Tribal Composting Needs Assessment

Tribal Perspectives on Composting and Waste Recovery

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Executive Summary

This report presents the findings of a statewide Tribal Composting Needs Assessment led by the California Department of Resources Recycling and Recovery (CalRecycle) to identify key challenges, opportunities, and strategies for developing and operating composting programs on Tribal lands in California. The assessment incorporated three primary components: 1) document review consisting of federal, state, local, nonprofit, and Tribal sources; 2) key informant interviews with subject matter experts and Tribal representatives; and 3) regional listening sessions with Tribal leaders, Tribal representatives, and community members.

The findings highlight composting, both food waste and other compostable materials, as a valuable strategy to advance climate action, environmental stewardship, and food sovereignty within Tribal communities. However, implementation is frequently constrained by systemic challenges, including high capital costs, limited technical assistance, complex permitting processes, and a lack of sustained funding.

Key findings from the assessment summarized:

- Best practices emphasize the importance of integrating Traditional Ecological Knowledge, conducting detailed waste audits, appropriately sizing composting systems, managing moisture and aeration, and mitigating odors.
- Common challenges include high startup costs, staff capacity to maintain operations, insufficient infrastructure in rural areas, and regulatory complexities or ambiguities, particularly for Tribes working to align traditional practices with federal or state standards.
- Policy strategies, such as infrastructure grants, waste diversion mandates, and clear guidance on permitting, are instrumental in expanding composting capacity.
- Tribes emphasized that cultural relevance, youth engagement, education, and local partnerships are essential to ensure community support, participation, and sustainability.
- Regional and inter-Tribal collaboration in equipment sharing, mentorship, and joint funding can build capacity, reduce costs, and facilitate program development.
- Data sovereignty and local control of information allow Tribes to manage sensitive composting, waste, and cultural data in line with their governance and values.

The report concludes with targeted recommendations for CalRecycle to address these findings, including tailored training, peer mentorship, increased funding opportunities, and simplified grant reporting. Collectively, these actions can strengthen Tribal leadership in implementing resilient, culturally grounded composting initiatives across California that advance zero-waste objectives while honoring Tribal sovereignty.

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Overview

Organics like food scraps, yard trimmings, paper, and cardboard make up half of what Californians dump in landfills. Organic waste in landfills emits 20% of the state's methane, a climate super pollutant that heats 84 times more than carbon dioxide. Cutting short-lived climate pollutants can have the fastest impact on the climate. To reduce methane pollution and other short-lived climate pollutants, California set a target to send 75% less organic waste to landfills by 2025. CalRecycle implemented a two-phased approach to expand small- to –medium-scale composting in California. Phase 1 focused on developing tools and guidance for small- and medium-scale composting operations across California for the general population. The Small/Medium Composting Project Permitting Report offers detailed guidance on regulatory considerations and program design and can be used to inform planning and implementation efforts. Phase 2 included the development of a Tribal Composting Needs Assessment, which builds on the foundation established in the first phase with a focus on Tribal Nations.

In July 2024, CalRecycle contracted Kauffman and Associates, Inc. (KAI), to develop a Tribal Composting Needs Assessment that would capture widespread input from California Native American Tribes (Tribes) to articulate goals and visions related to composting. There are currently 109 federally recognized Tribes and over 60 non-federally recognized Tribes in California, with lands that cross state boundaries. While some Tribes in California have developed composting projects to address community needs and priorities, many are in exploratory phases, and others have not yet begun to consider composting as a potential initiative.

KAI's engagement approach was to hear directly from Tribal leaders, Tribal program directors and staff, and interested parties about their composting program priorities. Prior to engaging Tribes, a Tribal advisory panel was formed to provide cultural guidance, local knowledge, and community perspectives to ensure the needs assessment reflects Tribal priorities and values. The advisory panel also reviewed findings from listening sessions and recommendations for this report.

Composting as Traditional Lifeway

Community Composting 101

Community composting is the collective process of managing organic waste — such as food scraps, yard trimmings, and other compostable materials — at a local level to produce a nutrient-rich soil amendment. Composting closes the loop in Tribal food systems by returning nutrients to the soil and supporting land stewardship. Composting represents a key step within the circularity of food systems (Figure 1).

Figure 1. Food system circularity

Composting is important because it diverts waste from landfills, reduces greenhouse gas emissions, and improves soil health and water retention. By developing or expanding composting operations, communities can create local jobs, strengthen food sovereignty, support urban and rural gardens, and reduce municipal waste management costs. For example, the Hopland Band of Pomo Indians has developed a composting program that processes green waste from fuel load reduction efforts. The resulting compost is used in their community garden, enriching the soil and promoting sustainable agricultural practices. Composting also fosters environmental stewardship and community engagement. When designed with local priorities in mind, community composting becomes a practical, sustainable solution that supports environmental, economic, and social goals — especially in Tribal and underserved communities seeking to build resilience and promote ecological balance.

Traditional Ecological Knowledge

Traditional Ecological Knowledge (TEK) is a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment (Berkes, 2004). Tribes play a vital role in protecting and managing natural environments, using a deep understanding of their ancestral lands and their responsibility to care for them. This innate and inherent stewardship, for many Tribes, can be tied to ancient narratives of creation, like that of the Achomawi people, whose human existence is attributed to the serviceberry plant (Dixon, 1908).

Stewardship is rooted in ancient TEK that involved deliberate practices such as controlled burning to promote the growth of desirable plants; selective harvesting techniques to ensure sustainability; and cultivation of native species that were vital for food, medicine, and cultural ceremonies. By carefully tending to the landscape, Tribal communities were able to conserve biodiversity and balance ecosystems, fostering resilience in the face of changing environmental conditions. For example, the cultural burns practiced by the Karuk Tribe illustrate the circularity that connects forest management with the cultural practice of basketmaking using bear grass, communal well-being, and environmental health (Denetclaw, 2025) (Figure 2).

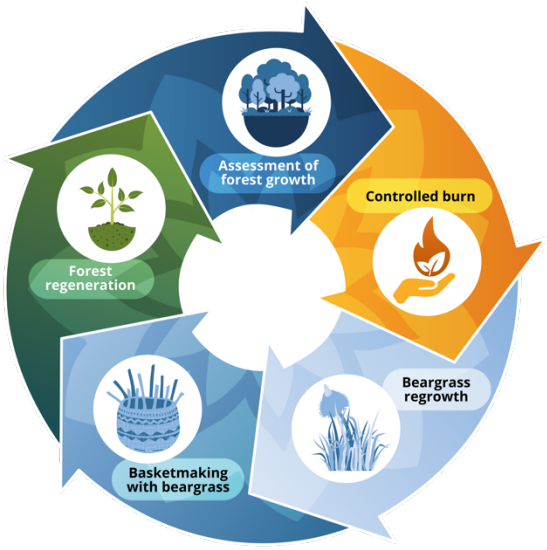

Figure 2. Cultural burn circularity

This harmonious relationship with the land reflected a sophisticated approach to conservation long before modern environmental science emerged, highlighting the importance of Indigenous Knowledge in today's efforts to protect natural habitats and biodiversity. Indigenous Knowledge encompasses all aspects of a culture's knowledge — including ecological, social, spiritual, and practical systems — whereas TEK refers specifically to Indigenous Knowledge related to ecological relationships. While the ability to honor interconnectedness to its highest fidelity has been challenged for generations, TEK is reemerging as an important accelerator of modern techniques to combat climate challenges.

