

FACILITATOR GUIDE: Built Environment GRADE: 9th – 12th**CONCEPTS & SKILLS****Mathematics**

- **S-IC.6.** Evaluate reports based on data.

Science

- A variety of technologies, such as hand tools, measuring instruments, and calculators should be an integral component of scientific investigations. The use of computers for the collection, analysis, and display of data is also a part of this standard. Mathematics plays an essential role in all aspects of an inquiry investigation. For example, measurement is used for posing questions, formulas are used for developing explanations, and charts and graphs are used for communicating results.
- Human modification of ecosystems
- Habitat destruction threatens global stability
- Human beings live within the world's ecosystems. Increasingly, humans modify ecosystems as a result of population growth, technology, and consumption. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems will be irreversibly affected.
- Ecosystem and population limiting factors
- Ecosystems have finite resources
- Environmental factors and finite resources influence ecosystem interactions
- Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite. The distribution and abundance of organisms and populations in ecosystems are limited by the availability of matter and energy and the ability of the ecosystem to recycle materials.

MATERIALS & RESOURCES:

- Access to websites:
 - Dan Phillips Builds Houses- <http://www.youtube.com/watch?v=9HrwFF0w4XY>
 - Ecomii website- <http://www.ecomii.com/building/building-construction-waste>
 - Phoenix Recycling- <http://www.phoenixrecycling.net/index.html>
- Handout- Closed Loop Systems- included in this guide



PRESENTATION:

Build homes from reclaimed materials from recycle bin

DIRECTIONS:

1. Watch the first 9-10 min. of the Dan Phillips Youtube video. (Or watch the entire video if desired)
2. Watch the video about Phoenix Recycling (5 min.).
3. Study the building waste data from Ecoii website. (Some of the info included below.) Find out how much total waste goes into your local landfill. Graph the total, then using the Ecoii or similar resource, calculate the percentage which is from building waste.
4. Continue to calculate and graph by representing the percentage of building waste that is from demolition, remodeling, and new construction. Then figure out the percentages of waste based on how much is from specific materials (brick, wood, steel, etc...), as specified on Ecoii site or similar resource.
5. Consider the handout *Closed Loop Systems*, included with this guide. Review the graphing outcomes and the Dan Phillips video. Lead a discussion using the following questions and issues generated by the group.
 - If humans had to mimic nature when building our homes, what would we do different? What impact would it have on pollution and resource depletion?
 - If you could design a closed loop system or close the loop at Phoenix Recycling, how would you do it?
 - How would these changes affect you, your family, your community? Are there benefits or disadvantages? What is the net result?

TIME:

2 hours

PROCESSING THROUGH THE SIX PILLARS:

What?

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So What?

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Now What?

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- **Some of the information from Ecoii website. Much more is available at <http://www.ecomii.com/building/building-construction-waste>**

Americans generate anywhere from 200 to 250 million tons of solid waste each year. That translates to about 3 ½ to 4 ½ pounds of landfill per person per day. Only 20% to 30% of that waste gets recycled.

As part of the immense environmental impact of buildings, construction waste accounts for almost a quarter of what goes into a landfill. This makes buildings the largest contributor to landfills. In response, many cities are now requiring construction waste to be recycled, to keep it from ending up in the landfill.

The waste from building construction activities breaks down like this:

Demolition: 50%

Renovation and remodeling: 40%

New construction: 10%

Because half of construction waste comes from demolition activities, restoring and keeping old buildings saves a great deal of the material we would otherwise throw away.

All this construction waste is made up of the following ingredients:

1. Concrete and rubble: 40% to 50%

2. Wood: 20% to 30%

3. Drywall: 5% to 15%

4. Asphalt roofing: 1% to 10%

5. Metals: 1% to 5%

6. Bricks: 1% to 5%

7. Plastics: 1% to 5%

Most of this construction waste could be recycled if people paid closer attention to how they demolish their buildings. Carefully taking old buildings apart is called deconstruction instead of demolition. If just a quarter of the buildings demolished every year were deconstructed instead, approximately 20 million tons of debris could be diverted from landfills.

Total waste from the typical 2,000-square-foot home adds up to about 8,000 pounds of debris, taking up 50 cubic yards of space in the landfill. That's about the size of a bedroom in the house you just built.

Closed Loop Systems

Ecological or biological cycle- returns all elements to the soil. Waste equals food.

A tree drops leaves, fruit, wood, which decays to soil.

The tree uses the soil for growth.

An example of a biological cycle is in the photo below.

Technological cycle- the materials are re-used and never go to landfill.

When an item is taken out of use it is disassembled and all parts are used again.

Examples are materials in cars, furniture, appliances, televisions, etc...

The materials from both cycles might be mixed in one application such as housing.

