PLASTIC BAG
LESSON PLAN

FUTURESTATES

COMMUNITY CLASSROOM
ENGAGING STUDENTS AND EDUCATORS THROUGH FILM

PRESENTED BY:
cpb ITVS

FUTURESTATES.TV

COMMUNITY CLASSROOM
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COMMUNITY CLASSROOM is an innovative education resource providing short documentary video content and accompanying curricular materials, lesson plans, and homework assignments to high school and community college instructors and youth-serving community-based organizations. Film modules are drawn from documentaries scheduled for broadcast on the Emmy Award-winning PBS series *Independent Lens*. Content is grouped into subject specific segments that correspond to lesson plans and educational activities. All COMMUNITY CLASSROOM lesson plans are designed with key education standards in mind, and are available free of charge online, along with the film modules.

COMMUNITY CLASSROOM is a program of the Independent Television Service, created with support from the Corporation for Public Broadcasting. Lesson plans were developed with guidance from the American Association of Community Colleges, KQED Education Network, National Association for Media Literacy Education, National Council for the Social Studies, National State Teachers of the Year, and PBS Teachers.

Where Does It All End Up? Lesson Plan Overview

Topics

Ecology; environmental quality; human-induced hazards; science and technology in local, national, and global challenges.

Target Audience

Grade 9 Biology, Environmental Science, Earth Science, Grades 10-12 Advanced Earth/Space Science, Advanced Biology, Advanced Environmental Science.

National Educational Standards

All components are aligned to the National Science Education Standards as presented by the National Academy of Science and available as a free download at http://www.nap.edu/catalog/4962.

NS.9-12.1 SCIENCE AS INQUIRY
As a result of activities in grades 9-12, all students should develop

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

NS.9-12.3 LIFE SCIENCE
As a result of their activities in grades 9-12, all students should develop understanding of

- Interdependence of organisms

NS.9-12.4 EARTH AND SPACE SCIENCE
As a result of their activities in grades 9-12, all students should develop an understanding of

- Geochemical cycles

NS.9-12.6 PERSONAL AND SOCIAL PERSPECTIVES
As a result of activities in grades 9-12, all students should develop understanding of

- Natural resources
- Environmental quality
- Natural and human-induced hazards
- Science and technology in local, national, and global challenges

In addition to the National Standards for Science, the lesson plans provide an excellent framework for instruction in Media Literacy. This instruction further supports both NS.9-12.1 SCIENCE AS INQUIRY and NS.9-12.7 HISTORY AND NATURE OF SCIENCE by instructing students in methods to make them more effective in media analysis. Information on Media Literacy can be found at www.NAMLE.net .

Time

Each lesson is designed for a 45-55 minute class period. The modules may be separated or combined to accommodate differences in instructional time. The entire unit may be completed in 4 days.

Overview of *Plastic Bag*

Struggling with its immortality, a discarded plastic bag ventures through the environmentally barren remains of America as it searches for its maker.

Summary of Lesson

In this lesson, the students will view the film *Plastic Bag* and evaluate the information presented in the film. They will gather data and determine the scope of plastic bag use and disposal issues. Students will investigate predictions related to *Plastic Bag* on the FUTURESTATES Predict-O-Meter website and discuss their viability. They will present proposed solutions to the problem presented in the film and post their own predictions on the website.

Background Brief

This is the information for the teacher. It includes information about the disposal, recycling, and environmental problems associated with the widespread use of plastic bags, and may help you direct your students through the lesson plans for *Plastic Bag*.

Paper or Plastic?

The commonly asked question "Paper or plastic?" is simply a reflection of how common the use of plastic bags has become. In the United States alone, over a billion plastic bags are given away to customers every day. Less than 3% of those bags are ever recycled. The rest are destined for the landfill, although many of them never make it there. The bags are so light that they often become airborne and can drift until they become stuck on something or bogged down in water. Those that do make it to the landfill will take as much as a thousand years to degrade.

Ironically, the plastic bag is in many ways more desirable than the alternative, the paper bag. Both are expensive in terms of the energy needed to produce them, but the paper bag requires the most energy to produce. In addition, paper bags take up much more room in our landfills. Paper bags are biodegradable, but because our landfills are designed to keep out water and air, paper bags take much longer to break down than they would in a normal environment. In a landfill, it may take a century for a paper bag to decompose, which creates significant volume issues for landfills.

