



WHERE DOES ALL THE 'ŌPALA GO?

LETTER TO FAMILIES

Aloha 6th grade students and families,

We are about to embark on an adventure into learning about how technology has changed the way we use items and dispose of waste. We will also be discovering how we can help to *ho'ōla* (heal) our *ahupua'a* by reducing, reusing and recycling.

Your assignment is to gather some of the items we will need to compare the products and technology of ancient Hawai'i to our products and technology today.

Please bring in three (3) items from the following list.

Please make sure these items are clean, and will not attract pests. Do not bring sharp objects that could cause injury.

- plastics
- glass
- aluminum or metal
- rubber
- yard trimmings
- food packaging (clean, empty cereal boxes, food containers, etc.)
- old toys
- unneeded clothing



Please list the items you brought below:

1. _____
2. _____
3. _____

Your items are due in class by _____

Mahalo!



WHERE DOES ALL THE 'ŌPALA GO?

STUDENT READING 1

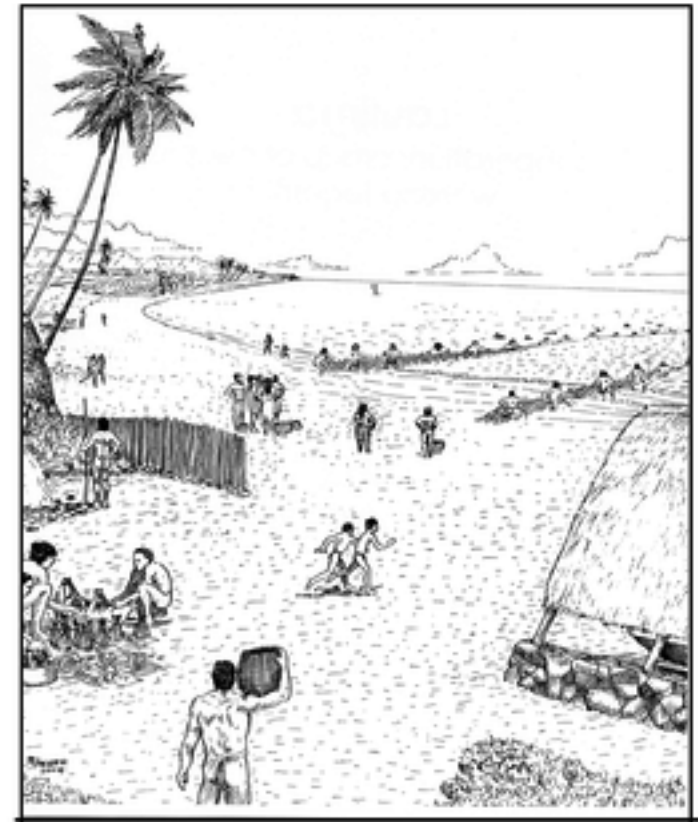
WASTES IN EARLY HAWAI'I

In early Hawai'i, our *kūpuna* (ancestors) did not have to worry about plastic bags, glass bottles, or disposable diapers. These kinds of materials did not exist. They used natural materials to manufacture their tools and products, which later could be easily disposed of and broken down naturally in the soil.

Our ancestors were stewards of the land. They would consistently care for the 'āina, realizing that this most valuable resource would grow the food needed to feed their families. It was their *kuleana* (responsibility) to always *mālama* this gift given to them by their gods.

Also important were the tools they manufactured to help till the soil, catch their fish, serve their foods, build their *hale* (houses) and keep their bodies healthy. "Sanitary regulations imposed by *kapu* controlled the disposal of garbage and human wastes" (Mitchell, 1992).

Our *kūpuna* were known for their cleanliness. The foot paths within their *ahupua'a* were swept clean with the *ni'au* (coconut midrib) broom. Those who owned animals such as pigs, dogs, and chickens, observed the rules that required them to be placed in clean and sanitary areas.



