



# ZERO WASTE REVOLUTION

2015-2016 School Year

## MONTHLY REPORT • SEPTEMBER

### Closing the circle

The most rewarding accomplishment in a very busy September was *closing the circle*. Collecting and processing our own food waste means that valuable nutrients can be returned to the soil, the very foundation of magnificent, robust Lanikai School gardens. We are so proud to be practicing the philosophy of Zero Waste to “*conserve and recover all resources... emulate sustainable natural cycles where all discarded materials are designed to become resources for others to use.*”

### AINA program kicks off September 14th

AINA – Actively Integrating Nutrition and Agriculture – a program of Kokua Hawaii Foundation (Kim and Jack Johnson) begins its third year at Lanikai School. This comprehensive gardening program is beautifully organized and wildly popular among students, staff, and parents.



Each grade level has four sessions in both Fall and Spring that emphasize grade-appropriate key concepts about plant science and growing cycles, local food culture and nutrition. Hands-on activity covers a wide arc – preparing the garden beds, seeding, planting, cultivation, weeding, harvesting, and participating in chef-mentored preparation – what’s not to love?



This Fall the grade-level beds were planted with kalo, pole beans, sweet potato, cucumber, and herbs as well as with companion flowers such as sunflower, marigold, cosmos, and zinnias. Students are eagerly scanning the beds for signs of sprouting. The recent drenching rains have painted our entire campus a vibrant emerald – the garden crops will be the crowning jewels.



*Environmental Protection Agency’s hierarchy for food recovery places composting at the bottom, just above landfill. Hawaii schools are unable to access the upper EPA strategies because of Federal lunch program mandates and rigid DOE policies. We are banned from passing food on to Aloha Harvest and other agencies. There are regulatory barriers to using piggeries. Industrial uses on Oahu are limited.*

*Yes, Hawaii is different. Because our distinct advantage of climate gives us the capacity to process food waste on site year ‘round, the local version elevates COMPOSTING up the hierarchy and morphs the triangle into a sphere, where all strategies are multi-dimensional and of equal value.*

*At Lanikai we have embraced and enhanced composting to realize significant **added value**. By composting on campus, we not only eliminate waste but generate benefits as depicted below:*

**Lanikai School Food Recovery**



**Lanikai raises the bar on organics recycling and resource recovery**

For 3rd graders, the AINA program offers four classes that cover the basic concepts and technologies of decomposition: constructing a small thermal compost pile, starting a classroom worm bin, and making up a batch of bokashi inoculate.

This information is excellent and the effort is appreciated, but these are demonstration projects only, producing barely a handful of usable product. AINA purchases the soil products required for its gardening program at 14 school sites.

Although all Hawaii schools generate tons of valuable organic material daily at every lunch, only at Lanikai has 100% of this valuable resource been recovered in a systematic way and processed on-site to create a significant volume of rich organic soil amendments. Our hot composting, vermicomposting, and bokashi fermentation operations are full-on production scale.

In less than one year, we have made enough input for our own expanding garden program as well as plenty surplus to share with others – all this from our own food waste. Lanikai wants to serve as a model so that other schools can choose to do the same.

It was so satisfying to use our own soil mix and vermicompost to prepare our garden beds this year! Our advice to any school wanting to start a garden is to begin with Resource Recovery – spend a year composting lunch waste. When you have made the soil you need to assure success, then start your garden.

## Compost College

Lanikai encourages and challenges other schools – especially AINA schools – to step up their recycling capabilities. It’s not necessary to go 100%, but collecting and composting even one day’s worth of organic waste would make a big difference in creating award-winning gardens, all the while increasing everyone’s understanding of the importance, science, and downright fun of turning garbage into gold.

We have everything we need to close the circle at our fingertips. AINA and Lanikai School are co-hosting a **Compost College** on Saturday, October 17, so that others can learn our techniques. Expansion means many more practitioners and much more impact. At last count, over 60 people have signed up.



*Young gardeners plant seedlings using compost and vermicast processed from last year’s lunch scraps. The kids sing a song called “Dirt Made My Lunch” but at Lanikai it’s also true that “**lunch made my dirt!**”*



*Zero Waste is a philosophy that encourages the redesign of resource life cycles so that all products are reused. No trash is sent to landfills and incinerators. The process recommended is one similar to the way that resources are reused in nature.*

*The internationally recognized definition of ZERO WASTE adopted by the Zero Waste International Alliance is:*

*“Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use.*

*Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them.*

*Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health.”*



## Lanikai School is awarded \$15,000 Koaniani grant!

Lanikai School applied for support to produce a video about our Zero Waste Revolution and was thrilled to receive a \$15,000 grant on September 30, 2015 from the **Koaniani Fund of the Hawaii Community Foundation**.

