



ZERO WASTE REVOLUTION

2015-2016 School Year

MONTHLY REPORT • JANUARY

Back with a bang!

Harvest bonanza

Winter break was over far too soon but the 2016 half of the school year kicked off anyway on January 7th with 326 Lanikai Learners back in the classroom, ready to resume participation in the Zero Waste Revolution.

The daily rhythm of Resource Recovery is characterized by small acts accomplished frequently such as the daily lunch food waste collection, the afternoon Sort-It-Out Sam catch, a layer or two on the compost pile, a weekly worm bin feeding, a pile of paper shredded...

By January, the prior six months of steady incremental processing accumulated into a tsunami that came crashing to shore all at once, bestowing upon us three weeks of astonishing abundance and satisfying work that required many hands to handle. We were blessed with bountiful riches from our efforts.

Hot compost piles Purple and Green came due and were harvested by several 4th grade harvest teams that yielded sixteen and nineteen 10-gallon boxes respectively, an estimated **four cubic yards** of the darkest, richest, most beautiful compost anyone has ever seen.

The five worm bins of the Mulberry Gang were also scheduled for harvesting, yielding **400 pounds** of top quality vermicast, all of which was dried and screened for sale to local growers and gardeners. While drying and screening vermicast is not necessary for our own use, it is recommended for proper packaging and a more professional product presentation.



*AINA Garden & Mulching Party – Parents, students, and church volunteers gathered on January 16th to clean and clear garden beds, amend the soil in preparation of the second planting, and spread **three tons** of mulch.*

Vermicast display

What do you do with 400 pounds of vermicast that needs to air out and dry? We took the opportunity to utilize a 10' x 2' unfinished worm bin as a public display piece and post some pertinent informational signage.

Permission was granted to set up a loaded open bin under shelter in the breezeway in front of the library for a couple of weeks.

The weather was rainy and humid, but eventually the vermicast dried sufficiently for screening.



January 2016 VERMICAST HARVEST

Our Mulberry Gang Worm Colony is so awesome!

Thousands of worms have been very busy processing waste since the last harvest in June.

In the bin below is the yield from our harvest. You see before you several hundred pounds of rich vermicast (also correctly called vermicompost), created by our Mulberry Gang composting worms.

It needs to dry for a week or so – please look but don't touch.

Mahalo!



Let's do the math:

One pound of composting worms (pictured above) = 1,600 worms

We have **six** pounds of worms in each worm bin.
• $6 \times 1,600 = 9,600$ worms.

We have **five** worm bins
• $5 \times 9,600 = 48,000$ worms!

They are small, but together they become a powerful force of nature, able to turn garbage into gold!

Or – to be more scientific – worms break down food and paper waste and create **vermicast**, a nutrient-rich soil amendment often called "Gardeners' Gold."
Vermicast is worm poop.



+



How do we vermicompost?

- 1) Make a deep bed of moistened ripped-up cardboard. We use all school cardboard – pizza boxes, Amazon shipping boxes, egg cartons, etc.
- 2) Feed fruits, veggie, and grain waste once a week. During this six-month cycle, our worms were fed **1,420 pounds** of food – melon and pineapple rinds, pear and apple cores, potato skins, salad trimmings, leftover beans and carrots, rice, bread, and pancakes.
- 3) Cover with a few inches of fluffy shredded paper. This is the paper we collect from Sort-It-Out Sam! It all gets used as worm covering.
- 4) Water every day.
- 5) Continue for six months. The worms will consume all the food, all the paper, all the cardboard, and poop out...

VERMICAST!

Screening is a fun activity!

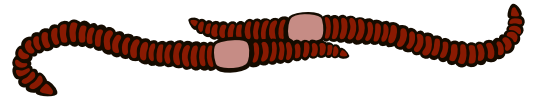
Students at every grade level voluntarily assisted with the screening during recess and after school. Screening consists of pushing barely-moist vermicast through an 1/8" mesh to remove bits of debris, snail shells, and seeds. The clean vermicast is of uniform texture, soft and velvety.



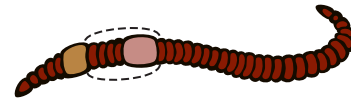
Screening also offers an up-close and personal exploration of this final phase of decomposition. Screeners keep an eye out for any stray worms, baby worms, and egg capsules to rescue. These go into a cup filled with damp shredded paper to be returned to the bin. In this particular batch there were hundreds of tiny, just-hatched, still-white millipedes as well as the familiar adults of several species and a wide variety of very interesting unprocessed mystery items.

Most exciting was the bumper crop of worm egg capsules. Some lucky students saw a baby worm hatching out! From this sample of worm bin material, it is clear we will very soon be experiencing a worm population explosion.