The tools they developed were made from natural materials that could easily be returned to the earth to decompose. If an *ipu* (gourd) cracked, they would repair it. If a fish net became damaged, they would mend it. It was uncommon for our *kūpuna* to unnecessarily toss away items that could be easily fixed and reused. Waste was rare, as tools, nets and utensils took a long time to make. And when materials needed to be thrown away, they were buried in the earth or returned to the ocean to replenish the 'āina.

OUR WASTES TODAY

Today we use many modern tools and products that are made of plastics and other materials that don't easily decay. Many products are disposable or come heavily wrapped in packaging. In 2003, people in the United States threw away an average of 4.5 lbs. of 'ōpala (rubbish) per person every day (EPA, 2006). Where does it all go? The 'ōpala that we don't recycle is carted to our landfills and to the H-POWER Plant in Honolulu, which processes 2,000 tons of garbage or 40 million pounds of metals a day.

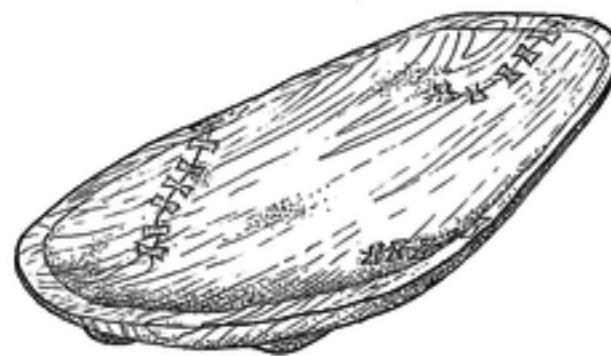


On O'ahu, 1.6 million tons of garbage is generated every year; 500,000 tons of it goes into our landfills (City and Co. of Honolulu, 2006). Old carpets, furniture, mattresses, sewage sludge and dead animals are just a few of the items that end up in our landfills.

How Long Will It Take to Break Down?

Glass bottles	1 million years
Monofilament fishing line	600 years
Plastic beverage bottles	450 years
Disposable diapers	450 years
Aluminum can	80 - 200 years
Foamed plastic buoy	80 years
Rubber boot sole	50 - 80 years
Foamed plastic cup	50 years
Tin can	50 years
Leather	50 years
Nylon fabric	30 - 40 years
Plastic film canister	20 - 30 years
Plastic bag	10 - 20 years
Cigarette filter	1 - 5 years
Wool sock	1 - 5 years
Plywood	1 - 3 years
Waxed milk carton	3 months
Apple core	2 months
Newspaper	6 weeks
Orange or banana peel	2 - 5 weeks
Paper towel	2 - 4 weeks

(Reprinted from North Western Hawaiian Islands Multi-Agency Education Project. A Teacher's Guide to Navigating Change™. 2006.)





WHERE DOES ALL THE 'ŌPALA GO?

LEARNING LOG 1

NAME: _____ DATE _____

Thinking About 'Ōpala

1. What are the two items you chose from the class garbage dump?

2. What kinds of materials are your products made of (paper, plastic, metal, wood, etc.?)

3. List three interesting facts you learned after reading your technology card.

4. Would you choose the technology described on your technology card to reduce or dispose of the products you chose from the garbage dump? Why or why not?

5. Can you recommend an alternate way to reduce, eliminate or dispose of the items you chose?

6. How do the items you have chosen compare to one or two of the items from the Hawaiian materials on display? Write on the back of this sheet or on a separate paper for more room.



WHERE DOES ALL THE 'OPALA GO? REFLECTION LEARNING LOG 2

NAME _____

DATE _____

In this lesson we have:

- Looked at some types of technology used by the ancient Hawaiians
- Studied waste management technologies and systems used today
- Analyzed our class "garbage dump" to decide how best to dispose of our wastes

To assess your learning, write a two-paragraph reflection.

