructional and outreach programs. Future levels of enrollment are strongly dependent on the College's ability to restructure its academic units and programs, restore and maintain faculty in priority areas, acquire extramural funding, provide financial assistance, and be perceived as "the place to be" by prospective students.

A LAND GRANT COLLEGE FOR HAWAI'I'S FUTURE - PLAN OVERVIEW

The CTAHR Strategic Plan consists of four levels of development; Strategic Initiatives, Goals, Objectives and Actions. Three Strategic Initiatives, representing critical areas of endeavor for the College and University, are introduced along with a planning perspective to provide context. Initiatives are supported by eight Goals that are further defined by 23 objectives.

STRATEGIC INITIATIVE 1-LEARNING ENVIRONMENTS

Serving learners (on-campus students and off-campus clients) is the main role of CTAHR. Hawai'i's future vitality depends upon linking core industries (agriculture, tourism, and human services) with a commitment to maintaining our most precious resources-our people and the environment. CTAHR is uniquely positioned to continue making significant contributions to this effort based on its Land Grant mission to promote the best interests of Hawai'i's human, environmental, and

agricultural resources through education and research for the future.

The development of human capital in these areas has always been a College effort. Societal interests and needs, however, have evolved over the years from largely traditional agriculture to include environmental stewardship, quality of life, community development, and health and safety. To meet these new expectations, the College will develop the conceptual tools necessary to reconcile the needs of consumers and agriculture with those of natural resource stewardship, and meet the challenges of the people of the State. The College will continue to provide professionals and educate students and clients who can: (1) create technology and help formulate policies that support and sustain Hawai'i's natural, cultural, and agricultural resources; (2) use critical thinking and problem solving skills to develop creative and proactive initiatives to address consumer, business, and environmental concerns; and (3) debate and mediate ethical issues.

STRATEGIC INITIATIVE 2-CREATING NEW OPPORTUNITIES FOR THE STATE THROUGH RESEARCH

The creation of knowledge provides the basis for the advancement of society. For Hawai'i to be competitive in the global economy, the continuous discovery of knowledge, development of technology, and transfer of science-based information is essential. Hawai'i's unique tropical island environment, however, imposes constraints on agricultural production and environmental management that are not generally experienced on the U.S. mainland. As a result, the science and technology necessary to support economic activities in this unique setting are not readily transferable, making a state-assisted research and learning program essential to enable Hawai'i's agriculture to be economically viable, environmentally compatible, and sustainable for rural communities and families.

CTAHR scientists are determined to focus their state-of-the-art research program on meeting these unique challenges in an effort to help maintain Hawai'i's economy, and natural and managed environments for the benefit of Hawai'i's residents and visitors. CTAHR research also provides the vehicle for graduate degree programs, thereby enhancing the learning environment of our students. In addition, CTAHR will increase its efforts to obtain extramural funding to support its basic science, technology development, and applied science programs.

STRATEGIC INITIATIVE 3-OUTREACH TO THE CITIZENS OF HAWAI'I

The College's communication with internal audiences (students, colleagues, other UH colleges, the University Administration and the Board of Regents) and external groups (prospective students and alumni, businesses, agriculturists, consumers, families, elected officials, academic peers, government and non-government agencies, and funding agencies) is critical. Such communication significantly improves decisions about Hawai'i's environment, economy, communities, and agriculture; demonstrates relevance and responsiveness in meeting Hawai'i's societal needs; presents a positive image of the College's on and off-campus activities; recruits and retains students and faculty; connects the Land Grant philosophy between rural and urban people, the economy, and decision-makers; demonstrates our accomplishments and impacts; influences future funding and demonstrates accountability; and may be the only contact that many of Hawai'i's taxpayers have with the University of Hawai'i.

Both UH and CTAHR will fail to achieve their Land Grant mission and will continue to experience an erosion of their ability to contribute to Hawai'i's future if the College does not effectively communicate to its audiences. As a result, society will make less informed decisions that will significantly and negatively impact Hawai'i's environment, economy, communities, and agriculture in the years to come. To improve the situation, CTAHR will enhance its efforts to bring the University of Hawai'i to the community by employing efficient methods that increase opportunities for citizens to participate in its programs. CTAHR is setting a new agenda for utilizing the outcomes of its research programs to further the development of diversified agriculture, to protect the environment, and to assist families and communities in meeting their goals.

RESTRUCTURING TO MEET THE NEEDS OF FUTURE LEARNERS

In order for the College to achieve the Goals of this Strategic Plan, wholesale changes in the structure and operation of the College are taking place. Recently, the administrative structure of the college was altered to provide more emphasis on extension activities. CTAHR currently consists of eleven academic departments and four county outreach or Extension units. To use our knowledge, skills, and infrastructure

resources more efficiently and effectively in the future, the College (its faculty, staff, students, and stakeholders) is undertaking a three-year restructuring process. As a result of this restructuring, our human, fiscal, and capital resources will be concentrated for developing local expertise that sustains and facilitates the growth of the State's economy in an environmentally sustainable and culturally appropriate manner. Our efforts will be focused on agriculture, human and natural resource management and enhancement as they have impacts on a number of areas in our economy. There will also be a number of new activities that enhance and encourage academic excellence and scholarly activity by all.

The college will restructure departments, develop new curriculums, and build a solid infrastructure to meet the needs of an increasingly diverse constituency of learners in the 21st century. The term "learner" collectively denotes the people upon whom CTAHR makes an impact, including degree-oriented students, off-campus clients, alumni, and other friends of the College. Our clients include present and future beneficiaries, patrons, and stakeholders including learners, agri- and associated businesses, government, consumer interest groups, individuals and families, and professional and non-professional organizations and groups.

CTAHR's plan will create six restructured departments, identified by faculty and staff participation and represent their informed opinion on the best way to cluster skills and resources to meet the needs of tomorrow's learners. These departments will focus on areas where even stronger academic, research and outreach programs can be created to address the changing needs of society. All faculty, regardless of Instructional, Research, or Extension functions will become part of one of these new departments. Each new department will determine the most relevant undergraduate and graduate degrees and programs, research thrusts, and off-campus programs.

PROPOSED DEPARTMENTS

TROPICAL PLANT AND SOIL SCIENCE. Purpose. To provide quality education and enhance the competitiveness and economic sustainability of plant and soil systems in the tropics through research and outreach. The Department utilizes an integrated and interdisicplinary approach to problem solving and fundamental research, outreach, and graduate and undergraduate education.

PLANT AND ENVIRONMENTAL PROTECTION SCIENCES. Purpose. To develop and disseminate principles of biological and environmental sciences to protect agricultural and urban activities as they interface with the natural environments in Hawai'i and the Pacific. To protect food, fiber, and recreational and environmental resources through high priority research and outreach programs. To provide broad education in plant and environmental protection.

FOOD, NUTRITION AND ANIMAL SCIENCES. Purpose. To develop solutions to problems and to foster opportunities for economic and community development in human nutrition, food and animal production systems, especially in Hawai'i. Research fundamental biological, chemical, physiological and social processes in nutrition, food, and animal systems and apply this knowledge to solve problems facing these industries. Foster an integrated and interdisciplinary approach to undergraduate and graduate education that prepares students to join the work force, pursue advanced degrees in nutritional, food and animal sciences, and to be effective leaders in science education.

MOLECULAR BIOSCIENCES AND BIOSYSTEMS ENGINEERING. Purpose. To create, advance, represent, integrate, and apply knowledge in biochemistry, cell and molecular biology, food science, and engineering with the aim of strengthening biologically-based industries in tropical agriculture and aquaculture, biotechnology and bioproducts generation, and food processing. To disseminate fundamental knowledge, scientific methods, and economical solutions for biological systems through instruction, extension, and outreach.

FAMILY AND CONSUMER SCIENCES. Purpose. To be the leader in the development and dissemination of information that supports individuals, families, businesses, and communities in the State and the Asia-Pacific Region. The Department of Family and Consumer Sciences is committed to its mission of putting knowledge to work through instructional, research, and outreach programs that prepare the people of Hawaii for life in the global community by the effective management of resources to foster viable and healthy individuals, families, businesses and communities.

NATURAL RESOURCES AND ENVIRONMENTAL MANAGEMENT. Purpose. To discover and assist CTAHR's students and clients to learn how to better use, manage, and conserve natural resources for optimum benefits and enhanced environmental quality. To optimally combine multidisciplinary scientific information for developing holistic, action-oriented management technologies and policies that assure the sustainable and efficient use of natural, environmental, and economic resources in Hawaii and similar volcanic, small, tropical island ecosystems.

II. PLANNED PROGRAMS – RESEARCH, EXTENSION, AND INSTRUCTION

	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5
1862 Extension and Research	Programs 1.1, & 1.2	Program 2.1	Program 3.1	Program 4.1	Programs 5.1, 5.2, 5.3, & 5.4

GOAL 1: AN AGRICULTURAL SYSTEM THAT IS HIGHLY COMPETITIVE IN THE GLOBAL ECONOMY

PROGRAM 1.1: DIVERSIFIED AGRICULTURE

Statement of Issues:

Diversified agriculture is filling voids in land utilization, employment, and revenue generation created by declining sugar and pineapple industries. In the near- and mid-terms, diversified agriculture and emerging aquaculture operations will not be able to support the levels of research found previously in the sugar and pineapple industries. Thus, these new industries will rely heavily on the University for technology and training. CTAHR will play a pivotal role in revitalizing agriculture and improving the economy of the State, while protecting the environment and food supply and producing better informed consumers and families. The college will take the lead in bridging the U.S. with developing economies in the Pacific Rim that need new products and technologies.

Hawaii's agriculture continues to be a strong sector of state economic base. Change and diversification are keywords describing the industry. The sugar industry was drastically downsized during the past seven years and now occurs only on the islands of Maui and Kauai. Pineapple acreage declined by about 15% percent during the same period, but the industry appears to have stabilized. These factors have contributed to an explosive increase in land available for diversified agriculture and a ready supply of agricultural workers. However, the former sugar and pineapple workers have limited decision-making skills and most have not directly participated on making agronomic decisions. Due to the wide variety of jobs in these plantation operations, few have direct experience in actually growing a crop. These factors, coupled with state initiatives to maintain Hawaii's agricultural base have resulted in many new growers entering the business of agriculture. These producers require much direct assistance in order to be successful. A recent census of agriculture in Hawaii indicates the presence of at least 5,500 farms, an increase of 10% over the previous year.

The combined aggregate returns from diversified commodities other than sugar and pineapple have exceeded the returns from those two crops since 1992. Diversified crops (ornamental horticultural crops, fruits, vegetables and forage, grain, livestock, and forest products) comprised 74 percent of Hawaii's diversified agriculture industry value in 1997. By

contrast, agronomic crop (sugar and pineapple) production comprised 36 percent of the total. These production numbers do not include landscape service industries or contributions by golf courses, suppliers, or value-added agricultural industries. However in total, the Hawaii agricultural sector is valued at nearly $4.5 billion.

The overall goal of this program is to secure, develop and disseminate scientific information and management technologies on diversified agriculture to support the ecologically compatible production of high quality food, feed, fiber, fuel crops, and landscapes for Hawai'i and selected areas in the tropics. This program is aimed at strengthening the State's economy, the food supply, and the environment by improving agricultural systems and export opportunities for Hawaii and of countries that import goods and services from Hawaii.

In order for agriculture to make a significant contribution to Hawaii's economy, it will need to enhance the exportation of crops and other agricultural products and services. A major challenge faced by local agribusiness is producing and exporting high quality, pest-free products. To that end, developing innovative methods to select high-quality fruits and vegetables and to detect and/or eradicate pests so that those products are suitable for export are high priorities for this program. Agricultural production and processing research and extension presently are being directed at expanding agri-industries in Hawaii: banana, coffee, papaya, specialty seed crops, tropical tree fruits, and aquaculture. Expansion to other industries will follow. The development of new products and co-products from existing crops and services and targeting commodity as well as niche and high-valued markets are to generate additional income and expand market opportunities for traditional crops such as sugarcane.

Hawaii's relies heavily on its environment as a major attractant for the visitor industry. The green industry plays an essential role in the visitor industry by providing flowers and landscape plants that provide the ambiance tropical in hotels and shops. Production facilities provide unique opportunities for visitors to gain first hand knowledge tropical plants. The golf industry is intimately linked to the tourism industry as many visitors specifically come for this activity. These industry sectors provide the scents, visual, and experiential experiences that comprise a visit to Hawaii. The romance and mystique of the tropics fuel a strong export market for exotic ornamentals and flowers.

This segment of Hawaii's diversified agriculture industry is difficult to assess in terms of economic value; however, floriculture contributes at least $65 million in farm gate sales, and the landscape and ornamental industry are estimated to be worth in excess of $500 million. A typical golf course in Hawaii employs at least 100 with revenues in excess of $200 million.

Performance Goal:

1. Increase production, efficiency and profitability of diversified agricultural industries while protecting the environment.
2. Provide diagnostic and analytical services for soil testing, water analysis, plant tissue analyses, plant disease identification, insect pest identification, and feed and forage analyses.
3. Provide best management practices needed to grow and market existing and new crops.
4. Increase the competitiveness of local agricultural production systems by reducing costs and increasing efficiency.
5. Provide training in identification and management of costs of production, identification of niche market opportunities.
6. Incorporate research-based technology that reduces losses due to pests, disease, and inefficient use of resources into production systems.