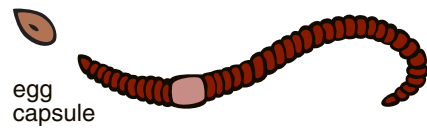
Worm Reproduction (elementary school version)



happy worms get together to make eggs



formation of egg capsule



egg capsule



Baby worms hatching

WOW!



Schoolyard restoration, Phase 1, second mulching

Last year, the LSO wisely rejecting the proposed plans of either cementing over the front schoolyard or installing artificial turf in favor of restoring the soil and replanting real grass. After 53 years of heavy use, the area consists of compacted, depleted dirt that can barely support living turf during the wet months. When it rains hard, the yard turns into a mud pit. Runoff increases erosion and the cycle of degradation continues. When the weather is hot and sunny, the entire yard is a brown, dead dustbowl.

The first phase in restoring the schoolyard is to mulch the area four times over a two-year period to build a layer of rich soil, created as the mulch naturally decomposes. Just before school started in August, the first layer of mulch was spread over nearly all of the worst sections. At that time, our entire mulch supply was in the back field and moving the stuff was a laborious process of filling boxes with mulch, loading them into Mr. Sawyer's truck, driving them into the front yard, unloading and spreading, then repeating, repeating, repeating, repeating.... Inefficient and exhausting as that was, it started the process and six months later there can be scratched out about an inch of actual soil covering the hardpan dirt. Success!

It would be far more efficient if the mulch coming from the tree trimmers could be dumped directly into the front yard, and we anticipated the second layer could be spread during Winter Break. Unfortunately, the arborists empty their trucks only when they are full. They took time off for Christmas, too, so mulch didn't arrive until mid-January. The unanticipated **January Mountain of Mulch** caused some inconvenience for students and staff.



Like any construction project, inconvenience is what you put up with to get to the desired result. A more typical building project would create noise, sawdust, tar or other chemical smells, dust being tracked around, trucks taking up parking spaces, etc. Everyone deplores construction when it is taking place, then loves the finished product and forgets the irritation inherent in the process. Because we are partnering with Mother Nature in this construction effort – and She is a notorious slowpoke – making soil will stretch out for a while and will require everyone's patience and understanding. Guaranteed, the resulting carpet of lush, resilient green grass will be well worth it.

Spreading the initial three tons – three truckloads – was completed by the parents and students who showed up for the Garden Party (AINA-ese for “work day”). They finished cleaning and prepping the garden, then grabbed pitchforks and wheelbarrows and toiled away until the mulch pile was pau.

Another three tons showed up days later and were quickly spread with the help of additional staff. Both Davey and HTM tree trimmers unloaded a total of *six tons* of fresh, fragrant mulch into our front schoolyard. This is a huge contribution of valuable organic matter and transformed the look and feel of the campus immediately – walk by the cafeteria or library and you can imagine being deep in a forest. The sweet, woody scent and earthy textures are particularly pleasing after a drenching rain. Observant students noticed how many more birds – and more species of birds – visited our school this month. Birds are feasting on the insects and other invertebrates who have arrived on the scene to break down the mulch. Biodiversity and nutrient cycling is enriched at every level when organic content is added to dirt.



All of the cardboard waste generated the first six months of school is buried underneath this batch of mulch. It will all break down to soil – a far better fate than being land-filled or incinerated. Cardboard is a valuable resource.



Magnificent Mulch: *Our schoolyard restoration project is a work in progress and a showcase of soil science.*

Activating a green waste composting operation

When the AINA docents cleared out their 3rd grade composting lesson site – the double-pallet structure near the garden picnic tables – and presented quite a decent volume of medium quality compost, Mr. Sawyer and Ms. Mindy got inspired to organize and activate that area to address the green waste issue that has been gnawing at us for months.



As Zero Waste practitioners, it is our goal to keep all our biodegradable organic resources on campus and find a use for them. Green waste is particularly tricky because 1) there is so much of it at one time, 2) it may contain undesirables such as weed seeds or rat treats, and 3) it is mainly composed of tough cellulose and lignin – challenging materials to handle, difficult to break down.

There is a long DOE custodial tradition of bagging up green waste in plastic liners and depositing it in the dumpster, by far the most convenient practice. This still happens from time to time but our custodians are getting *much better* at eliminating the plastic bags and hauling the stuff out to the mulch pile. Davey Tree folks have already agreed to chop up our big stuff with their machinery – all we have to do is deposit it in one spot – the far side of the back mulch pile – and they will grind it up and add it to the tree mulch.