What's the Problem?

In most cases, the real problem with plastic bags is the fact that they don't reach the landfills. The United States alone introduces over 8 billion pounds of plastic into the waste stream every year. When even a fraction of that amount escapes the waste stream as litter, the consequences can be devastating, particularly if the plastic becomes airborne.

Land animals and birds often mistake bits of plastic for food. When the plastic is ingested, the plastic can choke the animal or block the intestinal tract. Even when the pieces are tiny, they can be very hazardous to wildlife. The plastic particles are polymers, which act as "sponges," accumulating hazardous chemicals.

The effects of plastic bags on land animals are significant, but the effects on marine life are devastating. Over a million seabirds and over 100,000 marine mammals and sea turtles die every year from ingesting pieces of plastic or tangling in plastic netting and line. Small pieces of plastic bags look like jellyfish to turtles. Animals have been found dying with nothing but pieces of plastic bags in their stomachs. Seals and turtles alike have suffocated, encircled by plastic rings that slowly choke them as they grow.

The Pacific Ocean

The major oceans are made of gigantic gyres that drive the currents and the flow of water around the planet. In the center of the North Pacific Gyre is an area of virtually no wind and very high air pressure. It is the center of a slowly circling vortex of water. Wind and water currents have come together to create a "trap" for the plastic debris floating in the ocean. In an area roughly twice the size of the continental United States, over 100 million tons of flotsam–mostly plastic in origin–have created a "trash vortex" that continues to circulate through the Pacific Ocean. The danger to wildlife is significant and the vortex is growing.

What Can We Do?

The most obvious answer is to reduce the amount of plastic entering the waste stream. Some countries, such as Ireland, have already instituted a tax on the use of plastic bags. Cities like Boston, and the entire state of California, have considered bans on plastic bags. The problem is that people will either pay the tax or increase the use of paper bags. The current focus for most people working on this issue is on the development of more efficient, consumer-friendly ways to recycle the plastic bags.

Web Resources

- http://.FutureStates.tv. "The Making of *Plastic Bag*"
- http://.www.savetheplasticbag.org. "Paper Bags in Landfills"
- http://harpers.org/archive/2007/01/0081345. An article on the plastic ducks ending up in the Pacific gyre.
- http://www.nationalgeographic.org. "Are Plastic Grocery Bags Sacking the Environment?"
- http://www.AlterNet.org. "The World's Dump: Ocean Garbage From Hawaii to Japan"
- http://www.worldwatch.org. "Good Stuff?"
- http://www.theplastiki.com. An adventure ecology project that follows the creation of a huge catamaran from recycled plastic and its voyage through the Pacific vortex.

Lesson 1

Objectives

Students will:

- Compare and contrast the benefits and problems associated with the use of paper and plastic bags.
- View the film *Plastic Bag*.
- Calculate theoretical plastic bag use in the students' community or state for one day.

Materials

- Paper and plastic bag
- Computer with internet access
- Plastic bag use worksheet (optional, see page 8)
- Calculators (optional)

Beginning (10 minutes)
The teacher will have a paper bag and a plastic bag. Ask: "Have you ever been asked to choose 'Paper or plastic?' What did you choose? Why?" Follow with a brief discussion of the pros and cons of each choice. The teacher will differentiate between biodegradable and recyclable. "Have you ever wondered how many plastic bags are actually used every day? Let's try to develop an educated guess. How many bags do you typically use when groceries are purchased?" Come up with a class consensus. How many people buy products in a single day in a single store? (Select and discuss a specific store, such as Costco or Best Buy.) Multiply the number of customers by the number of bags, then multiply that by number of days in a week, the number of other stores in the community, etc. "Are you surprised at the number? We are now going to watch a film that presents a different perspective on the use of plastic bags. It is a futuristic fantasy with a very strong message. Enjoy the film, but listen to its message."

Middle (30 minutes)
View *Plastic Bag*.