One of the components required by the grant is to highlight student-to-student outreach. We were planning to send a team of our experienced lunch monitors to conduct a waste audit at Aikahi Elementary per their request. *This audit will be postponed until we have – wow! – our film crew with us!*

Next month we will be soliciting bids from videographers and choosing the filmmakers who we feel can best help us to tell our story.

## Additional food-service reusable debut

*“I’m gonna go for it!”*

One Love Cafe owner Shannon Walker didn’t wait for grant money – a true Zero Hero, Shannon invested in beautiful durable washable cups that make us feel we are at a fancy restaurant rather than at a school cafeteria. The shiny swirly cups make the locally-sourced, organic fresh fruit we are lucky to have daily at Lanikai School even more appetizing to our students – an additional benefit of eliminating ugly, environmentally degrading single-use items.



The 6th graders in charge of the lunch catch are developing new procedures for swiftly bussing our new reusable trays and cups back to the cafeteria after use. So far we have found no items in the rubbish, but they do get spread around the campus.

It will take a while to raise awareness to change our habits. Our disposable society has conditioned all of us to “trash it” wherever we happen to be.

## Kindergarten & 1st graders contribute

It makes a lot of sense to focus on the youngest members of the school community, who not only soak up knowledge like sponges but have proven themselves to be champion helpers. Last month, the little kids delighted in meeting our campus worms and discovering what they do for us. Kindergarteners and first graders do an important service as well by tearing up the waste cardboard we generate to make a valuable product – worm bin bedding.



*Pizza boxes make the best worm bedding!*

Because Lanikai has chosen to maintain an extensive worm system to handle the large volume of fruit and vegetable prep waste our kitchen cranks out, we need mountains of new cardboard bedding periodically – every time we harvest a batch of vermicast.

Worms, microorganisms and other invertebrates use the fluffy layer of cellulose bits as habitat. Cardboard bedding provides shelter and protection, the perfect environment for decomposition that requires not only substrate but water and air. The multitudinous surfaces hold moisture and between each bit is a little air pocket.

### Six month cycle

The tough cellulose material takes a while to break down. As it does, it is consumed by the worms (a source of carbon) and along with food waste becomes part of the vermicast that fills the bin in its place. When the cardboard bedding has disappeared, it's time to harvest. Our lateral-flow Pipeline worm systems operate on six-month cycles, with worms beginning the migration into fresh bedding – where the food is placed – every six months.

At Lanikai, we collect every single box that comes our way – no cardboard in the dumpster, ever! The majority of big boxes are used for sheet mulching but much of the softer material and smaller boxes are cut into pieces, soaked in water, drained, and delivered to K-1 classrooms.

Children use their developing fine motor skills to tear up the cardboard into 1” pieces. They use their judgement to



determine that the piece is not too big, not too small, but just right. Making worm bin bedding is a very relaxing and calming activity that the teachers also enjoy. Kids consolidate their pieces into a big pile, fill a container, and deliver the goods to Ms. Mindy who will provide another batch.

When the classrooms have a Pizza Party, we can cut down those big pizza boxes, soak and rip right on the spot, part of the festivities for sure! After a few months in kindergarten or 1st grade, it would never occur to a Lanikai Learner to throw away a pizza box... a perfectly good resource.

We make enough surplus bedding to share with others on Oahu who also have Pipeline worm systems, whose cellulose recycling operation is not as organized as ours. Recently our bedding customers included Palolo, Waikiki, Liholiho, and Lincoln Elementary Schools, Kailua Intermediate School, Windward Community College, UH Urban Garden Center, Hawaii Baptist Academy High School, and Foodscapes Hawaii. We sell a 5-pound bag of bedding for \$5.



## 5th graders make a big supply of bokashi inoculate



Fifth graders are assigned the Zero Hero Service job of making bokashi starter, or inoculate. They truly enjoy this hands-on activity and make quite a mess! We are fortunate to have outdoor work tables that can be hosed down after each session.

Bokashi inoculate is made from mill run – the chaff (aka bran) that is separated from wheat in the process of making flour, plus molasses and a consortium of bacteria and yeasts. Unfortunately, the local mill went out of business this year. We used to routinely purchase a 60-pound bag of mill run for \$6 at Waimanalo Feed Supply. Now they have to ship it in from the mainland and it's 50 pounds for \$20. Until we find a local alternative, we're stuck with this.

In spite of the cost increase, bokashi fermentation is still a technology worth pursuing. Bokashi adds flexibility to our operation whenever worms and hot compost piles are filled to capacity, and gives us a way to process food waste into rich supersoil amendment relatively within just a few weeks. We have learned that there are many ways to break down organic matter, and bokashi fermentation demonstrates the less familiar *anaerobic* process – academically, a good exercise in “compare and contrast.”



