

# Strategic Plan for Transforming Agriculture and Natural Resources Education in Hawaii

## EXECUTIVE SUMMARY

To effectively meet the workforce needs of the Agriculture and Natural Resource Management employment sectors, we have developed a strategic plan that addresses workforce needs, builds upon existing programs, encourages greater participation by employers, and when implemented, will result in a more cohesive effort between educators and employers. The plan was developed with input from an advisory board that consisted of representatives from the private sector, the University of Hawaii at Manoa, the University of Hawaii at Hilo, the University of Hawaii community colleges, and the Hawaii Departments of Agriculture, Labor, and Education (K–12 public schools). Implementation of the strategic plan will transform Agriculture and Natural Resource Management education in Hawaii to meet the workforce needs related to these fields.

After performing a needs assessment; a political, economic, social, and technological environment assessment; and a strengths, weaknesses, opportunities, and threats analysis; four objectives and corresponding strategic actions were developed and categorized as short term (1–3 years), medium term (3–5 years), and long term (> 5 years). These objectives, described below, are focused around four key areas, 1) public perception, 2) partnerships, 3) student preparation, and 4) articulation.

**Objective #1: Create greater awareness and interest in the Agriculture and Natural Resource Management career fields and improve public perception and support.**

**Objective #2: Develop more effective partnerships between industry and academia. Utilize these partnerships to recruit more students into these careers and to better prepare them for these careers.**

**Objective #3: Improve the preparedness of students in Agriculture and Natural Resource Management programs.**

**Objective #4: Develop articulated academic programs for students interested in Agriculture and Natural Resource Management careers.**

The key strategic actions are provided in Section 2.

# 1. SITUATION ANALYSIS

## 1.1 Summary of Key Drivers for Development of This Plan

Agriculture is the world's largest business. Forecasters estimate a worldwide population explosion within the next decade. Education and ingenuity are essential if we are to provide enough food to feed this population while addressing the effects of climatic change and polluted water supplies and avoiding further damage to the environment. Increasing worldwide population, changes in farming practices, globalization of the economy, and the increasing demands of consumers have created daunting challenges as well as a wide range of career opportunities for the next generation of graduates that work in agriculture-related fields.

Hawaii's overall agricultural output, measured in economic value, has remained relatively constant over the past five years. While production from plantation crops (sugar and pineapple) has shrunk by 13 percent during this period, diversified agriculture production has grown by 9 percent. The State of Hawaii Department of Business Economic Development and Tourism (DBEDT) has identified diversified agriculture as one of Hawaii's key economic strengths (Quarterly Statistical and Economic Report, DBEDT, August 2004). Newly emerging value-added consumer product industries centered on the culinary arts, biotechnology, plant science, aquaculture, forestry, ornamental horticulture, and other agriculture-related fields are quickly becoming important factors in Hawaii's economic growth.

The 2002–2012 Employment Outlook for Industries and Occupations predicts increases in the number of Hawaii jobs in farming, forestry, and fishing and the life and physical sciences (Hawaii Department of Labor and Industrial Relations, 2005). Despite this significant growth, complicated resource issues that include high costs for land, water, labor, and transportation make it difficult for farmers (and investors) to succeed in Hawaii's agricultural industry. In addition, agribusinesses in Hawaii have stated that they are not able to find enough highly qualified graduates with various levels of education to meet their needs.

Agricultural science courses are offered in only a few of Hawaii's high schools. Most courses in agriculture are offered in rural schools as part of a vocational education program or as an alternative for students who are unable to pass the traditional physical science, biology, and chemistry courses. Until recently, most high school agriculture courses focused on traditional farming techniques. Only recently have teachers begun to incorporate more contemporary topics, such as native species propagation, tissue culture, conservation of natural resources, and biotechnology. Several high schools need to update their agriculture curricula.

Only three out of the seven University of Hawaii community college campuses—Hawaii Community College (HawCC), Maui Community College (MCC), and Windward Community College (WCC)—offer Agriculture- or Natural Resource Management-related degrees. A summary of the degrees and certificates related to Agriculture and Natural Resource Management fields is given in Appendix B. Although Leeward Community College (LCC), which services the area of Oahu with the greatest density of agriculture and conservation lands, offers several courses related to Agriculture and Natural Resource Management, it does not offer any degrees in these fields. HawCC and WCC are currently working with

institutions that offer more advanced degrees—the University of Hawai'i at Hilo's College of Forestry and Natural Resources Management and the University of Hawaii at Manoa's College of Tropical Agriculture and Human Resources—to prepare their students for entrance to a four-year program after completing their community-college studies. Efforts to articulate the programs of these community colleges and universities are underway, but more work needs to be done.

## **1.2 Agriculture and Natural Resource Management Education Needs Assessment**

It is apparent that Hawaii needs a larger and more skilled workforce for its Agriculture and Natural Resource Management industries, but meeting this need is complicated by the diversity of skills needed and jobs available. This diversity presents a challenge to the academic programs that are tasked with training this workforce. There are many ongoing activities that have been successful in creating greater interest and more effective instruction in science, technology, engineering and mathematics (STEM) related to Agriculture and Natural Resource Management programs, and it is the goal of this strategic plan to build upon these ongoing activities to meet this workforce need.

