Slide 1

Text: Standard 14: How human actions modified the physical environment

[Photo of the Lavender Copper Mine Pit in Bisbee, Arizona]

Audio: Standard 14 shows us how human actions modified the physical environment. Just about every human action has some physical or environmental impact, positive and/or negative, intended and/or unintended. In this slide, we see a photograph of the Lavender Copper Mine Pit in Bisbee, Arizona.

Slide 2

Text: Society and Environment

[Photo of a farmer on a tractor] [Photo of the Light Rail] [Maps of the eastern portion of the United States from 1850, 1910, and 1997]

Audio: Whether it's mining and/or cultivating a farm land or raising a desert to build the subdivision or delaying legislation that will lead to more stringent regulations on CO2 emissions or building a light rail for mass transit. Human's actions and technologies have had a great impact on the natural and physical environment. If we look at the maps in the upper right hand corner, we see three maps of the eastern portion of the United States from 1850, 1910, and 1997. These maps are showing its land and agriculture or improved land. What we can see is how agriculture first begins in the eastern colonies. And that begins to spread westward from the east coast and grows ever-darker green as we move west. By 1910, we can see very dark green portions of counties in agriculture. And by 1997, we see that agricultural land or improved lands have moved even a little further west. Yet, the lands in the eastern coast have begun to decline in terms of agricultural production. This map shows us very clearly how human beings accelerate environmental change.

Slide 3

Text: Human actions modify the physical environment

[Photos of Bisbee] [Image of poster for a Benefit Art Auction in Bisbee] [Logo for “Dozen Distinctive Destinations]

Audio: There are consequences and costs, merits and drawbacks when a natural world is modified. They might be political or societal like health or economic reasons like economic booms and busts. For example, a mine maybe an important part of a town or states revenue while it's booming, like the Lavender Mine that we saw in the first slide in this unit. But once the ore is depleted, the economy falters. What to do next to reinvigorate an old town? In the case of Bisbee, Arizona where the Lavender Mine is located, the town became an artsy tourist town as
seen below. And in 2005, the National Trust for Historic Preservation named Bisbee one of America's Dozen Distinctive Destinations. Another good example in Arizona is Jerome, like Bisbee the town of Jerome is an old copper mining town. But when the copper was depleted, how could this small mountain town continue to thrive? Like Bisbee, Jerome became a tourism town and took advantage of old mining structures and miner shacks by buying the map and remodeling them and them establishing art galleries, shops, eateries, and other shops of interest to tourists.

**Slide 4**

[Graphic of Earth being devoured by a machine]

**Audio:** Human adaptation to and modification of physical systems are influenced by the geographic context in which people live, their understanding of that context, and their technological ability and inclination to modify the physical environment. They adapt to it and modify it to suit their changing needs for things such as food, clothing, water, shelter, energy, and recreational facilities. In meeting their needs, they bring knowledge and technology to bear on physical systems. Consequently, humans have altered the balance of nature in ways that have brought economic prosperity to some areas and created environmental dilemmas and crises in others. In this slide, we see earth being devoured by a machine. The tag line reads, in biological terms, we have become parasites and are devouring our hosts. This quote is from Paul Hawken's who wrote the book, the Ecology of Commerce. In his book, Hawken's focuses on the environmentally degrading aspects of current industrial and business practices. However, at the same time, he argues that business can adapt new practices to promote environmental regeneration and restoration.