Output Indicators:

1. Research/field day demonstrations conducted.
2. Extension newsletters published.
3. Stakeholder participation in on-farm cooperative trials.
4. Publications in leading journals.
5. Invited presentations at international and national scientific meetings, universities.

Outcome Indicators:

1. Introduction of new varieties.
2. Reduction of losses due to insects and diseases.
3. Reduction of losses due to post-harvest handling and the inability to meet export standards.
4. Adoption of efficient water use methods and best management practices to promote environmentally responsible agricultural and landscape management.
5. Increase in marketable yields compared against baseline values.
6. Increased profitability and competitiveness

Key Program Components:

Extension: Hawaii's base agricultural extension programs focuses support on "diversified agriculture," that is, livestock and crops other than the "plantation" crops, sugarcane and pineapple. Smith Lever targeted 3(d) programs include agronomic (sugar and pineapple) as well as diversified crops.

Extension and problem-solving research will work to increase production by and profitability of diversified agricultural industries.

There are unique opportunities for increasing production by diversified agricultural industries in Hawaii. Following the closure of major sugarcane plantations, large tracts of land became available for large-scale production of many crops. Extension works in partnership with growers, private organizations, and local government agencies to facilitate the establishment of the new farms and agriculture systems. Extension provides science-based analytical and educational support to increase the growth of diversified agriculture industries.

The Agricultural Diagnostic Center provides diagnostic and analytical services for soil testing, water analysis, plant tissue analyses, plant disease identification, insect pest identification, and feed and forage analyses.

Displaced sugar workers, recent immigrants and experienced growers are establishing new farms. Extension specialists and county agricultural agents will continue to develop educational programs to meet the needs of each group. Basic and advanced level education on culture and best management practices needed to grow and market the new crops and for new farmers to compete is critical.

Extension and problem-solving research will work to increase the competitiveness of local agricultural production systems.

Large, diversified production units of vegetables and other crops have been established near metropolitan markets. As a result, producers located at distant, neighbor island locations are less competitive because of shipping costs and the economy of scale. Likewise, the livestock, landscape and other industries can greatly benefit by reducing costs of production.

Extension found that the majority of growers had good levels of knowledge about culture and crop management. However, a critical need for many growers was skills to determine and lower their costs of production. In addition, extension is collaborating with growers and governmental agencies to identify niche market opportunities. Another critical need was organizing producers in a manner that might allow for greater export opportunities.

Extension continues to work collaboratively with livestock, landscape and other producers and industry organizations to provide the educational support that will result in greater production efficiency.

Extension and problem-solving research will work to increase the productive efficiency of agricultural production systems.

Pests and diseases cause crop and product losses that reduce the efficiency and profitability of production systems. Water is a limited resource in parts of the state. Researchers have developed technologies and practices that must be integrated into present production systems to gain efficiency. Examples of projects that will be conducted are provided below.

1. Extension Horticulture and Plant Pathology specialists and county agricultural agents partner with the Papaya Administrative Committee (PAC) and growers to introduce two transgenic papaya varieties to mitigate losses from papaya ringspot disease.
2. An Entomology researcher, an Entomology specialist, and county agricultural agents partner with the macadamia nut growers to gain adoption of practices that will reduce losses from the tropical nut borer and the southern green stink bug.
3. An Extension Entomology specialist and county agricultural agents are transferring post-harvest heat-treatment technologies to growers for insect control on exported cut flowers. Adoption of the technologies will reduce losses due to the inability to meet export standards.
4. County agricultural agents, working in partnership with specialists, researchers and the industry are educating growers on the efficient water use and best management practices to promote environmentally responsible agricultural and landscape management. Efficient irrigation in onion production has resulted in higher yields, reduced water consumption and greater net profits.
5. A taro task force was organized as a “rapid response” to a critical disease problem that was impacting up to 90% of some farmers’ crops. This initiative is determining ways to reduce the incidence of disease and to improve nutrient management and other

practices for this Polynesian staple. Impacts include alteration of decades old practices that resulted in increased production and the savings of thousands of dollars through reduced fertilizer costs. Because this crop is traditionally grown in submerged conditions near waterways or streams, other efforts are aimed at minimizing the negative effects on water quality.

Research: A significant portion of CTAHR's research efforts is aimed at diversifying production agriculture on former plantation lands through projects on alternative cropping and forest systems. More than 100 commodities are currently grown and require research-based best management information to assure maximum efficiency and profitability. New fruit crops are being introduced and their production and management criteria are being defined. Research on taro, a Polynesian staple, is focused on applications in hypoallergenic foods, new hybrids that are resistant to disease leaf blight, heat and drought and acidity stress. The optimal environmental and soil settings for sustained growth and production of many important commodities are being modeled. The college is improving access to management tools as well as diagnostic and analytical services via websites, interactive computerized management programs, and other electronic media. Improvement in traditional media will also be supported.

Internal and External Linkages:

Internal Linkages:

1. Extension specialists and agents.
2. Researchers.
3. Departments and Experiment Station system.
4. County Learning/extension centers.
5. Agricultural Diagnostic Service Center.

External Linkages:

1. Commercial producers/growers
2. Consumers.
3. Commodity Associations.
4. Hawaii Department of Agriculture.
5. Hawaii Agricultural Research Center.
6. USDA/ARS Pacific Basin Regional Agricultural Research Center.
7. Pacific Region Land Grant Institutions.
8. Agricultural supply houses.
9. University of Hawaii Hilo, College of Agriculture, Forestry and Natural Resources.
10. Professional societies

Target Audiences:

1. Producers, Growers.
2. Commodity Associations.

3. Researchers, Scientists.
4. Extension specialists and agents.
5. Instructional faculty

Program Duration:

There are short, intermediate, and long term objectives.
October 1 1999 to September 30, 2004: For Short and some Intermediate Term objectives.
Greater than 5 years: For Long Term Objectives.

Education and Outreach Programs:

In addition to the programs which are included as part of the section on “key components,” the following examples are cited as programs that are already underway to convey the research results that are pertinent to the critical issues identified in the "Statement of Issues."

The Vegetable Crops Industry in Hawaii has experienced tremendous change over the past few years and will continue to experience such turbulence at a similar or faster pace in the foreseeable future. At the macro-level, production acreage has shifted from some areas of the state to new opened lands for diversified agriculture. At the farm level the perspective is two-fold, with both dire and positive consequences.

A CTAHR Vegetable Crops Extension Team was organized and is developing both short term and longer-term research and extension programs to better meet the needs of the vegetable industry. A tentative five-year plan was developed and goals are to consolidate efforts that have statewide relevance by pooling expertise from all team members. The plan is to increase the efficiency and effectiveness of extension and research faculty to focus on issues of relevance through industry networking, improved production technologies, cost production analysis, education/training, and timely transfer of information.

One of the niches available to Hawaii is the production of tropical fruits both for local consumption and export markets. An industry analysis is currently being completed and further input is being sought from the industry prior to the adopting of new research and extension projects in this area.

PROGRAM 1.2: FUNDAMENTAL PLANT AND ANIMAL SCIENCES

Statement of Issues:

Many Hawaii commodities are not grown elsewhere in the U.S. or local growing conditions present greatly different environmental parameters. Basic research on how the biology, physiology and biochemistry of plants and animals are impacted by environmental conditions and biotic and abiotic stress is essential to optimize production efficiency.

The development of the tools of biotechnology has provided powerful means to dissect and manipulate basic cellular functions. The ability to dissect the genetic machinery has facilitated the development of mutants. Analyses of such mutants is providing in depth understanding of metabolic pathways, biological processes such as signal transduction and

responses to various biotic and abiotic stresses. The ability to track gene movements using molecular markers and direct genetic modifications via transformation have shortened the time required for modifying genetic traits. These advances are at the forefront of science and offer significant opportunity for economic development. Many Hawaii agricultural production systems are too costly and inefficient to compete effectively in the global economy. Thus, engineering and developing next-generation production systems and introducing innovative new systems are essential.

The college has a major commitment to the application of biotechnology to tropical agriculture. Examples of these activities span marker assisted breeding of papaya, Koa and other plants, to transgenic plant development, to bioprocess engineering, marine biotechnology, and bioremediation. In conjunction with scientists at Cornell University, CTAHR scientists developed and patented the first genetically engineered tree fruit (papaya). Other significant potential breakthroughs include the development and patenting of genetically engineered caffeine-free coffee, ripening and harvest controls, and the discovery of patented, marine-based antibiotics that are effective against a variety of resistant bacterial strains.

CTAHR is developing an integrated thrust in biotechnology. The purpose of this thrust is to foster and support the development of a high-value, intellectual property-based, agricultural biotechnology industry in Hawaii. This action is a critical component of much-needed economic development for the state. Opportunities in biotechnology span agriculture and marine biology. Components of this industry include tissue culture robotics, transgenic plants of all types, tropical plant genes and promoters, nutraceuticals and botanicals, bioprocessing and fermentation technology, corn seed production, and pharmaceuticals. An implicit goal of CTAHR's biotechnology thrust is to catalyze the establishment of new businesses in Hawaii that are able to generate new products and export technological services using scientists and engineers trained at this university. Local farmers, food and fiber processors, managers, and shippers will benefit from our work by increasing their yields and reducing production costs, and will have new products that they can take to larger and more diverse markets.

Performance Goal:

1. Improve quality, value, and marketability of agricultural products.
2. Enhance understanding of basic biological processes in plants and animals.
3. Increase understanding of the principles of biotechnology.
4. Provide objective, balanced information on bioethics as related to biotechnology.

Output Indicators:

1. Publications in leading journals.
2. Invited presentations at international and national scientific meetings, universities.
3. Individuals attending public forums on biotechnology.
4. Student enrollment in biotechnology courses and program.

Outcome Indicators:

1. Increased funding from federal and private agencies.
2. Advances in the understanding of basic biological processes.
3. Application of scientific advances to important commodities.
4. Introduction of new varieties with desired traits.
5. Increased public awareness of issues surrounding biotechnology.

Key Program Components:

Research: Presently CTAHR has some 60 faculty and graduate students working in the area of biotechnology. Projects include genetic manipulation of fruits for disease resistance, altered ripening, and enhanced characteristics, genetic manipulation of flower fragrance and color, discovery of new tropical plant genes and regulatory elements, antibiotic development, beverage biotechnology, development of molecular marker-assisted breeding programs and bioreactor design and production of high value chemicals.

Extension: Extension faculty will be encouraged to work collaboratively with researchers to improve quality, value, and marketability of agricultural products, enhance understanding of basic biological processes in plants and animals, and increase understanding of the principles of biotechnology.

Stakeholders, including policy decision-makers, growers, consumers, and students will also need to be involved to understand and appreciation the application of biotechnology.

Internal and External Linkages:

Internal Linkages:

1. Researchers, Scientists and faculty.
2. Extension specialists and agents.
3. Departments and Experiment Station system.
4. County Learning/extension centers

External Linkages:

1. Peer universities and laboratories.
2. Researchers, scientists, instructors.
3. Commodity associations.
4. Hawaii Agricultural Research Center.
5. USDA/ARS Pacific Basin Regional Agricultural Research Center.
6. University of Hawaii Hilo, College of Agriculture, Forestry and Natural Resources
7. Professional Associations

Target Audiences:

1. Researchers and scientists.
2. Biotechnology industry.
3. Extension specialists.
4. Instructional faculty.
5. Professional Associations.
6. Producer/Growers.
7. Commodity Associations.

8. Consumers.
9. Students.
10. Policy Makers (Legislators).

Program Duration:

There are short, intermediate, and long term objectives.
October 1 1999 to September 30, 2004: For Short and some Intermediate Term objectives.
Greater than 5 years: For Long Term Objectives.

Education and Outreach Programs:

As one of the college's integrated initiatives, "research derived material" is being transferred through an extension education program designed to meet the needs of papaya farmers growing the genetically enhanced, ring spot virus resistant papaya, UH Rainbow. The objectives of this program are "to increase the total production of papaya in the state by two to three folds; increase efficiency and productivity of new and current papaya farmers; and certify producers (commercial and home) to allow them to purchase the new transgenic papaya varieties."

Cooperator trials of transgenic varieties are also being installed to observe fruit quality under different environmental conditions, and production information and projections are being provided to marketers including the Papaya Administrative Committee, the Hawaii Department of Agriculture, and shippers.

As the college's initiative expands, opportunities are being created by CTAHR's proposed departments to strengthen the linkages amongst research, extension and stakeholders to convey the research results that are pertinent to critical issues.

GOAL 1: ALLOCATED RESOURCES

Fiscal Year	Research Hatch and State Funds ($)	Research Other Fed & Non Fed Funds ($)	Research Scientist Years (SY)	Extension Smith-Lever & State Funds ($)	Extension Other Funds ($)	Extension Faculty Years (FY)
2000	8,500,000	5,000,000	54.0	2,640,000	25,000	33.0
2001	8,200,000	5,000,000	52.0	2,575,000	50,000	32.0
2002	8,200,000	5,000,000	52.0	2,575,000	50,000	32.0
2003	8,200,000	5,000,000	52.0	2,575,000	50,000	32.0
2004	8,200,000	5,000,000	52.0	2,575,000	50,000	32.0

GOAL 2: A SAFE AND SECURE FOOD AND FIBER SYSTEM

PROGRAM 2.1: SMITH-LEVER 3D PROGRAM "FOOD QUALITY AND SAFETY."

Hawaii's program under Goal 2 will be the Smith-Lever 3d Targeted program in "Food Quality and Safety."

