

Lesson #8: Project TAKE-MAKE-WASTE → TAKE Report

Stage 1 – Desired Results	
<p>Established Goals: GLOB: Explore problems and issues that demonstrate interdependence among science, technology, society and the environment GLOC: Demonstrate appropriate inquiry, problem-solving and decision-making skills and attitudes for exploring scientific and/or technological issues and problems</p>	
<p>Understandings: Students will understand that...1. Science-based decision-making models such as The Natural Step's 4 sustainability guidelines can be used to help make decisions about how to TAKE-MAKE-WASTE more sustainably 2. Science is a useful and essential tool in addressing sustainability</p>	<p>Essential Questions: SLO C3: How can the Natural Step's 4 sustainability guidelines be used to help in decision-making about how to TAKE-MAKE-WASTE more sustainably?</p>
<p>Students will know... 1. SLO B3: Identify factors that affect health and explain the relationships of personal habits, lifestyle choices, and human health (individual/social) 2. How to apply the 4 guiding ideas to their organization. How to apply the 4 guiding ideas to their organization</p>	<p>Students will be able to... SLO C5: Work cooperatively with others and value their ideas and contributions SLO B5: Identify and demonstrate actions that promote a sustainable environment, society and economy (locally/globally)</p>
Stage 2- Assessment Evidence	
<p>Knowledge: 1. Assess student presentations re: Evaluating the Action Plan of a Real-Life Organization 2. Assess knowledge of content on sulphur (if taught)</p>	<p>Skills: Assess ability to work cooperatively (Groupwork Evaluation) Assess Decision-Making Process (Appendix 9 (p.54&55))</p>
Materials Required	
<p>Powerpoint: Project TAKE-MAKE-WASTE (you may want to re-word the 4 system conditions according to the wording that your class understands/prefers) HANDOUTS: Decision-Making Skills How To Complete the Summary Charts of the TAKE-MAKE-WASTE Reports The TAKE Report (Summary Chart) (you may want to re-word the 4 system conditions according to the wording that your class understands/prefers) Evaluating the Action Plan of an Organization Reading from Biomimicry "Living The Lessons" :Evaluating the Action Plan of an Organization (highlight starting points for each group if handling the handout as described) (Source: Benyus, J. (1997). <i>Biomimicry</i>. New York: William Morrow and Company p.255-258)) Access to websites (or paper copies of pertinent info) For teacher reference: 4 Guiding Ideas to Becoming More Sustainable (note that Robert refers to them as the four system conditions), The Four System Conditions (from The Natural Step website) http://www.naturalstep.org.nz/tns-f-system-conditions.asp#thefour For teacher reference: Information on Sulfur (Source: Dorin, H., Demmin, P. & Gabel, D. (1989). <i>Chemistry: A Study of Matter (3rd ed.)</i>. USA: Prentice Hall Inc.)) Samples of galena (PbS), cinnabar (HgS), pyrite (FeS) GUEST SPEAKERS</p>	
Stage 3 – Learning Plan	
<p>1. Slide 5 - Describe the 4 assignments that will be involved in the project. 2. Slide 6 - DISCUSS the role of economic factors when moving toward more sustainable practices and products. It must not be ignored. Depending on how your students have organized their organization (ie as a business, as a co-op, as a non-</p>	

governmental agency) this discussion might cause a change in the way some of them structure their organization. Allow time for this re-processing as many students may be unaware of how such types of organizations operate.

3. Slide 7 – Remind students of The Natural Step as one approach to moving businesses and organizations toward sustainability. Revisit the mental models for humans and nature using the poster boards/representations that the students have created. Karl Henrik Robert emphasizes that in the long term sustainability can even be **profitable**. Review the meaning of sustainability and discuss the role of different types of governance and political systems - (big topic!) as they discuss the profits (or the potential for profits) within their own organizations. Determine the level to which the students think that sustainability can be profitable (this may already have come up).

4. **Slide 8**– Discuss the need for a global perspective to fully understand system condition #4. Discuss what mental models the Sao Paulo example provides in terms of social disparity.

5. **Slide 9** – Decision-Making Skills – discuss the process of decision making (which corresponds to filling in their summary report). You might discuss that this process of decision-making aims to be more democratic than others (and some might argue less democratic than others). Use a classroom/student-volunteered example.

6. **Slide 10** REVIEW expectations for the TAKE report.

7. **DVD:** Captain W Productions. (n.d.). Ecology of Commerce. Schumacher College: Dartington Totnes Devon, UK: Captain W Productions (Title 2: Paul Hawken Ecology of Commerce **(22:22-31:30)**) This details the Intelligent Product System that helps throughout the projects.