When referring to climate action, Chairman Ron W. Goode of the North Fork Band of Mono Indians stated, "It starts in your own backyard" (Long et al., 2017). In a powerful blend of tradition and innovation, several Tribes across California have embarked on composting projects as a straightforward yet impactful strategy to combat climate change. Rooted in centuries-old beliefs that even the smallest microorganisms matter, these composting initiatives not only help reduce greenhouse gas emissions but also enrich the soil in Tribal agricultural areas, promoting healthier ecosystems and food sovereignty. Composting projects serve as encouraging examples of how Indigenous Knowledge and modern environmental strategies can unite to foster resilience, reduce carbon footprints, and nurture the health of both the land and the people for generations to come.

Permitting Authority and Land Status

Composting activities may trigger permitting requirements from Tribal, state, or federal authorities when the composting facility processes large volumes of organic waste, accepts off-site materials, or handles feedstocks like food waste or manure that can affect water or air quality. Permits may also be required for facility construction,

stormwater or leachate management, odor control, or the sale and distribution of finished compost products. However, to understand the permitting and regulatory environment of composting activities on Tribal lands, it is necessary to reiterate the unique government-to-government relationship between federally recognized Tribes and the federal and state governments. Because of this relationship, permitting authority over composting facilities on Tribal lands depends on the legal status of the land — specifically, whether it is held in trust or fee simple. For trust land, regulatory authority generally rests with the Tribe and federal agencies (such as the U.S. Environmental Protection Agency (U.S. EPA)), whereas fee simple land may fall under state or local jurisdiction, depending on location and applicable agreements. Definitions of trust and fee simple land follow, as well as associated guidance on permitting-related issues.

Trust Land

Federal trust land is land that the federal government holds legal title to but holds it for the benefit of an American Indian Tribe or individual. This legal status means the federal government manages the land and has ultimate control, while the Tribe or individual has the right to use and benefit from it. These lands are often exempt from state and local taxes and are subject to certain federal restrictions and regulations. Approximately 56 million acres are currently held in trust on behalf of federally recognized Tribes. Permitting questions related to composting operations on trust land can be directed to U.S. EPA Region 9.

Fee Simple Land

Fee simple land is under complete control of its owner, which can be an individual or an entity such as a Tribe. Fee simple ownership is the highest form of property possession. The owner can use the land for any legal purpose. State and local governments have primary jurisdiction over fee simple land, including the authority to impose and collect taxes. For permitting questions related to composting operations on fee simple land, review the Small/Medium Composting Project Permitting Report produced by CalRecycle.

Needs Assessment

Goals and Objectives

This needs assessment examines the opportunities and barriers Tribal Nations face in developing composting facilities on Tribal lands. It explores regulatory, financial, and infrastructure challenges while highlighting culturally aligned solutions to support sustainable waste management and environmental stewardship in Tribal communities across California. Through this needs assessment, CalRecycle seeks to understand three important issues:

- The composting interests, needs, and experiences of Tribes.
- The composting resources and development needs of Tribes.
- Policies that affect the composting capacity of Tribes and their Tribal citizens/members through consultation with California Tribal governments.

Questions

The needs assessment was guided by three questions designed to deepen understanding of Tribal composting efforts. The questions explore the challenges Tribal communities face when implementing composting programs across diverse geographic settings and help identify best practices that support successful Tribal composting initiatives in varied contexts:

1. What are the challenges to Tribal composting in various geographic settings?
2. What are the best practices for Tribal composting in various geographic settings?
3. What are the applicable state and federal composting regulations and standards?

Methods

Document Review

KAI conducted a targeted grey literature review to examine composting requirements and related assessments developed by Tribal, local, state, federal, and nonprofit agencies. The review aimed to identify Tribal composting best practices across the United States and to explore factors that influence program success. KAI followed a systematic protocol to ensure transparency, define the scope, and guide the processes of searching, selecting, assessing, extracting, synthesizing, and reporting information. In addition to reviewing published materials, KAI employed a keyword search strategy to locate relevant documents, using terms related to composting equipment (e.g., in-vessel machines), source reduction, zero waste, operational protocols, health and safety practices, registration with the California Department of Food and Agriculture (CDFA), U.S. Department of Agriculture National Organic Program (NOP) standards, and California fertilizing materials law and regulations. Insights from the document review have been integrated into the Overview, Key Takeaways, and Recommendations sections of this report.

Advisory Council

KAI convened an advisory council of California Tribal representatives currently engaged in composting activities. The advisory council offered key insights that informed the development of the listening session framework. It also identified early priorities, such as permitting clarity, funding navigation, and cultural alignment in composting practices, with strong emphasis on advancing food sovereignty through sustainable organic waste management.

Key Informant Interviews

The key informant interviews were conducted to develop a baseline of knowledge related to composting on Tribal lands. KAI conducted seven key informant interviews with a range of industry experts, regulators, advocacy groups, traditional practitioners, and groups with direct experience planning and operating Tribal composting programs. The 30-minute interviews focused on identifying external factors impacting Tribes' ability to engage in composting, using a PESTLE (political, economic, social, technological, legal, and environmental) framework. Next, the interviews used a SWOT (strengths, weaknesses, opportunities, and threats) analysis to understand Tribes' capacity to successfully develop, scale, and sustain composting facilities on Tribal lands. In tandem, these analyses form an overall understanding of the strategic landscape. The organizations that key informants represented are listed in the appendix.

Listening Sessions

Three in-person listening sessions were hosted by the Santa Ynez Band of Chumash Indians, Chicken Ranch Rancheria of Me-Wuk Indians, and Big Valley Band of Pomo Indians. The first two listening sessions included presentations on composting programs, zero-waste strategies, and case studies from Tribes and partner organizations. The third listening session focused on soliciting participant feedback on emerging themes of the Tribal needs assessment. Listening sessions with Tribal interested parties used facilitated discussions, open-ended questions, and culturally respectful engagement methods. Hybrid sessions (i.e., virtual and in-person attendance options) allowed for inclusive participation. Facilitators prioritized active listening and relationship-building between Tribes, CalRecycle, U.S. EPA, and nonprofit representatives. Notes and themes were documented to capture visions, goals, and barriers related to Tribal composting facility development and maintenance. For more details on host Tribe efforts, see the case studies section.

