Unit 8 Aquatic & Terrestrial Pollution

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.

ERT-4 Earth's systems interact, resulting in a state of balance over time.

STB-1 Humans can mitigate their impact on land and water resources through sustainable use.

Essential Questions

How does pollution impact your health?

Learning Objectives

STB-3.A Identify differences between point and nonpoint sources of pollution.

STB-3.B Describe the impacts of human activities on aquatic ecosystems.

STB-3.C Describe endocrine disruptors.

STB-3.D Describe the effects of endocrine disruptors on ecosystems.

STB-3.E Describe the impacts of human activity on wetlands and mangroves.

STB-3.F Explain the environmental effects of excessive use of fertilizers and detergents on aquatic ecosystems.

STB-3.G Describe the effects of thermal pollution on aquatic ecosystems.

STB-3.H Describe the effect of persistent organic pollutants (POPs) on ecosystems.

STB-3.I Describe bioaccumulation and biomagnification.

STB-3.J Describe the effects of bioaccumulation and biomagnification.

EIN-2.J Descrive causes of and problems related to overfishing.

ERT-4.F Describe the characteristics of a watershed.

STB-1.B Describe methods for mitigating problems related to urban runoff.

Standards

STB-3.A.1 A point source refers to a single, identifiable source of a pollutant, such as a smokestack or waste discharge pipe.

STB-3.A.2 Nonpoint sources of pollution are diffused and can therefore be difficult to identify, such as pesticide spraying or urban runoff.

STB-3.B.1 Organisms have a range of tolerance for various pollutants. Organisms have an optimum range for each factor where they can maintain homeostasis. Outside of this range, organisms may experience physiological stress, limited growth, reduced reproduction, and in extreme cases, death.

STB-3.B.2 Coral reefs have been suffering damage due to a variety of factors, including increasing ocean temperature, sediment runoff, and destructive fishing practices.

STB-3.B.3 Oil spills in marine waters cause organisms to die from the hydrocarbons in oil. Oil that floats on the surface of water can coat the feathers of birds and fur of marine mammals. Some components of oil sink to the ocean floor, killing some bottom-dwelling organisms.

STB-3.B.4 Oil that washes up on the beach can have economic consequences on the fishing and tourism industries.

STB-3.B.5 Oceanic dead zones are areas of low oxygen in the world's oceans caused by increased nutrient pollution.

STB-3.B.6 An oxygen sag curve is a plot of dissolved oxygen levels versus the distance from a source of pollution, usually excess nutrients and biological refuse.

STB-3.B.7 Heavy metals used for industry, especially mining and burning of fossil fuels, can reach the groundwater, impacting the drinking water supply.

STB-3.B.8 Litter that reaches aquatic ecosystems, besides being unsightly, can create intestinal blockage and choking hazards for wildlife and introduce toxic substances to the food chain.

STB-3.B.9 Increased sediment in waterways can reduce light infiltration, which can affect primary producers and visual predators. Sediment can also settle, disrupting habitats.

STB-3.B.10 When elemental sources of mercury enter aquatic environments, bacteria in the water convert it to highly toxic methylmercury

STB-3.E.1 Wetlands are areas where water covers the soil, either part or all of the time.

STB-3.E.2 Wetlands provide a variety of ecological services, including water purification, flood protection, water filtration, and habitat.

STB-3.E.3 Threats to wetlands and mangroves include commercial development, dam construction, overfishing, and pollutants from agriculture and industrial waste.

STB-3.C.1 Endocrine disruptors are chemicals that can interfere with the endocrine system of animals.

STB-3.D.1 Endocrine disruptors can lead to birth defects, developmental disorders, and gender imbalances in fish and other species.

STB-3.F.1 Eutrophication occurs when a body of water is enriched in nutrients.

STB-3.F.2 The increase in nutrients in eutrophic aquatic environments causes an algal bloom. When the algal bloom dies, microbes digest the algae, along with the oxygen in the water, leading to a decrease in the dissolved oxygen levels in the water. The lack of dissolved oxygen can result in large die-offs of fish and other aquatic organisms.

STB-3.F.3 Hypoxic waterways are those bodies of water that are low in dissolved oxygen.

STB-3.F.4 Compared to eutrophic waterways, oligotrophic waterways have very low amounts of nutrients, stable algae populations, and high dissolved oxygen.

STB-3.F.5 Anthropogenic causes of eutrophication are agricultural runoff and wastewater release.

STB-3.G.1 Thermal pollution occurs when heat released into the water produces negative effects to the organisms in that ecosystem.

STB-3.G.2 Variations in water temperature affect the concentration of dissolved oxygen because warm water does not contain as much oxygen as cold water.

STB-3.H.1 Persistent organic pollutants (POPs) do not easily break down in the environment because they are synthetic, carbon-based molecules (such as DDT and PCBs).

STB-3.H.2 Persistent organic pollutants (POPs) can be toxic to organisms because they are soluble in fat, which allows them to accumulate in organisms' fatty tissues.

STB-3.H.3 Persistent organic pollutants (POPs) can travel over long distances via wind and water before being redeposited.

STB-3.I.1 Bioaccumulation is the selective absorption and concentration of elements or compounds by cells in a living organism, most commonly fat-soluble compounds.

STB-3.I.2 Biomagnification is the increase in concentration of substances per unit of body tissue that occurs in successively higher trophic levels of a food chain or in a food web.

STB-3.J.1 Some effects that can occur in an ecosystem when a persistent substance is biomagnified in a food chain include eggshell thinning and developmental deformities in top carnivores of the higher trophic levels.

STB-3.J.2 Humans also experience harmful effects from biomagnification, including issues with the reproductive, nervous, and circulatory systems.

STB-3.J.3 DDT, mercury, and PCBs are substances that bioaccumulate and have significant environmental impacts.

EIN-2.J.1 Overfishing has led to the extreme scarcity of some fish species, which can lessen biodiversity in

aquatic systems and harm people who depend on fishing for food commerce.

ERT-4.F.1 Characteristics of a given watershed include its area, length, slope, soil, vegetation types, and divides with adjoining watersheds.

STB-1.B.1 Methods to increase water infiltration include replacing traditional pavement with permeable pavement, planting trees, increased use of public transportation, and building up, not out.

Content

Vocabulary:
Freshwater Resources

Ogalalla Aquifer

Wetlands

Watersheds

Pros & Cons of Dams

Desalination

Sources of Water Pollution

Point Source Pollution

Nonpoint Source Pollution

Biomagnification

Bioaccumulation

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