### First phase - mixing the inoculate

The inoculate is made in two phases, two weeks apart. In the first session, 5th graders mix a solution of water, molasses, and a blend of bacteria called EM-1 into a quantity of dry bran. They use their fingers to evenly moisten the bran, much as you would smooch together ingredients for cookie dough. The moistened material is then pressed firmly into plastic containers to squeeze out all the air, and sealed with a tight-fitting lid. At this point, the material smells like gingerbread Christmas cookies.



### Two weeks fermentation

The containers are stored in a cool place for two weeks. During this time in anaerobic conditions, the bacteria reproduce prodigiously, feed on and ferment the molasses.

### Second phase – drying and re-packing

When we pop open the containers, the material smells like beer! The bokashi starter can be used fresh at this point, or dried and stored indefinitely. It is exactly the same as a yogurt culture or sourdough starter – a bacterial inoculate. The 5th graders crumble it, spread it out and let it dry in the sun for a few days in kiddie wading pools. When dry, it is packed tightly again into sealed containers. Each container holds one pound of inoculate.

### RECIPE

#### Bokashi Inoculate

- 4 pounds wheat bran
- 1 quart water
- 2 tbsp molasses
- 2 tbsp EM-1

Dissolve molasses and EM-1 in water. Add to dry ingredients and mix thoroughly. Pack tightly into sealed containers; store for two weeks. Decant. Use fresh or dry and re-pack.



*Although you can make your own, for convenience and consistency, we prefer EM-1, a commercial formulation of microbes. EMHawaii LLC's president, Hiromichi Nago, is always available to help.*



**Bokashi operation finds new home alongside portables**



This underutilized patch of dirt and weeds by the portables was sheet mulched to become the permanent site of our productive bokashi operation.

For this spread-it-out-to-dry phase, our 5th graders were joined by a group of Environmental Club high schoolers from Hawaii Baptist Academy who were touring Lanikai School to observe our resource recovery operation. Because they have limited space on their campus, HBA is unable to incorporate hot compost, so bokashi fermentation was of special interest to them. Our kids showed them the ropes!



*Whoops! This container was not properly sealed. Oxygen got in and grew a nice clump of fungus. The bokashi underneath is salvageable; the fuzzy fungus (harmless) will be tossed into the bushes.*

*With more practice, 5th graders will pack the material perfectly.*



## Lanikai initiates a weekly tea party – for the plants!

### Compost tea is cutting edge technology worldwide

Although the utilization of compost tea has not yet become widespread in Hawaii, this strategy is gaining rapid acceptance around the world as the damage from synthetic fertilizers and pesticides becomes increasingly apparent. In California where strict regulations on toxic pollutants have been enacted within the last 15 years, every golf course, park, and sports facility in the Bay Area has made the transition from chemical to biological soil management based on application of compost tea. In 2009, Harvard University groundskeepers replaced chemical fertilizers with organic compost tea made right on campus with astounding results.

At Lanikai School, where the gardening program is expanding and ambitious plans are underway to revitalize landscaping and lawn, compost tea is the best choice for biological augmentation, fertilization and pest control. Not only is tea perfectly safe for children and the environment, but we make our very own ingredients: high quality compost and vermicast.

In September, we acquired a Growing Solutions System10 Compost Tea Brewer, backpack sprayer, a supply of catalyst and an hour of consultation with \$1,000 from a HCF Koaniani grant. A heavy-duty wheeled stand was purchased with garden funds. This equipment was tested by Mr. Sawyer and custodian Uncle Jeff.

The brewer is currently being housed in the Teachers' Lounge, where it can be turned on after school to run overnight, then wheeled outside first thing in the morning to complete its 24-hour brewing cycle where the hum of the air pump will not disturb anyone.

*Tom Gibson, manager of a 1/4-acre organic urban micro farm for MOA Hawaii, has considerable experience with compost tea. Tom came by to give us some tips on dilution rates, application techniques, and equipment care.*

### Why use compost tea?

#### **Liquid most efficient, effective**

*Tea – an aqueous extract – offers the best possible delivery system for the nutrients, organic compounds, and beneficial microbes present in solid compost and vermicast.*

#### **Water conservation**

*Tea augments soil biological activity, promoting soil aggregation and improving infiltration, drainage, and water-holding capacity.*

#### **Less chemicals**

*Compost tea reduces the need for synthetic fertilizers and pesticides by enabling plants to access and utilize nutrients more efficiently, and by fortifying their immune system to better withstand disease and pest pressures.*



The initial brew of ten gallons was completed and decanted. Compost tea is most commonly used as a foliar spray and soil wash. Jeff used the backpack sprayer to hit landscape plants on the underside of leaves where aphids and white fly are tenacious. Within a few applications, these insect pests will disappear. Vermicast contains an enzyme call chitinase, which breaks down chitin, the tough material that makes up the exoskeleton of insects. When pesky bugs walk on a tea-treated plant surface, their little feet burn and they buzz off.