GOAL 3: A HEALTHY WELL-NOURISHED POPULATION

PROGRAM 3.1: NUTRITION AND HEALTH IN HAWAII

Statement of Issues:

Hawaii's population is growing and aging and requires extensive attention to nutritional health and the understanding of the consequences of their ethnically diverse diet. Unfortunately, fundamental research on the nutritional composition of foods grown and eaten in Hawaii and the Pacific is lacking. As a result, nutrition education efforts to promote the many beneficial components found in ethnic diets are limited. On the other hand, a growing percentage of Hawaii's people have an increased interest in and sensitivity about their personal nutrition and wellness.

Five of the ten leading causes of death due to disease in the United States are associated with diet. These are coronary heart disease, several types of cancer, stroke, diabetes mellitus and atherosclerosis. These diet-related causes of death include the three leading causes of death in Hawaii: heart disease, cancer and stroke. In addition, obesity, which is a risk factor for all of the above causes of death, is reported to affect about one-fifth of the adults in Hawaii. Specific dietary behaviors that are related to risk for these diseases include eating a high fat diet; eating too few fruits, vegetables and whole grains; eating a diet too high in sodium; and not balancing caloric intake with energy expenditure.

Approximately one-fourth of the adults in Hawaii were considered to be "high fat" consumers. The situation was worse among young adults (18-24 years old) with one-third of the females and one-half of the males considered "high fat" consumers. In addition, less than one-fourth of the adults in Hawaii consumed the recommended 5 servings a day of fruits and vegetables. Specific behaviors that are related to eating a moderate level of sodium in the diet varied in the adult population. A majority of adults reported that they "rarely" add salt at the table, but only about one-third say they regularly buy low sodium foods. Finally, the reported prevalence of obesity in Hawaii has increased over the past ten years, indicating that individuals are not balancing energy intake with expenditure.

Among youth in Hawaii, adequate intake of nutrients and healthful dietary behaviors were not prevalent among adolescents. Fruit and vegetable intake was far below recommended levels; inadequate intakes of calcium, iron and Vitamin A were widely prevalent; intake of candies and sodas was high; and average fat intake was above the recommended 30%.

Inspite of the clear need for nutrition education programming to prevent chronic diseases and promote overall health, major cut-backs in the number of community nutrition education programs and services in Hawaii severely limit the resources to meet the constant demand from consumers and the media for nutrition information. Encouraging collaboration with internal and external linkages allows for more effective, timely and relevant programs to be delivered to a wider audience.

Performance Goals:

Extension Performance Goal:

Improve the diet, nutrition and health of families and individuals in Hawaii.

Output Indicator:

Number of persons that complete on-going community-based education that encourages, empowers and facilitates families and individuals to adopt healthy behaviors and lifestyles

Outcome Indicators:

1. Number of persons completing non-formal nutrition education programs on dietary guidance and appropriate nutrition practices that actually adopt one or more recommended Dietary Guidelines and eating according to the Food Guide Pyramid (i.e. eating less fat and more fruits, vegetables and being physically active).
2. Number of persons participating in non-formal health education and promotion programs that actually address individual and family health issues (i.e. diabetes awareness and management education project).

Research Performance Goal:

To identify the most salient motivators and barriers influencing the consumption of calcium rich foods among adolescents, especially in selected ethnic groups in Hawaii.

Output Indicator:

Using focus groups and survey questionnaires, knowledge and attitudes toward calcium rich foods will be assessed. A food frequency tool will be developed and validated to measure consumption of calcium rich foods.

Outcome Indicator:

Following the identification of motivators and barriers toward the consumption of calcium rich foods, educational materials will be developed. Expected outcomes include increased consumption of calcium rich foods in adolescents identified through assessment using a validated food frequency tool.

Instruction Performance Goal:

Prepare students for professional careers in human nutrition, especially through the Dietetics Program.

Output Indicators:

1. Number of students entering the human nutrition/dietetics program.
2. Number of students graduating from the human nutrition/dietetics program.

Outcome Indicators:

1. Number of students successfully completing dietetic internships after a BS degree.
2. Number of students finding positions in the human nutrition/dietetics field.

Key Program Components:

The proposed Department of Human Nutrition, Food and Animal Sciences (HNFAS) is providing the leadership for integrating research, extension and instruction for a healthy well-nourished population in Hawaii. This department is composed of faculty, staff, and students from the current Departments of Animal Sciences, Food Science and Human Nutrition, and Agricultural and Resource Economics, and county-based extension faculty. The vision for HNFAS is to be the leader in the development and dissemination of information that focuses on the enhancement of nutritional health of humans and strengthening the sustainability and competitiveness of animal production systems in the State and the Asia-Pacific Region.

As knowledge bases continue to increase exponentially, and budgets and staffing/personnel continue to downsize, it is in everyone's best interest to cooperate, network and collaborate. As a general mode of functioning, and as a basis for collaborations, the following are the services delivery focus areas for this goal:

1. Consumer food and nutrition education is the focus expertise area of Cooperative Extension. Consumer nutrition education focuses on basic life skills for survival and security. Food education learning experiences are designed to facilitate people eating food that contributes to their health and well-being, and nutrition education provides learning experiences designed to facilitate the voluntary adoption of eating and other related behaviors conducive to health and well-being.

2. Public Health food and nutrition education is the focus expertise area of health and human service agencies, including federal and state departments of health. Public Health nutrition education focuses on health promotion and disease prevention.

3. Clinical food and nutrition education is the focus expertise area of medical centers, hospitals and clinics. Clinical nutrition education focuses on medical nutrition therapy.

Through food and nutrition education programs, the people of Hawaii will use the Dietary Guidelines, the Food Guide Pyramid, and Nutrition Facts labels to choose healthful diets, and youth, families, and older adults will adopt healthful food selection and preparation as well as safe food handling practices at home.

As part of this plan of work, CTAHR will partner with CSREES to implement the Healthy People…Healthy Communities national health initiative bringing together the extension, teaching, and research resources to address health care issues.

Extension Key Program Components:

A timely and relevant extension/outreach program that applies the knowledge generated by the research program and other sources and delivers this information to consumers, health professionals and producers is needed to meet the needs of the state for a healthy well-nourished population.

As part of Hawaii's nutrition education program, Cooperative Extension has been an active participant in coalitions, networks and other collaborative arrangements designed to create and sustain programs that promote sound nutrition, and to identify nutrition research and education needs.

A team of extension faculty is working with research and education to encourage consumers to increase their consumption of locally grown produce. Focus groups were conducted to help assess vegetable preferences and factors that influence vegetable intake among the target audiences. Results of the focus group interviews showed that participants knew the importance of eating fruits and vegetables; thus, educational programs will focus on "how to include more fruits and vegetables to increase the number of servings consumed."

Food & Money Basics combines basic financial management and foods/nutrition education and promotes learner-based, hands-on literacy instruction to reach targeted low-income, low literacy clientele. This program has been successfully integrated into EFNEP and is being implemented statewide through EFNEP and collaborating agencies.

Statewide extension programs also include the Expanded Food and Nutrition Program, Nutrition for Older Adults with the State Executive Office on Aging, Nutrition Education and Training with the Department of Education, Lifeskills in Food Education with the Food Stamp Program, and a Diabetes Education Program with CSREES, Washington State Cooperative Extension and the Joslin Diabetes Center.

Research Key Program Components:

Current research and future projects include development of economical, nutritional menus using local ethnic foods of the Pacific islands; and the relationship between calcium and aluminum in the diet. Other areas of interest are mineral metabolism; nutrient composition of foods; nutrition-related practices; and their impact on human performance and health; and identifying components in food that reduce the absorption of known carcinogens. The latter program has gained national attention and excellent competitive grant support.

Instruction Key Program Components:

The human nutrition instructional program at the University of Hawaii resides in the Department of Human Nutrition, Food and Animal Sciences. The curriculum has a strong science base in which faculty members help students develop and practice the skills needed by competent nutritionists: critical thinking, problem solving, written and oral communication and other skills.

The curricula options include human nutrition, dietetics, and science education. Students majoring in any of the options are prepared for diverse careers in the health care and fitness facilities, hospitals, government or private-sector food and nutrition agencies, nutrition education and communication businesses, science education, and for further education in graduate, medical, dental and pharmacy schools. Students in all options are required to take a practicum or internship course in their senior year in which they receive hands-on experiences and on-the-job training.

The undergraduate dietetics program is a four-year didactic program approved by the American Dietetics Association, the major professional organization for dietetic practitioners. It prepares students with the knowledge and skills base for a post-baccalaureate dietetic internship, AP4 program, or graduate school.

Internal and External Linkages:

Internal Linkages:

Within CTAHR, multi-departmental and multi-county teams are being encouraged to coordinate outreach and utilize complementary areas of expertise. Internal linkages include faculty members within Human Nutrition, Food and Animal Sciences, other departments within and external to the college that offer courses required by human nutrition majors, undergraduate and graduate libraries, UH Computer center, and UH Student Health Services.

External Linkages:

Collaborative, cooperative and coordinated outreach with USDA Food and Nutrition Programs, state agencies (i.e., Executive Office of Aging, Department of Education, Department of Health) and various local social service agencies is on-going.

External linkages specifically to support the dietetics programs include the following sites for internship and practicum experiences:

1. Local hospitals (i.e. mainly Kapiolani, Queens, St. Francis and Kaiser).
2. Health clinics.
3. Food companies.
4. Health and physical fitness facilities.

5. Government agencies (mainly Health, Agriculture, Land and Natural Resources, and Human Services).
6. Local private and public elementary, middle, and high schools.

Target Audiences:

1. People with limited resources: youth, families, older adults.
2. Nutrition Health Professionals.
3. Extension Specialists and Agents.
4. Student majors in FSHN.
5. Instructional Faculty.
6. High school students interested in the applied sciences.
7. Students interested in health, nutrition, and wellness.
8. Students taking introductory nutrition course.
9. Biology students.
10. Students interested in medical, dental, and other professional schools.

Program Duration:

There are short, intermediate, and long term objectives.
October 1 1999 to September 30, 2004: For Short and some Intermediate Term objectives.
Greater than 5 years: For Long Term Objectives.

Education and Outreach Programs:

Education and outreach programs led by HNFAS that are already underway to convey the research results that are pertinent to the critical issues identified in the "Statement of Issues" include the following:

1. Research results are being utilized to increase the consumption of fruits and vegetables among youth as part of the Fruit and Vegetable Education Project.
2. Research based information on (1) the nutrient composition of foods and (2) nutrition-related practices and their impact on human performance and health are currently supporting the on-going development of economical, food and nutrition education programs which include the use of local ethnic foods of the Pacific islands.
3. Extension faculty will be working closely with research faculty and clinical nutritionists to implement the Diabetes Education Program.

GOAL 3: ALLOCATED RESOURCES

Fiscal Year	Research Hatch and State Funds ($)	Research Other Fed & Non Fed Funds ($)	Research Scientist Years (SY)	Extension Smith-Lever & State Funds ($)	Extension Other Funds ($)	Extension Faculty Years (FY)
2000	235,000	190,000	2.0	270,000	15,000	3.0

2001	225,000	190,000	2.0	260,000	25,000	3.0
2002	225,000	190,000	2.0	260,000	25,000	3.0
2003	225,000	190,000	2.0	260,000	25,000	3.0
2004	225,000	190,000	2.0	260,000	25,000	3.0

GOAL 4: GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT

PROGRAM 4.1: GREATER HARMONY BETWEEN AGRICULTURE AND THE ENVIRONMENT IN HAWAII

Statement of Issues:

The Setting

Tropical, small volcanic islands are the distinctive terrestrial ecosystems of the Hawaiian Archipelago. The islands function as "whole ecosystems" in which all segments of the landscape are joined directly and are intimately interdependent. The stability and function of natural resources, sustainability of agroecosystems, and the quality of the environment are, therefore, intrinsically sensitive to the impacts of land use and management.

A watershed perspective is important in understanding and managing these ecosystems, partly because of the high degree of diversity in climatic and land characteristics, and because of the compressed spatial and temporal scales in which on-site and off-site impacts of land use and management are manifested. All Orders of the U.S. Soil Taxonomy, except Gelisols are present. Topography is often dominated by steep slopes. There are few natural perennial streams but engineered stream diversion and ditch systems supply about 63% of the state's agricultural water. Watersheds, hydrographic areas, and groundwater aquifers are small by continental standards and most consist of even smaller sub-units. A recent survey delineated 614 watersheds ranging in size from less than 0.05 ha to about 23,000; of these 566 (or 92%) are less than 1,700 ha and drain directly into the ocean. These facts figure prominently in applying the nonpoint pollution requirements of the federal Clean Water Act and Coastal Zone management Act (Section 6217). Because of catchment sizes and continuity of surface water pathways from mountain crests to the ocean, the definition of coastal zones extends to every bit of land in the state.

Land Use Dynamics

Historic patterns of agricultural land use in Hawaii have developed, to a large extent, to suit the topography, climatic regime, availability of water, soil capabilities, and economic factors. The steep slopes and higher elevations on most islands are generally forested, accounting for about 40 percent of the land area. Plantations were, and to some extent remain, the dominant enterprises for sugarcane and pineapple production. Today, sugarcane production is rapidly declining but pineapple remains somewhat viable. Pasture is the third major agricultural enterprise and “diversified” agriculture, including forestry, is on the rise. Other crop commodities include macadamia nuts, coffee, papaya, vegetables, melons, floriculture, seed crops, bananas, guavas, specialty fruit, taro, avocados, and ginger.