Case Studies

This needs assessment also features case studies of successful Tribal composting programs, highlighting diverse approaches, key partnerships, and lessons learned. Each profile illustrates how Tribes have integrated cultural values, community engagement, and sustainable practices to operate effective composting systems.

Tribal Engagement Feedback

Between April and July 2025, three hybrid listening sessions were hosted, offering Tribes the option to attend virtually or in person. Throughout the listening sessions, participants consistently described composting as more than an environmental strategy — it is a pathway to community healing, food system resilience, and cultural revitalization, rooted in TEK practiced since time immemorial.

The following section summarizes feedback from Tribal participants during facilitated discussions on Tribal composting efforts. This section is organized by the topics used during the listening sessions:

- Vision
- Values
- Barriers
- Resource requirements
- Infrastructure needs
- Questions on permitting
- CalRecycle support

Vision

As part of the listening sessions, Tribal participants collaboratively drafted a shared vision statement to allow California Tribes to articulate common goals and values that guide the development of composting facilities in a culturally grounded and sustainable way. The vision statement is meant to foster unity, strengthen collaboration, and provide a clear framework for decision-making and future investment. The vision statement below (encircled by core values identified by Tribal participants) captures the shared goals and long-term aspirations of California Tribes for developing and sustaining composting operations on Tribal lands.

Values

The following core values emerged from the needs assessment as foundational principles guiding Tribal approaches to composting, reflecting cultural priorities, ecological relationships, and community well-being.

Food Sovereignty

Tribes possess an inherent right to self-governance, the protection of their Tribal citizens, and the preservation of their cultures. Composting is a foundation for achieving food sovereignty by revitalizing local food systems and increasing access to traditional foods.

Land Stewardship

As the original caretakers of the Earth, Tribal members feel a deep responsibility to care for and sustain the land through respectful, place-based practices that honor ancestral relationships and ensure ecological health for future generations.

Circularity

All elements of nature are interconnected in cyclical relationships, where actions and impacts return to and affect the whole system, emphasizing balance, reciprocity, and continuity across generations. Circular food systems help Tribes manage and reduce excess waste more effectively. They also strengthen the connections between food waste recovery, local agriculture, education, and land stewardship.

Reciprocity

Humans and the natural world should interact through mutual, respectful exchange, where taking is balanced by giving back to sustain harmony and ecological balance.

Welfare of Future Generations

Policy development and local decision-making must ensure that natural resources and ecological relationships are preserved and protected for the long-term well-being of descendants and all life. Local, regional, and federal policies must be inclusive of Tribal values and needs and include Tribes in decision-making.

Barriers

This section outlines the primary barriers to implementing composting facilities on Tribal lands, as identified through input from interested parties and key informant interviews. The barriers span regulatory, financial, infrastructural, and capacity-related challenges that impact planning, development, and long-term operation.

Funding

Major concerns include grant reimbursement delays (e.g., CalRecycle's 10% withholding), the requirement of a Limited Waiver of Sovereign Immunity to access

certain grants, and the administrative and legal costs of ensuring acceptable use of grant funds. Frequently, CalRecycle's grant opportunities do not align with the needs and priorities of Tribal communities.

Sustainability

Heavy reliance on grants during the startup period, combined with expectations from Tribes that initiatives show a positive return on investment, can create sustainability challenges if grant funding ends before the compositing initiative achieves its anticipated savings. The cost-benefit analysis of Tribal composting programs should also account for secondary benefits (e.g., job creation).

Limited Understanding of Composting

To increase community involvement, it is important to elevate the community's understanding of the benefits of composting and to shift the perception that composting is inconvenient. Additionally, education efforts are needed to clarify what materials are compostable to avoid contamination in food waste.

Workforce

The limited availability of long-term staff with required technical expertise creates a barrier to launching and sustaining composting operations.

Regulations

In some cases, permitting requirements, data reporting requirements, and regulatory ambiguity — particularly for California's Short-Lived Climate Pollutant Reduction Strategy (SB 1383) — pose additional burdens, especially for Tribes in rural or remote areas with limited access to compostable materials. Participants noted difficulties in navigating regulatory systems, not because of direct requirements like SB 1383, from which many Tribes are exempt, but due to confusion over jurisdictional responsibilities and unclear guidance. Regulatory requirements are especially burdensome for small Tribes with limited resources.

Infrastructure and Equipment

Tribes may have limited access to equipment, storage, water, land, and power (e.g., to operate pumps), especially in rural communities.

Haulers

Tribes may have limited access to local haulers, or local haulers may exert monopoly pricing power in rural areas. Additional support is needed to increase Tribal capacity to provide hauling services.

Environmental

Climate variability (e.g., elevation and rainfall) and wildlife disturbances create challenges for composting operations.

Resource Requirements

This section summarizes the necessary resources identified by Tribal participants to implement and sustain composting programs. Feedback emphasized the importance of long-term staffing, internal engagement strategies, and tools to measure impact and strengthen participation.

Technical Assistance

Participants identified the need for ongoing technical support to build internal capacity. This may include practical guidance on composting practices (on- and off-reservation), infrastructure planning, and troubleshooting challenges as they arise. Technical assistance could be supported by knowledge sharing opportunities among Tribes, such as establishing a Tribal composting mentor network.

Workforce Development

Sustaining composting operations requires reliable, long-term staffing supported by dedicated workforce development strategies. Suggestions included identifying recycling champions and offering incentives — such as stipends or recognition — for line cooks, custodial staff, and others who support daily composting tasks within Tribal enterprises and communities. Workforce strategies should specifically engage TEK holders, seed keepers, youth, and elders. Having a plan for knowledge succession is essential for workforce development.

Community Engagement

Maintaining interest, changing behaviors, and shifting community perception of composting — from an inconvenience to a traditional lifeway —were seen as essential to program success. Internal promotion within Tribal enterprises, promotion across the Tribal community, and regular reporting on program benefits were viewed as effective strategies to reinforce commitment and encourage participation. Several Tribes described the benefit of identifying local champions who can lead internal coordination and encourage wider adoption within their communities.

Monitoring and Measurement Tools

The ability to conduct regular audits of waste streams was seen as essential for tracking progress, identifying opportunities for improvement, and demonstrating the value of composting to Tribal leadership and the broader community. Tribes also highlighted the importance of data sovereignty and the ability of Tribes to retain sensitive and proprietary information related to composting activities.

Strategic Partnerships and Communities of Practice

Participants highlighted Tribal councils, Tribal enterprises, local governments, and casino leadership as necessary partners. They also expressed interest in building regional partnerships with other Tribes to share resources, exchange knowledge and learnings, and strengthen local infrastructure. Many saw value in collaborating with nearby farms, schools, county governments, and nonprofit organizations to broaden the reach and resilience of composting initiatives. Tribe-to-Tribe collaboration was also identified as important.