The plan was developed with input from an advisory board that consisted of representatives from the private sector, the University of Hawaii at Manoa, the University of Hawaii at Hilo, the University of Hawaii community colleges, and the Hawaii Departments of Agriculture, Labor, and Education (K–12 public schools). A complete list of advisory board members can be found in Appendix A.

Several areas that need improvement were identified by the board based on two Strengths, Weaknesses, Opportunities, and Threats (SWOT) analyses of Hawaii's Agriculture and Natural Resource Management education programs. Separate SWOT analyses were completed from an industry perspective and an academic perspective. The results of these analyses are given in Appendix C. The academic- and industry-focused analyses were combined and each issue prioritized as being of high, medium, or low importance. The prioritized SWOT analysis is presented in the Appendix D. The high-importance needs derived from this SWOT analysis are summarized here:

- ***Better perception of Agriculture and Natural Resource Management careers*** – Most agree that careers in agriculture are perceived largely as the plantation or processing-plant jobs of 20 years ago. The public is not familiar with the array of jobs available in the Agriculture and Natural Resource Management fields. The advisory board generally felt that if students, teachers, parents, and the community understood that many of these careers involve science, technology, and business management and offer good pay with competitive benefits, more students would be interested in pursuing these careers.
- ***Better preparation of graduates entering the workforce*** – Employers have stated that they would like the graduates who are entering the workforce to be better skilled in critical thinking, communications, business management, teamwork, problem solving, and leadership.
- ***Better articulation between high school, community college, and four-year universities*** – It is frustrating for the student who transfers from a community college to a four-year university program to discover that many of the earned credits are not transferrable. It is equally frustrating for the high-school graduate who must take

several remedial courses, which offer no college credit, to enter a desired post-secondary program. High schools, community colleges and universities that offer four-year degrees must articulate introductory courses as well as basic entry requirements to encourage more students to enter and complete Agriculture and Natural Resource Management degree programs.

- ***More sustainable and effective partnerships between industry and academia*** – Many successful projects involving industry and academia partnerships have been developed and completed, achieving impressive outcomes. However, once a project (or its funding) ends and the individuals involved in the project move on to other activities, the partnership usually ends. In these instances, much of the effort expended by the partners is lost, and any future efforts require the formation of a new partnership. It would be much more productive if initial efforts were documented and/or sustained so that subsequent efforts could build upon successful outcomes rather than recreating them.
- ***Better preparation of students entering post-secondary education programs*** – Many students entering the community colleges must take remedial Math and English courses. In many cases, the difficulty encountered in completing these courses is so discouraging that they discontinue pursuing a post-secondary degree.

### **1.3 Agriculture and Natural Resource Management Education Environment**

An assessment of Political, Economic, Skills, and Technological (PEST) environments that would affect Agriculture and Natural Resource Management education was completed. It is important to keep these issues in mind as they can profoundly affect the implementation of this strategic plan. The PEST environment might not change, therefore understanding how to work within the present environment is critical.

#### **1.3.1 Political Environment**

Traditional plantation crops that historically dominated agriculture in Hawaii have experienced a dramatic drop in revenue, and diversified agriculture has taken their place. Whereas the large companies of the past had a strong political voice, the many new diversified companies do not. As initiatives like 2050 Hawaii, and DBEDT and EDB push to diversify the economy and work towards self-sufficiency, the timing is right for further political action. Recent partnerships, such as those involved in passing Act 183, are supportive of agriculture, but additional steps are needed. Act 183 provides the standards, criteria, and processes to fulfill the intent and purpose of the Important Agriculture Lands article.

#### **1.3.2 Economic Environment**

Agriculture continues to be an important industry in Hawaii, generating \$1.9 billion to the state's annual economy and directly or indirectly providing 38,000 jobs. Hawaii-grown products have gained substantial recognition in foreign and domestic markets, and the local market has expanded in unique ways, such as the development of Hawaii Regional Cuisine that utilizes fresh island products. Trends in Hawaii's leading industry, tourism, show an increasing interest in eco-tourism, agritourism, and cultural experiences; all of which are related to Agriculture and Natural Resource Management. But Hawaii's agribusinesses struggle to find good employees. In addition to the poor public perception of careers in Agriculture and Natural Resource Management, the

overall unemployment rate in the state is low, so competition for good employees is high. Furthermore, global conditions in the post-9/11 world have made immigration of potential employees more difficult. New and innovative solutions are needed.

### **1.3.3 Social/Cultural Environment**

The public perception of agriculture-related careers appears to be outdated, narrowly viewing these careers as simply consisting of strenuous field work. The media has perpetuated this view, and negative associations with the plantation companies persist in the minds of Hawaii residents. Although the departure of these plantation companies makes the news, the rise of diversified agriculture has not. Therefore, the majority of Hawaii residents do not know that diversified agriculture is a formidable industry in Hawaii. In addition, the public has a negative perception of the impacts that agriculture companies have made on the environment.

A recent resurgence of traditional Hawaiian culture has taken place and should create greater interest in the Agriculture and Natural Resource Management fields. Historically, the Hawaiians grew many types of food crops, and created fishponds along the coasts to raise fish and other seafood. Agriculture was central to traditional Hawaiian culture.