Agricultural diversification, i.e. replacing the ailing plantation industries of sugarcane and pineapple with "diversified" crops, is accelerating. It is expected to have very profound

impacts on the sustainability of Hawaii's natural resource base and environmental quality. This is due to the fragility of the tropical island ecosystem that is symbolized by the fact that *the average annual erosion rate is highest in the United States.* Sediment-based non-point source pollution and agrichemical transport into groundwater aquifers are the important concerns. Managing sugarcane and pineapple as virtual "perennials", with few and short periods of soil disturbance or exposure, lead to relatively effective soil protection. The "diversified" crops that are likely to replace them may be annuals, orchards, or pastures. Their impacts are expected to be as diverse as the specific crops and the management practices applied to them. Sound scientific tools and environmentally sustainable technologies are required for predicting and mitigating any detrimental impacts of land use change.

Natural Resource Status, Degradation Threats and Conservation Needs

Soil Quality

Soil erosion is a paramount concern since soil loss reduces soil productivity and sediment is Hawaii's most important pollutant. For most Hawaii basins, nearly one third to two thirds of the eroded sediments (estimated at an average of 14.3 Mg/ha/yr for crop land) is destined for surrounding bays and estuaries. These values compare with 0.1 or less for continental basins and represent special challenges in designing and applying applying conservation technologies. Biological conservation options have received increasing research and demonstrations by the University of Hawaii and its partners in recent years and offer substantial promise for controlling sediment losses and protecting both soil and water quality. The use of intercropping and precropping with low-lying ground cover vegetation have been demonstrated in pilot areas beyond the research farms. Residue recycling remains the single most promising but least utilized technology for soil protection (El-Swaify, 1996). *Hawaii lags behind other states in adopting "conservation tillage"* and, in the absence of such practices, annuals and some orchards grown as diversified crops would be considerably less protective against sediment losses than either sugarcane or pineapple.

Water Quantity

Despite many perceptions to the contrary, water resources in Hawaii are not luxuriously abundant. There are cyclical periods when droughts at some or all locations reach crisis proportions. Every island has experienced shortfalls and water use restrictions due to drought and increasing demand. The County of Maui, where drought has recently persisted, is investigating a water ordinance. Municipal water use is less subject to these situations than agricultural water use. In general, water conservation has emerged as a major issue. Allocation of water supplies for agriculture is increasingly competitive, and the problem is exacerbated by rapid urban development. Estimates of sustainable yields of groundwater from the various aquifers are questionable, and so present a major challenge to planners and regulatory agencies. Water supplies and conservation will become even more important in leeward areas, partly because they are

drier than windward areas and also because they are undergoing the largest population and development increases.

Watersheds' protection, therefore is a primary prioirityif their hydrologic function is to be maximized for the benefit of surface and groundwater supplies. In addition, augmenting water supplies by harnessing excess runoff or cistern systems for irrigation, livestock, or domestic use has been the subject of some research but more is needed. Selective use of brackish water, or even saline ones is more feasible here than in many other "typically arid" areas. Already, certain farms, golf courses and developments are using brackish water. Effluent water is also used for irrigation on some golf courses.

Water Quality

Water quality for irrigation in Hawaii has been extensively investigated by the CTAHR and other agencies. In this discussion, however, concerns are less with irrigation use but with human and ecosystem health.

The quality of ***surface water*** has been a major focus of multi-agency initiatives since the late 1970's and assumed special vigor in the late 1980's. The initiatives are spearheaded by the Hawaii Department of Health (DOH) which is the designated water quality regulatory agency. "Hawaii's Assessment of Nonpoint Source Pollution of Water Quality Problems" (DOH, 1990) identified five major pollutants; sediments, nutrients, toxins, pathogens, and pH. Freshwater inflows to estuaries are of special importance in Hawaii. Sediments were identified as having the most extensive and thus the most detrimental impact on water quality. Currently, sixteen watersheds and hydrologic unit areas are specifically undergoing serious erosion and contributing to downstream sediment-based water pollution. The receiving coastal waters have been characterized as "Water Quality Limited Segments" in the official DOH Assessment Report and updated by the Coastal Zone Management (CZM) Program, 1996. These documents identify the locations and characteristics of those areas.

Basal ***groundwater***, the primary potable water source, supplies about 87 % of the State's domestic and commercial water use. This source is unique to island and coastal environments. Each of the state’s counties (Honolulu, Maui, Hawaii, and Kauai) has a public agency responsible for municipal water supply. There are at least 3100 wells in Hawaii. The majority are operated by county Boards of Water Supply (BWS) and regulated by the Hawaii Department of Health (DOH). The Hawaii Department of Land and Natural Resources (DLNR) keeps a drill log database on new "deepwater" wells. However, information on usage and water quality are not available from the majority of these wells. There are about 175 private domestic water supply wells in use in the state; many of these belong to the U.S. military. Also, there are an estimated 8,000 catchment systems (primarily roof catchments and cisterns) serving an estimated 20,000 rural people, out of a total state population of 1.2 million.

Generally, Hawaii's municipal water meets both state and federal water quality standards; however, chemical contaminants of possible agricultural and industrial origin have been detected in groundwater. Statewide since 1980, 17 chemical contaminants of possible agricultural origin and 12 chemicals of possible industrial origin have been confirmed in Hawaii's groundwater (Natural Resources Defense Council, 1993, "Groundwater in Hawaii"). In addition, certain small municipal water systems which are derived from surface water sources (primarily in Maui and Hawaii) have had frequent violations of microbiological drinking water standards and are in the process of being up-graded. Expanded monitoring efforts are required along with a broad-based public education program on groundwater protection.

Funding of pollution prevention programs in Hawaii through section 319 of the Clean Water Act implementation grants has primarily been directed by DOH to protection of priority coastal waters and their associated watersheds. Faculty of the University of Hawaii have led or participated in over 10 of these grants since 1991.

Air Quality

Natural air quality in most parts of Hawaii is considered close to "pristine"; the exceptions are areas subject to diffusion or precipitation of naturally emitted acidic volcanic gases (called volcanic fog or "vog"). Agricultural activity can contribute to changes in air quality and atmospheric composition, such as emissions of greenhouse gases. Agricultural burning of vegetative biomass prior or after crop harvests reduce air quality and contributes to carbon dioxide enrichment in the atmosphere. It also deprives soils of beneficial organic matter enrichment that may follow recycling of crop residues. There is broad-based interest in the agricultural and forestry communities in not only generating income but also enhancing carbon sequestration by increasing tree planting and improving land use and soil conservation.

Renewable Resources and Biological Diversity

Forestry and range (including intensive grazing) are important extensive land uses that have significant potential for expansion as part of diversifying the use of former plantation lands. Interest and investments in forestry has accelerated in the last decade and the earlier staffing of a dedicated research-instruction position in forestry and agroforestry has proved timely for addressing emerging needs. During the past year, McIntyre-Stennis and RREA funding were both instrumental in leveraging additional funding from the Fund for Rural America (FRA) and the Hawaii Forestry and Communities Initiative (HFCI) that allowed the staffing of a position in forestry extension to provide support and assistance in addressing industry needs.

Another important dimension of national relevance but especially for Hawaii is the intensifying interest in the use of native and endemic plant species. CTAHR researchers and extension faculty have opportunities for using the CTAHR Urban Garden Centers and network of Experiment Stations, as well as the USDA/NRCS Plant Materials

Center to address the need for propagating such plants and determining their suitability for a variety of important uses. Prominent among these uses is the restoration of degraded lands, especially on Kaho`olawe. Another emerging interest is potential use in bio/phyto-remediation of contaminated soils.

Rehabilitation of Degraded and Idle Lands

Degraded lands include primarily lands subjected to accelerated erosion due to excessive exposure and disturbance, poor grazing management, or other means such as aggressive activity by feral animals in watershed areas. Idle lands are those abandoned, mostly temporarily, following the failure of agricultural enterprises or expiration of land leases. The island of Kaho'olawe poses a special challenge because it had a history of excessive grazing as well as land deformation by military activity. Restoration of such locations should aim at reversing losses in land productive capacity, enhancing hydrologic functions, as well as recovering land quality as a wildlife habitat. Where degradation is still reversible, restoring these lands may involve reclamation of their physical and fertility conditions. Where soil pollution is a problem, contaminants may be mined by bio/phyto-remediation techniques that will require considerable adaptive research and training before full-scale adoption in Hawaii. Low-input technologies, particularly using beneficial soil organisms, offer some exciting options as a component of rehabilitation.

Urbanization and other Residential Land Use

Availability of good agricultural land is critical to Hawaii's economy and the survival of Hawaii's farmers. *As an island state, the supply of land well suited for farming is scarce*. Although the agricultural sector may be unable to fully utilize all available acreage at a given time, some consider high-quality farmland an irreplaceable resource that should be preserved for future generations. Farmland conversions to urban use rose sharply in the 1980's in Hawaii to approach 3,000 acres per year. Oahu recorded the highest rate of conversion and a significant loss of high-quality agricultural lands. State and county zoning, agricultural use rate taxation, and right-to-farm laws are the primary regulatory methods used in Hawaii to protect farming and farm lands. State legislation to better identify and preserve agricultural land has been considered every year since 1985 but has not been enacted. County governments have recently begun to revise their land use ordinances to deal with the agricultural preservation issue. The CTAHR has provided expertise on land evaluation and site assessment, GIS mapping and evaluation of alternative zoning policies, and recommendations on alternative techniques for protecting agricultural lands. While slow economic growth has recently diminished the rate of urbanization of agricultural lands, this is an issue that will always be present.

Crop Commodity Protection and Nutrient Management

As stated above, 17 chemical contaminants of possible agricultural origin have been detected in groundwater statewide since 1980. Increasing the use efficiency of agricultural chemicals (be they nutrients or pesticides) faces many challenges. In addition to the high degree of agro-ecosystem diversity within Hawaii, agriculture is also characterized as having a mix of

few large producers and many small ones. A gradual increase in the latter is taking place as part of agricultural diversification. While large plantations have the capacity for formulating the appropriate technologies for use of agricultural chemicals, the majority of the small grower community needs assistance for implementing practices that are both productive and environmentally friendly. Increasing nitrate levels in ground water have been identified as a special concern. Diversified crop producers in general tend to apply standard rates of complete fertilizer to every crop, often without using soil or tissue testing. "Appropriate input" technologies such as Integrated Pest Management (IPM) or Integrated Nutrient management (INM), do not exist for many of the soils or crops (listed earlier). Thus, while remaining research gaps are being addressed, efforts are needed to transform existing research-based knowledge into practices that can be adopted immediately.

Much of the early work on agrichemical management area will be on developing baseline knowledge about existing grower practices. Once baselines are established, an educational program can be devised to improve agrichemical use efficiency and management for specifically targeted crops.

Community Involvement

Community awareness is most often, the first and most important step in securing their support and commitment to good land stewardship and environmental enhancement. There is continued felt need to convey to the land user and impacted communities and policy makers a clear understanding of the causes, extent, and detrimental impacts of misusing natural resources. Such sensitization and increased awareness can now be amply supported by quantitative data, models, and tools to aid improved decision-making. Educational vehicles must be carefully selected to assure that information is disseminated effectively to all concerned audiences. Addressing primary and secondary school teachers and students directly in the classroom is presumed to be particularly desirable for reaching many families. The Hawaii Association of Soil and Water Conservation Districts (HASWCD) and a number of other community-based organizations are active in promoting conservation-effective land use planning and in collaborating with CTAHR and other institutional partners in carrying out educational programs.

The idea of involving community members in the actual monitoring of natural resource conditions has a special appeal in Hawaii. This is partly because of the unique setting and small scale described earlier. Proximity adds a higher sense of unity and attachment to land than remoteness common to large continental areas.

Adopting an Integrated Perspective for Sustainable Land Use and Management

Addressing the important natural resource and environmental issues requires a high degree of prioritization among multiple objectives, as well as a true commitment to the broad paradigm of "sustainable development". In addition, in this era of abundant environmental regulation, natural resource management is increasingly in need of quantitative understanding of sustainability determinants, indicators, standards, thresholds, etc. A major concern here is the

inapplicability of certain criteria and standards to Hawaii. CTAHR must be alert to contribute the necessary input towards making these more applicable.

Performance Goal:

Develop, transfer, and promote the adoption of efficient and sustainable agricultural, forestry, and other natural resources conservation policies, programs, technologies, and practices that allow ecosystems to achieve a sustainable balance of agricultural activities and biodiversity.

Research Output Indicators:

1. Number of research projects addressing natural resource and environmental issues.
2. Number of grant proposals submitted that address natural resource and environmental issues.
3. Number of grant proposals funded that address natural resource and environmental issues.

Instruction Output Indicators:

1. Number of formal courses in natural resource management, environmental quality and related areas.
2. Number of students enrolled in formal courses in natural resource management, environmental quality and related areas.

Extension Output Indicators:

Based non-formal education programs on sustaining and protecting ecosystem biodiversity, enhancing surface and groundwater quality, soil quality, and air quality while improving the productivity of the agricultural production system.

1. Number of agency professionals, including extension agents completing non-formal education programs.
2. Number of agency professionals, including extension agents who plan to implement or install demonstration or similar programs for clientele education.
3. Number of people completing non-formal education programs
4. Number of people who plan to adopt one or more recommended practices.

Research Outcome Indicators:

1. More efficient cultural practices that achieves a balance between agricultural productivity and preserving environmental quality.
2. Development of agricultural practices that protect, sustain and enhance water, soil, and air resources.
3. Development of public policy affecting agricultural production and the environment based on results from research on balancing agricultural productivity and preserving environmental quality.