8. **HANDOUT:** Take-Back Laws.

HANDOUT: Evaluating the Action Plan of a Real-Life Organization

9. Divide class into groups, describing that before they make an action plan for their organization to move toward sustainability, they now have a chance to evaluate the action plan of a real-life company. Each group will read about one organizations/businesses and report back to the larger group using the handout as a guide. Guide students appropriately. Allow time for research where possible.

10. **DISCUSS** local examples.

11. **GUEST SPEAKERS**-see list under Longer Term Planning)

12. **DEMO:** To extend the Ecopark idea, sulphur and its unique properties should be discussed. Use the teacher references provided Chemistry text to give direct instruction to highlight sulphur. Sulphuric acid is used in many industries and so this can be additional information for many groups in terms of finding out what their product is made of and how it is made. As time permits, explore:

- a) sulphur as a typical non-metal (physical and chemical characteristics)
- b) bonding characteristics of sulphur (covalent bonding)
- c) samples of forms of sulphur (galena – PbS, cinnabar, (HgS) , pyrite, (FeS)
- d) Describe the mining of sulphur (Frasch process)
- e) Describe the making of sulphuric acid from sulphur (contact process)
- f) Discuss SO_x as pollutant

13. **Slides 11-13** Address the problems that are not “owned” by anyone (ie tragedy of the commons). The TAKE-ing of resources is somewhat the same. Apply to the classroom/school (ie litter). For example, the problem of transporting hydrocarbons include oil spills and long-range transport air pollution (LRTAP).

14. Begin discussing individual students'/groups' products and what system conditions might be violated by the production of each one.

15. Provide list of websites as starting points (again beware of the need to monitor what “pops up” on these websites) (Educator’s Guide to the TAKE-MAKE-WASTE project)
16. Facilitate completion of the TAKE-REPORT (summary chart), providing assistance in finding information.

Extension Learning Activities

It would be GRAND if you could host a PRODUCT PROMOTION FAIR for the rest of the school. The student body would be given a specified amount of “money” (I was thinking of chocolate loonies but I question how sustainable it is to buy candy that is individually wrapped in foil) to buy any product that they wanted. On a specific day, the students in your class would display

- *sample (s) of their products (already done as part of the Organization Profile)
- *posters of the product (already done as part of the Organization Profile)
- *posters of their company (already done as part of the Organization Profile)
- *information pamphlets that promote how sustainable their product is
- *prize draws for student body (perhaps if they give their written opinion about the product and why they chose to spend their limited amount of money on that product instead of all of the other products available). This would be a neat way for them to examine market trends and discuss real-life implications of trying to promote sustainability to consumers (ie will consumers pay more for sustainable products? How much more? (price-points)

See your nearest business ed teacher for discussion of this possibility!! (I’ll help too)

Educator Notes

" EARTH FROM ABOVE "

An aerial portrait of our planet

Since 1990, Yann Arthus-Bertrand has flown over hundreds of countries to shoot a aerial portrait of our planet. His photographs invite all of us to reflect upon the future of Earth and its inhabitants. Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history. Under the assaults of mankind our planet's ecosystem appear everywhere to deteriorate : fresh water, oceans, forests, air, arable land, open spaces, cities... Whatever the media (books, exhibitions, web sites, films, posters...) *Earth from Above* reminds us that each and everyone of us is responsible of the future of the Earth. Because each one of us has a part, we all have the duty to act.

www.yannarthusbertrand.org - www.goodplanet.org

Details for Visual on Slide #8

Reference: Arthus-Bertrand, Y. (2001). *Earth From Above, 365 Days*. New York: Harry N. Abrams, Inc.

“Ivory Coast. Bouna region. Deep well in a village near Doropo. Everywhere in Africa, as here near Doropo in the north of the Ivory Coast, collecting water is a role that generally falls on women. Deep wells equipped with manual pumps are gradually replacing traditional village wells, and canaries (large earthenware jars) and gourds are being supplanted by plastic, enamelware, or aluminum containers to transport the precious resource. Drawn from underground sources, the water in these wells presents fewer health risks than traditional wells, which hold water that is, in more than 70 percent of cases, unfit for consumption. At the opening of the third millennium, three-quarters of the world’s population does not have running water and about 1.6 billion does not have water fit to drink. Illnesses due to unhealthy water supplies are the largest cause of infant mortality in the developing world.” (Arthus-Bertrand, 2001, p. May 08) © Yann Arthus-Bertrand “Earth from Above” publisher Abrams

Details for Visual on Slide #10

Reference: Arthus-Bertrand, Y. (2001). *Earth From Above, 365 Days*. New York: Harry N. Abrams, Inc.