Immigrant workers have historically provided a portion of the agriculture workforce, and this remains the case today. Education and incentive programs for these immigrant workers can facilitate their effective integration into Hawaii's workforce.

### **1.3.4 Technological (Skills) Environment**

The transformation of agriculture in Hawaii has resulted in a change in the diversity of skills needed by employers. More training is needed in new technologies related to agriculture, safety, and supervisory and middle management roles. Because there are more small businesses and fewer large companies, a broad skill set and the ability to acquire new skills as needed are more important than targeted knowledge. Problem-solving and the ability to work with members of various cultures are essential. In an exciting development, new distance education technologies provide opportunities for training immigrant workers before they arrive in Hawaii.

## 2. STRATEGY AND PURPOSE

The plan was developed with input from an advisory board that consisted of representatives from the private sector, the University of Hawaii at Manoa, the University of Hawaii at Hilo, the University of Hawaii community colleges, and the Hawaii Departments of Agriculture, Labor, and Education (K–12 public schools). A complete list of advisory board members can be found in Appendix A.

### 2.1 Vision

Hawaii's educational institutions, in collaboration with employers, will provide excellent and integrated education programs that meet existing and emerging economic and workforce needs in the Agriculture and Natural Resource Management sectors.

### 2.2 Strategic Purpose

The purpose of this strategic plan is to transform Agriculture and Natural Resource Management education programs at the high schools, community colleges, and universities in Hawaii, offering updated curricula and professional development for instructors and incorporating strong partnerships with employers to provide a larger and better-trained workforce for the Agriculture and Natural Resource Management sectors.

### 2.3 Targeted Population

Because there are a wide variety of jobs in the Agriculture and Natural Resources Management fields, students with broad interests could potentially be the targets for the Agriculture and Natural Resource Management education programs. In general, the student who is interested in science or business, and enjoys a variety of work environments (i.e. laboratory, outdoors, and office, not just the office setting) would be interested in these career fields. There are probably many more students who would be interested in these career fields if they were better informed.

### 2.4 Objectives and Key Strategies for Action

Current efforts will focus around four areas:

- Public perception
- Partnerships
- Student preparation
- Articulation

Objectives and key strategies for action related to these four areas were developed based on the needs assessment, PEST analysis and SWOT analysis. Strategies for action were developed by pairing a strength or opportunity with a weakness or threat from the SWOT analysis. These action items were then categorized as short term (1–3 years), medium term (3–5 years) or long term (> 5 years) based on 1) the priority of the strength, weakness, opportunity, or threat upon which the action item was based, and 2) an assessment of available infrastructure and capacity needed to complete the action item. The strategy combination upon which each action item was developed is given in Appendix E.

**Objective #1: Create greater awareness and interest in the Agriculture and Natural Resource Management career fields and improve public perception and support.**

Key Strategies (Short term, 1–3 years):

- Publicize successes in the agriculture industry, so that students at all grade levels (Kindergarten through doctoral studies) and members of the public recognize that agriculture is strong in Hawaii and around the nation, thus creating greater interest in careers in the Agriculture and Natural Resource Management fields.
- Publicize the variety of jobs available in the Agriculture and Natural Resource Management fields to correct student and public perceptions of agriculture-related jobs, helping them understand that many of these jobs require advanced skills, utilize new technologies, and offer a wide range of careers with potential for advancement.
- Help Agriculture and Natural Resource Management programs at the high-school and post-secondary levels to highlight the relationship between their disciplines and STEM (Science, Technology, Engineering, and Math). Science, technology, engineering and math has received substantial attention and funding recently. STEM disciplines are part of many areas of study within the Agriculture and Natural Resource management disciplines. This relationship will be publicized more widely in order to improve student perceptions of agriculture careers, create additional career opportunities, and expand opportunities for funding.
- Publicize the steady, long-term economic contribution of Hawaii's agriculture industry, including diversified agriculture, both to help the public understand that Agriculture and Natural Resource Management careers can offer stability, solid income, and opportunities for advancement and to garner support from legislators, the Farm Bureau, and the public. Build upon and publicize Hawaii's unique climate and culture and their relationship to the agriculture industry. Publicize the importance of agriculture for economic sustainability and food security.

Key Strategies (Medium term, 3–5 years)

- Publicize workforce development efforts to garner legislative and public support.

**Objective #2: Develop more effective partnerships between industry and academia. Utilize these partnerships to recruit more students into these careers and to better prepare them for these careers.**

Key Strategies (Short term, 1–3 years)

- Develop and sustain strong partnerships between educators and employers to update curricula, provide professional development, and increase the number of workforce-ready graduates in the Agricultural and Natural Resource Management fields.
- Help community colleges establish necessary infrastructure so that they can assume the primary role in establishing better coordination between industry and

academia. Develop a mechanism through which partners in this strategic effort can effectively communicate and work together.

- Coordinate UH programs with Hawaii Department of Education Natural Resources Career Pathway efforts.
- Broaden the use of Farm Bureau's efforts/resources to coordinate internships and develop a sustainable infrastructure for better coordination between employers and educators.