Instruction Outcome Indicators:

1. Number of students with undergraduate and graduate degrees in NREM and related environmental science areas.
2. Number of CTAHR graduates employed by environmental enterprises.

Extension Outcome Indicators:

Based non-formal education programs on sustaining and protecting ecosystem biodiversity, enhancing surface and groundwater quality, soil quality, and air quality while improving the productivity of the agricultural production system.

1. Number of agency professionals, including extension agents who actually implement or install demonstration or similar programs for clientele education.
2. Number of people who actually adopt one or more recommended practices.
3. Number of people who actually become actively involved in one or more public policy issues related to the environment.

Key Program Components:

Administrative and Functional Restructuring

The new strategic plan for CTAHR acknowledges broad-based commitments to balancing the need for productive agricultural systems with enhanced environmental quality. The associated college reorganization will reflect a strengthened programmatic commitment to this area via the establishment of new departments on Natural Resources and Environmental Management (NREM) and Plant and Environmental Protection Science (PEPS). Efforts on the environmental arena are carried out in partnership with state and federal agencies as well as community and industry groups. Examples include the Hawaii Interagency Water Quality Action Program, Hawaii Forestry Communities Initiative, and several field-based projects for controlling water quality impairments in watersheds and hydrologic unit areas draining in water quality limited segments. Collaboration to offer a campus-wide natural resources and environmental management program with other interested units on campus is under discussion. Because of growing interest by the general public and businesses, and expanding employment opportunities dealing with the environment, new undergraduate and graduate majors in natural resources and environmental management are being added, and the role of environmental engineering, bioremediation and the treatment of wastes from agri-industries in the curricula is increasing. Dealing with environmental problems crosscuts a wide array of disciplines. Therefore, the use of a multi-disciplinary approach in addressing such problems is part of the plan.

Still, a focus is required to provide accountability. Two of the new departments, namely NREM and PEPS, have included "environment" in their names. Their missions, however, are not in conflict but, rather, are complementary (see unit descriptions in CTAHR's overall POW). We envisage that several interdepartmental courses, curricula, and projects will be implemented in the next five years to ensure efficiency and synergy in carrying out CTAHR's mandate for developing fully sustainable land use systems.

Higher Education

CTAHR now has one undergraduate course and two graduate courses that directly address Goal 4. The first is Soil Erosion and Conservation (AGRS 461), and the latter are Agriculture and the Environment (AGRS 630) and the second is Sustainable Agriculture Seminar (AGRS 631). Other courses are offered in which Goal 4 issues are inferred, if not directly addressed. The new department of natural resources and environmental Management (NREM) is intended to assume major responsibility for courses and curricula that holistically address resource issues. Environmental perspectives are stated by nearly all the other CTAHR departments, but the primary focus there will be on products and commodities. NREM's undergraduate curriculum will provide two specialization tracks, one emphasizing physical and biological aspects and the second on social, economic, and policy aspects. It is intended that the undergraduate curriculum will receive input from several other departments, particularly for supporting courses on environmental soil science, pest management, and recycling.

Graduate programs in NREM will be designed similarly. Their purpose will be to offer a multi-disciplinary curriculum to strengthen CTAHR's capacity for training future scientists, professionals, and leaders in environmental sciences and related disciplines. The balance between biophysical and socioeconomic training will allow trainees to more effectively

contribute to the development of productive, efficient, profitable, protective, and environmentally sound agricultural systems.

Efforts will be made to accelerate the pace and enhance enrollment in both new graduate and undergraduate programs by competing for available extramural funds.

Research

Based on the above-stated Key Issues, CTAHR's research mission for goal 4 is "to develop, transfer, and promote the adoption of efficient and sustainable agricultural, forestry, and other natural resources conservation policies, programs, technologies, and practices that allow ecosystems to achieve a sustainable balance of agricultural activities and biodiversity. In order for agriculture to remain viable in Hawaii, it is essential that producers have access to and practice effective methods of sustainable management of natural and capital resources, i.e. the soil, water, nutrients, pesticides, residue, and other agricultural "waste".

The college has been a global pioneer in advocating the need for and articulating means of achieving sustainability in tropical agro-ecosystems. As explained above, Hawaii's small, volcanic, tropical island ecosystems are intrinsically fragile and subject to high degradation hazards that impact the natural resource base and the environment. CTAHR has endeavored to emphasize well-informed decision making as key to addressing this goal and resolving the often-conflicting agendas for food production, economic development, natural resource protection and environmental conservation.

As the rural, suburban and urban environments overlap, society is demanding more information and help to facilitate constructive solutions. One case in point is the appropriate care, management and well being of domesticated animals raised for food. There is a growing need here to encourage the use of food production discards as animal feed and to recycle animal byproducts as fertilizers, soil amendments or plant food.

CTAHR research provides information on how the use of fertilizers and agrichemicals may affect surface and groundwater. CTAHR provides NRCS with the climatic, soil, and management data necessary for applying refined soil erosion models to develop soil and water conservation plans that are suited for the State. CTAHR's environmental research role assumes greater importance since the rapid evolution of the state's agricultural land use patterns and will have profound impacts on the natural resource base and environmental quality. Combating nonpoint source pollution, for example, will require well designed conservation technologies to sustain and protect soil, water, and ecosystem quality.

Another important role for the college is to correct and reverse the consequences of past resource degradation. An important and challenging example is the anticipated college role in the restoration of island of Kaho'olawe. The college expertise is key to team efforts aimed at mitigating and correcting such problems and, in so doing, our faculty and students can benefit from a multitude of new learning opportunities.

College water quality projects have shown clear benefits of cover cropping and residue cycling as means of suppressing weed and insect pest proliferation and reducing the use of pesticides on crops and orchards.

Because Hawaii lags behind most other states in adopting conservation tillage, barriers to its adoption need to be better understood. We are encouraged by the fact that most soils are

well-structured and intensive tillage benefits, if any, are short lived. The cultural practices associated with most crops may require substantial modification to allow leaving large amounts of plant residue on the soil surface, or its incorporation if necessary.

Soil erosion research addresses and models the factors responsible for soil losses on steep slopes, the processes causing selective removal of sediment and its enrichment with nutrients and organic matter, and the protective attributes of alternative cropping systems against soil loss. This research provides the basis for conservation planning on existing agricultural land and for projecting the potential impacts of changing agricultural land use patterns.

CTAHR has played a key role in developing innovative nonpoint source pollution control technologies, and installing field demonstrations of these technologies for the benefit of land users.

CTAHR's activities in this goal area also include a large IPM effort that encompasses the use of sustainable methods, biocontrol agents, trap and alternative crops, and pesticide monitoring. College faculty are at the forefront in applying molecular methods to IPM efforts. This has resulted in the development of a genetically engineered papaya that is resistant to papaya ringspot virus. Other efforts seek to apply molecular methodology to fruit fly management and plant viral diseases. The college also contributes basic information to the management of predators and diseases that impact Hawaii's endangered birds, plants and fish.

Agriculture provides many opportunities for improving the environment through bioremediation and recycling of waste streams. CTAHR is developing means of reducing the amounts and impacts of wastes generated in the production and processing of crops and livestock. In partnership with the USDA, CTAHR is also developing outreach and technology-development capabilities in bioremediation with the aim of fostering the industry in the state. Thermochemical and biological conversion processes have the potential to control pollutant streams as well as generate new co-products.

CTAHR’s research efforts in addressing Goal 4 will be supported by a combination of State, Hatch and McIntyre-Stennis funds. We anticipate continued success in leveraging extramural funds to accelerate the pace of high priority research.

Extension

The skeleton of Hawaii’s extension work plan for Goal 4 will be to utilize the Smith-Lever 3 (d) targeted programs to focus our limited extension resources on high priority issues. Coordinators of the targeted programs on Integrated Pest Management (IPM), Water Quality, Renewable Resources Extension (RRE), Pesticide Use and Safety, and Pesticide Impact Assessment (PIA) targeted programs have submitted plans of work and/or performance plans that address many objectives, performance goals and indicators of Goal 4. These plans are provided as separate submissions under the respective targeted programs section.

In addition Hawaii receives an annual allocation for Sustainable Agriculture Research and Education (SARE) Planning and was awarded a SARE training grant to address how cover crops selection and management may contribute to enhancing soil quality. The first training workshop is scheduled for Fall, 1999.

The following statements discuss other plans that also relate to Goal 4. Progress reports will be made in the respective targeted program section and will not be double reported here.

Youth environmental education.

The Environmental Quality specialist has adapted a national 4-H SERIES (Science Experiences and Resources for Informal Educational Settings) curriculum titled "Ridges to Rivers: Watershed Explorations". The curriculum encourages children to explore different forces that shape our watersheds and their water quality. A train-the-trainer workshop was held at Hilo Hawaii. The Environmental Quality specialist, extension 4-H educators, and other environmental educators will educate Hawaii's youth about the importance of proper management of watersheds. A watershed conservation awareness program is underway. The Oahu 4-H program developed a program titled "Earthwise: The Extension Youth Environmental Stewardship Initiative". The water quality component was designed to increase 4-H'ers understanding of Hawaii's watersheds and how non-point source pollution impacts this valuable resource.

Internal and External Linkages:

Internal Linkages:

1. CTAHR academic departments, districts, counties, 4H, Agricultural Leadership and other special programs.
2. University of Hawaii at Manoa departments.
3. University of Hawaii at Hilo.
4. Community Colleges of the University of Hawaii system.

External Linkages:

1. USDA Cooperative State Research, Education, and Extension Service (CSREES).
2. USDA Natural Resources Conservation Service (NRCS).
3. USDA Forest Service Institute for Pacific Islands Forestry.
4. USDA Agricultural Research Service.
5. State Department of Land and Natural Resources (DLNR).
6. Hawaii Association of Soil and Water Conservation Districts (HASWCD).
7. State Department of Education (DOE).
8. State Department of Agriculture.
9. Office of Hawaiian Affairs.
10. Land Grant colleges and universities.
11. Hawaii Forestry Industry Association.
12. Environmental and Conservation NGO's.

Target Audiences:

As intended by the Land Grant perspective, CTAHR's "targeted" clients for Goal 4 in ***teaching*** are the undergraduate and graduate students in agriculture and allied fields. Targeted clients for ***research*** are peers and extension specialists. Clients for ***extension specialists*** are CTAHR's county extension agents and the counterpart professional personnel of sister state and federal agencies (such as the Hawai`i State Departments of Agriculture, Health and Land and Natural Resources, and the USDA Natural Resources Conservation Service, NRCS). Clients for ***extension agents*** are land users and commodity producers and their organizations (such as the Hawaii Association of Soil and Water Conservation Districts, Hawaii Forestry Industry Association, and the Hawaii Farm Bureau), extension staff in other CTAHR units and at sister institutions, and other members of the professional community who deal with managing land, soil and water resources especially in tropical agro-ecosystems. *Interfacing with other professional and community groups who can provide new and useful knowledge to facilitate making Goal 4 decisions is an important expectation for effectively meeting its commitments*.

Program Duration:

There are short, intermediate, and long term objectives.
October 1 1999 to September 30, 2004: For Short and some Intermediate Term objectives.
Greater than 5 years: For Long Term Objectives.

Education and Outreach Programs

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CTAHR has played a key role in developing innovative nonpoint source pollution control technologies, and installing field demonstrations of these technologies for the benefit of land users.

CTAHR's activities in this goal area also include a large IPM effort that encompasses the use of sustainable methods, biocontrol agents, trap and alternative crops, and pesticide monitoring. College faculty are at the forefront in applying molecular methods to IPM efforts. This has resulted in the development of a genetically engineered papaya that is resistant to papaya ringspot virus. Other efforts seek to apply molecular methodology to fruit fly management and plant viral diseases. The college also contributes basic information to the management of predators and diseases that impact Hawaii's endangered birds, plants and fish.

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GOAL 4: ALLOCATED RESOURCES

Fiscal Year	Research Hatch and State Funds ($)	Research Other Fed & Non Fed Funds ($)	Research Scientist Years (SY)	Extension Smith-Lever & State Funds ($)	Extension Other Funds ($)	Extension Faculty Years (FY)
2000	670,000	240,000	7.5	820,000	20,000	14.0
2001	650,000	240,000	7.0	800,000	40,000	13.0
2002	650,000	240,000	7.0	800,000	40,000	13.0
2003	650,000	240,000	7.0	800,000	40,000	13.0
2004	650,000	240,000	7.0	800,000	40,000	13.0

GOAL 5: ENHANCED ECONOMIC OPPORTUNITY AND QUALITY OF LIFE FOR AMERICANS

PROGRAM 5.1: COMMUNITY AND ECONOMIC DEVELOPMENT

Statement of Issues:

Hawaii's culturally diverse families are faced with many challenges. In the last ten years, the state has experienced a depressed economy due to the decline in tourism and the closure of several sugar companies, once the dominant employer in the community. The sugar industry, based in rural communities, offered affordable housing and close proximity to work for many families.

The high cost of living in Hawaii (33% higher than the U.S. mainland) and the scarcity of affordable housing in safe communities has forced many heads of households to accept entry level wages at employment centers far from home or even on neighboring islands. Many fathers have had to secure dual income producing jobs to support their families, while mothers with young children have been forced to accept whatever employment they can find in the community.