- First paragraph should discuss the value of *mālama* (caring): How did Hawaiians *mālama* their environment? How did their choices of technology reflect and affect the way they cared for the environment?
- Second paragraph should discuss how we could apply traditional methods of waste management to our own society today. How can we better *mālama* our environment today?
- Paragraphs may be written on this Learning Log, or word processed.

Grading will be as follows:

Mechanics: Spelling, neatness, punctuation and grammar	_____ / 5
Content: Clearly address the topics, include examples, and have supporting details	
Paragraph 1:	_____ / 10
Paragraph 2:	_____ / 10
Total	_____ / 25

To help organize your thoughts, you can use the following:

- List examples of Hawaiian technologies. How did the choice of technology reflect how they cared for the environment?
- Describe modern technologies that correspond to the early Hawaiian ones.
- Describe the modern waste management techniques you have learned about.

Use the back of this page (or work on a computer) to continue your reflection.

My Reflection



WHERE DOES ALL THE 'ŌPALA GO?

'ŌPALA TECHNOLOGY CARDS



TECHNOLOGY CARD #1 - SOURCE REDUCTION

Source reduction or waste prevention is the best way to *mālama* our 'āina. Source reduction is not a form of technology. It's just a better system of managing waste. Source reduction simply means producing less waste. If we can create less waste, we can help decrease the amount of 'ōpala that ends up in our landfills and waste-to-energy plants. Waste prevention also helps conserve our natural resources. If we buy fewer products and materials, we use fewer resources.

Some ways we can be more active in source reduction and waste prevention and to help *mālama* our 'āina are to:

1. Buy products with less packaging.
2. Buy items that can be reused.
3. "Pre-cycle" by buying items that have been recycled.
4. Buy food items in bulk.
5. Buy locally made items to save on shipping, which uses oil.
6. Recycle old clothes by donating them to charitable organizations.
7. Reuse items and buy fewer products.



TECHNOLOGY CARD #2 - RECYCLING

When we recycle, the materials that were used to manufacture a product are reused to make new products. Recycling materials such as plastic containers, metal cans, glass bottles and paper products involves collecting and sending these materials to a manufacturing plant where they are made into new products.

Recycling prevents materials from ending up in our landfills or waste-to-energy plants.

On O'ahu, redemption centers have been set up to address our recycling needs. These centers are open for people to drop off recyclable items such as plastic, glass and aluminum. Some companies are recycling old rubber tires and using them for playground surfaces and as a soil additive to improve drainage on athletic fields. Recycled plastics are being used to build picnic tables, park benches, decks and bridges.

The City & County of Honolulu is also inviting schools to earn extra money by setting up recycling bins on their school campus. The city is offering 96-gallon carts for schools to use in their recycling efforts. This is a great opportunity for schools to earn extra money and at the same time *mālama* our 'āina.



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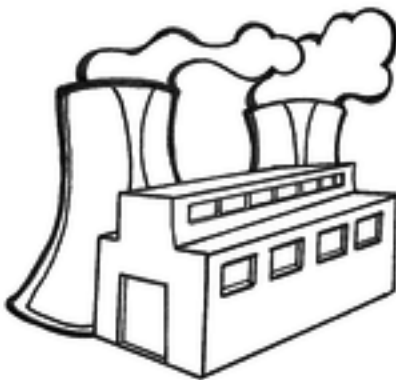


TECHNOLOGY CARD #3 - COMPOSTING

Composting is another way to recycle. Yard waste such as leaves, grass and other small trimmings are placed in a bin or left in an open pile to decompose. A natural process breaks down the organic material, which can later be used as plant fertilizer.

On O'ahu, there are two companies that produce composted green waste. The compost is used in many ways. Punahou School baseball and football fields and the Waipi'o Soccer Park use green waste around their facilities. Mulch has been used to fertilize plants at Hawaiian Waters Adventure Park, Kalāheo High School, and Marine Base Corps Hawaii.

We can help *mālama* our 'āina by creating a compost bin at our home or in our school.