A simple watering can is used to do a soil drench or soil wash, which will deliver nutrients to plants as well as organic compounds that stimulate their own hormonal defenses against disease and pests. This application can be managed by students.

### **Engaging 3rd graders in the tea party**

Mr. Sawyer will plan a weekly tea brew and target that may be in the various gardens, on our new lawn, or to infuse biochar with an organic component. Tea should be used within 24 hours of brewing; it's at its best within four hours.

Although it is still in the the conceptual stage, we propose that 3rd grade students will be assigned in tea-teams of two. They will learn to set up the brewer and turn it on, assist with the application of the tea, and clean the equipment afterward. As a Zero Hero Service for 3rd graders, this activity will compliment the basic course in composting they study with AINA this year.

### **Tea has solid, steady fundraising potential**

Calvary-by-the-Sea Church and Preschool has had worms and a 10-gallon tea brewer for many years. They brew a batch to rotate application around their property for three weeks. On the 4th week, they sell the tea to Sunday parishoners for \$5/gallon. It always sells out. Lanikai parents and Windward residents might like the same opportunity to purchase tea – presumably from our enterprising 3rd graders.



*A soil wash, or soil drench, is easy to do with a simple watering can – students can easily take on this task.*



## Community outreach, mentoring, networking

### Lanikai's Zero Waste program draws visitors

In September, we welcomed folks who came with various agendas, mostly the desire to see for themselves a fully operational food waste collection and composting program.

### Intern Kelsey Jorgensen joins our team

Kelsey holds a degree in Architecture from the University of San Francisco and is currently preparing to start her MA in Hawaiian Studies at UH while she completes her internship as the RISE Food Recovery Fellow at Kupu, the local office of the Environmental Protection Agency. Although Kelsey's focus is on agricultural waste, she is very eager to learn from us and offered to help out several hours a week... all paid for by EPA!



KIS Malama Garden teacher **Wendy Rosen** and PCNC **Laurie Algren** from **Kailua Intermediate School** came to check out our operation. One peek into Big Blue and Wendy realized that she and the forty-plus Special Ed students who work in the garden were not using their worm bin correctly! Although KIS is far too big with far more waste than can be managed with current staff and resources, we decided that a reasonable step forward would be to get the ailing worm system back on track. Lanikai School graduate Phoebe Wallace will be documenting the worm colony restoration as her science fair project.



Twelve students from the **Environmental Club of Hawaii Baptist Academy High School** came to spend an entire afternoon learning at Lanikai accompanied by their Environmental Studies teacher **Claire Mitchell** and Student Activities Coordinator **Michele Oda**. In addition to the tour, they requested a bokashi workshop. The students made 30 pounds of starter, helped the 5th graders decant their finished inoculate, and dug right in to process 123 pounds of food waste in one of our bokashi blasters. HBA is already vermicomposting on their campus and plans to adopt more Zero Waste strategies this year.





## Bottom line for September 2015

This report covers the interval between September 1–30, 2015. There were 19 school days during this period.

- Total food waste diversion rate was 100%. Total composted was **998 pounds** via vermicomposting, hot composting, and bokashi fermentation. Total composted since the beginning of the school year is **2,933 pounds**.
- 100% of all HI-5 cans and bottles were collected and redeemed.
- Approximately 85% of all paper and cardboard was collected and processed.
- Approximately 60% of all green waste was collected and processed. *Let's look at getting a small chipper shredder to bring up this diversion rate.*



*Sadly, nearly all of the talapia in our aquaponics system perished when the air pump broke over a long weekend.*

*Happily, our talapia will rise again! Fourteen big dead fish were added to our hot compost, providing a nitrogen-rich, calcium-rich nutrient bonanza.*

*Everything on the Lanikai campus is **resource**.*

## Coming up in October

- We will interview and select the videographer for our Zero Waste movie!
- Tea program to be fleshed out, 3rd graders get Zero Hero Service assignment.
- Biochar program – delayed one month because it took longer to get our kiln built than expected – will be underway mid-October.
- Six graders will prep Science Beds for biochar comparison field trials.
- First Compost College to be held October 17, 2015
- Product labels unveiled. Ms. Kristi's art students have developed Lanikai School brand labels for bokashi inoculate, vermicast, vermicast tea, biochar, and compost.