



**HAWAI'I
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POLICY**

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Kuleana AgTech Pathways Program

AgTech as Civic Infrastructure: Building Hawai'i's Education-to-Workforce Pipeline for Food System Resilience

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The Food+ Policy internship develops student advocates who learn work skills while increasing civic engagement to become emerging leaders. We focus on good food systems policy because we see the importance and potential of the food system in combating climate change and increasing the health, equity, and resiliency of Hawai'i communities.

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I. Executive Summary

Hawai'i's agricultural future depends on whether the state can cultivate a new generation of place-based stewards equipped with modern technical competencies. The state's producers are aging, farms have declined in number, and entry barriers remain high for young and beginning farmers.¹ At the same time, Hawai'i continues to rely heavily on imported food, creating structural vulnerability during supply-chain disruptions and disasters.²

Agriculture today is not solely a production activity; it is increasingly a data-driven, systems-based field. Water management, wildfire risk, soil health, pest response, market logistics, and land-use planning are all spatial and analytical problems. Geospatial literacy, coding, remote sensing, and data automation are no longer peripheral, rather they are core infrastructure competencies.

The 2023 Lahaina wildfires demonstrated that geospatial capacity is civic infrastructure. Hawai'i-based institutions mobilized geospatial specialists and impact modeling tools to support disaster response and recovery.³ Federal partners documented the operational role of GIS systems in tracking missions and coordinating field activity.⁴ Even NASA produced disaster mapping products to support response operations.⁵ These events illustrate that the same technical skills used to map irrigation systems or model soil health are also used to assess damage, coordinate emergency operations, and restore infrastructure after disaster.

Senate Bill 2320 (SB2320) proposes the Kuleana AgTech Pathways Pilot Program (KAPP), a statewide initiative designed to create structured education-to-workforce pipelines in agriculture and agricultural technology.⁶ KAPP would align Hawai'i Department of Education (HIDOE) programs with University of Hawai'i (UH) pathways, establish county-based hubs, and explicitly train students in geospatial sciences, drone operations, climate-smart agriculture, and data systems.⁶

Framed properly, KAPP is both an agricultural workforce initiative and a civic infrastructure investment. By embedding transferable technical skills within place-based agricultural education, the state can simultaneously strengthen food security, expand high-skill career pathways for youth, and build in-state resilience capacity.

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II. Agriculture as Civic Infrastructure: A Systems Framing

a. Workforce Instability and Succession Risk

Public reporting based on federal census data shows Hawai'i's agricultural sector has experienced measurable contraction, with a decline in farms between 2017 and 2022.¹ Analysis has also highlighted Hawai'i's unusually old farmer demographics relative to other states, underscoring succession risk.⁷

National policy research confirms that beginning farmers face persistent structural barriers, particularly land access and capital constraints.⁸ In high-cost regions such as Hawai'i, these barriers are amplified.

Without a pipeline that connects youth to agriculture through modern, economically viable skillsets, workforce renewal becomes increasingly unlikely.

b. Food System Vulnerability and Import Dependence

State planning documents acknowledge Hawai'i's heavy reliance on imported food and the risks this creates during shipping interruptions or natural disasters.² This reliance is not simply an economic concern; it is a resilience issue. A food system that lacks local production capacity and skilled labor redundancy becomes fragile when transportation or infrastructure is disrupted.

Strengthening local agriculture therefore requires strengthening the technical capacity of the workforce that supports it.

c. The Lahaina Wildfires and the Transferability of Geospatial Skills

The Lahaina wildfires in 2023 illustrate the transferability and urgency of geospatial competencies. The Pacific Disaster Center described deploying geospatial analytics, impact estimation tools, and decision-support products during response and recovery.³ The U.S. Army Corps of Engineers documented the use of GIS systems to support wildfire response coordination and operational tracking.⁴ NASA's disaster activation for the Hawai'i wildfires included the production of damage proxy maps and geospatial assessments to assist responders.⁵

These functions, damage assessment, parcel mapping, infrastructure layers, and spatial analytics, are built on the same foundational competencies required for modern agriculture:

- mapping irrigation networks
- modeling drought exposure
- monitoring crop performance via remote sensing
- identifying wildfire risk buffers
- optimizing farm logistics