We will tackle the small to medium pieces including grass, leaves, garden trimmings, shrub prunings, etc. The plan is to layer green items with layers of disintegrating burlap bags (the “brown” component) that pile up as they are retired from our hot compost piles into the AINA structure and keep it wet. This minimal management should work just fine over several months’ time. The structure will be cleared in time for AINA to use it again in August of next year.

The two manufactured tumbler composters for green waste will also be activated for breakdown of the same material. This neglected equipment has been cleaned out and repaired. As with all composting operations, this one will require organization, attention and some experience to get it right. We can do this!



The medium-grade compost created will be ideal for building up the organic content the central area of the front schoolyard – we cannot mulch this section because it is used continually for morning assembly and A-Plus activities. The current AINA batch and the compost from this new on-going operation will be broadcast over the area by members of the Green Team as it accumulates.

The custodians have been asked to deliver all small green waste materials to this area from now on.

Pearl City High School wins national EPA award

Lanikai School participates in the Food Recovery Challenge, a nationwide competition sponsored by the U.S. Environmental Protection Agency to promote food waste prevention and recycling. They sent an e-mail to remind us to submit our data for the 2014-2015 school year and included a list of the 2013-2014 winners. Ms. Mindy was thrilled to see that her former program at Pearl City High School was the big deal, numero uno ***national winner*** in the category of K-12 Schools! That year 34,635 pounds of food waste was recovered on site using worms, hot composting, bokashi and Black Soldier Fly Larvae. All of the waste recovery operations we use at Lanikai were developed and perfected at Pearl City. Although the scale is much smaller, Lanikai's program has far more depth, student participation, and complexity.

Let's make it a two-fer win for Hawaii! We will submit our data ASAP knowing that we have done our very best. The winner will be announced in January of next year.

What is the cost of wasted milk?

The data we collect at lunch tells us that 16.1 pounds of milk – just over two gallons – is thrown out each day by students who do not finish their half-pint carton of skim or 1% milk.

With a school year of 182 days, that comes to 364 gallons. Each half-pint costs 60 cents. There are 16 half pints to a gallon so each gallon costs \$9.60.

$364 \text{ gallons} \times \$9.60 = \$3,494.40.$

*Lanikai parents are paying **\$3,494.40** each year for wasted milk.*

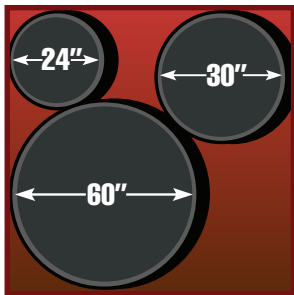
No mystery here: milk in plasticized milk cartons does not taste good. Schools who have switched to refrigerated milk dispensers report a sharp drop in wasted milk. At \$3,494.40, it is worth our consideration.



HDPE pipe – a saga of landfill diversion

One can't help but notice the proliferation of HDPE (high density polyethylene) irrigation pipe items popping up everywhere on the Lanikai School campus. Here's their story:

All major construction projects – shopping centers, residential developments, etc. – are required to install drainage systems underground. The pipes must be 60 inches in diameter, and they are manufactured in 20-foot lengths. Each pipe section is shipped from the mainland in a 20-foot container. In order to keep the 60-inch pipe from bouncing around, two other pieces of pipe serve as



Cross section of pipes in a shipping container

packing material – one 30 inches and one 24 inches in diameter. (See diagram, left). These smaller pieces were junk – damaged or remnants. They were unloaded along with the good pipe and hauled off to the landfill when the project was finished.

Ed Souza, Jr.*, from Pacific Industrial Products, hated to landfill perfectly good stuff and thought that someone might have a use for these pieces. He started to buy them up from construction sites and pile them up in a baseyard. Everyone thought he was crazy! His mountain of HDPE pipe got higher and higher.

In 2006, the owner of Waikiki Worm Company (that would be Ms. Mindy) walked into Ed's shop to explore the possibility of making lateral flow worm bins from HDPE pipe – about ten feet long and 24 or 30 inches in diameter, maybe?

Over the past decade, over 200 vermicomposting systems have been crafted from that “junk” pipe and put into use statewide. Ed's mountain of pipe has been completely leveled. Other bits and pieces collected over the years have been turned into many useful objects. HDPE is virtually indestructible, easy to clean, and looks really

cool. Every HDPE object on campus represents a landfill diversion.



Junk HDPE pipe is no longer used as packing material for container shipping – wood frames have been substituted. Mainland scrap pipe has more value when shredded and returned to the manufacturer for recycling.



Worm bins



Bokashi Blaster



Garden planters. On left, a cafeteria rubbish receptacle

* Mr. Souza designed all our HDPE pieces and is the creator of Sort-It-Out Sam.