Upon completion of film, discuss student impressions of the film. Sample questions:

- What did the film reveal that you didn't already know?
- Is this film based on fact, opinion, or something else?
- Do you think the "Pacific Vortex" is real?
- What is left out of this message that you probably need to know?
- What might have happened to the pieces of the plastic bag?
- Why are the people "missing"?
- Have any of you seen *A.I.*? It is the story of an android that lives forever, waiting for its "mother." How is the android like the plastic bag?
- Do you think things are as bad as the film implies?

End (3-5 minutes)
Tomorrow we will investigate some of the claims in the film. We'll try to find an answer to the question "How bad is the problem of plastic bags…really?"

Assessment

- Responses to intro discussion.
- Responses to discussion questions after viewing film.

Lesson 2

Objectives

The students will:

- Investigate and verify or refute information from the film.
- Assess the nation's current usage of plastic bags per day or year.
- Identify procedures in place to reduce plastic bag use.
- Identify procedures in place to safeguard wildlife from non-biodegradable waste.

Materials

- Computer with internet access
- Website evaluation guide (see page 9)
- *Plastic Bag* Web Research Sheet (see page 10)

Beginning (10-12 minutes)
Remind students of information from the film. Remind students of the theoretical amount of plastic bags generated per day in their community or state. "The film presents a very strong warning about the continued use of plastic bags, but is it a valid warning? Where did the filmmakers get their information? Today we are going to search for more information on the problems associated with plastic bag disposal, but first everyone will examine the information used in the making of *Plastic Bag*." Students will go to http://FutureStates.tv, click on *Plastic Bag*, and then click on "The Making Of" video the left hand bar. The film is about five minutes long and provides additional information on the problems associated with plastic bag disposal.

Note: "The Making Of" film may be used as a source of research or as an introduction to the student's own research.

*Middle (*35-40 minutes)
Students will be assigned specific areas to research. The teacher will provide suggestions for evaluating the credibility of websites. Students will share their information with class using worksheet provided (see supplemental documents).

General instructions using Google (any search engine may be used for this investigation):

Group 1	Google: plastic bag environment
Group 2	Google: plastic bags in the Pacific Ocean
Group 3	Google: plastic bags in the food chain
Group 4	Google: plastic bags recycling
Group 5	Google: plastic bags in landfills

Students are to gather information from the internet pertaining to the group topic. Each group should divide the website investigations among the members. Each student should be responsible for evaluating and gleaning information from 1-2 websites.

End (5 minutes)
Tomorrow we will discuss our findings and investigate the predictions on the FUTURESTATES Predict-O-Meter website. Begin thinking of a prediction of your own about future environmental issues related to plastic bags. You must be able to support your prediction with current facts or trends.

Assessment

- Responses during introductory discussion.
- Accurate location and evaluation of assigned website.
- Completion of information worksheet

Lesson 3

Objectives

The student will:

- Investigate the predictions for *Plastic Bag* posted on the Predict-O-Meter located on the FUTURESTATES website (http://FutureStates.tv).
- Create and post their predictions about the future effects of plastic bag usage.

Materials

- Computer with internet access
- Prediction Evaluation sheet (see supplemental materials)

Beginning (10-15 minutes)
Students will share and discuss the information they found from the previous day's lesson. The teacher will aid the students in creating a summary (list) of the important facts about plastic bag use and disposal.

Middle (30-35 minutes)
Students will visit the FUTURESTATES website and investigate the predictions posted on the Predict-O-Meter for *Plastic Bag*. Students will select three predictions to analyze on the provided worksheet (see supplemental materials). Students will then create 1-3 predictions of their own to post on the site. The predictions must be based on science and approved by the teacher. The predictions may alter a course projected in a Predict-O-Meter prediction. Students may require an example of a valid prediction. Using the rubric to instruct the students, prepare a sample prediction and lead the class in an analysis of the statement. The following is an example of a proposed prediction and the evaluation of it using the prepared rubric.

Proposed Prediction: "In 2012, following the disastrous leaks of undersea oil rigs during 2010 and 2011, a new strand of petroleum-eating bacteria is developed. The organism is capable of devouring many plastic polymers as well."

- Is the prediction based on scientific possibilities?
  Yes: there are already bio-engineered bacteria that can consume oil.

- Do the consequences of the prediction support the film?
  Don't know. The film does not present an answer to pollution already present.

- Do known events in the past support the prediction?
  Yes: Archaebacteria have species that are chemosynthetic.