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The response during the Lahaina wildfires tragedy demonstrates that geospatial literacy is not niche technical knowledge. It is civic infrastructure and emergency response. Training these skills locally increases Hawai'i's in-state capacity for both agricultural productivity and emergency response.

d. The Pipeline Gap in Hawai'i's Education System

Available adoption data from Hawai'i Academies (a network of HIDOE member high schools organized around career pathways) shows uneven implementation of Agriculture, Food, and Natural Resources (AFNR) programs across the state. Within Hawai'i Academies member schools:

- **Animal Systems / Food Systems:** 2 schools
- **Natural Resources Business:** 1 school
- **Natural Resources Management:** 11 schools⁹

This distribution demonstrates partial reach across islands but limited scale and uneven subarea adoption.⁹ It does not guarantee consistent statewide access to modern agricultural technology training. Moreover, pathway offerings vary by school capacity, facilities, and staffing constraints.¹⁰

KAPP directly addresses this gap by proposing:

- regional hubs in each county
- educator and coordinator support
- structured internships and apprenticeships
- dual-credit pathways aligned with UH
- explicit AgTech competencies including GIS and drone operations⁶

By formalizing a statewide structure, SB2320 moves beyond isolating agriculture education within individual school capacity and instead builds a coordinated pipeline.

e. Why KAPP: Agriculture Today Is Also a Data-and-Systems Job

Modern agriculture is increasingly shaped by information flows: water management, irrigation efficiency, pest outbreaks, supply logistics, wildfire risk, drought patterns, and soil performance are all spatial problems. KAPP is designed to treat agriculture as a high-skill workforce sector, not only field labor, by building competence in:

- **Geospatial sciences (GIS)** for mapping, monitoring, and decision support
- **Spatial analysis** for site suitability, risk modeling, and resource allocation
- **Data automation** using **Python and SQL** for reporting, dashboards, and data cleaning
- **Web technology** for public-facing tools and stakeholder coordination
- **Remote sensing / drones / sensors** for crop monitoring and climate-smart operations
- **Systems thinking** so students understand the relationships between land, water, labor, markets, and community wellbeing

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This aligns with Hawai'i's broader CTE strategy emphasizing “high-skill, high-wage, in-demand” pathways and stronger cross-sector partnerships.⁸

II. SB2320 as an AgTech + Civic Infrastructure Investment

SB2320 establishes the Kuleana AgTech Pathways Program within the University of Hawai'i system and requires collaboration with HIDOE, the Department of Agriculture and Biosecurity, the Agribusiness Development Corporation, DLIR, and appropriate community organizations.⁶ Program elements include:

- expansion of agricultural science and technology into CTE and UH pathways
- educator and coordinator support
- internships and apprenticeships
- dual credit opportunities
- training in climate-smart farming, GIS, and drone operations
- regional hubs in each county
- tiered certification systems⁶

The bill's architecture recognizes that agriculture workforce development must be integrated across agencies and institutions to be durable.

Framing KAPP as AgTech + Civic Infrastructure clarifies its value proposition:

- It strengthens farm viability through modern technical skills.
- It expands high-skill, transferable career pathways for Hawai'i youth.
- It builds in-state geospatial and data capacity relevant to disaster response and public planning.
- It reinforces food security by increasing local production-support competence.

III. Comparative Models: Statewide Ag-Education and AgTech Pathway Programs (Case Studies)

SB2320 explicitly references successful pathway models outside Hawai'i, including Connecticut's regional agricultural science centers and California's emerging AgTech hub approach. This section synthesizes comparable programs and extracts design features that are most relevant to Hawai'i's geographic realities (island counties, high logistics costs, and uneven access to specialized instruction).

a. Connecticut: Regional Agricultural Science & Technology Education (ASTE) Centers

Connecticut operates a statewide system of regional Agricultural Science and Technology Education (ASTE) centers embedded within high schools and designated by the State Board of Education. These centers provide students with career-connected training across multiple agriculture domains (e.g., plant science, agribusiness, agricultural mechanics, aquaculture, biotechnology, food science, natural resources), with offerings varying by center.¹¹

A defining feature of Connecticut's model is its formal requirement for supervised work-based learning in agriculture. State regulations require vocational agriculture students to have a “planned, supervised, occupational-experience program in agriculture” in addition to regular class activities.¹² Operationally,

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ASTE centers implement this requirement through a structured Supervised Agricultural Experience (SAE) system, including placement expectations and mentorship at worksites.¹³ This design ensures that “pathways” are not merely curricular but anchored in real labor market contexts, with relationships between schools and employers built into the model.