**Slide 5**

**Text:** Human impact on the environment

[Photo of heavy traffic on a freeway] [Photo of eroded land beneath trees] [Photo of bees on a honeycomb]

**Audio:** Clearing land for settlement, mining, and agriculture provides homes and livelihood for some but alters physical systems and transforms human populations, wildlife, and vegetation. Inevitable by-products such as garbage, air and water pollution, hazardous waste for the over burden and waste from strip mining, place enormous demands on the capacity of physical systems to absorb and accommodate them. How much solid waste, toxic waste, and air and water pollution can earth's ecosystem absorb before gasping their final breathe and collapsing? Beehives and certain other species act as something of a parameter on a state of the environment. One beekeeper noted that he keeps several beehives in his vineyards to help promote bio-complexity, which leads to a healthier ecosystem for his vines and him as well. The process of
urbanization affects wildlife habitats, natural vegetation and drainage patterns. Cities create their own microclimates in large numbers and produce large amounts of solid waste, photochemical smog and sewage. A growing world population stimulates, increases in the agriculture, urbanization, and industrialization. These processes expand demands on water resources resulting in unintended environmental consequences that can alter water quality and quantity available for human beings.

**Slide 6**

Text: Intended and unintended impacts on physical systems

[Image from the Tennessee Environmental Conference 2011] [Photo of a stream] [Photo of concrete walkway]

Audio: There are both intended and unintended impacts on physical systems, and they vary in scope and in scale. These impacts can be local and small scale like acid stream pollution in Eastern Pennsylvania. They can be regional and medium scale such as an urban heat island with its microclimatic effects in places like Chicago or Phoenix or LA or other large urban areas. And they can be global and large-scale effects such as the clearing at the forests of North America for agriculture or the depletion of the ozone layer by chlorofluorocarbons. Estimates are at the acid mine drainage, AMD, problem in the United States will cost tens of billions of dollars to clean up. It is also estimated that the state of Pennsylvania has inherited at least 1/3 of the nation's total problem. Federal and state officials have said that they are actively seeking new and innovative approaches to dealing with this issue. Attempts to control the acid mine drainage problem have mostly drawn on data collection efforts, the design and implementation of engineered treatment systems and massive earthwork projects. However, to date, quantifying the overall effect on this of any of these activities or assembling previously collected data into a comprehensive understanding of the problem has proven difficult. Everything that falls in the ground can be washed into streams and water waste. There's a direct connection between the streets and the streams through the storm sewer system. When it rains, litter, particulate matter, chemicals and other hazardous wastes and so on are washed into the nearest stream through the storm drain. The treatment are filtering that the storm water receives varies from community to community. Myriad pollutants and toxins end up in the water waste and this can be things like oil and other fluids that drip from cars, fertilizers of high levels of phosphates and nitrogen that feed harmful algae and make them bloom. Break dust with heavy metals, harm marine life. Cigarette butts and other garbage that doesn't break down easily ends up in sewers systems. Pesticides and other chemicals prove poisonous to aquatic life. Sediments can consume dissolved oxygen in the water waste. Pet excrement is loaded with bacteria and pathogens. And dirt and soap from car washing is also a pollutant. Even if urban storm water run off contained no pollution in it, it would still cause problems for streams. Hard impervious surfaces like rooftops, concrete and asphalt don't allow rainwater to soak into the ground, as it would naturally do. Instead rain runs off these hard
surfaces to the near storm drain and it's piped directly to the near stream. With each rainstorm, streams experience flooding that causes erosion, [inaudible] polluted sediments and destroys the habitat for fish and other aquatic life. In urban areas that are covered with rooftops and pavement, water can no longer soak into the ground. With no water on the ground, streams may dry up and heat up in the summer. How can we protect our streams? Individual and collective actions as well as legislation can help protect our streams and water waste. Some of these examples are: pick up after your pets, stop using darn chemicals that aren't organic, fix oil leaks and other fluids leaks in your car, don't wash your car in the street or drive way, write to your legislatures and representatives and demand a cleaner environment and better legislation, staff and information booth on the environment, initiate a letter writing campaign or organize an environmental awareness day in your school. In addition, our communities need to change the way we develop. Architects, developers and builders need to reduce impervious surfaces that cause run off and street to stream pollution. And we also need to adapt practices called low impact development. Some examples of low impact development are pavement that allows rainwater to pass through and soak into the ground beneath, eco-roofs that absorb rainwater like a sponge, rain gardens that allow rain to soak into the ground, narrow streets and smaller roofs that reduce run off, by planting more trees and intercepting the rain when it falls, and by building cisterns and rain barrels that collect roof run off for later use, and finally, by composting and adding soil amendments that help soil absorb more water.