#### Key Strategies (Medium term, 3–5 years)

- Broaden industry's focus on student preparation to include more holistic student development that defines career paths for students and lays the groundwork for future career success rather than just preparing them for immediate employment needs.
- Identify opportunities for partnering between industry and specific DOE school programs, teachers, and principals, especially in rural areas where external funding can be used to help direct students into community colleges and the local workforce.
- Use technology (i.e., innovative delivery modes) to bring industry representatives into the classroom.
- Publicize and build upon previous programs that were successful, to develop additional partnerships.

#### Key Strategies (Long term, > 5 years)

- Develop partnerships with both small and large companies and agencies that might generate political capital and bring about needed change in agriculture education and the political landscape.
- Build upon and strengthen the partnership between industry and the Hawaii DOE Career Pathways Program.

### **Objective #3: Improve the preparedness of students in Agriculture and Natural Resource Management programs.**

#### Key Strategies (Short term, 1–3 years)

- Develop and sustain partnerships among high schools, community colleges, and four-year universities to improve student preparation and articulation between the various institutions.
- Assist community colleges, which have the ability to adjust their programs more quickly, to address lack of student preparation.

#### Key Strategies (Medium term, 3–5 years)

- Identify opportunities to work with landowners, agriculture businesses, and agencies as potential funding sources or partners to support remedial education needs and Agriculture and Natural Resource Management career pathways.

**Objective #4: Develop articulated academic programs for students interested in Agriculture and Natural Resource Management careers.**

Key Strategies (Short term, 1–3 years)

- Use technology more widely and effectively to overcome geographic isolation of programs and to efficiently utilize resources such as faculty expertise.
- Focus on building upon and articulating existing programs (including those currently offered by industry, e.g., professional certificates) to create a flexible workforce development pathway. At various points along the pathway, students could either choose to continue on to higher levels of education or exit into the workforce. This flexibility would attract more students and would require stronger partnerships between community colleges, four-year universities, and employers.
- Explore the diversity of careers in Agriculture and Natural Resource Management to reach students with varying needs, abilities, and interests. Programs can be developed and/or adjusted to address career ladders rather than just entry-level employment.

Key Strategies (Medium term, 3–5 years)

- Make adjustments to existing programs to better articulate Agriculture and Natural Resource Management career pathways both horizontally and vertically, rather than creating new programs in isolation.

### 3. IMPLEMENTATION STRATEGY

The success of these actions will depend on the following:

- Willing collaboration among partners working toward a shared mission and vision.
- Obtaining the needed resources
- Flexibility and the ability to change direction if needs change

To pursue these strategic actions, the following resources and partnerships are needed.

#### 3.1 Partners

- University of Hawaii at Manoa, College of Tropical Agriculture and Human Resources (CTAHR)
- Leeward Community College (LCC)
- Pioneer Hi-Bred International, Inc.
- Windward Community College (WCC)
- Hawaii Department of Education – Natural Resources Career Pathways (DOE)
- Hawaii Department of Agriculture (HDOA)
- Hawaii Agriculture Research Center (HARC)
- Department of Labor and Industrial Relations – Workforce Development Council (DLIR-WDC)
- University of Hawaii at Hilo, College of Agriculture, Forestry, and Natural Resources Management (CAFNRM)
- Alluvion, Inc.
- Other important partners: industry professional organizations, state and county Farm Bureaus, additional companies, and other community colleges.

One of the first tasks to be completed in the implementation phase will be closely related to the second component of the second short-term strategic action listed under objective #2, namely, develop a mechanism through which partners in this effort can effectively communicate and work together, in order to achieve the vision and objectives stated in this strategic plan.

#### 3.2 Resources

##### 3.2.1 *Functional Positions*

- Academic/industry liason and internship coordinator or staff
- Instructors (including experts from industry)

##### 3.2.2 *Funding*

- Functional Positions, including stipends and/or salary for guest instructors

- Faculty time to develop new curriculum
- Equipment, Materials, and Supplies
- Subcontractors for marketing and assessment

### 3.3 Participation

In order to have an impact on workforce development it is critical that all partners participate in carrying out the key strategic actions identified above. The following partners were identified as having the best capability for reaching each objective. The advisory board also brainstormed about what kinds of activities could be carried out in order to reach these objectives. These are summarized below.

Objective #1: Create greater awareness and interest in the Agriculture and Natural Resource management career fields and improve public perception and support.
HDOA, Farm Bureaus, CTAHR, CAFNRM

Such activities might include regular articles and columns in the newspapers, features and commercials on public and network television, podcasts, job shadowing, and more contact with K–12 teachers and the DOE’s Explorations program.

Objective #2: Develop more sustainable partnerships between industry and academia. Utilize these partnerships to recruit more students into these careers and to better prepare them for these careers.
University of Hawaii community colleges (CCs), CTAHR, CAFNRM, DOE, academic advisory boards and/or focus groups, industry professional organizations.

Organizations that might be interested in these activities include professional organizations such as Landscape Industry Council of Hawaii, Hawaii Crop Improvement Association, Hawaii Flower Industry Association, Honolulu Orchid Society, Hawaii Orchid Growers Association, Hawaii Organic Farmers Association, and many others.