Educational programs which strengthen the capacity of adults to become employed and provide new skills for employability are critically needed in these economically depressed communities. External grants and resources are needed to stimulate the economy and to provide employment. Agencies and organizations need to work collaboratively to assess community needs and develop strategic plans for community economic development.

Performance Goal:

To increase the capacity of communities and families to enhance their own economic well-being.

Output Indicators:

1. Number of public officials and community leaders completing non-formal education programs on economic or enterprise development.
2. Number of these public officials and community leaders who plan to adopt one or more recommended practices to attract new businesses or help expand existing businesses.
3. Number of people completing non-formal education programs on community decision-making and leadership development.
4. Number of people completing non-formal education programs on community decision-making and leadership development who plan to become actively involved in one or more community projects after completing one or more of these programs.
5. Total dollar value of outside grants pursued to obtain funding for the community to develop community programs.

Outcome Indicators:

1. Number of public officials and community leaders who actually adopt one or more recommended practices to attract new businesses or help expand existing businesses within six months after completing one or more of the educational programs.
2. Number of people completing non-formal education programs on community decision-making and leadership development who become actively involved in one or more community projects within six months after completing one or more of these programs.
3. Number of new businesses started and number of existing businesses maintaining or expanding operations resulting from economic development programs developed in collaboration with CSREES partners and cooperators.
4. Number of jobs created by the formation of new businesses and expansion of existing businesses resulting from economic development programs developed in collaboration with CSREES partners and cooperators.
5. Total dollar value of grants obtained to implement community programs

Key Program Components:

Hawaii's Cooperative Extension Service has provided the following non-formal educational programs in these economically depressed communities:

1. "Extension On-Line" State Strengthening Grant: Through a partnership with the Kau Family Center, a Community Site Facilitator has been working with adults in the community to enhance and expand their job skills, to develop "cottage" industries, and to elevate their computer skills. Partnering with other agencies and organizations in the community has enabled the group to obtain grants for local projects. The Community Site Facilitator at the Waipahu "Extension On-Line" site has conducted educational programs for adults on accessing information through the computer to seek employment. These sessions have included resume writing and identifying resources to assist in exploring the job market.
2. 4-H Youth involved in the "Bridging The Gap of Isolation" project developed a community brochure and map in an effort to encourage tourists to visit local historic sites and to patronize local businesses.
3. Molokai has received several grants to develop new industries on the island and to expand or support existing programs. These include the five year grant from USDA/CSREES: "An Aquaculture Demonstration Grant" ($ 550,000), "Aquaculture Training Program" ($ 80,000), "Finfish Hatchery on Molokai" ($ 40,000).
4. Both Molokai and Naalehu have been involved in the MIRA Project (Managing Information for Rural America). Team members participated in a six-month training program (once a month) and developed a proposal for their communities.
5. Through partnerships with government and private agencies, Hawaii's community economic development is working with agriculture and community leaders to organize and strengthen community-based programs and organizations to improve the economic stability for families residing in rural communities. As part of this effort, extension agents worked with the community to facilitate a highly competitive application process

resulting in the designation of the island of Molokai as one of 20 new Enterprise Communities nationwide. The college will continue to play an essential role in supporting and enhancing this vital program.

6. With funding support from the Department of Hawaiian Home Lands, extension faculty work with Hawaiian Home Lands agricultural lessees including active and inactive subsistence and commercial farmers and ranchers to use homestead lands productively and to work cooperatively to form agricultural communities.
7. The Apparel Product Design and Merchandising program (APDM), one of two programs in the Department of Family and Consumer Sciences contributes to community economic development by preparing students for both entry level management and management training positions in domestic and international apparel business and industry settings. The APDM curriculum also provides a foundation in professional skills, including leadership, research skills, and computer applications. This program provides opportunities to "strengthen the capacity of adults to become employed and provide new skills for employability critically needed in economically depressed communities."

Internal and External Linkages:

Internal Linkages:

1. College of Tropical Agriculture - Research Specialists, Instructional Staff.
2. "Extension On-Line" Community Sites.
3. 4-H Youth and Volunteer Development Program.
4. Family Community Education.
5. Agricultural Leadership.

External Linkages:

1. Queen Liliuokalani Children's Center.
2. Department of Hawaiian Home Lands.
3. Department of Labor and Industrial Relations.
4. State Department of Agriculture.
5. Office of Hawaiian Affairs.
6. Alu Like.
7. Maui Community College.
8. Hikiola Cooperative.
9. Hui Laulima.
10. Molokai Icehouse Cooperative.
11. Kamehameha Schools.
12. Molokai Community Services Council.
13. Queen Emma Foundation.
14. Maui Office of Economic Development.
15. Kau Family Center, Family Support Services of West Hawaii.
16. Main Street.
17. MIRA (Managing Information for Rural America).
18. National 4-H Council- "Bridging The Gap of Isolation" and "Powering Up" project.

Target Audiences:

1. Children, youth, and families in economically depressed communities.
2. Unemployed adults.
3. Staff and volunteers at community agencies and organizations.
4. Businesses.
5. Community leaders.
6. Policy makers.
7. Agriculture and Community Leaders.

Program Duration:

There are short, intermediate, and long term objectives.
October 1 1999 to September 30, 2004: For Short and some Intermediate Term objectives.

Greater than 5 years: For Long Term Objectives.

Education and Outreach Programs:

The college recognizes that continuous discovery of knowledge, development of technology, and transfer of science-based information applicable to Hawaii's unique tropical island environment are essential for communities in Hawaii to be competitive in the global economy. Thus, the college's commitment is to provide on-going research and educational programs to enable Hawaii's agriculture to be economically viable, environmentally compatible, and sustainable.

As part of the college's commitment, faculty work with and empower agricultural based organizations to develop and implement strategic plans with long-range goals. Educational programs provide CTAHR's research-based information for members of the organizations and farm entrepreneurs to improve their knowledge and abilities to make informed decisions. Multi-disciplinary efforts are utilized to resolve problems affecting agriculture and related industries supporting community economic development for communities in economic transition.

PROGRAM 5.2: DATA COLLECTION AND REPORTING SYSTEM FOR CHILDREN AND FAMILIES

Statement of Issues:

There is little question that the American family has undergone dramatic changes during the past four decades. What is of concern to many are the changes that have had a deleterious effect on family life and, in particular, the impact these changes have had on children. Although various data relating to families and children are collected by federal, state, and other sources, there is a great need in Hawaii for a centralized system that pulls all of these data together and conducts a review and analysis of the information. Moreover, there is a need to collect useful data that are presently unavailable, particularly those that focus on the strengths of families and children.

The College of Tropical Agriculture and Human Resources (CTAHR) at the University of Hawaii is in the best position to serve as the data collection and reporting system for the state's families and children. The system will be based on measurable indicators regarding the well-being of families and children that can be tracked over time. This initiative will add to and support other outcomes-oriented efforts in the state, none of which focus on families and children. It will provide data that can greatly inform discussion and decisions on family and child-related policies, programs, and budgetary allocations.

Performance Goal:

To increase the capacity of communities, families, and individuals to improve their own quality of life.

Output Indicators:

1. Number of reports, both print and electronic, issued.
2. Number of publications purchased.
3. Number of presentations conducted.

Outcome Indicators:

1. Number of reports, proposals, and other documents that utilize Hawaii Family Touchstones and Hawaii Kids Count data.
2. Number of legislative and policy actions taken in support of families and children which have been influenced by Hawaii Family Touchstones or Hawaii Kids Count data.
3. Number of editorials, programs initiated or revised, or other actions taken to encourage support of Hawaii's families and children.

Key Program Components:

Hawaii's data collection and reporting system will utilize broad community input to identify the key indicators relating to families and children that will be tracked over time. All of the selected indicators will meet the scientific criteria of validity and reliability. In addition, they will have the following characteristics:

1. Clarity: phrased to be easily understood by the general public.
2. Regular measurement: data are collected consistently at regular intervals.
3. Timely measurement: data are collected at sufficiently frequent intervals to allow timely reporting.
4. Covers geographic area of interest: data are collected from representative samples of Hawaii's four counties.

Hawaii Family Touchstones will serve as the primary reporting mechanism on the well-being of the state's families, while Hawaii Kids Count will report on the status of children. Both will utilize print and electronic means to disseminate their findings. In addition, periodic summaries on relevant topics will be issued to the media, policy makers, human service providers, and the general public utilizing a variety of communication strategies.

Internal and External Linkages:

Internal Linkages:

1. Extension county agents.
2. Department of Human Resources faculty.

External Linkages:

1. Governor's Policy Advisor for Children and Families
2. Departments of Health; Human Services; Education; Labor; and Business, Economic Development, and Tourism.
3. Bank of Hawaii
4. AT&T
5. Market Trends Pacific, Ltd.
6. Good Beginnings Alliance
7. Gannet Foundation
8. Canon, USA - Hawaii
9. Annie E. Casey Foundation

Target Audiences:

State government officials, legislators, human service providers, the media, general public, academicians, and students.

Program Duration:

October 1, 1999 to September 30, 2003

Education and Outreach Programs:

Research and extension funds are committed to identify the key indicators relating to families and children that will be tracked over time. All of the selected indicators will meet the scientific criteria of validity and reliability. Useful data that are presently unavailable, particularly those that focus on the strengths of families and children will thus be provided for discussion and decisions on family and child-related policies, programs, and budgetary allocations. Print and electronic reports on the well-being of Hawaii's families based on the results of the state of Hawaii's families research report will also be developed and disseminated to educate policy makers, community leaders, program managers, and others.

PROGRAM 5.3: LIFE SKILLS AND LEADERSHIP

Statement of Issues:

CTAHR/CES programs and staff have become a valuable resource for community development in Hawaii, especially in the areas of life skills and leadership. Presently, the efforts of CES Programs have been identified as the provision of general technical assistance, leadership training, education and training in specific program areas such as life skills education through 4-H and FCE programs, collaboration with communities, advisory and resource support, and work with specific groups. To further support programming efforts in these areas, it is necessary to measure the successes and outcomes of CES programs. This initiative provides an opportunity to create change, contribute to the scientific knowledge

about outcome measurements in programs offering life skills and leadership training, and better identify program outcomes.

Performance Goal:

To increase the capacity of communities, families, and individuals to improve their own quality of life.

Output Indicators:

Number of staff and volunteers to complete outcome assessment training and to adopt measures of outcomes in their yearly reports for CES Programs.

Outcome Indicators:

1. Increased numbers of CES staff & volunteers trained each year over a 3-year period.
2. Increased number of reports using outcome measures for 2 programs over 3 years.
3. Increased participant involvement at every level, especially between CES staff and stakeholders.
4. Increased use of culturally sensitive outcome measures at the state level.

Key Program Components:

This initiative focuses on outcome measurements in two CES programs, the Family Community Education (FCE) Program and the 4-H Program. The FCE program, one of two CES target programs for this project, works at many levels to build the capacity of individuals, families and communities to contribute to a caring community. FCE teaches, offers technical training and support, develops leaders, works with groups such as schools, provides resources and volunteers to help community programs, co-authors grant proposals with agencies, and collaborates and sponsors activities with non-profit groups. 4-H, the other target program offers many types of programs, including traditional and emergent programs for youth and adults. 4-H works with other youth agencies such as the Boy Scouts and Girl Scouts, provides individual after-school programs for youth K-12, provides volunteer training and leadership development, co-authors grant proposals with the DOE and Boys and Girls Clubs, and is currently working on a project with the U.S. Army. 4-H in Hawaii has been randomly selected to participate in a national impact assessment through the University of Arizona to provide national baseline data on 4-H programs.

The objectives of this initiative are to measure the effectiveness of training CES staff and volunteers to use outcome measures, to develop culturally sensitive measures of program effectiveness for use with Hawaii's diverse ethnic mix, to demonstrate an increase in collaboration between CES staff and stakeholders, and to apply outcome measurements developed at the state and national levels.

Internal and External Linkages:

This program will be a collaborative, increasingly cooperative effort between the research team, clients and stakeholders. This is important to the study because data collection of program efforts for the FCE and 4-H Programs affects a number of stakeholders. Stakeholders of FCE and 4-H include internal and external linkages. Youth and adult groups are involved. Internal stakeholders include agents, other college departments, current and future appointments, student leadership development, administrators, university interdisciplinary programs, content area or programmatic staff, tenured faculty, part-time faculty, volunteer and paraprofessional workers. Other CTAHR units involved with FCE and 4-H include Animal Sciences, Horticulture, Agronomy and Soils, Food Science and Human Nutrition, Family Resources, Family Community Leadership, and EFNEP. External units involved with FCE and 4-H include Animal Sciences, Horticulture, Agronomy and Soils, Food Science and Human Nutrition, Family Resources, Family Community Leadership, and EFNEP.

Target Audiences:

CTAHR and CSREES administrators, grantors, state government officials, staff and volunteers, stakeholders and the general public.

Program Duration:

October 1, 1999 to September 30, 2001

Education and Outreach Programs:

Research and extension funds are allocated to support this integrated initiative. Research results are to provide opportunities to create change, contribute to the scientific knowledge about outcome measurements in programs offering life skills and leadership training, and better identify program outcomes.