- Is this prediction plausible?
  This is the evaluator's opinion based on the evidence presented in defense of the prediction.

End (Time Varies)
Go over the Predict-O-Meter activity instructions with students (see supplemental materials) and direct them to complete the activity. Tell the class that tomorrow we will share our preidctions and revisit the film.

Extension Activities and Modifications

Lesson 1

To save time, the teacher could already have the calculations finished for the plastic bag use calculation activity.

The activity could be extended into a homework assignment in which students select different establishments and collect actual data on the number of customers and the number of bags used by the store.

The film could be viewed as enrichment following instruction in ecology/pollution or it could also be paired with *Mr. Green*, as both address environmental concerns.

Lesson 2

The search for information on this topic could easily extend to two class periods. There is a wealth of information to investigate. If desired, the students could write a research paper on one of the group topics.

Lesson 3

It may be desirable to simply investigate the Predict-O-Meter site. Students may explore the site without formal evaluation or development of predictions.

Other Ideas

If time permits, the unit could be expanded by viewing the film a second time and:

- Responding to the following writing prompt: "How has your perception of the film changed from the first time you saw it? What is your answer to the question 'How bad is it…really?'"

  Information for creating writing rubrics may be found at:
  - http://www.englishcompanion.com/pdfDocs/aprubricjago.pdf (AP 9-point rubric)
  - http://educationnorthwest.org/resource/464 (Sample Six Traits rubrics)
  - http://rubistar.4teachers.org (Templates for personalized rubrics)

- Instead of a writing prompt, the students could propose a sequel to the film based on what they have learned. Students would work in teams of 3-5 to develop an outline of their sequel. Upon approval by the instructor and depending upon availability of equipment, students could write a short skit and either perform or film it for the class. The film could also be posted on the school or class website. If desired, the students could analyze the presentations using the "key questions" presented by the National Association for Media Literacy Education at www.NAMLE.net.

- Students could analyze the effectiveness of the film *Plastic Bag* in educating students about the problem of waste plastic bags. If the students have not previously been instructed in media literacy, this lesson could provide an opportunity to do so. In addition to *Plastic Bag*, students could watch the film *Story of Stuff* and evaluate it using the internet site evaluation guide from Lesson 2. Students could then compare the differences in the approaches used by the filmmakers as well as the effectiveness of each film in educating students about the problems of waste. (*Story of Stuff* is 20 minutes long and can be found at www.storyofstuff.com.)

Plastic Bag Use Worksheet

Store name: _____

Average number of bags per visit (A) _____

Approximate number of customers per day (B) _____

A x B = number of plastic bags per day

_____ **x** _____ **=** _____

Plastic bags per week _____

Plastic bags per month _____

Plastic bags per year _____

Number of stores in the community _____

Number of plastic bags per day in your community _____

Number of plastic bags per day in your state (assume one store per county) _____

Website Evaluation Guide: Criteria for Evaluation

Everyone needs to learn to evaluate the quality of information found on the Web. Unlike magazine articles and books, it's not always easy to find the author or source of the information. Be skeptical of every site until you are convinced that the site is valid. The following guide may help you critically evaluate a potential website as a source of information.

Authority

Who is the author of the information?

Is the author associated with a school, group, or product?

Authenticity

Where does the information actually come from?

Are the sources clear and can they be verified?

Timeliness

Is the information reasonably current?

Purpose

What's the point of the information?

Who is sponsoring this site? Look at the URL!

What is the bias present in the information?

Does the bias affect the facts presented by the website?

Relevance

Is the information relevant to the topic you are researching?

Does it tell you something you didn't already know?

Plastic Bag Web Research Sheet

Name:

Group Assignment:
Web Address:
Article Title:
Author/Source of Information:
Date of Publication:
Summary of Information:

Extension Activity: Predict-O-Meter Evaluation Form

FUTURESTATES Predict-O-Meter Activity Instructions
Instructions: Log on to www.futurestates.tv. Choose the Predict-O-Meter. There are three rows of predictions. The first row on the far left contains predictions based on the film. The center row has predictions submitted by viewers. The far right row contains dates of known events. For this activity, click on the green FUTURESTATES predictions. The number that appears in the green box is the number of predictions posted for that year. Be certain to scroll down to view all the predictions. At the end of each prediction is the tag for the film it is associated with. Read all the predictions for Plastic Bag. Choose three predictions to evaluate using evaluation rubric (see Supplemental Materials). When the assigned evaluations are finished, create at least one prediction of your own. Your prediction will be evaluated by another student. If the evaluation is at least a "3", you may post it on the FUTURESTATES website.