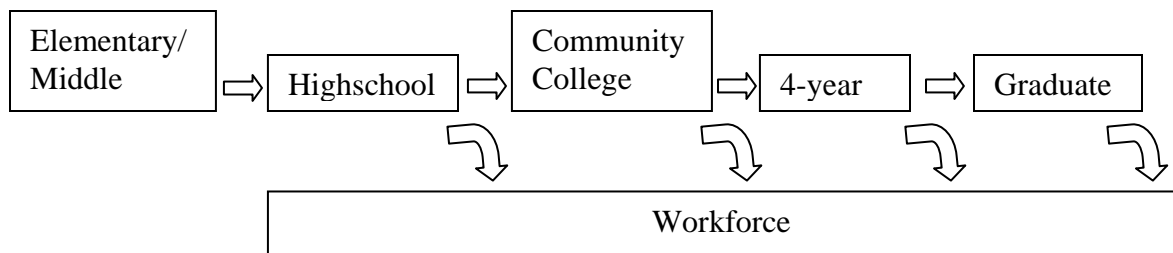
Objective #3: Improve the preparedness of students in Agriculture and Natural Resource Management programs.
CCs, CTAHR, CAFNRM, DOE, academic advisory boards and/or focus groups, industry professional organizations.

It was suggested that these partners become more involved in initiatives such as the P-20 and Title 3 initiatives, as well as the DOE’s Natural Resources Career Pathway advisory board, in order to address student preparation.

Objective #4: Develop articulated academic programs for students interested in Agriculture and Natural Resource Management careers.
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CCs, CTAHR, CAFNRM, DOE, academic advisory boards and/or focus groups, industry professional organizations.

A model is proposed in which each of the articulated academic programs would naturally flow into the next one but would also include natural exit points from which students could easily enter the workforce. With this model, the articulated programs create a flexible pipeline through which students can enter academic programs or the workforce at all levels.



Additional involvement from employer partners is needed to:

- provide internship positions and mentors
- participate in updating curricula and programs as well as providing instruction, when appropriate and applicable
- provide jobs upon completion of updated programs
- support activities, when possible, with funding

### 3.4 Alignment with other Agriculture and Natural Resource Management Education Initiatives

Significant and closely related initiatives are currently being pursued by the Hawaii Department of Education and several institutions within the University of Hawaii system and are listed below. In order to maximize resources, every effort will be made to align the implementation of this plan with the activities related to these initiatives.

- Natural Resources Career Pathways – one of six career pathways within the Hawai'i Career Pathway System. The programs of study begin at the secondary level where core and/or cluster courses are offered and will be aligned with postsecondary courses to adequately prepare students for success in these career pathways. The two agencies tasked with this initiative are Hawaii Department of Education and University of Hawaii community colleges.
- Agribusiness Education, Training, and Incubation (AETI) project and consortium – The AETI program seeks to serve both new and existing agriculture businesses in Hawaii, with an emphasis on Native Hawaiian-owned businesses, in an effort to build Hawaii's diversified agricultural market. Supported by a grant that involves a nine-campus consortium, AETI also supports training and education. The consortium's goals focus on education and workforce development, business and community economic development assistance, and market and capacity building.
- Hawaii Future Farmers of America (FFA) – FFA is dedicated to making a positive difference in the lives of students by developing their potential for leadership, personal

growth, and career success through agricultural education. Although participation in the Hawaii chapter has decreased in recent years, new legislative funding and leadership hold promise for changes in the near future.

## APPENDICES

### A. Advisory Board Members

- College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa
  - Charles Kinoshita, Associate Dean of Academic and Student Affairs
  - Traci Sylva, Faculty, Coordinator
- Leeward Community College
  - Priscilla Millen, Faculty
  - Kabi Neupane, Faculty
  - Michael Pecsok, Vice Chancellor for Academic Affairs
- Pioneer Hi-Bred International, Inc.
  - Cindy Goldstein, Business and Community Outreach Manager
- College of Agriculture, Forestry, and Natural Resources Management, University of Hawaii at Hilo
  - William Steiner, Dean
  - William Sakai, Faculty
- Windward Community College
  - Inge White, Faculty
- Hawaii Board of Agriculture
  - Sandra Kunimoto, Chairperson
- Hawaii Agriculture Research Center
  - Stephanie Whalen, President and Director
- Hawaii Department of Agriculture
  - Melvin Jadulang, Education Specialist
- Hawaii Department of Labor, Workforce Development Council
  - Ann Yamamoto, Executive Director
- Alluvion, Inc.
  - Susan Matsushima, President