Relevance to Hawai‘i (design implications for KAPP):

- A statewide pathway gains durability when it includes formal work-based learning requirements and a clear implementation mechanism (e.g., SAE-like placements, farm mentors, defined roles and expectations).^{12 13}
- Connecticut’s “regional center” approach provides a blueprint for Hawai‘i’s county-aligned hubs, especially where not every school can offer the same specialized facilities and instruction.¹¹

b. California: AgTech Network/Alliance Model for Innovation + Workforce Development

California’s current approach is less a single K-12 program and more a statewide innovation-to-workforce ecosystem model. University of California Agriculture and Natural Resources (UC ANR) reports receiving \$15.1 million to administer a statewide effort that aligns research, industry, and community partners across nine regions, with the explicit goal of accelerating innovation, strengthening workforce development, and ensuring equitable diffusion of benefits across California agriculture.^{14 15}

The California AgTech Alliance model is notable for treating workforce development as part of an integrated innovation system. Its workforce activities emphasize training pathways that combine digital literacy, technical training, and hands-on learning, and highlight programs such as the Farm Robotics Challenge and related youth-facing initiatives.^{16 17}

Relevance to Hawai‘i (design implications for KAPP):

- Hawai‘i can adapt the underlying logic of California’s model (regional coordination + cross-sector partnerships) without copying the scale.^{14 15}
- California’s approach reinforces that workforce pathways are strongest when tied to a broader platform (universities, industry, growers, community partners) that sustains curriculum relevance and creates real placement opportunities.¹⁶
- For KAPP, this supports SB2320’s emphasis on UH–HIDOE–agency collaboration and regional hubs designed around county needs.

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c. Florida: Precision Agriculture as a Defined CTE Program with Work-Based Learning Standards

Florida's Department of Education publishes a formal Precision Agriculture Technology program framework within its Career and Technical Education system.¹⁸ While Florida's program does not replicate Connecticut's regional-center structure, it illustrates how a state can formally define agricultural technology as a recognized pathway with standardized instructional components.

Florida also publishes statewide Work-Based Learning Standards and guidance that set minimum expectations for eligibility, employer obligations, and institutional requirements for work-based learning opportunities.^{19 20}

This is important for pathway integrity: a program can incorporate workplace learning while protecting student welfare, ensuring educational alignment, and clarifying responsibilities for schools and employers.

Relevance to Hawai'i (design implications for KAPP):

- Hawai'i can strengthen KAPP by developing statewide standards for AgTech-aligned work-based learning—especially if students are placed on farms or in applied technical roles.^{19 20}
- Florida's model supports framing AgTech as a credible technical pathway within existing education structures, rather than an elective add-on.¹⁸

d. North Carolina: State-Industry Partnership Model for Drone Workforce Pathways

North Carolina provides an example of a state education agency partnering with private industry to build a youth-to-workforce pipeline in uncrewed aerial systems (UAS). The North Carolina Department of Public Instruction described a partnership with Zipline aimed at creating workforce opportunities for high school graduates in UAS-related fields.²¹

While this is not exclusively agricultural, drones are directly relevant to precision agriculture, remote sensing, and geospatial workflows, and therefore offer a transferable model for one component of KAPP.

Relevance to Hawai'i (design implications for KAPP):

- KAPP's inclusion of drone operations can be operationalized through formal partnerships that lead to recognizable credentials (e.g., FAA-aligned training) and workforce placements.²¹
- This supports the "hard transferable skills" framing: UAS competence can serve agriculture while also applying to emergency response, infrastructure inspection, and environmental monitoring.