PROGRAM 5.4: FAMILY EDUCATION PROGRAMS

Statement of Issues:

Family Education programs to address the needs of Hawaii's multi-ethnic families have become increasingly critical due to changes in family structure and support system and the state's depressed economic condition. The rising divorce rate has resulted in more children living in single-parent homes (21% statewide) and in children alternating where they live throughout the year. There has also been an increase in non-marital births. The Kids Count Data Book for 1996 reported that each day in Hawaii: 1 in 6 children live in poverty; over 1 in 5 live with a single parent; 8 babies are born whose mothers did not get prenatal care in the first trimester; 3 babies are born with dangerously low weight (less than 5.5 pounds); there are 5 or 6 births to teen moms, 80% of whom are not married; 11 reports of child abuse are made, 56% of which will be confirmed; and there are 13 youths arrested for serious crimes.

The cost of maintaining an intermediate standard of living in Hawaii is 33% higher than the U.S. mainland. Affordable housing in safe communities is not available, forcing many mothers with young children to enter the job market and many fathers to have dual income producing jobs to support their families. This has resulted in a growing number of "latchkey" children after school, and during the evening and school vacations.

Several communities have undergone major transitions with the decline of the sugar industry, once the dominant employer in the community. The high unemployment in plantation communities has created new stresses in families or accelerated existing stressful situations. Meanwhile the demands and interests in agriculture by homeowners and the urban/suburban communities continue to increase. With the current and projected increase in urbanization and smaller farms, retail businesses for gardeners, and media programs gardening, a steady increase for home gardening information is anticipated.

Performance Goal:

To increase the capacity of communities, families, and individuals to improve their own quality of life.

Output Indicators:

1. Number of people completing non-formal education programs on parenting, youth development, and leadership development.
2. Number of people completing non-formal education programs on parenting, youth development, and leadership development, who plan to adopt one or more parenting principles, behaviors, or practices after completing one or more of these programs.

Outcome Indicator:

Number of people completing non-formal education programs on parenting, youth development, and leadership development, who actually adopt one or more parenting principles, behaviors, or practices within six months after completing one or more of these programs.

Key Program Components:

Family Education programs reach out to a broad spectrum of families throughout Hawaii. Some of the major "Family Education" program efforts include:

1. State Strengthening Grant, "Extension On-Line": The goal of this project is for Extension to serve as a catalyst in creating positive changes in children, youth, and families to strengthen their capacity to participate in a culturally diverse and changing society through the delivery of comprehensive, collaborative, community-based educational programs. Five community sites have been established in collaboration with community agencies working with “at risk” children, youth, and families. In addition to

delivering parenting education programs in these communities, site facilitators have been assisting youth and adults in accessing parenting information on the internet and in becoming computer literate.

2. Kindergartners Are Most Precious (KAMP): A transition program for children entering kindergarten, is designed to promote school readiness and academic success. This collaborative program has been held at various schools on the Big Island, Oahu, and Kauai, through funding from the Weinberg Trust Fund, Hawaii 4-H Foundation, and the State Strengthening Grant. The "day camp" program, held before the beginning of the school year, provides interactive parent child learning experiences for participants, classroom activities for children, parenting tips and advice, group and individual story-telling, orientation to school facilities, and information about resources available for parents, both at the school and within the community.

3. Family Literacy: Various programs to promote literacy have been held in the counties, including the Family Community Education's "Reading Aprons" program, the 4-H "Read To Me" and "Storybook Apron" programs, and literacy programs integrated with "KAMP" and at the "Extension On-Line" community sites.
4. Leadership and Volunteer Development: Through the Family Community Education, Family Community Leadership, and 4-H Youth and Volunteer Development Programs, over 2,500 youth and adult volunteers have received leadership training, provided leadership training, or participated in leadership programs statewide.
5. Financial Management/Family Resources Management Education programs annually improve the financial status of families and increase their capacity to enhance their economic well-being. Extension faculty in Hawaii joined the Money 2000 national Cooperative Extension campaign to encourage and assist 2000 households in Hawaii to set goals to increase their levels of wealth or net worth by decreasing debt and/or increasing their savings by December 31, 2000. Workshops and educational materials on "Take Charge of Your Money" and "Food and Money Basics" are resulting in improved utilization and management of available resources.
6. An "urban garden center" was established to meet the increasing demands from the urban community on the island of Oahu for horticulture and related information. The Center develops and maintains garden plots for urban food production using environmentally sound practices, demonstrates landscaping ideas, and provides practical research and demonstration activities related to urban horticulture. Training is conducted for volunteers to support the center as master gardeners providing "expert" assistance on horticulture and related topics. Based on the Urban Garden Center's successes in stimulating interest in agriculture through timely research-based information, the establishment of (1) a statewide system of community demonstration sites (urban garden centers) modeled after the Center on the island of Oahu with (2) programs to recruit and train master gardeners and volunteers is a major CTAHR initiative.
7. The Family Resources program (FAMR) is one of two programs in the college's Department of Family and Consumer Sciences generating and conveying knowledge needed to strengthen families and communities. FAMR students study theoretical and applied literature concerning the biological, social, cultural, psychological, and economic well-being of individuals and families. Using a systems perspective, the curriculum integrates knowledge of (a) human development, resource management, and family functioning across the life span, (b) the interdependence of families and the environments in which they live, and (c) community programs and policies that affect family and consumer well-being.
8. The FAMR curriculum trains students to work proactively in multicultural settings to enhance the quality of family life. Students are prepared for bachelor-level positions in human and family services, and for graduate training in child and family studies, family life education, marriage and family therapy, family economics and management, education, gerontology, and other disciplines. The FAMR curriculum also provides a foundation in professional skills including research methods, leadership, and team-building.

Internal and External Linkages:

Internal Linkages:

1. Center on the Family.
2. Department of Human Resources.
3. 4-H Youth Development Program.
4. Family Community Education.
5. Family Community Leadership.
6. County/Community Extension Offices.
7. "Extension On-Line" Community Sites.
8. Educational Resource Library, Pearl City.
9. Expanded Foods and Nutrition Education Program.
10. CYFERNet.

External Linkages:

1. Army Youth Services Programs.
2. Air Force Family Advocacy Programs.
3. Kau Family Center, Family Support Services of West Hawaii.
4. Waipahu Ohana Center, YMCA Communities in Schools Program.
5. Kaneohe Community Family Center.
6. Molokai Youth Council.
7. Eleele Elementary School.
8. Department of Education and Kindergarten "KAMP" school sites.
9. Housing & Community Development Corporation of Hawaii.
10. Women Studies Program, University of Hawaii.
11. State Volunteer Services Program.
12. Voluntary Action Center/Helping Hands Hawaii.
13. Department of Health.
14. Department of Human Services.
15. State Library System.
16. Financial Institutions.
17. Retail Garden Shops.

Target Audiences:

1. Children, youth and families "at risk" in targeted communities through the "Extension On-Line" program.
2. Kindergartners and parents through the "KAMP" programs.
3. Adult and youth (ages 5 - 19) through the 4-H Youth Development program.
4. Young children and parents through the literacy programs.
5. Adults through the Family Education and Family Community Leadership Programs.
6. Other youth and adult participants reached through other delivery methods.
7. Home gardeners

Program Duration:

October 1, 1999 to September 30, 2003

Education and Outreach Programs

Research results from the university as well as throughout the Land-Grant system Family are reviewed and adapted to support the college's family education programs.

More relevant research to address the changing needs of Hawaii's multi-ethnic families and communities who are experiencing major social and economic transitions are needed.

GOAL 5: ALLOCATED RESOURCES

Fiscal Year	Research Hatch and State Funds ($)	Research Other Fed & Non Fed Funds ($)	Research Scientist Years (SY)	Extension Smith-Lever & State Funds ($)	Extension Other Funds ($)	Extension Faculty Years (FY)
2000	175,000	50,000	2.0	1,750,000	200,000	25.0
2001	170,000	50,000	2.0	1,700,000	250,000	24.0
2002	170,000	50,000	2.0	1,700,000	250,000	24.0
2003	170,000	50,000	2.0	1,700,000	250,000	24.0
2004	170,000	50,000	2.0	1,700,000	250,000	24.0

III. STAKEHOLDER INPUT PROCESS

Agricultural Commodities

CTAHR will employ a long-standing industry analysis process that has provided valuable input into research and extension program planning. The Associate Director for Research and the Associate Director for Extension designate a convenor who will be responsible for the development of a draft analysis of the commodity group. The convenor will assemble a committee of appropriate faculty to develop a draft analysis.

In general, the draft analysis will assess the important issues, problems and concerns of the commodity group. The draft analysis will consider the present status of the commodity including current production, value and recent trends. Of particular importance is the development of an understanding of the reasonable potential and the underlying assumptions. Based on the above, the analysis will identify the major issues related to the following factors: land, water, capital, labor, cultivars, pest and disease control, culture and management practices, harvest management and post-harvest handling, processing including food safety and quality, waste management, transportation, marketing, cost of production, and government policies, rules and regulations.

Input on the draft will be sought via several mechanisms. The draft analysis will be published on the Web for electronic review and comment by stakeholders, faculty, and government agencies. Hard copies of the draft analysis will be distributed to stakeholders for

written comment. Alternatively, if there is a strong commodity association, the analysis will be presented at a meeting of the association. Using a focus group approach, input will be obtained from the association. If sufficient input is not received by the above methods, input will be obtained from key stakeholders in one to one meetings. Based on these methods, the draft analysis will be modified as appropriate to develop a final industry analysis that will serve to guide POW development.

Family and Consumer Science Areas (4-H and youth, leadership development, nutrition , resource management)

The Associate Director for Research and the Associate Director for Extension designate a convenor who will be responsible for the development of a draft analysis of the area under consideration. The convenor will assemble a committee of appropriate faculty to develop a draft analysis.

In general, the draft analysis will assess the important issues, problems and concerns including an assessment of other public and private programs in the area. The draft analysis will consider the present status of the area, recent trends, and reasonable expectations, and underlying assumptions. Based on the above, the analysis will identify the major issues related to the area.

Input on the draft will be sought via several mechanisms. The draft analysis will be published on the Web for electronic review and comment by stakeholders, faculty, and government agencies. Hard copies of the draft analysis will be distributed to stakeholders for written comment. A town meeting will be held to allow stakeholders to provide comment and input that will be used to develop the final analysis. If sufficient input is not received by the above methods, input will be obtained from key stakeholders in one to one meetings. Based on these methods, the draft analysis will be modified as appropriate to develop a final analysis, which will serve in guiding POW development.

Agricultural Commodities and Family and Consumer Science

Stakeholders will thus assist CTAHR to maintain relevance of overall programs and help to assure program coordination among teaching, research and extension/outreach programs. In general, stakeholders will include producers, processors, consumers, decision-makers, students, alumni, and members of the business community. Stakeholder input will ensure that:

1. The production and processing of food and fiber is closely related to consumer needs and preferences.
2. The curricula and methods used in teaching attract quality students and produce “society ready” graduates.
3. Environmental stewardship is recognized broadly by customers as being a key part of food and fiber production and processing.
4. Agricultural research, education and extension functions make full use of new opportunities in science and technology to enhance the competitiveness of agriculture.

5. CTAHR programs are relevant, timely and user friendly. The *Hawaii Invests* database will assess the value of CTAHR for commodities, youth, families and communities and show the relevance and value to stakeholders of the public dollars invested in CTAHR programs. Annual impact reports will also be published to document program accomplishments and impacts.

IV. PROGRAM REVIEW PROCESS

MERIT REVIEW

Teams of five individuals will be established to review plans of work for CTAHR's program areas on (1) Agriculture Production and the Environment; and (2) Family and Consumer Sciences (including food safety, human nutrition, leadership development, family resources management, and community economic development).

Each team will include individuals representing users/stakeholders with broad understanding and appreciation of multi-disciplinary, coordinated approaches as well as those complex problems facing the people of Hawaii. Team members will utilize their knowledge and experiences to review programs and ensure the following:

1. Planned programs address the critical issues of strategic importance, including those identified by the stakeholders.
2. Planned programs utilize multi-disciplinary approaches and provide evidence of integration of research and extension.
3. Planned programs address the needs of under-served populations of the State.
4. Planned programs prescribe the expected outcomes and impacts.
5. Planned programs result in improved effectiveness and/or efficiency.

CTAHR administrators and faculty may serve as resources to clarify plans of work for merit review teams. Final review for extension plans of work occurs in the office of the Associate Dean and Director for Extension.

Plans of work will be reviewed annually, and recommendations for update will be submitted by the teams for consideration. CTAHR administrators and faculty will utilize the input to ensure that programs are timely and relevant.

PEER REVIEW

CTAHR will employ a peer review process that has been in use for some time. The process begins when a project proposal is submitted to a unit administrator. The unit administrator checks the proposal for completeness and format. A draft proposal that is ready for review is transmitted to the department's Peer Review Committee. This committee is comprised of three departmental members and two ad hoc members external to the department. These ad hoc reviewers may be peers from another department, university, or from the industry.

The Peer Review Committee reviews the proposal for (1) significance; (2) need; (3) approach; (4) new knowledge of programs to be generated; (5) potential for impact; (6) collaborative arrangements; (7) track record of the project leader(s); and (8) potential for success of the proposed project. After the committee completes its evaluation, the proposal and the peer evaluation forms are returned to the unit administrator.

The unit administrator evaluates the proposal and completes the unit administrator review form. A research proposal that is ready for administrative review is submitted to the Associate Dean and Director for Research. Alternatively, if the reviews indicate that a proposal needs to be improved and strengthened the proposal will be returned to the faculty who initially developed and submitted it. The proposal initiator is consulted if concerns or questions arise during any phase of the review process.

Final review occurs in the office of the Associate Dean and Director for Research.