Film:_____ **Year:** _____

Prediction: _____

	No 1	Somewhat 2	Yes 3	Don't know 0
Is the prediction based on scientific possibilities?				
Do the consequences of the prediction support the film?				
Does the prediction directly lead to the next prediction?				
Do known events in the past support the prediction?				
Is this prediction plausible? (This is your opinion.)				
Total: (add column)				

Overall Total: (Add totals for each column together) _____ Score: Overall Total / 5 = _____

Film:_____ **Year:** _____

Prediction: _____

	No 1	Somewhat 2	Yes 3	Don't know 0
Is the prediction based on scientific possibilities?				
Do the consequences of the prediction support the film?				
Does the prediction directly lead to the next prediction?				
Do known events in the past support the prediction?				
Is this prediction plausible? (This is your opinion.)				
Total: (add column)				

Overall Total: (Add totals for each column together) _____ Score: Overall Total / 5 = _____

Film:_____ **Year:** _____

Prediction: _____

	No 1	Somewhat 2	Yes 3	Don't know 0
Is the prediction based on scientific possibilities?				
Do the consequences of the prediction support the film?				
Does the prediction directly lead to the next prediction?				
Do known events in the past support the prediction?				
Is this prediction plausible? (This is your opinion.)				
Total: (add column)				

Overall Total: (Add totals for each column together) _____ Score: Overall Total / 5 = _____

Personal prediction for _____ **(film name)**

Name: _____ **Evaluator:** _____

Year: _____

Prediction: _____

	No 1	Somewhat 2	Yes 3	Don't know 0
Is the prediction based on scientific possibilities?				
Do the consequences of the prediction support the film?				
Does the prediction directly lead to the next prediction?				
Do known events in the past support the prediction?				
Is this prediction plausible? (This is your opinion.)				
Total: (add column)				

Overall Total: (Add totals for each column together) _____ Score: Overall Total / 5 = _____

Should this prediction be posted to the website? _____

Teacher's approval _____

Date posted _____

If not posted, explain the reason for declining.

LESSON PLAN CREDITS

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A 23 year veteran of teaching, Kathie L. Hilbert is currently the Science Chair at Connersville High School in Connersville, Indiana. Ms. Hilbert has both a BA (University of Evansville) and MAT (Miami of Ohio) in Biology. Ms. Hilbert has taught all levels of Biology and Earth Science, as well as Botany and Geology. She has also accompanied and supported her students on several summer Marine Biology programs held in Hawaii. Ms. Hilbert has written and developed curriculum for Botany, Geology, and Early College Earth Science as well as revised curriculum for other classes. She has also written curriculum for community Science Outreach Programs and was a Science Ambassador for the CDC (writing lesson plans for their website). Ms. Hilbert was Fayette County's Teacher of the Year in 2001 when she also successfully attained National Board Certification in science teaching.

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About FUTURESTATES:
Imagining tomorrow's America today, FUTURESTATES is a series of independent mini-features – short narrative films created by experienced filmmakers and emerging talents transforming today's complex social issues into visions about what life in America will be like in decades to come. The first season of FUTURESTATES debuted in March 2010, and is available online at futurestates.tv.

About ITVS:
The Independent Television Service (ITVS) funds and presents award-winning documentaries and dramas on public television, innovative new media projects on the Web and the Emmy Award-winning weekly series *Independent Lens* on Tuesday nights at 10 PM on PBS. ITVS is a miracle of public policy created by media activists, citizens and politicians seeking to foster plurality and diversity in public television. ITVS was established by a historic mandate of Congress to champion independently produced programs that take creative risks, spark public dialogue and serve underserved audiences. Since its inception in 1991, ITVS programs have revitalized the relationship between the public and public television, bringing TV audiences face-to-face with the lives and concerns of their fellow Americans. More information about ITVS can be obtained by visiting itvs.org. ITVS is funded by the Corporation for Public Broadcasting, a private corporation funded by the American people.