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e. **Comparative Synthesis: What High-Performing Pathways Share**

Across these models, several design principles recur:

1. **Regional delivery systems** (Connecticut's centers; California's nine-region alignment) expand access where specialized instruction cannot be evenly distributed.^{11 14}
2. **Structured work-based learning** is treated as core, not optional (Connecticut regulation; Florida standards).^{12 19}
3. **Cross-sector governance** (universities + agencies + industry + community partners) keeps pathways aligned to real labor demand and reduces the risk of "training without placement."^{15 16}
4. **Clear standards and credentials** increase legitimacy for students, employers, and postsecondary partners (Florida program frameworks; statewide WBL rules).^{18 19}
5. **Technology is positioned as an enabling tool** within agriculture rather than a separate "tech track," allowing students to apply geospatial analysis, drones, data systems, and sensors to place-based stewardship goals (California workforce framing; North Carolina UAS pipeline).^{16 21}

f. **Implications for SB2320 / KAPP in Hawai'i**

Taken together, these case studies support SB2320's core architecture- regional hubs, interagency collaboration, internships/apprenticeships, and AgTech skill development- while suggesting concrete implementation upgrades:

- Establish a Hawai'i equivalent of structured supervised agricultural experience placements (farm-paired capstones and mentorship) as a core program element, modeled after the regulatory clarity seen in Connecticut.^{12 13}
- Develop statewide work-based learning standards for farm placements aligned with safety, learning objectives, and employer responsibilities, consistent with Florida's WBL standards approach.^{19 20}
- Operate hubs as **county-aligned coordination nodes** that can broker placements, share equipment (drones/sensors), and reduce duplication, an approach consistent with both Connecticut's regional centers and California's regional alignment logic.^{11 14 15}

IV. **Recommended Program Design: "Farm + Tech Capstone" Model**

To ensure KAPP delivers real workforce value, the pilot should be designed as a **place-based applied learning pipeline**:

1. **Core structure**
 - Students are paired with a local farm/farmer, lo'i, loko i'a team, or community agriculture site.
 - Students learn technical skills in short modules (GIS basics → spatial analysis → data automation).
 - Students complete a supervised capstone that improves farm outcomes, such as:
 - irrigation mapping + water-use efficiency plan
 - invasive species/pest reporting map + monitoring workflow
 - farm logistics mapping (aggregation routes, market access)

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- soil health sampling plan + spatial dashboard
 - wildfire risk buffer mapping + preparedness planning support
2. **Why this model works**

Applied civic learning research shows youth engagement deepens when students work on real community problems and can see tangible outcomes from their work. This is also consistent with best practices in workforce pathways: mentorship + work-based learning + stackable credentials.

V. Recommended Appropriations and Fiscal Structure for a Phased Pilot

A successful pilot of the Kuleana Agricultural Technology Pathways Program must be funded at a level sufficient to support coordination, instructional quality, technical infrastructure, and structured work based learning. Comparative state models demonstrate that durable agricultural workforce pathways require dedicated administrative capacity, regional coordination personnel, supervised placement oversight, and equipment access.^{11 14 19} Programs that lack sustained staffing or infrastructure investment often fail to produce measurable workforce outcomes.

In light of fiscal realities and the importance of demonstrating proof of concept prior to statewide expansion, this paper recommends a phased three year pilot serving two regional hubs rather than immediate implementation across all counties. A two hub structure allows for concentrated impact, measurable evaluation, and scalable replication.

1. Pilot Design Structure

The pilot would establish:

- Two regional hubs aligned to geographic need and existing institutional capacity
- Formal partnership between the University of Hawai'i, the Hawai'i Department of Education, and relevant state agencies
- Structured work based learning placements with agricultural producers and community agriculture sites
- Delivery of agricultural technology modules including geospatial sciences, drone operations, climate smart agriculture, and applied data systems

This regional model reflects the logic of Connecticut's Agricultural Science and Technology Education centers, which operate as designated regional hubs embedded within secondary education institutions and supported through structured supervised agricultural experience requirements.^{11 12} It also aligns with California's regional coordination approach that integrates research institutions and workforce partners across designated service regions.¹⁴

2. Recommended Three Year Appropriation Framework

The proposed fiscal structure supports statewide coordination, two regional hub coordinators, student work based learning stipends, technical infrastructure, and formal evaluation. Total recommended funding is approximately 2.85 million dollars over three fiscal years.