Slide 7

**Text:** Human impact on the environment & implications on human health & well-being

[Map of United States emissions distribution by county] [Chart of school absences caused by asthma] [Chart of Asthma absence days]

**Audio:** This slide talks about human impact on the environment and the implications on human health and well-being. Asthma, a chronic disease that inflames the airways and the lungs causing shortness of breath, wheezing and in extreme cases, death, affects more than 5 percent of the American population. In the United States, causes of asthma have increased by 74 percent since 1980 and there's no indication that cases will decline in the near future. A growing number of study show that air pollution influences asthma and triggers attacks. Research has found that common air pollutants like pollu--particulates that are very small pollutant particles that can reach the lungs, nitrogen oxides and ozone s exacerbate asthma. A study by the American Lung Association found that children with asthma are 40 percent more likely to suffer asthma attacks on high pollution days than on days when conditions do not violate pollution standards. During the 1996 Summer Olympics at Atlanta, traffic was reduced because more commuters use public transportation. During this period of reduced traffic, area hospitals saw fewer patients who complained of respiratory problems presumably due to a reduction in traffic and air pollution. Children are more susceptible in adults to outdoor air pollution since they spend more time
engaged in vigorous activity. Higher activity levels and longer duration of exposure combined with the higher breathing rate relative to body weight result in higher pollutant exposure for children. Air pollution that may cause negligible breathing difficulties in an adult may seriously impair a child's ability to breathe because of children's higher exposure and smaller airways. Nearly half of all Americans, 133 million in fact, live in areas where air pollutants reach unhealthy levels as measured by the US Environmental Protection Agencies Air Quality Index.

Slide 8

Text: Standard 9: Wrap-up

- Understanding global interdependence begins with an understanding of global dependence—the modification of Earth’s surface to meet human needs.
- When successful, the relationship between people and the physical environment is adaptive; when the modifications are excessive the relationship is maladaptive.
- Increasingly, students will be required to make decisions about relationships between human needs and the physical environment.
- They will need to be able to understand the opportunities and limitations presented by geographical contexts and to set those contexts within the local to global continuum.

Audio: Students must understand both the potential of a physical environment to meet human needs and the limitations of that same environment. They must be aware of and understand the causes and implications of different kinds of pollution, resource depletion, and land degradation and the effects of agriculture and manufacturing on the environment. Students must know the locations of regions vulnerable to desertification, deforestation, and salinization, and they must be more aware of the spatial impacts of technological hazards such as photochemical smog and acid rain. Students must be aware that the current distribution patterns for many plant and animal species are a result of relocation diffusion by humans. Understanding global interdependence begins with an understanding of global dependence, the modification of Earth's systems to meet human needs. When successful, the relationship between people and the physical environment is adaptive. When the modifications are excessive, the relationship is maladaptive. Increasingly, students will be required to make decisions about relationships between human needs and the physical environment. They will need to be able to understand the opportunities and limitations presented by geographical contexts and to set those contexts within the local to global continuum. In addition, students must learn to pay careful attention to the relationships between population growth, urbanization, and the resultant stress on physical systems for humans that inhabit the region. Asthma, the most chronic disease in children and the primary cause of missed school days is responsible for more than 14 million missed days per year in the United States. In 1980, that figure was 6.6 million days. Work absences due to asthma attacks had increase as well, from 6.2 million days in 1982 to 14 million days in 1999. If current rate continues, the country will have 29 million people with asthma by the year 2020.
Slide 9

[Photo of Elizabeth Larson]

Audio: This presentation has been done by Beth Larson, School of Geographical Sciences and Urban Geography, Arizona State University 2011.