Unit 9 Environmental Health

Content Area: **Science**
Course(s): **AP Environmental Science**
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Enduring Understandings

STB-3 Human activities, including the use of resources, have physical, chemical, and biological consequences for ecosystems.

Essential Questions

How can you decrease your waste?

Lesson Objectives

STB-3.K Describe solid waste disposal methods.

STB-3.L Describe the effects of solid waste disposal methods.

STB-3.M Describe changes to current practices that could reduce the amount of generated waste and their associated benefits and drawbacks.

STB-3.N Describe best practices in sewage treatment.

EIN-3.A Define lethal dose 50% (LD50).

EIN-3.B Evaluate dose response curves.

EIN-3.C Identify sources of human health issues that are linked to pollution.

EIN-3.D Explain human pathogens and their cycling through the environment.

Standards

Solid Waste Standards:

STB-3.K.1 Solid waste is any discarded material that is not a liquid or gas. It is generated in domestic, industrial, business, and agricultural sectors.

STB-3.K.2 Solid waste is most often disposed of in landfills. Landfills can contaminate groundwater and release harmful gases.

STB-3.K.3 Electronic waste, or e-waste, is composed of discarded electronic devices including televisions, cell phones, and computers.

STB-3.K.4 A sanitary municipal landfill consists of a bottom liner (plastic or clay), a storm water collection system, a leachate collection system, a cap, and a methane collection system.

STB-3.L.1 Factors in landfill decomposition include the composition of the trash and conditions needed for microbial decomposition of the waste.

STB-3.L.2 Solid waste can also be disposed of through incineration, where waste is burned at high temperatures. This method significantly reduces the volume of solid waste but releases air pollutants.

STB-3.L.3 Some items are not accepted in sanitary landfills and may be disposed of illegally, leading to environmental problems. One example is used rubber tires, which when left in piles can become breeding grounds for mosquitoes that can spread disease.

STB-3.L.4 Some countries dispose of their waste by dumping it in the ocean. This practice, along with other sources of plastic, has led to large floating islands of trash in the oceans. Additionally, wildlife can become entangled in the waste, as well as ingest it.

STB-3.M.1 Recycling is a process by which certain solid waste materials are processed and converted into new products.

STB-3.M.2 Recycling is one way to reduce the current global demand on minerals, but this process is energy-intensive and can be costly.

STB-3.M.3 Composting is the process of organic matter such as food scraps, paper, and yard waste decomposing. The product of this decomposition can be used as fertilizer. Drawbacks to composting include odor and rodents.

STB-3.M.4 E-waste can be reduced by recycling and reuse. E-wastes may contain hazardous chemicals, including heavy metals such as lead and mercury, which can leach from landfills into groundwater if they are not disposed of properly.

STB-3.M.5 Landfill mitigation strategies range from burning waste for energy to restoring habitat on former landfills for use as parks.

STB-3.M.6 The combustion of gases produced from decomposition of organic material in landfills can be used to turn turbines and generate electricity. This process reduces landfill volume.

STB-3.N.1 Primary treatment of sewage is the physical removal of large objects, often through the use of screens and grates, followed by the settling of solid waste in the bottom of a tank.

STB-3.N.2 Secondary treatment is a biological process in which bacteria break down organic matter into carbon dioxide and inorganic sludge, which settles in the bottom of a tank. The tank is aerated to increase the rate at which the bacteria break down the organic matter.

STB-3.N.3 Tertiary treatment is the use of ecological or chemical processes to remove any pollutants left in the water after primary and secondary treatment.

STB-3.N.4 Prior to discharge, the treated water is exposed to one or more disinfectants (usually, chlorine,

ozone, or UV light) to kill bacteria.

Environmental Health Standards:

EIN-3.A.1 Lethal dose 50% (LD50) is the dose of a chemical that is lethal to 50% of the population of a particular species.

EIN-3.B.1 A dose response curve describes the effect on an organism or mortality rate in a population based on the dose of a particular toxin or drug.

EIN-3.C.1 It can be difficult to establish a cause and effect between pollutants and human health issues because humans experience exposure to a variety of chemicals and pollutants.

EIN-3.C.2 Dysentery is caused by untreated sewage in streams and rivers.

EIN-3.C.3 Mesothelioma is a type of cancer caused mainly by exposure to asbestos. EIN-3.C.4 Respiratory problems and overall lung function can be impacted by elevated levels of tropospheric ozone.

EIN-3.D.1 Pathogens adapt to take advantage of new opportunities to infect and spread through human populations.

EIN-3.D.2 Specific pathogens can occur in many environments regardless of the appearance of sanitary conditions.

EIN-3.D.3 As equatorial-type climate zones spread north and south in to what are currently subtropical and temperate climate zones, pathogens, infectious diseases, and any associated vectors are spreading into these areas where the disease has not previously been known to occur.

EIN-3.D.4 Poverty-stricken, low-income areas often lack sanitary waste disposal and have contaminated drinking water supplies, leading to havens and opportunities for the spread of infectious diseases.

EIN-3.D.5 Plague is a disease carried by organisms infected with the plague bacteria. It is transferred to humans via the bite of an infected organism or through contact with contaminated fluids or tissues.

EIN-3.D.6 Tuberculosis is a bacterial infection that typically attacks the lungs. It is spread by breathing in the bacteria from the bodily fluids of an infected person.

EIN-3.D.7 Malaria is a parasitic disease caused by bites from infected mosquitoes. It is most often found in sub-Saharan Africa.

EIN-3.D.8 West Nile virus is transmitted to humans via bites from infected mosquitoes.

EIN-3.D.9 Severe acute respiratory syndrome (SARS) is a form of pneumonia. It is transferred by inhaling or touching infected fluids.

EIN-3.D.10 Middle East Respiratory Syndrome (MERS) is a viral respiratory illness that is transferred from animals to humans.

EIN-3.D.11 Zika is a virus caused by bites from infected mosquitoes. It can be transmitted through sexual contact.

EIN-3.D.12 Cholera is a bacterial disease that is contracted from infected water.

Content

Vocabulary:
Solid Waste
Municipal Solid Waste
Sanitary Landfill
Reuse
Recycle
Biodegradable
Compost
Hazardous Waste

Four types of Environmental Hazards

Infections vs. Noninfectious Diseases

Indoor vs Outdoor Toxins

Lethal Dose

Dose-Response

Threshold dose

Risk

Probability

Risk-Management

Risk Assessment

Resources

College Board AP Central : https://apcentral.collegeboard.org/courses/ap-environmental-science/course

College Board AP Environmental Science Course & Exam Description Manual https://apstudents.collegeboard.org/sites/default/files/2019-05/ap-environmental-science-course-and-exam-description.pdf

College Board AP Environmental Science "AP Classroom" https://apcentral.collegeboard.org/about-ap/news-changes/ap-2019?course=ap-environmental-science

AP Environmental Science Classroom Resources https://apcentral.collegeboard.org/courses/ap-environmental-

science/classroom-resources

Khan Academy (Please look in AP Biology & Chemistry/Physics for all APES topics) https://www.khanacademy.org/science

Bozeman Science AP Environmental Science videos http://www.bozemanscience.com/ap-environmental-science