Infrastructure Needs

A range of infrastructure priorities were identified by Tribal participants to support the development, expansion, and long-term success of composting programs. These priorities include equipment, collection systems, and tools to improve operational efficiency, product quality, and accessibility across Tribal communities.

Collection Systems

Participants recommended curbside compost pickup and drop-off locations at transfer stations to improve access and encourage wider community participation.

Processing Equipment

Infrastructure and equipment needs vary depending on the size of composting operations. Smaller programs have a need for buckets, rakes, screeners, and fencing, while larger programs could require chippers, shredders, windrow turners, aeration systems, compost spreaders, in-vessel machines for odor and vector control, and pyrolysis systems for the thermal decomposition of food waste, depending on the composting system implemented. The right combination of these tools, matched to the specific application, is important in managing diverse materials and supporting growth over time.

Material Handling

Lifting equipment (e.g., front loader) and vehicles for hauling were cited as necessary to move compost materials efficiently within and between sites.

Data Tracking

Participants expressed interest in tools, such as apps, to monitor operations and prevent waste. This could include food audit systems to identify when and why food becomes waste, as well as artificial intelligence (AI)-based platforms to track inputs and compostable outputs.

Engagement Strategies and Resources

Labeled bins and signage were recommended to guide sorting behavior, raise awareness, and support community participation in composting programs.

Questions on Permitting

Participants raised a range of questions and considerations related to permitting composting projects on Tribal lands. These reflected both uncertainty around jurisdiction and procedural requirements, as well as broader concerns about impacts to Tribal sovereignty and operations.

Sovereignty and Compliance

Several participants raised concerns about how permitting could affect Tribal sovereignty, particularly when grant eligibility requires compliance with state laws (e.g., California Environmental Quality Act (CEQA)) or Limited Waiver of Sovereign Immunity.

When Permits are Needed

Tribes asked for clarity on when a permit is required, including specific thresholds related to volume, discharge, or equipment type. Common questions included, “At what point do Tribes need permits,” “When does discharge or runoff trigger permitting requirements,” and “What happens if compost is sold or transferred off the reservation?”

Permit Exemptions

Some participants referenced specific technologies — such as in-vessel composting systems that avoid using potable water or connecting to sewers — and asked whether these configurations exempt a project from permitting requirements.

Hauling and Jurisdictions

Questions emerged around hauling compostable materials off-reservation, including applicable permit requirements for haulers and cross-jurisdictional operations.

Scale and Operators

Participants also questioned whether small-scale operations (e.g., under 100 cubic yards) are exempt, and how permitting requirements differ based on the scale of the operation or the involvement of non-tribal operators.

Organic Agriculture

Tribes are unsure if or when their compost sales would be subject to CDFA regulations (the entity charged with regulating compost used in organic agriculture).

CalRecycle Support

This section offers recommendations for how CalRecycle can strengthen its support for Tribal composting development. Suggestions emphasized the need for accessible guidance, more responsive funding structures, and sustained engagement that reflects the diversity of Tribal contexts and priorities.

Targeted Technical Assistance

Participants requested tailored support to help Tribes navigate permitting processes, system design, monetization strategies for end products, and the use of data to show the benefits of composting (e.g., cost savings, job creation). Suggestions included decision trees based on operation size or type, as well as guidance on federal and technology-specific requirements.

Training and Peer Learning

There was interest in ongoing learning opportunities, such as CalRecycle online modules and mentorship support from experienced Tribal composters. Participants noted the value of community readiness tools to assess composting feasibility.

Grant Access and Flexibility

Recommendations included simplifying reporting requirements, such as itemized cost tracking, to reduce administrative burdens. Participants also suggested revisiting delayed payments, the 10% withholding policy, and ensuring that incentives are considered allowable grant expenses.

Localized Tools and Messaging

Participants emphasized the usefulness of boilerplate language for community education efforts. Access to region-specific data was also viewed as important for strengthening grant applications and guiding program design.

Partnership and Presence

Tribes encouraged CalRecycle to actively participate in local conversations, such as county-level negotiations over exemptions. Tribes emphasized the importance of continued engagement, including support for decentralized composting models, and implementation of Zero Waste Hierarchy policies and strategies. The Zero Waste Hierarchy is a framework that describes a progression of policies and strategies from highest and best use to lowest use of materials. It supports a zero waste system by prioritizing prevention, reuse, and recycling. Tribes also requested that CalRecycle periodically meet with Tribes to review and update the vision, values, and goals identified in this document.

Funding Alignment

Participants called for CalRecycle to explore how its resources could offset gaps in federal funding. They emphasized the importance of aligning state resources with Tribal budgeting and planning realities.

External Factors that Impact Composting

To better understand the external and internal forces shaping Tribal composting efforts, KAI used a PESTLE framework to guide interview discussions with key informants. These insights also reflect the priorities and concerns raised during listening sessions and align with broader patterns seen in the document review. A summary of the full PESTLE analysis follows in Table 1.

Table 1. PESTLE analysis summary

External Factor	Findings
 **Political**	• Relationships between the composting organization and the commercial establishments that produce waste are key to ensuring a reliable source of feedstock and long-term program viability. • It is challenging to convince the state to invest in large composting facilities because they are expensive ($30-$50 million, not including permitting expenses and costs). • High and costly regulatory standards in the state (State Water Resources Control Board, 2020). However, there are exemptions for small composting operations and Tribal lands (held in trust). • Siting a composting site requires community and political will. • U.S. EPA has jurisdiction over Tribal lands held in trust, while the state has jurisdiction over fee simple lands. • The Tribal council needs to support composting for it to be successful. • Less federal funding is available for composting programs.
 **Economic**	**Income:** • Composting typically costs more than disposal, so multiple sources of income are usually required. • Grant funds for a Tribal composting project are helpful, but do not ensure a sustainable economic model. • The economic model for a composting program typically has two sources of income: user fees from waste producers and revenue from compost sales. • High-grade compost can represent a revenue opportunity. However, compost that is approved for organic agriculture needs

External Factor	Findings
	to meet NOP requirements of the U.S. Department of Agriculture. • Composting financial assistance is available (California Water Boards, 2024). • Many Tribes pay for waste disposal out of grant funding, making it difficult to justify investments in waste disposal. **Expenses:** • Large-scale equipment is very expensive and can cost millions of dollars per piece of equipment. • The technology (screening) needed to produce high-quality compost is expensive. • Transportation costs to ship compost can exceed the price of the compost itself. • Equipment and maintenance are the largest costs. • Need funding for labor — should not rely on volunteer labor. **Cost Savings:** • The cost of composting could be offset by fertilizer costs, soil costs, and reduced solid waste disposal fees.
 **Social**	• TEK can be used in the design and operation of organic composting programs, as long as the certifier approves them. The certifier understands that they need to consider practices that have been used for thousands of years. • Tribal communities are stewards of their lands and have a strong environmental ethos. • Tribal communities vary in their support of composting, whereas. some are very knowledgeable and supportive, others have been difficult to get buy-in from. • Tribal agriculturalists understand the benefits of compost. • Tribes need to conduct a food waste audit when planning a composting operation. • For those in food deserts, using compost for community gardens has a nutritional benefit. • If a site is well engineered with buffers and setbacks, community exposure can be mitigated.