## B. Inventory of Agricultural Education and Natural Resources Programs in Hawai'i

MAJOR	<a href="#">UHM</a>	<a href="#">UHH</a>	<a href="#">UHWO</a>	<a href="#">HAW CC</a>	<a href="#">HCC</a>	<a href="#">KCC</a>	<a href="#">KAU CC</a>	<a href="#">LCC</a>	<a href="#">MCC</a>	<a href="#">WCC</a>
Agribusiness		B								
Agribusiness Management	C									
Agricultural & Resource Economics	M, D									
Agricultural Technology				C, A					C, A	
Agriculture	B	B								
Agroecology & Environmental Quality		B								
Agroforestry				C, A						
Agronomy & Soil Science	M, D									
Animal Science	B, M	B								
Sustainable Livestock Production		B								
Pre-Veterinary Medicine		B								
Aquaculture		B								
Bioengineering	B, M									
Civil & Environmental Engineering	M, D									
Crop Protection		B								
Ecology, Evolution, & Conservation Biology	M, D									
Environmental Studies	C, B	C		C						
Food Science & Human Nutrition	B, M									
Food Science	M									
Nutritional Science	M									
Dietetics	B									
Food Service				C, A		C, A	C, A	C, A	C, A	
Global Environmental Science	B									
Landscaping										CC
Molecular Biosciences & Bioengineering	M, D									
Natural Resources & Environmental Management	B, M, D									
Resource Development & Policy	B									
Resource & Environmental Economics	M, D									
Resource Management)	Grad C									
Resource Management & Conservation	B, M, D									
Plant & Environmental Biotechnology	B									
General Biotechnology	B									

<b>MAJOR</b>	<u><a href="#">UHM</a></u>	<u><a href="#">UHH</a></u>	<u><a href="#">UHWO</a></u>	<u><a href="#">HAW CC</a></u>	<u><a href="#">HCC</a></u>	<u><a href="#">KCC</a></u>	<u><a href="#">KAU CC</a></u>	<u><a href="#">LCC</a></u>	<u><a href="#">MCC</a></u>	<u><a href="#">WCC</a></u>
Plant Biotechnology	B									ASC
Insect and Pathogen Biotechnology	B									
Environmental & Microbial Technology	B									
Aquaculture & Bioreactor Biotechnology	B									
Plant & Environmental Protection Sciences	B									
Entomology	M, D									
Tropical Plant Pathology	M, D									
Plant Tissue Culture		C								
Tropical Horticulture		B								
Tropical Plant & Soil Sciences	B, M, D									
Plant Sciences & Genetics	B									
Plant Production & Management (Horticulture)	B, minor									
Environmental Soil Sciences	B									
Horticulture	M, D									
Plant Science	M, D									
Soil Science	M, D									

B = Bachelor's degree

D = Doctorate

C = Certificate

UHM=University of Hawaii at Manoa

UHWO=University of Hawaii West Oahu

HCC=Honolulu Community College

KauCC=Kauai Community College

MCC=Maui Community College

M = Master's degree

A = AssociatesAssociate degree

ASC = Academic Subject Certificate

UHH=University of Hawaii at Hilo

HawCC=Hawaii Community College

KCC=Kapiolani Community College

LCC=Leeward Community College

WCC=Windward Community College

### C. Full SWOT analysis for Transforming Agricultural and Natural Resources Management education (Academic Perspective)

<b>Strengths (internal)</b>	<b>Weaknesses (internal)</b>
<p>-Existing programs on all islands Oahu: UH Manoa – CTAHR, LCC – biotech and ethnobotany, WCC – landscaping and bio-resources technology, HCC - aquaculture UH Hilo – CAFNRM, Haw CC – agriculture technology and agro-forestry Kauai CC - agribusiness and Maui CC – agriculture technology -Comm. Colleges are able to adjust to quickly to meet workforce needs -Currently, there are a number of partnerships that support transformation of agriculture education such as the Agribusiness, Education, and Incubator Training consortium.</p>	<p>-Funding reliance, for past efforts, has been on state grants and therefore programs tend to die when the funding source runs out. -Coursework in agriculture education is not well articulated across the UH educational continuum. -Post-high students are not being taught the core set of skills that are desirable to industry, such as business and marketing, management, and leadership. -Innovative delivery modes (e.g., distance learning) are under-utilized. -Course work does not include enough practical application to real world examples. Deficit in quantity and topics of agriculture in adult education programs. -Inadequate coordination between industry and education for internship programs, e.g. no central contact and straightforward procedures for advertising and recruiting students. - “Insufficient numbers of interested students to sustain agriculture education programs at UH, which “live” on head counts.</p>
<b>Opportunities (external)</b>	<b>Threats (external)</b>
<p>-Several sources of funding available, e.g., Dept of Labor and legislative support.(but a plan for sustainability beyond these funding sources is important) -There are instances of successful industry/education partnerships that support the transformation of agriculture education and could serve as models for a comprehensive, larger efforts, such as:     -DOE Natural Resources Career Pathway     -FFA     -Hawaii Agriculture Education curriculum project -There is a need for workers at all levels for existing Ag industry as well as for future Ag-related industries, e.g., bio-energy, food safety. -A new DOE point of contact has been retained by the state for the development of Hawai'i agriculture education programs in public schools – this person will be partnering with current strategic planning efforts.</p>	<p>-Geographic isolation between programs and students on different islands. -For the Leeward coast, the current population has 1/3 the education level as compared to the rest of the island. -Employers require a diverse set of skills and the Comm. Colleges may not be able or find it practical to develop those diverse skills. -The perception of UH is that they are not responsive enough to industry needs. -Agriculture careers are viewed as lacking prestige, as dead-end, and are not science-related. -Students, coming from DOE schools, are poorly prepared in the core areas of reading and math for post-high work. -High school Ag programs are “dumping grounds” for low-level students in the DOE. -DOE, in prior Ag. Ed. efforts, has been resistant to collaboration. -Potential future opportunities in Ag. Industries are not identified as growing areas by the Dept of Labor.</p>