“Brazil. Detail of an apartment building in Sao Paulo.

More than 5 million Paulista – inhabitants of Sao Paulo – live in underequipped working-class suburbs, in shabby apartment buildings known as corticos. With a population of 18 million, which increases by 600,000 every year, this is the largest megalopolis not only in Brazil, but in the whole of South America. Sao Paulo is an industrial city and a true driving force of the national economy, with more than 36,000 firms that supply half of the country’s manufactured products and employ nearly 45% of the Brazilian labor force. Although it is the most prosperous city in the country, almost 1 million of its children (one in five) are said to be living in the street, engaged in begging, petty crime, and prostitution. It is believed that between 7 and 9 million minors have been left to fend for themselves in the streets of the large urban centres of Brazil.” (Arthus-Bertrand, 2001, p. May 08) © Yann Arthus-Bertrand “Earth from Above” publisher Abrams

Details for Visual on Slide #13

Reference: Arthus-Bertrand, Y. (2001). *Earth From Above, 365 Days*. New York: Harry N. Abrams, Inc.

“Brazil. Sao Paulo. Sao Paulo University swimming pool.

With 15.2 million inhabitants, the Sao Paulo metropolitan area is the largest in Brazil. Deep social inequalities are leading to increasingly sharp spatial segregation. Districts wholly inhabited by the rich are turning into cities within the city, protected by security guards, watched by cameras, and surrounded by high walls to keep out the violence and misery that surround them. At the other extreme are the shantytowns (favelas) which were home to 1.1 percent of the population in 1973, increasing to 19.4 percent in 1993. In this new social partitioning, private enclaves are begin created within a public space. These are the Brazilian equivalent of the “gated communities” of wealthy suburban America. This spatial fragmentation is accompanied by a privatization of the urban environment which ultimately threatens democracy, as democracy cannot function in the absence of public space.” (Arthus-Bertrand, 2001, p. January 16) © Yann Arthus-Bertrand “Earth from Above” publisher Abrams

**Title 2: Paul Hawken – The Ecology of Commerce
(22:22-31:30)**

Notes:

1. Hawken refers to “pimps” in reference to those who dress in black. It appears to be an inside joke between Hawken and the participants but you may want to omit it.
2. There is a reference to “China” as having figured out that the west prefers heavier silk and so adds tin and chromium to their silk to make it heavier. Some might take offense to this comment being directed at the entire nation of China rather than only the companies within China who utilize that practice.

Suggested Questions:

1. Hawken details the Intelligent Product System in which there would be true “product responsibility”. Goods would be one of 3 types described below. Give an example of each one.
 - a) products that are consumable
 - b) products that provide services and are then taken back to the manufacturers in “de-shopping” centres to be used again/disposed of
 - c) un-usables that cannot be sold but can be used in manufacturing as long as they are tagged molecularly so that when we found them in nature we could return them to the manufacturer

4 Guiding Ideas to Becoming More Sustainable **(teacher version)**

Eliminate our contribution to systematic

1. increases in concentrations of substances from the Earth's crust
2. increases in concentrations of substances produced by society (persistent and unnatural compounds)
3. physical degradation of nature through over-harvesting, introductions and other forms of modification
4. Contribute as much as we can to the meeting of human needs in our society and worldwide, over and above all the substitution and dematerialization measures taken in meeting the first three objectives. This means using all of our resources efficiently, fairly and responsibly so that the needs of all people on whom we have an impact, and the future needs of people who are not yet born, stand the best chance of being met. (Robèrt, 2002)

Reference: Robèrt, K. (2002). *The natural step story: seeding a quiet revolution*. British Columbia, Canada: New Society Press.

4 Guiding Ideas to Becoming More Sustainable

Does your company operate as part of a sustainable society...ie does it

- 1) subject nature to systematically increasing concentrations of substances extracted from the earth's crust?
- 2) subject nature to systematically increasing concentrations of persistent and unnatural compounds?
- 3) subject nature to systematically increasing degradation by physical means?
- 4) strive to meet human needs worldwide?

Reference: Adapted from Robèrt, K. (2002). *The natural step story: seeding a quiet revolution*. British Columbia, Canada: New Society Press.

Evaluating the Action Plan of a Real-Life Organization

What do Xerox, Black & Decker, Canon, and Body Shop have in common? They are all moving toward sustainability. Choose one of the following organizations. You will evaluate their action plan for moving toward sustainability.