External Factor	Findings
	• A robust outreach program will be needed to teach communities what is and is not compostable.
 **Technological**	• Machinery and equipment (turners, grinders, screens, and covered facilities) needed to increase the quality of the compost is expensive. This equipment and the training to operate it are necessary if the goal is to produce a saleable product. • If the development of compost for organic agriculture is a goal, then the compost input must be entirely yard waste to avoid plastics contamination; it is almost impossible to screen out fine plastics from food waste. • Composting equipment is typically designed for larger facilities. • Composting can be done at any scale. Small-scale community composting can be organized in a hub-and-spoke model (local collection can be transported to a larger facility). • The U.S. Composting Council offers operator training courses (U.S. Composting Council, n.d.).
 **Legal**	• Tribes generally have sovereignty over their composting decisions, although some federal regulations may apply and some Tribes have their own regulations to follow. • Some areas in the state (Central Valley and the South Coast) have significant regulatory barriers. • It may be necessary for composting operations to apply for, secure, and comply with all appropriate environmental regulatory permits, including those for air quality, public health and safety, water quality, and permits for project construction and operation from local agencies. • Composting may need to be added to the existing zoning regulatory framework. However, if the facility is on Tribal lands, this is not a concern. • If the compost is intended for use in organic agriculture, the compost must be registered with the CDFA.

External Factor	Findings
 **Environmental**	• Composting produces good soil amendment, reduces landfill expansion, and reduces methane emissions. • Compost has the potential to improve soil health. • Composting operations can negatively impact watersheds and airsheds if not properly constructed. • If the goal is to produce compost for organic agriculture, it must be protected from “synthetic drift” — fertilizers or other foreign material. • Local composting that reduces transportation costs and emissions is the most environmentally beneficial. • Temperature and moisture control are needed in composting. • Local animals may be attracted to the composting site.

SWOT Analysis

Key informants from Tribal communities also identified the strengths, weaknesses, opportunities, and threats to composting on or near Tribal lands. They were invited to include any factors identified in the PESTLE analysis that they wished. The results of the SWOT analysis of composting on or near Tribal lands are in Table 2.

Table 2. SWOT analysis results

Strengths	Weaknesses
• Willingness of Tribal community members and establishments (schools, businesses, Tribal departments) to support composting. • Some Tribes' public works departments lend equipment for composting. • Local knowledge of composting. • Excitement teaching next generation.	• Composting programs need capital investment in equipment, which is challenging to obtain. • Local wildlife is attracted to compost and can become pests. • The community may not appreciate the pests or the smell. • Having enough moisture could be a challenge in some areas.
Opportunities	**Threats**
• Revenue generation and cost savings. • Workforce development (temporary and permanent jobs). • Partnering with Tribes/farmers to share composting program and equipment. • Invest in small-scale composting facilities (lower startup costs and fewer regulatory hurdles). • Include TEK in U.S. Composting Council training for Tribal context. • Compost is being used in fire-damaged areas to prevent mudslides. • 35% of waste is compostable (i.e., large addressable market). • Diverse uses for compost (e.g., landscaping, native plant restoration, community parks, community gardens).	• Reductions in federal or state funding available for composting. • Composting can negatively impact watersheds and airsheds, if not properly constructed. • Local residents and businesses may object to the development or expansion of a composting facility. • Permitting processes can involve regulations from multiple agencies (which can take 3–5 years), depending on the location of the composting facility (fee simple or trust land).

Case Studies

This section highlights case studies of Tribally operated composting programs that demonstrate innovative, culturally grounded approaches to organic waste management. Each case illustrates how Tribal Nations are addressing environmental and economic challenges through composting, while honoring TEK and supporting community health. From small-scale community projects to regionally significant composting facilities, these programs reflect a wide range of strategies, funding models, and operational scales. Profiled programs include:

- Santa Ynez Band of Chumash Indians
- Chicken Ranch Rancheria
- Big Valley Band of Pomo Indians
- Shakopee Mdewakanton Sioux Community (SMSC)
- Kootenai Tribe of Idaho
- Tribal Solid Waste Advisory Network (TSWAN)

The case studies provide practical insights into infrastructure development, community engagement, and regulatory navigation, offering valuable lessons for other Tribes seeking to launch or expand composting efforts aligned with their values and long-term sustainability goals.

Santa Ynez Band of Chumash Indians

The Santa Ynez Band of Chumash Indians, located in the Central Coast of California, is actively advancing composting and sustainability initiatives through efforts coordinated by the Santa Ynez Chumash Environmental Office and Chumash Enterprises. These efforts reflect the Tribe's environmental stewardship by managing food scraps and organic waste responsibly, supporting community engagement, and reducing environmental impacts. The Tribe also showcases its commitment through visible zero waste branding and community education. These initiatives have enabled alignment with California's environmental goals under SB 1383 and enhanced the Tribe's internal capacities.

Program Description

The Santa Ynez Chumash Environmental Office operates a residential composting program with seven participating households. Each household receives bright yellow collection bins that are picked up weekly. Collected food scraps are weighed, documented, and transported to the Tribal nursery, where red-wiggler worms process them into nutrient-rich castings. Concurrently, Chumash Casino Resort maintains a seven-day-a-week waste separation team working daily from 6 a.m. to 2 p.m., ensuring proper sorting of organic waste streams. Additionally, Chumash Enterprises leverages nine strategic partnerships focused on food rescue initiatives, pig-farm donations, and just-in-time deliveries to minimize food waste.

Key Achievements

- Maintained an average weekly diversion of 6.76 pounds per household.
- Successfully recovered the investment in the TerraForma aerobic digester in under four years and currently processes 700–800 pounds of organic waste daily.

Challenges and Lessons Learned

- Small-scale collection programs are labor-intensive and require considerable staffing resources. Effective backyard composting methods depend heavily on sustained community participation.
- Pooled-cart collection systems may require specialized handling equipment (e.g., cart tippers).
- Annual trash audits involving multi-day sampling of landfill-bound waste may require coordinated efforts and resources.
- Material that comes out of the aerobic digester is not fully finished compost, but if it is spread on the landscaping in a very thin layer, the material can continue to break down after being applied.

Figure 3. Santa Ynez composting operation

From top: (1) output material produced by aerobic digester, (2) TerraForma aerobic digester, (3) and (4) show the Tribe's vermicomposting process that uses earthworms to breakdown organic waste into nutrient-rich compost.