### Full SWOT analysis for Transforming Agricultural and Natural Resources Management education (Industry Perspective)

<b>Strengths (internal)</b>	<b>Weaknesses (internal)</b>
<ul style="list-style-type: none"> <li>-Diversified Ag has replaced pineapple and sugar and is a strong force.</li> <li>-There have been some small, focused programs between industry and agriculture education programs that have had successful outcomes.</li> <li>-Industry is willing to partner/participate in intern programs, as long as there is good structure, and directly leads to the development of a trained workforce.</li> <li>-Industry is willing to provide access to industry sites for education and training purposes.</li> <li>-There are a good variety of jobs and opportunities that exist within agriculture and natural resources industry.</li> <li>-Significant internal expertise/resources among Hawai'i's agriculture and natural resources industry.</li> </ul>	<ul style="list-style-type: none"> <li>-Currently, numbers of programs between Ag. Industry and education that exist are very small.</li> <li>-Ag industry, as a political force, is small and unconnected - lacks coordination and presence needed to effectuate change in political arenas and properly represent agriculture education related interests.</li> <li>-Ag. Industry is insufficiently staffed to exclusively coordinate internships or recruit from the education sector – strong reliance on the volunteer model for the development of partnered programs.</li> <li>-Industry may have a narrow focus for partnerships – confined to “what will we get out of this immediately”?</li> <li>-Need to recognize that professional development of students and human capital is important for long term career development.</li> <li>-Although there is job variety and opportunities within agriculture and natural resources, these jobs do not receive the media press they need.</li> <li>-Geographic limitations/isolation of some industries makes educational partnerships difficult.</li> </ul>
<b>Opportunities (external)</b>	<b>Threats (external)</b>
<ul style="list-style-type: none"> <li>-Legislative initiatives for Ag. Lands are strongly embraced by people.</li> <li>-Currently, there are efforts within the Farm Bureau to organize a shared voice among Ag &amp; Nat. Resource management employers.</li> <li>-Many partnership possibilities with Ag industry organizations that support the transformation of education exist:                         <ul style="list-style-type: none"> <li>-DOE Natural Resources Career Pathway</li> <li>-Ag in the classroom/Speakers Bureau</li> <li>-Biotech in the classroom</li> <li>-Career Kokua</li> </ul> </li> <li>-Potentially advantageous for large landowners (KS, Campbell) to support educational activities as they have available lands for lease that could improve their land assets.</li> <li>-Bio-energy has become a “hot need” for Hawai'i and the nation.</li> <li>-Technology (e.g. distance ed) has opened opportunities to educate the workforce and overcome geographic limitations.</li> <li>-Some positive media attention exists for Ag. – It is just not at the forefront.</li> <li>-There is potential to unify Diversified Ag. around common issues such as land, water, workforce, and education.</li> </ul>	<ul style="list-style-type: none"> <li>-Perception of agriculture careers as dead end jobs that require hard labor and long hours.</li> <li>-Negative perception of employers - Pineapple and Sugar industries, as the primary Ag. employers in Hawai'i over the last century, were seen as the “bad guys”.</li> <li>-Current low unemployment rate means workers can be choosy about the jobs they take.</li> <li>-Affordable housing is needed and unavailable for service like trades in Ag. Industry.</li> <li>-Opportunities for industry to reach out. into DOE to change perceptions and build student interest early may be unavailable due to resistance from DOE.</li> <li>-Successes depend on strong relationships between Education and Industry; feedback suggests that levels of trust are low.</li> <li>-Politically, Ag. Legislation that could benefit the partnership between Education and Industry, takes a long time to pass.</li> <li>-Currently, Ag related jobs are not listed as one of the “hot jobs” or fastest growing labor force opportunities.</li> </ul>

### D. Analysis and prioritization of Strengths, Weaknesses, Opportunities, and Threats.

	<b>Strengths</b>	<b>Opportunities</b>
High	Strong diversified Ag is important in determining a range of educational skills needed for the wide variety of jobs	Many potential partnership possibilities between Ag Industry, DOE, Organizations
	Industry is willing to partner/participate through the facilitation of internships, providing expertise, etc. as long as there is a good infrastructure that supports this partnership	Positive media will create greater interest by students in Ag and Nat Resources
	Community Colleges are able to adjust (quicker) to changing needs	There is public support and legislative support for Ag Lands initiatives
	Good Ag jobs and good variety of ag jobs needs to be portrayed in the media for bolstering the image of Ag which is not very positive	Newly hired DOE contact for ag and natural resources
	There currently exists multiple agriculture and natural resource management education programs on all major islands (UHM, UHH, LCC, WCC, HawCC, KauCC, MCC, HCC)	Opportunity to identify as a STEM program which is receiving much attention and funding.
		Need for workers at all levels for existing ag industry and future ag-related industries, e.g. bioenergy, food safety
Medium	Diversified Ag is a growing force	Farm bureau's efforts to organize shared voice among ag and nat. resource mgmt employers
		Innovative delivery modes/Technology (Distance Ed) is important to meet education needs and is more commonly used to overcome geographic isolation
Low	Significant internal expertise is not as high priority for workforce development	External sources of funding not critical because too transient
	Past small and focused programs between industry and ed programs have been somewhat successful in providing interesting curricula in the schools	Potential advantages for large landowners to support ag ed initiatives but they aren't necessarily interested
	Number of existing partnerships don't matter if they aren't effective and sustainable	