TECHNOLOGY CARD #4 - WASTE-TO-ENERGY PLANT

A waste-to-energy plant turns waste into energy. Materials that cannot be reused, recycled or composted end up in a waste-to-energy plant.

In Hawai'i, the City & County of Honolulu manages a plant called H-POWER. The plant processes over 2,000 tons of garbage a day. The 'ōpala is burned in a furnace at 1,800 degrees Fahrenheit, which produces steam. The steam operates a machine called a turbine generator. The movement of the turbines produces electricity. The amount of electricity the H-POWER plant produces provides power to 60,000 O'ahu homes.

There are some risks involved in operating a waste-to-energy plant. Some experts say that the pollutants released into the atmosphere can be harmful to our health and our environment. Studies are still being done to find out what kind of impact the waste-to-energy plants have on society.

**WHERE DOES ALL THE 'ŌPALA GO?****'ŌPALA TECHNOLOGY CARDS****TECHNOLOGY CARD #5 - LANDFILLS**

Landfills are the most common way to dispose of waste. Garbage is dumped into a large cavity in the earth at a designated landfill site. A plastic liner is placed in the hole to prevent toxic materials from getting into the groundwater. The waste is spread out into thin layers, packed down firmly and covered every day with a fresh layer of soil or plastic foam. This is done to prevent the 'ōpala from blowing away and to prevent smelly odors!

On O'ahu, 1.6 million tons of garbage is generated every year; 500,000 tons of it goes into our landfills. Old carpets, furniture, mattresses, sewage sludge and dead animals are just a few of the items that end up in it. The City & County of Honolulu is taking steps to reduce the amount of materials that end up in our landfill by increasing recycling efforts.



WHERE DOES ALL THE 'ŌPALA GO? 'OHANA SHEET EXTENDED ACTIVITY

How Can My 'Ohana Help Mālama Our Ahupua'a?

1. Before you buy a product, check it out. Is it wrapped in lots of plastic? Will it end up in the landfill because it isn't made to last? Evaluate items before buying them as to cost, convenience, and environmental impact. How many pieces will have to be discarded and how can such pieces be discarded in the least wasteful manner?
2. Hawai'i has plenty of fresh fruit year round. If you buy natural fruits and vegetables, instead of processed frozen or canned, you'll be eating a healthier diet and throwing away less rubbish. It's also good for your health to eat less highly-processed food.
3. Buy bulk produce (or grow a garden) and do your own canning and freezing in reusable containers. Did you know, you can freeze bananas and use them later for baking things like banana bread?
4. What do you do with all your plastic grocery bags? Do you throw them away or try to reuse them? Next time you go shopping, bring your own reusable cloth or plastic bags for carrying purchases.
5. Don't throw away those *poi* bags! You can reuse them! Make a "waste-reduction kit" of twist ties, paper and plastic bags to be taken along when you shop.
6. Those mayonnaise jars can come in handy! Seek out stores that will fill and refill containers you bring in.
7. Reduce the amount of junk mail you get by asking companies to remove your name from mailing lists. To remove your name from third-class mail "master lists", send your name and address with such a request to: Mail Preference Service, 11 W. 42nd Street, P.O. Box 3861, New York, New York 10163-3861
8. What do borax, vinegar and baking soda have in common? They are all fairly non-toxic products that can be used to clean your house and the environment. Make your own less toxic household products for cleaning, personal care and pest control. (See <http://rps.uvi.edu/CES/recipes.htm> for a list of environment-friendly recipes.)
9. Oven or refrigerator giving you problems? Don't throw it away! Fix it! Try to buy durable, easily fixable appliances and then, instead of discarding them, keep them well maintained and fix when necessary.
10. Buy local. Buy Hawai'i. Try to purchase items that have been produced in a manner that is least damaging to the environment. For example: avoid items made of wood from rainforests, buy organically grown produce, consider reducing the amount of meat consumed, buy locally produced unprocessed foods at farmer's markets.



(Source: Adapted from the Mississippi State Cooperative Extension Program Web Site.)