Chicken Ranch Rancheria of Me-Wuk Indians

The Chicken Ranch Rancheria Me-Wuk Indians, located in the Central Valley of California, is implementing an innovative composting initiative focused on diverting food waste, bolstering Tribal agriculture and food sovereignty, and advancing sustainability objectives. Driven by community values and cultural practices, the initiative uses resources such as the Suchumumu Tribal Farm, casino facilities, and cultural gathering spaces. This effort emphasizes the Tribe's commitment to managing resources responsibly and enhancing community well-being. The program continues to evolve toward a farm-to-table and closed-loop food system, aiming for a zero-waste community.

Program Description

With support from CalRecycle's Community Composting for Green Spaces and Edible Food Recovery grants, the Chicken Ranch Rancheria's composting program collects food scraps primarily from Chicken Ranch Casino Resort, transporting them to the Suchumumu Tribal Farm. Since 2022, more than 64,000 pounds of food waste have been composted using various techniques. The program uses Winnow Solutions' AI-powered food waste tracking system to monitor and reduce waste in casino kitchens by refining procurement and portion sizes. As a result, it minimizes overproduction and excess food. Additionally, about 30,000 pounds of edible food are recovered through donation and use as livestock feed. Recent improvements, such as the acquisition of a tractor and software upgrades, have streamlined operations and positioned the program for continued growth.

Key Achievements

- Implemented an AI-powered food waste tracking system (Winnow AI) to reduce food waste by better aligning produce orders with custom food purchases.
- Diverted a total of 180,083 pounds of food from landfills since 2022 through both edible food recovery and composting initiatives.
- Collected and composted 68,721 pounds of food scraps since 2022, diverting an average of 7.98 tons of organic waste annually between 2022 to 2024.
- Annual data estimated over $40,000 in food waste, indicating potential for cost savings through waste reduction.
- Integrated multiple composting techniques and systems, including windrow piles, three-bin arrangements, and bio-digestion.

Challenges and Lessons Learned

- Initial casino-based composting operations required adjustments during the transition to more productive farm-based systems.
- Scaling composting efforts necessitated investment in specialized equipment and refined management processes.
- Encouraging community transition to compostable disposables and reducing single-use items remains an ongoing effort.

Figure 4 Composting operations at Chicken Ranch Rancheria of Me-Wuk Indians
Clockwise from top left: (1) weighing station powered by AI tracking system, (2) composting pile near community garden, and (3) vegetables in community garden.

Big Valley Band of Pomo Indians

The Big Valley Band of Pomo Indians is a federally recognized Tribe located near Clear Lake, California. Descended from the Pomo people, the Tribe has deep cultural and spiritual ties to the land and water of their homelands. The community is committed to environmental stewardship, cultural preservation, and economic development. The Tribe's nascent composting efforts focus primarily on food waste and algae collected from the lake.

Program Description

The Big Valley Rancheria operates a multifaceted composting initiative through its Environmental Protection Agency (Big Valley EPA), led by an environmental director with support from a dedicated solid waste coordinator and contractors. Composting activities are integrated into the Tribe's broader solid waste management program that includes buy-back recycling, household hazardous waste management, tire amnesty, and neighborhood cleanups. The composting program supports the Tribe's goal to address solid waste needs in a way that protects the health and well-being of Tribal members and the environment. Composting activities have focused on governmental offices and Tribal events, such as the Tule Boat Festival, where food scraps are collected, processed into compost, and redistributed to the community.

Key Achievements

- In 2025, the Tribe expanded its composting operations by launching a home composting pilot project to increase household participation and further reduce organic waste sent to landfills.
- Processed materials have been used to produce compost that is redistributed to community members at events like Earth Day, promoting awareness and engagement.
- Successfully implemented composting infrastructure at Tribal events to increase visibility and demonstrate the feasibility of community-scale composting

Challenges and Lessons Learned

- Ongoing outreach and education are essential to shift perceptions and encourage consistent participation, especially for household composting.
- As the composting program expands (e.g., home composting pilot), growth should align with available staff and infrastructure to maintain program quality.

Figure 5. Composting operations at Big Valley Rancheria

Clockwise from top left: (1 and 2) composting sites, (3) compost screening, (4) bags of finished compost.

Shakopee Mdewakanton Sioux Community

The Shakopee Mdewakanton Sioux Community (SMSC), located near Minneapolis, Minnesota, operates Dakota Prairie Composting. The enterprise launched in June 2023 to expand Tribal waste management capacity by diverting up to 172,000 tons of organic material annually using advanced aerated static pile systems. This large-scale, culturally grounded initiative supports sustainability, food sovereignty (through the Wozupi Tribal Gardens), economic growth, and environmental stewardship.

Program Description

Dakota Prairie Composting is a large-scale composting facility that stands as a steward of the land and leader in sustainable waste management. The materials accepted are composted into high-quality soil amendments, keeping waste out of landfills and restoring soil health. According to the company website, “We are not just a composting facility — as the largest organics recycling facility in the Midwest, we are a beacon” (Dakota Prairie Composting, 2025).

Key Achievements

- Reaching commercial scale for Tribally operated composting.
- Alignment between cultural values, economic development, and community wellness. As stated by Dakota Prairie Composting, “At the heart of our operations lies a commitment to transforming organic waste into a valuable resource, aligning with the Dakota tradition of safeguarding the environment for seven generations.”
- Certifications for quality and environmental safety (e.g., U.S. Composting Council Seal of Testing Assurance).
- Diverse program offerings (e.g., household organics recycling, seasonal drop-off for yard waste, Christmas trees, and Halloween pumpkins).

Challenges and Lessons Learned

- Composting and organic waste management represents a growing avenue for economic development opportunities for Tribes.
- Focusing on composting organic waste produced by Tribal enterprises, programs, and households can provide the necessary scale to begin processing the organic waste of non-Tribal entities.
- Tribes should evaluate opportunities to develop branded compost offerings and use direct-to-consumer e-commerce sales channels.