	<b>Weaknesses</b>	<b>Threats</b>
High	Articulation from high school to Higher Ed & from 2 year to 4 year programs is critical but minimal or lacking	Ag Ed careers viewed as dead end
	Better coordination between industry and academia is needed.	High School programs perceived as dumping grounds
		Overall perception of Ag Industry and courses of study is negative
		Lack of student preparation - remediation is often needed.
		Lower education levels in the rural areas
		Opportunities for industry to reach down to DOE to create a pipeline of well trained employees, but resistance and confusion is often encountered
Medium	Internship coordination with a sustainable infrastructure is lacking	Low unemployment
	Narrow focus of industry on partnerships. Need to broaden focus and recognize that professional development of students is important for long term.	Diverse skills needed by employers
		Perception of UH as unresponsive to short-term needs
	Past small and focused programs between industry and ed programs, even though successful, have not had a significant impact on workforce development	Potential future career opportunities in Ag are not identified as growing areas by the Dept. of Labor.
Low	Head counts will increase if other successes for Ag are realized	Negative perception of employers (pineapple and sugar industries)
	Reliance on grants and temporary funding, thus program dies when funding ends. If infrastructure exists, additional funding can be pursued	Lack of affordable housing - true for all industries in Hawaii
	Ag industry, as a political force, is small and unconnected therefore unable to effectuate change. But there still exists strong support in the legislature	Ag legislation takes a long time or doesn't happen
	Innovative delivery modes underutilized	
	Geographic isolation	
	Post-high students are not being taught the core set of skills that are desirable to industry (i.e. business and marketing, management and leadership)	

## E. High-level action items and strategy combinations

### Short term (1–3 years)

Action Item	Strategy combination
Successes in the agriculture industry will be better publicized to create greater interest in Agriculture and Natural Resource management	Weakness/Opportunity
Strong partnerships between educators and employers will be developed and sustained in order to develop updated curricula, professional development, and workforce-ready graduates in the Agricultural and Natural Resource Management fields.	Strength/Opportunity
Partnerships between high schools, community colleges and 4-year universities will be developed and sustained to address the lack of student preparation and articulation between the various institutions.	Weakness/Opportunity
The variety of jobs available will be better publicized in order to increase public perception and public support, and correct the perception of students and public that ag-related jobs don't require a high level of academic rigor and preparation	Strength/Threat
Agriculture and Natural Resource Management programs will identify w/ STEM (Science, Technology, Engineering and Math) programs at high school and post-secondary levels, in order to change the face of agriculture careers; change the perception of dead-end jobs; possibly create additional career opportunities; and pursue additional funding.	Opportunity/Weakness or Threat
Community colleges will become the conduit for better coordination between industry and academia	Strength/Weakness
Diversity of careers will be explored to reach students with varying needs, abilities and interests. Programs can be developed to address career ladders.	Strength/Weakness
Build upon existing programs in order to increase head counts and create more partnerships	Strength/Weakness
Technology will be used to overcome geographic isolation and more efficiently utilize resources.	Opportunity/Weakness or Threat
Broaden use of Farm Bureau's efforts/resources to coordinate internships & sustainable infrastructure for better coordination between employers and educators	Opportunity/Weakness or Threat
Publicize the economic contribution of the growing diversified ag industry to overcome perception that ag ed careers are dead end and to garner support from legislators, the Farm Bureau and the public.	Strength/Threat or Opportunity
Community colleges, with their ability to adjust quicker will be tasked to address lack of student preparation	Strength/Threat
UH programs will collaborate with Hawaii Department of Education Natural Resources Career Pathway efforts.	Strength/Opportunity

**Medium term (3–5 years)**

<b>Action Item</b>	<b>Strategy combination</b>
Use existing programs to better articulate, both horizontally and vertically, ag ed pathways, instead of creating programs in isolation.	Strength/Weakness
Publicize workforce development efforts in order to increase political clout of ag industry and garner legislative support.	Strength/Weakness
Assess opportunities to work with large landowners, as potential funding sources or partners, to support remedial issues and ag ed pathways.	Opportunity/Weakness or Threat
Identify opportunities for partnering between industry and specific DOE school programs, their teachers and principals, especially from rural areas, in order to help feed students into community colleges and the workforce.	Strength/Threat
Use technology (innovative delivery modes) to partner with and to bring industry into the classroom.	Strength/Opportunity
Use small focused successful programs from the past to develop further potential partnership possibilities	Strength/Opportunity

**Long term (> 5 years)**

<b>Action Item</b>	<b>Strategy combination</b>
Use existing successful partnerships to broaden industry's focus on student preparation to include more holistic student development that defines career paths for students and sets them in motion rather than just preparing them for immediate employment needs.	Opportunity/Weakness or Threat
Explore partnerships with large landowners who might provide political force and bring about needed change in ag ed and political landscape	Opportunity/Weakness or Threat
Explore partnership between industry DOE system as a whole.	Strength/Threat