Harold K. L. Castle Foundation comes to call

Our only visitor in January was a very important one, and he did *not* come to learn about the worms or see a hot compost operation. Having grown up on an organic farm, **Alex Harris**, Senior Program Officer for Education for the Castle Foundation, assured us he was very familiar with these technologies.

Mr. Harris came to Lanikai School to have a conversation with Mr. Noh about the future.

The Harold K. L. Castle Foundation is about to launch a one-year community of practice for ‘aina-based education organizations and schools in Windward Oahu. This hui comprising senior-level staff from up to eighteen nonprofits and schools as well as a youth advisory group will meet over the next year to:

- Support collaboration and strengthen relationships between ‘aina-based organizations and schools;
- Identify place-based indigenous evaluation tools to track lasting, intergenerational impact; and
- Work across sectors to address barriers to ‘aina-based education so that more students can be engaged effectively.

Mr. Noh was encouraged to apply to be a part of the **Windward Oahu ‘Aina-Based Education Hui**. He says, “As I considered the mission and purpose of the hui, I thought about all the ways our school has already begun to address some of the goals outlined by the Castle Foundation.

“My own personal journey around Zero Waste is growing first around awareness, education and action. Each day I am amazed at the level of excitement and engagement... We have students involved at every step of the process, all lending a hand because it does indeed take many hands to make an operation like ours work.

I am convinced that our students are receiving one of the best learning experiences because it has the recipe of meaningful learning. It's hands-on and problem-based. They are working towards a solution on a local level with global implications.”

Mr. Noh noted that Alex Harris was very impressed with our Zero Waste initiative and how all the elements of reducing landfill waste was being implemented in an educational setting. Mr. Noh's day-to-day experience with a solidly established, fully functioning model program makes him an ideal candidate for this gig, one who can make a substantial contribution. *Go for it, Ed!*



Lanikai School Director Mr. Ed Noh has been asked to step up to an important leadership position that could effect environmental education and activity on Windward Oahu for years to come. Daily participation in Zero Waste has given Mr. Noh unprecedented experience, understanding, and an enviable tool kit. This is a great opportunity for expansion and growth.

Bottom line for January

This report covers the period from January 1 through 31, 2016. The tail end of Winter Break and Martin Luther King Day trimmed down the month to include only 16 school days. We used our time well.

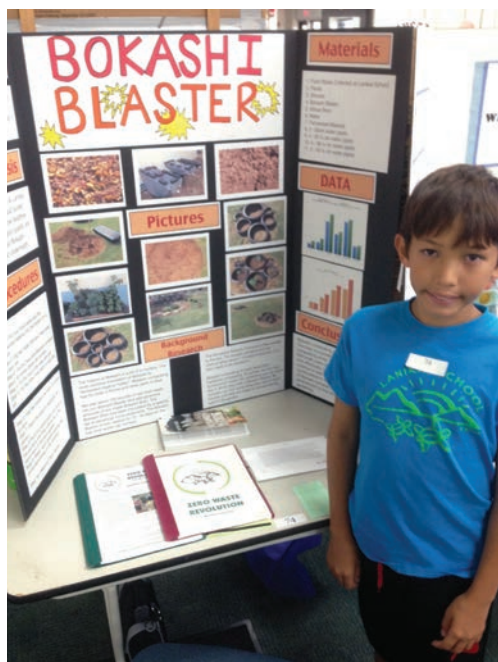
During this interval, **1,125 pounds** of food waste was collected and processed via vermicomposting and hot composting technologies. The school year total to date is **8,216 pounds** of food waste recovered, representing a 100% landfill diversion rate.

- 100% of all HI-5 cans and bottles were collected and redeemed
- 95% of all paper and cardboard waste was collected and processed.
- 90% of all green waste was recovered and shifted to a new processing system.

Other good January news:

At long last our video project is underway

Cinematographer Gabe Cabagbag visited the campus several times in January to collect footage of the lunch separation and hot compost harvest. Interviews are scheduled for early February. Gabe has his work cut out for him – developing a narrative of our complex, interwoven, interactive and ever-changing operations is an exciting challenge for even an experienced professional.



Bokashi science fair project advances

Kainoa Orgeles, the young man featured in the December Report digging 150 pounds of bokashi into the hillside to test its effectiveness, was one of six Lanikai School students who presented their projects at the Windward District Science Fair competition this month. Our kids compete in a category that includes 6th, 7th, and 8th graders.

Three projects were selected to compete at the State Science Fair in March, Kainoa's among them! Processing food waste into soil nutrients is not just an abstract class project for a grade or award, but a real life activity that Kainoa participates in every day by sorting lunch and snack waste. Zero Waste practices teach both good science and good stewardship for a lifetime.