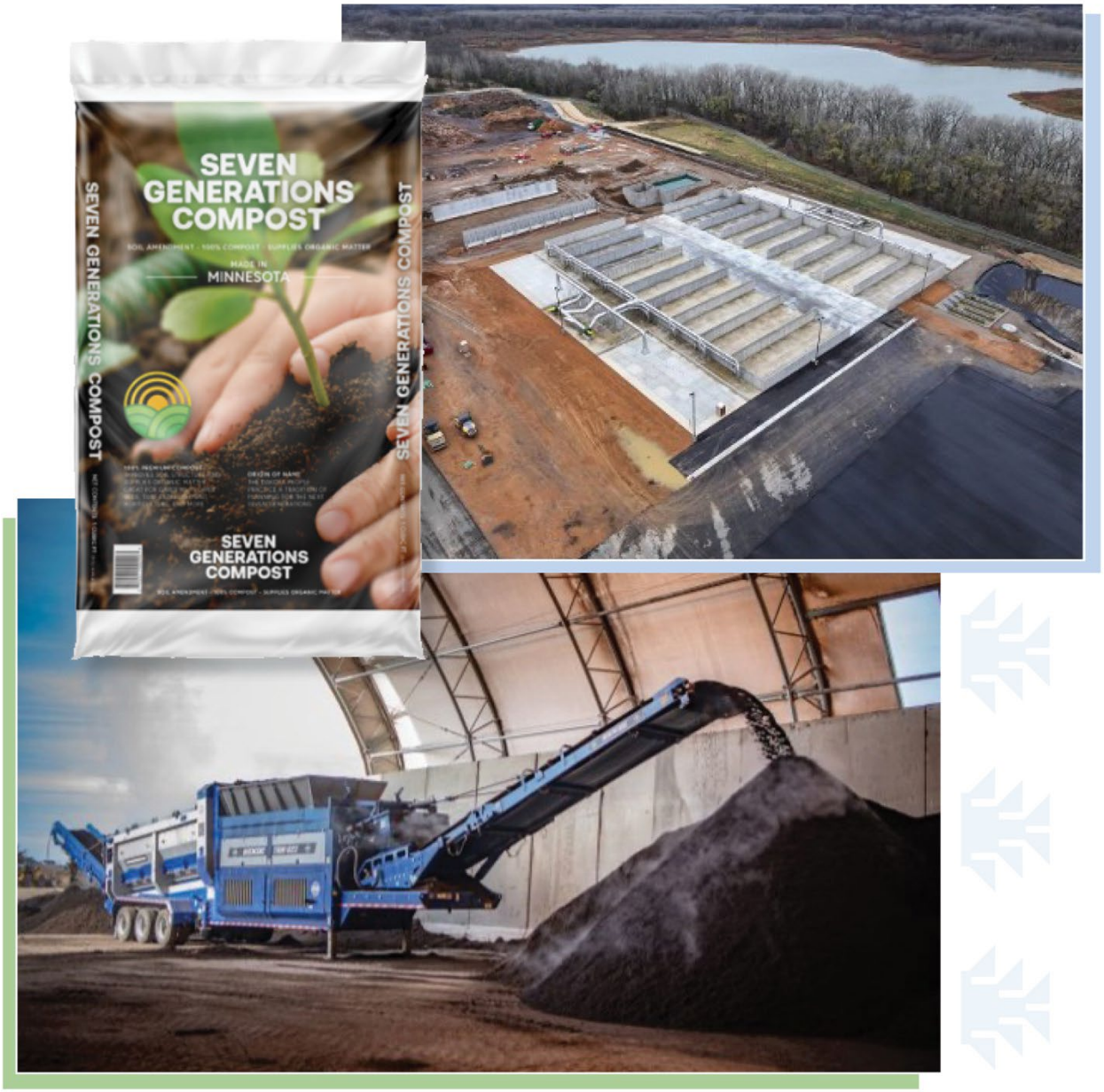

Figure 6. SMSC Dakota Prairie composting operations

Clockwise from top left: (1) branded bag of Tribally produced compost, (2) aerial photo of composting facility, and (3) commercial size compost pile.

Kootenai Tribe of Idaho

The Kootenai Tribe of Idaho, located in the northern region of the state, has launched a composting program rooted in environmental restoration, waste diversion, and local food system support. The Tribe's composting initiative is part of a broader vision to educate young Tribal members on land stewardship, protect natural resources, and promote sustainability in partnership with surrounding communities and institutions.

Program Description

The Tribe's composting efforts are centered around Green Mountain Technologies' Earth Flow in-vessel composting system, which provides an efficient and enclosed method of processing organic waste. The system is supported by strategic partnerships, including a collaboration with the University of Idaho Sandpoint Organic Agriculture Center, which provides site access and partial funding for site preparation. A U.S. EPA Solid Waste Infrastructure for Recycling grant and a private donation from Alterra (ski resort operator) have also helped establish and scale the project.

Compostable materials are collected from commercial food waste sources and transported using a flatbed trailer and pull-cart model. Full carts are swapped with empty ones and returned to the staging area. Drop-off arrangements are available by request, enabling flexible participation.

Key Achievements

- Installed and operationalized an Earth Flow in-vessel composting system.
- Secured U.S. EPA grant funding and private financial support to launch the project.
- Partnered with the University of Idaho and Alterra to develop and prepare the site.
- Implemented a mobile cart swap system for efficient material collection.

Challenges and Lessons Learned

- Up-front capital and site preparation needs require coordination and external funding.
- Transport logistics and remote location management are ongoing considerations.
- Building interagency and institutional trust is vital to securing technical and operational support.

Tribal Solid Waste Advisory Network

The Tribal Solid Waste Advisory Network (TSWAN) is a nonprofit consortium formed in 1997 by Pacific Northwest Tribes — including those in Washington, Oregon, Idaho, and Alaska — to collaborate on solid waste and environmental management across Indian Country. TSWAN remains the only unified Tribal consortium nationwide dedicated to these issues. It provides mutual support through technical assistance, shared expertise, quarterly meetings, and a governance structure in which each member Tribe designates a representative who participates in decision-making and elects a board annually. Today, as a 501(c)(3) nonprofit based in Tekoa, Washington, TSWAN serves over two dozen federally recognized Tribes and Tribal consortia. It offers training, outreach, planning support, resource-sharing — such as a database and library — and fostering inter-Tribal coordination to amplify Tribal voices in waste policy, environmental protection, and sustainable practices on Tribal lands

Support for Tribal Composting

TSWAN convenes quarterly and offers a consistent platform for Tribal representatives to exchange best practices, receive training, and hear from guest speakers. These sessions help Tribes strengthen their understanding of composting technologies, permitting requirements, grant opportunities, and culturally grounded waste management strategies.

Key Contributions

- Facilitates regular cross-Tribal learning and collaboration.
- Shares composting insights, tools, and templates from member Tribes.
- Hosts expert-led training and presentations on solid waste topics.
- Serves as a peer-driven resource for Tribes beginning or expanding composting programs.

Challenges and Lessons Learned

- Peer-to-peer learning between Tribes greatly enhances local capacity.
- Participation in inter-Tribal consortia can provide access to technical expertise that might otherwise be cost-prohibitive to an individual Tribe.

Key Takeaways

The Tribal Composting Needs Assessment highlights both the readiness and resilience of California Tribal communities in advancing composting initiatives, as well as the systemic barriers that continue to limit widespread implementation. While there is strong alignment between composting and Tribal values, significant gaps in resources, infrastructure, and regulatory support must be addressed to ensure long-term program success.

Strengths to Be Leveraged

- **Cultural alignment and community support:** Composting reflects longstanding Tribal values of land stewardship, sustainability, and care for future generations. Community members, including youth and elders, show strong interest in participating and supporting composting efforts.
- **Traditional Ecological Knowledge:** Tribes possess deep generational knowledge of land management that can strengthen ecologically-balanced lifeways and improve environmental outcomes when recognized and integrated.
- **Existing environmental and food sovereignty initiatives:** Many Tribes are engaged in community gardening, land restoration, or cultural burning practices that align with composting goals and provide natural integration opportunities.
- **Leadership and knowledge-sharing:** Several Tribes have established composting programs and are willing to serve as mentors to others. There is strong potential for peer-to-peer learning and the development of Tribal composting networks.