- Organizations:** a) EcoPark in the town of Kalundborg, Denmark (middle p.255)
b) Germany take-back laws (middle p. 256)
c) Refurbishment/Asset Recovery (Xerox, Black & Decker, Canon) (middle p.257)
d) Body Shop/Deja Shoe/Patagonia

Communicating The Action Plan to the class: Use the following guidelines to present your organization's action plan for moving toward sustainability. You can use powerpoint, a public service announcement, a town hall...your only limit is your imagination!!

1. The (organization name)(describe what they did)
2. What is the "science" behind what the organization did? (ie why does it work? What background information do you need to understand why it works or why it is a good step toward sustainability?)
3. a) The benefits to human health/well-being include...
b) The benefits to economy include...
c) The benefits to society (locally/globally) include...
4. Which of the 4 guiding ideas did the company address?

Evaluating The Action Plan : Include this in your presentation:

1. Do you think this organization's action plan will be effective?
 - a) Describe at least 3 reasons why it might be effective.
 - b) Describe at least 3 reasons why it might be ineffective.
2. Be prepared to ask your audience their opinions on whether they think the action plan is effective. Be prepared to lead a discussion about the organization. Again, it may be useful to have more information than is provided in the small reading. Research the action plan as there is likely more recent updates on it than have been published in the small reading.

Listening to Other's Action Plans: As you hear the other presentations you should make notes on each of these items such that you have a record of the action plans of all of the organizations.

Personal Action: What actions are you willing to start today to aid in supporting organizations move toward sustainability?

How to Complete the Summary Charts of the MAKE, TAKE, and WASTE Reports

For the TAKE, MAKE and WASTE reports, you will be asked to

- *identify some violation of one or more of the system conditions.
- *work through a decision-making process to come up with an action plan about what you can do with your organization/product to address that violation of the system condition
- *move toward a more sustainable organization and product

Description of violation

- *describe exactly how your organization is violating one or more of the system conditions

List creative options

- *possible ideas about what your organization might do to address the violation(s)
- *is doing nothing is a choice?

List + and – impacts of each one

- *making a larger portion of this part of the chart might be needed

Identify the plan you choose

- *consensus: 1. general agreement or concord; harmony 2. majority of opinion.
(Random House College Dictionary Revised Edition. (1988). New York: Random House, Inc.)
- *is doing nothing is a choice?

Action Plan

- *how will you get this done?
- *includes who, when, where, when

Implement the plan and evaluate the plan

- *you will have to “guess” what happens here

Communicate the results and reassess the results (consult with others)

- *share your idea with peers and have them give input

How to Complete the TAKE Report

Summary Chart

Directions: In your organization profile, you indicated what materials you would need to make your product and whether they came from natural or synthetic sources. You must now look carefully at those materials and decide which of the 4 conditions (if any) are violated by the “taking” of the raw materials to make your product.

This might require research to determine how your product is made and where the raw materials come from. Try e-mailing or phoning companies who make a similar product and getting information from them. Once you know where a raw material comes from, try to determine whether using the raw material for your product causes any violation of the fourth system condition.

Use this chart to summarize your information. Remember that decision-making might require more information and so you might have to research more about how your product is made.

Prepare a final report as your teacher directs.

TAKE Report

Summary Chart

Source of 4 guiding ideas: Robèrt, K. (2002). *The natural step story: seeding a quiet revolution*. British Columbia: New Society Press.

The Natural Step Four Guiding Ideas for Decision-Making Does your organization...	Description of violation	List creative options	List + and – impacts of each one	Identify plan you choose (consensus)	Action Plan	Implement Evaluate	Communicate results Reassess the results
1. ...TAKE substances from the Earth's crust. (metals, petroleum) at a rate that it is too high for nature to put the substance back into the earth's crust?							

<p>2. ...MAKE synthetic substances that cannot be degraded or recycled by nature (ie they are persistent or unnatural) at a rate that it is too high for nature to deal with the substance?</p>							
<p>3. ...physically degrade nature by taking too much (over-harvesting), introducing species to where they are foreign or participate in other forms of modification that nature cannot deal with?</p>							

<p>4. ...try to ensure that human needs are met in our society and worldwide do that everyone can meet their needs worldwide, now and in the future? (over and above just stopping the damage it is presently doing, using resources fairly, efficiently?)</p>							
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1. What is the most difficult part of decision-making?
 2. What is the role of science in your decision-making?
 - *is science needed? A little?A lot?
 - *does science help or hinder (or both) when making these decisions?
 3. DESCRIBE 1-3 main reasons that your business changed what it did?
 4. Did your mental model about how humans take-make-and-waste change from when you were making your organization profile? If so, how? If not, why? Be sure to record any changes on the form
- Changes in Your Organization Profile