V. MULTISTATE RESEARCH AND EXTENSION ACTIVITIES

CTAHR participates in a variety of multistate and regional activities. These include Hatch Multistate (regional) Projects (listed below), the Agricultural Development in the American Pacific (ADAP) project, and the Tropical and Subtropical Agriculture Research program. The regional projects are administered through the channels established by the USDA and by the Western Region. More focussed regional research, critical to meeting the increasing challenges and opportunities in tropical island environments occurs via the ADAP and T-STAR programs. The ADAP project is administered by a Board of Directors consisting of the Deans or Directors of the land grant colleges of agriculture in the American Pacific Territories and Hawaii. Included in this partnership are American Samoa Community College, The University of Guam, The College of Micronesia, Northern Marianas Community College and The University of Hawaii at Manoa. ADAP addresses important agricultural issues of significance to this region through a series of targeted activities developed through a special grants program. The T-STAR program is joint program between the Pacific and Caribbean basins. Institutions involved include University of Hawaii, University of Guam, University of Florida, University of Puerto Rico, University of the Virgin Islands. The program is administered by respective basin Advisory Groups. Besides funding high priority research projects, this collaboration includes joint initiatives on emerging tropical agriculture, workshops, Newsletters, and a comprehensive web site. Many of the funded research projects include collaborators from numerous institutions ranging from UC-Davis to Cornell University.

Hatch Mutistate Research

HATCH MULTISTATE (REGIONAL) RESEARCH PROJECTS		
Multi-State Project Number	Title	Participating States
NE-124	Genetic manipulation of sweet corn quality and stress resistance	FL, HI, ID, IL, IN, MA, MN, NYC, NYG, OH, OR, PA, WI
NE-167	Family businesses: interaction in work and family spheres	HI, IN, IA, IL, MI, MN, MOX, MT, NE, ND, NYC, OH, PA, TX, UT, VT, WI, CANADA, Brigham Young U.,

		Miami U. (in OH)
NE-179	Technology and principles for assessing and retaining postharvest quality of fruits and vegetables	AR, CA, GA, HI, ME, MI, NYC, NYG, NC, PA, IN, WA, USDA/ARS

HATCH MULTISTATE (REGIONAL) RESEARCH PROJECTS		
Multi-State Project Number	Title	Participating States
S-009	Plant genetic resources conservation and utilization	AL, AR, FL, GA, HI, KY, LA, MS, NC, OK, PR, SC, TN, TX, VA
S-275	Animal manure and waste utilization, treatment, and nuisance avoidance for a sustainable agriculture	AL, CA, FL, GA, HI, IL, IN, IA, KY, LA, MN, MI, NC, OR, SC, TN, TX, VA, WI, USDA-ARS
W-045	Environmental transformation, exposure, and effects of pesticide residue	ARS, AZ, CA-D, FL, HI, NV, NM, NYC, OR, UT, WA
W-045	Environmental transformation, exposure, and effects of pesticide residue	ARS, AZ, CA-D, FL, HI, NV, NM, NYC, OR, UT, WA
W-106	Regional research coordination, western region	AK, AS, AZ, CA, CO, GU, HI, ID, MICRONESIA, MT, NM, NV, NORTHERN MARIANA ISLANDS, OR, UT, WA, WY
W-112	Reproductive performance in domestic ruminants	AZ, CA, CO, HI, ID, KS, MN, MO, MT, NV, NM, OH, OR, TX, WA, WY
W-128	Microirrigation: management practices to sustain water quality and agricultural productivity	ARS, AZ, CA, CO, GU, HI, IA, KS, MI, NM, OR, TX, VA, WA, WY
W-170	Chemistry and bioavailability of waste constituents in soils	ARS, CANADA, CA, CO, FL, HI, IA, IL, KS, MI, MO, MT, OH, WA, WI, WY
W-173	Stress factors farm animals and their effects on performance	AZ, CA, CO, HI, IA, KS, MS, MO, NE, NYC, OR, TN, TX, UT, USDA/ARS
W-185	Biological control in pest management systems of plants	AZ, CA, GU, HI, ID, KS, MT, NM, NYC, OR, UT, WA, WY, USDA/ARS, USDA/APHIS, USDA/FS, USDA/DFA
W-186	Genetic variability in the cyst and root-knot nematodes	AR, CA, HI, ID, MI, NE, NM, NC, OR, WA, WY

HATCH MULTISTATE (REGIONAL) RESEARCH PROJECTS		
Multi-State Project Number	Title	Participating States
W-190	Water conservation, competition and quality in western irrigated agriculture	AZ, CA, CO, HI, ID, IN, NE, NV, NM, OK, OR, TX, WA, WY, ARS, ERS
W-191	Factors influencing the intake of calcium rich foods among adolescents	AZ, CA, CO, HI, ID, IN, MN, MT, NV, NM, OR, UT, WA, WY
NRSP-004	A national agricultural program to clear pest control agents for minor uses	AK, AZ, CA-D, CO, FL, GU, HI, ID, MT, NM, NV, OR, UT, WA, WY
WCC-020	Virus and virus-like diseases of fruit crops	CA-B, CA-D, CO, HI, NJ, NY, PA, SC, UT, WA
WCC-058	Production, transition handling, and reestablishment of perennial nursery stock	AZ, CA-R, HI, IA, MI, NJ, OH, OK, OR, TX, UT
WCC-069	Coordination of integrated pest management research and extension programs for the western united states	AZ, AZ, CA-D, CA-R, CO, HI, MA, MT, NM, OR, UT, WA, WY
WCC-086	Postharvest technology and quarantine treatments for insect control in horticultural crops	CA-D, CA-R, FL, HI, MI
WCC-103	Soil, water and plant analysis for improved nutrient management and water quality	AK, AZ, CA-D, CO, HI, ID, MT, NM, NV, OR, UT, WA, WY
WCC-107	Adding value to western u. s. agricultural exports	CA-B, CA-D, CA-R, CO, HI, MP, MT, OR, UT, WA
WCC-109	Seafood marketing and the management of marine and aquacultural resources	AK, CA-R, HI, OR, VA, WA

HATCH MULTISTATE RESEARCH: ALLOCATED RESOURCES

Fiscal Year	Research Hatch Funds ($)	Research State Funds ($)	Research Other Fed & Non Fed Funds ($)	Research Scientist Years (SY)
2000	410,000	1,450,000	650,000	9.5
2001	410,000	1,400,000	650,000	9.0
2002	410,000	1,400,000	650,000	9.0
2003	410,000	1,400,000	650,000	9.0
2004	410,000	1,400,000	650,000	9.0

NON-HATCH (T-STAR/ADAP) MULTISTATE RESEARCH: ALLOCATED RESOURCES

Fiscal Year	Research State Funds ($)	Research T-Star/ADAP Funds ($)	Research Scientist Years (SY)
2000	350,000	950,000	3.0
2001	330,000	950,000	3.0
2002	330,000	950,000	3.0
2003	330,000	950,000	3.0
2004	330,000	950,000	3.0

Smith-Lever Multistate Extension

Multi-state extension activities are limited to participation in programs related to CSREES national program initiatives, III D targeted programs and some projects which include networking and sharing of expertise amongst extension professionals throughout the land-grant system.

During fiscal year 1998, extension faculty from Hawaii joined the Money 2000 national Cooperative Extension campaign to encourage and assist 2000 households in Hawaii to set goals to increase their levels of wealth or net worth by decreasing debt and/or increasing their savings by December 31, 2000.

Family Community Leadership and Agricultural Leadership programs continue to network and share expertise with regional and national programs to share educational materials and resources strengthening leadership skills to addressing community issues and concerns.

Hawaii's statewide Master Gardeners program involves the adaptation of curricula and guidelines from several states including Virginia, Oregon and California. Master gardeners from other states have also completed requirements for certification in Hawaii and serve as capable and effective volunteers for extension in Hawaii.

Hawaii's State Strengthening Grant is providing several opportunities for increasing collaboration with other states.

Through the Western Region Rural Development Center, Hawaii Extension is partnering with several states to establish the internet masters program developed by the University of Missouri.

To ensure on-going collaboration resulting in planned multi-state, regional programs, a system needs to be established to identify regional and multi-state program priorities and to allocate resources to support these priorities. Due to the geographic location of the state of Hawaii, increased use of distance technology for communication and regional travel funds to participate in planning meetings are required for Hawaii to participate as active partners.

VI. INTEGRATED RESEARCH AND EXTENSION ACTIVITIES

As part of the extensive re-engineering of CTAHR's organizational structure, each of six academic departments will contain an undergraduate degree program, a *research* program that has basic and applied research activities and actively addresses state needs, an *extension outreach* program that has faculty who provide support to community groups, commodity associations, and government agencies, and a contribution to international education/research. In addition, all extension faculty are affiliated with an academic department and are to be available to solve problems on a statewide basis.

The restructuring supports and strengthens CTAHR's land-grant mission requiring an outreach program that responds to community needs in a timely and useful way. County extension faculty will thus ensure practical applications and technology transfer of CTAHR's cutting edge research while working closely with stakeholders to identify emerging issues and opportunities for "new" research.

"Seamlessness" will be embedded into CTAHR's programs so that curricula and extension/research programs and projects can bring together the required faculty expertise, regardless of departmental affiliation. Integrated initiatives and high priority thrust areas will emphasize multi-department teamwork for problem solving. Efficiencies gained from concentrating limited resources to focus on high priorities are expected.

Many of the college activities listed under the goal areas integrate research and extension to achieve programmatic objectives. Examples of these include coffee, vegetables, fruits floriculture, landscape, turf, forestry, and livestock.

Because of increasing complexity, CTAHR will address agriculture and food production system, families and youth problems using a multi-disciplinary approach in designing, developing, and evaluating sustainable agricultural production systems. Integrated research and extension activities occur in all of the goal areas covered by the POW. These activities range for on-farm, cooperative field trials, to integrating resource management practices, to the introduction of new varieties developed through research, to IPM, and to adaptive research that incorporates the latest in technology into grower practices. In the family and consumer sciences

area, integrated efforts develop and incorporate the latest in research-based information into training and educational programs.

CTAHR INTEGRATED INITIATIVES

The college is also moving from what was a departmental, project-based budget system to one that emphasizes state wide integrated programmatic thrusts. CTAHR's Integrated Initiatives address emerging issues and opportunities as identified by stakeholders, the faculty and the college administration. Initiatives combine a multidisciplinary and multi-institution approaches and a high degree of cooperation and accountability to rapid problem solving. These teams assemble, college faculty, state department of agriculture scientists or other state agency officials, and end-user stakeholders to create a focussed task force to solve problems within a specified time frame. These thrusts include biotechnology; tropical fruit industry development, animal and green waste management, taro, rural community development; sustainable and environmentally sensitive production systems, leadership development and 4H.

By focusing resources on specific target areas and niches, CTAHR has increased its efficiency while improving the sustainability, competitiveness, and profitability of agriculture and the quality of life in Hawaii. In doing so, CTAHR has increased its credibility and visibility in the community as well as increased state support for research and extension activities.

CTAHR initiatives that are already underway to convey the research results pertinent to critical issues impacting agriculture, families and communities in Hawaii are as follows:

Animal Waste Management. Island ecosystems are subject to rapid environmental degradation due to a limited buffering capacity and rapid nutrient cycling. Limited landmass and relatively close proximity of livestock and dairy operations to populated areas create problems in dealing with animal wastes. This initiative combines research and extension activities to do demonstration research on uses of animal wastes as fertilizer. The project also incorporates green wastes as appropriate.

Fruit and Vegetable Education. A team of extension faculty is working with research and education to encourage consumers to increase their consumption of locally grown produce. Focus groups were conducted to help assess vegetable preferences and factors that influence vegetable intake among the target audiences. Results of the focus group interviews showed that participants knew the importance of eating fruits and vegetables; thus, educational programs will focus on "how to include more fruits and vegetables to increase the number of servings consumed."

Measuring Successes/Outcomes. This initiative focuses on outcome measurements in two CES programs, the Family Community Education (FCE) Program and the 4-H Program. The objectives of this initiative are to measure the effectiveness of training CES staff and volunteers to use outcome measures, to develop culturally sensitive measures of program effectiveness for use with Hawaii's diverse ethnic mix, to demonstrate an increase in collaboration between CES staff and stakeholders, and to apply outcome measurements developed at the state and national levels. 4-H in Hawaii has been

randomly selected to participate in a national impact assessment through the University of Arizona to provide national baseline data on 4-H programs.

Papaya Education. Until the papaya ring spot virus nearly wiped out the industry, Hawaii farmers enjoyed a market share of nearly 80% of the U.S. papaya market. The industry is being revived due to the introduction of a genetically enhanced, ring spot virus resistant papaya, UH Rainbow. As a result hundreds of acres of new papaya plantings are being installed. This initiative is transferring research–derived material through an extension program designed to meet the needs of new papaya farmers.

Taro Task Force. This initiative began as a rapid response to a critical disease problem that was impacting up to 90% of some farmers' crop. This initiative is determining to reduce the incidence of disease and to improve nutrient management and other practices for this Polynesian staple. Impacts include alteration of decades old practices that resulted in increased production and the savings of thousands of dollars through reduced fertilizer costs. Because this crop is traditionally grown in submerged conditions near waterway or streams, other efforts are aimed at minimizing the negative effects on water quality.

Tropical Fruit Industry Development. One of the niches available to Hawaii is the production of tropical fruits both for local consumption and export markets. An industry analysis is currently being completed. Further input is currently being sought from the industry prior to the adoption of new projects in this area.

VII. PLAN OF WORK CONTACTS

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