Areas of Support Needed

- **Permitting and regulatory navigation:** User-friendly guides and technical assistance are needed to reduce barriers and navigate complexity. States and counties must respect Tribal sovereignty.
- **Funding and financial planning:** Tribes need sustained funding to support startup costs, hire and retain staff, purchase equipment, cover operational expenses, and develop long-term business models for composting programs.
- **Technical assistance and training:** There is a clear demand for hands-on training, operator certification, monetization strategies, and culturally relevant technical support to build and maintain composting systems and sustainable funding mechanisms.
- **State-level coordination and communication:** Participants identified a gap in easily accessible state-level resources tailored for Tribal composting programs. This includes streamlined application support, state-Tribal liaison roles, and clear points of contact within CalRecycle.
- **Infrastructure development:** Tribes require support in building and scaling composting facilities, especially in rural or geographically isolated areas where access to hauling, utilities, or materials may be limited.
- **Program sustainability:** Tribes need tools and support to monitor outcomes, build partnerships, retain staff, and maintain community interest over time.

Recommendations

Findings from listening sessions and interviews present opportunities for CalRecycle to more effectively support Tribal composting goals. The following recommendations are intended to help CalRecycle build Tribal capacity and foster knowledge exchange across various stages of composting program development.

Training and Technical Development

- Establish and fund a Tribal mentoring program or facilitate partnerships with existing inter-Tribal organizations (e.g., TSWAN), whereby Tribes with established composting programs can support those building their own.
- Offer technical support to new composting programs to help establish community partnerships and generate local-level support.
- Offer tailored technical support to Tribal composting programs and meet programs where they are in their development process.
- Support waste auditing activities for Tribes to determine their organic waste production and composting needs.
- Partner with the U.S. Composting Council and Traditional Practitioners to customize their 5-day hands-on training course for Tribes to include TEK and Tribal values and traditions.
- Develop a community readiness assessment tool specifically for Tribes to help them determine how to begin the process of developing composting activities.

Grantmaking

- Remove Limited Waiver of Sovereign Immunity requirements for all CalRecycle grants.
- Provide resources for Tribes who are applying for grants to help them establish their local needs and demands.
- Simplify reporting requirements for grantees.
- Make incentive payments that encourage composting an allowable expense.

Funding

- Help Tribes establish a business model for their composting programs.
- Identify and communicate funding opportunities for Tribes.
- Advocate for increased state-level investments in composting program funding.
- Increase state funding to help offset reductions to federal grant funding.

Initialisms and Acronyms

Acronym	Full Name
AI	Artificial Intelligence
CalRecycle	California Department of Resources Recycling and Recovery
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
U.S. EPA	United States Environmental Protection Agency
KAI	Kauffman and Associates, Inc.
NOP	National Organic Program
PESTLE	Political, Economic, Social, Technological, Legal, and Environmental
SB 1383	Senate Bill 1383
SMSC	Shakopee Mdewakanton Sioux Community
SWOT	Strengths, Weaknesses, Opportunities, and Threats
SWRCB	State Water Resource Control Board
TEK	Traditional Ecological Knowledge
TSWAN	Tribal Solid Waste Advisory Network
USDA	United States Department of Agriculture

Glossary of Terms

Circularity
A systems-based approach to managing resources in which outputs (e.g., food waste) are cycled back into inputs (e.g., compost) to reduce waste and promote sustainability.

Community composting
The collective management of organic waste at a local scale to produce compost, often emphasizing education, stewardship, and community participation.

Compost
The product resulting from the controlled aerobic (oxygen-required) biological decomposition of organic materials by microorganisms.

Composting facility
A site equipped to manage the controlled decomposition of organic waste materials into compost. Facilities may range in scale from small community operations to large industrial systems.

Cultural burning
The intentional use of fire by Indigenous Peoples to manage land, promote ecosystem health, and support cultural practices, including soil enhancement for traditional plants.

Data sovereignty
The authority to govern data — including its collection, ownership, storage, access, and use — under the laws and policies of the relevant jurisdiction.

Environmental stewardship
The responsible use and protection of the natural environment through conservation, sustainable practices, and cultural knowledge.

Fee Simple Land
Fee simple land is owned outright by an individual or Tribe. It is subject to state and local taxes and regulations, can be sold or mortgaged freely, and is under the full control of the owner.

Food sovereignty
The right of people to define and control their own food systems, including traditional agricultural and composting practices.

In-vessel composting
A composting method in which organic materials are enclosed in a container or vessel that controls environmental conditions (e.g., temperature, moisture, and aeration).

Permitting
The regulatory process through which composting facilities must obtain required approvals for land use, air and water quality, and health and safety compliance. Note, composting facilities may be exempted from permitting requirements, due to circumstances such as size of operations and land status (i.e., trust land).

Regulatory framework
A set of rules, standards, and policies established by government agencies to oversee composting operations and ensure public and environmental safety.

Traditional Ecological Knowledge
An Indigenous framework of environmental understanding based on centuries of knowledge and practice, often passed through oral tradition and cultural teachings.

Tribal lands
Territories that are federally recognized or traditionally occupied and managed by Tribal Nations for governance, cultural, and environmental purposes.

Tribal sovereignty
The inherent authority of Tribes to govern themselves, manage their lands, and implement programs and policies that reflect their cultural values and priorities.

Trust Land
Trust land is land for which the title is held in trust by the United States on behalf of an individual American Indian or Tribe. It is not subject to state or local taxes or regulations, cannot be sold or conveyed without federal approval, and is governed under the authority of the U.S. Department of the Interior.

Appendix: Key Informant Organizations

Key informant interviews were conducted with representatives from both Native and non-Native organizations experienced in Tribal composting and related waste management initiatives. Participants were selected for their expertise, regional knowledge, and direct involvement in composting programs serving Tribal communities. Semi-structured interview guides were used to ensure consistency while allowing flexibility for respondents to share unique perspectives and experiences. Interviews were conducted by video conference, recorded with consent, and supplemented with detailed notes. Data were analyzed to identify common themes, challenges, and best practices, providing culturally informed insights into effective composting strategies in Tribal contexts. The following key informant organizations contributed valuable insights during the engagement process.

- Native Health in Native Hands
- Tolowa Dee-ni' Nation
- Tribal Solid Waste Advisory Network
- California Certified Organic Farmers
- California Compost Coalition
- California State Water Resources Control Board
- U.S. Composting Council

These organizations represent a range of Tribal nonprofits, environmental programs, and regional partners involved in composting and waste management. The insights gathered helped inform the final needs assessment plan and ensured that Tribal voices were central to shaping program strategies.

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