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1. Statewide Program Administration

- Estimated at 300,000 dollars annually
- Three year total: 900,000 dollars

This allocation supports one full time program director housed within the University of Hawai'i system responsible for:

- Curriculum alignment across secondary and postsecondary institutions
- Interagency coordination with the Departments of Education, Agriculture and Biosecurity, and Labor and Industrial Relations
- Data collection and reporting
- Employer and community partnership development

California's statewide agricultural technology alignment model demonstrates that regional workforce systems require centralized coordination to sustain cross sector collaboration and maintain curriculum relevance.^{14 15}

2. Regional Hub Coordinators

Estimated at 115,000 dollars per hub annually inclusive of salary, benefits, and travel

Two hubs total annual cost: 230,000 dollars

Three year total: 690,000 dollars

Each hub coordinator would:

- Broker farm and community agriculture placements
- Supervise student capstone projects
- Manage shared equipment access
- Track credential attainment and student outcomes
- Support educator professional development

Connecticut's supervised agricultural experience regulations emphasize structured occupational experience as a required component of agricultural pathway integrity.^{12 13} Dedicated regional oversight ensures placement quality and student safety.

3. Technical Infrastructure and Equipment

One time startup allocation of 450,000 dollars in Year One

This allocation supports:

- Drone training kits aligned with Federal Aviation Administration standards
- Remote sensing and field sensor equipment
- Geographic Information Systems software licensing and cloud hosting
- Shared equipment libraries housed within hub sites

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Precision agriculture frameworks nationally treat hands on technical infrastructure as essential for competency development rather than supplemental enrichment.^{18 21} Without equipment access, agricultural technology pathways cannot deliver transferable skill attainment.

4. Student Work Based Learning Stipends

- Estimated at 200,000 dollars annually
- Three year total: 600,000 dollars

Structured stipends reduce equity barriers to participation and support supervised agricultural placements. Connecticut's regulatory model requires planned occupational experience in agriculture, underscoring the importance of formalized field engagement.¹² Stipend support increases access for students who might otherwise be unable to participate due to transportation or income constraints.

5. Independent Evaluation and Outcome Assessment

- Estimated at 75,000 dollars annually
- Three year total: 225,000 dollars

Evaluation ensures measurable outcomes in:

- Credential attainment
- Internship completion rates
- Postsecondary transition
- Employer satisfaction
- Regional workforce impact

Florida's statewide work based learning standards emphasize the necessity of formal oversight and outcome tracking to maintain program integrity and accountability.^{19 20}

3.3 Three Year Fiscal Summary

- Statewide Administration: 900,000 dollars
- Two Regional Hub Coordinators: 690,000 dollars
- Technical Infrastructure Startup: 450,000 dollars
- Student Stipends: 600,000 dollars
- Evaluation: 225,000 dollars

Total Estimated Three Year Pilot Investment: 2,865,000 dollars

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3.4 Fiscal Rationale

This funding level positions the Kuleana Agricultural Technology Pathways Program as a credible statewide pilot rather than a fragmented grant initiative. It balances fiscal discipline with the minimum structural requirements demonstrated in other state pathway systems.^{11 14 19}

Importantly, the proposed appropriation reflects the scale appropriate to Hawai'i's population while preserving program integrity. Underfunding risks creating symbolic programming without durable workforce impact.

A two hub pilot allows the Legislature to evaluate outcomes before expansion. If measurable gains are demonstrated in credential attainment, agricultural placement retention, and postsecondary transition, future expansion to additional counties can be justified with empirical evidence.

V. Conclusion

Hawai'i's agricultural contraction, aging producer base, and structural reliance on imported food together reveal a workforce and resilience gap that cannot be addressed through production policy alone.^{1 2 7}

Agriculture now operates within a data-driven environment where land stewardship, water management, wildfire mitigation, and market coordination are spatial and analytical functions. The Lahaina wildfires demonstrated that geospatial capacity is not an abstract technical skill but a form of civic infrastructure essential to emergency response and recovery.^{3 4 5} The same competencies required to model irrigation efficiency or soil health are those used to assess parcel damage, coordinate field operations, and rebuild communities.

SB2320's Kuleana AgTech Pathways Program responds to this structural need by aligning agricultural education with high-skill technical training and cross-sector collaboration.⁶ By embedding geospatial sciences, drone operations, climate-smart practices, and data systems within place-based agricultural learning, KAPP strengthens both farm viability and public resilience capacity. Comparative state models further demonstrate that durable workforce pipelines depend on structured work-based learning, regional coordination, and clear credentialing frameworks.^{11 12 14}

Investing in KAPP is therefore not solely an agricultural initiative; it is a long-term strategy for food security, workforce development, and civic resilience. By cultivating locally trained stewards equipped with transferable technical competencies, Hawai'i can reduce vulnerability, retain youth talent, and build the human infrastructure necessary to sustain both its land and its communities.

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