# 2021 Unit 08: Aquatic and Terrestrial Pollution

Content Area: **Science**
Course(s): **Advanced Placement Environmental Science**
Time Period: **March**
Length: **20 periods**
Status: **Published**

## Enduring Understandings:

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

## Essential Questions:

- How can you decrease your waste?
- How does pollution impact your health?

## Lesson Titles:

- Bioaccumulation and Biomagnification
- Dose Response Curve
- Endocrine Disruptors
- Eutrophication
- Human Impacts on Ecosystems
- Human Impacts on Wetlands and Mangroves
- Lethal Dose 50% (LD50)
- Pathogens and Infectious Diseases
- Persistent Organic Pollutants (POPs)
- Pollution and Human Health
- Sewage Treatment
- Solid Waste Disposal
- Sources of Pollution
- Thermal Pollution
- Waste Reduction Methods

## Career Readiness, Life Literacies & Key Skills

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| WRK.K-12.P.1 | Act as a responsible and contributing community members and employee. |
| WRK.K-12.P.4 | Demonstrate creativity and innovation. |
| WRK.K-12.P.5 | Utilize critical thinking to make sense of problems and persevere in solving them. |
| WRK.K-12.P.8 | Use technology to enhance productivity increase collaboration and communicate |

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| | effectively. |
| WRK.K-12.P.9 | Work productively in teams while using cultural/global competence. |

## Inter-Disciplinary Connections:

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| LA.RH.9-10.7 | Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text, to analyze information presented via different mediums. |
| LA.RH.9-10.8 | Assess the extent to which the reasoning and evidence in a text support the author's claims. |
| LA.RH.9-10.9 | Compare and contrast treatments of the same topic, or of various perspectives, in several primary and secondary sources; analyze how they relate in terms of themes and significant historical concepts. |
| LA.RST.9-10.7 | Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. |
| LA.RST.9-10.8 | Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. |
| LA.RST.9-10.9 | Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. |
| LA.WHST.9-10.1.A | Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. |
| LA.WHST.9-10.1.B | Develop claim(s) and counterclaims using sound reasoning, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. |
| LA.WHST.9-10.1.C | Use transitions (e.g., words, phrases, clauses) to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. |
| LA.WHST.9-10.1.D | Establish and maintain a style and tone appropriate to the audience and purpose (e.g., formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing. |
| LA.WHST.9-10.1.E | Provide a concluding paragraph or section that supports the argument presented. |
| | Random processes can be described mathematically by using a probability model: a list or description of the possible outcomes (the sample space), each of which is assigned a probability. In situations such as flipping a coin, rolling a number cube, or drawing a card, it might be reasonable to assume various outcomes are equally likely. In a probability model, sample points represent outcomes and combine to make up events; probabilities of events can be computed by applying the Addition and Multiplication Rules. Interpreting these probabilities relies on an understanding of independence and conditional probability, which can be approached through the analysis of two-way tables. |
| | Randomization has two important uses in drawing statistical conclusions. First, collecting data from a random sample of a population makes it possible to draw valid conclusions about the whole population, taking variability into account. Second, randomly assigning individuals to different treatments allows a fair comparison of the effectiveness of those treatments. A statistically significant outcome is one that is unlikely to be due to chance alone, and this can be evaluated only under the condition of randomness. The conditions under which data are collected are important in drawing conclusions from the data; in critically reviewing uses of statistics in public media and other reports, it is important to |

consider the study design, how the data were gathered, and the analyses employed as well as the data summaries and the conclusions drawn.

Connections to Functions and Modeling.

Decisions or predictions are often based on data—numbers in context. These decisions or predictions would be easy if the data always sent a clear message, but the message is often obscured by variability. Statistics provides tools for describing variability in data and for making informed decisions that take it into account.

Data are gathered, displayed, summarized, examined, and interpreted to discover patterns and deviations from patterns. Quantitative data can be described in terms of key characteristics: measures of shape, center, and spread. The shape of a data distribution might be described as symmetric, skewed, flat, or bell shaped, and it might be summarized by a statistic measuring center (such as mean or median) and a statistic measuring spread (such as standard deviation or interquartile range). Different distributions can be compared numerically using these statistics or compared visually using plots. Knowledge of center and spread are not enough to describe a distribution. Which statistics to compare, which plots to use, and what the results of a comparison might mean, depend on the question to be investigated and the real-life actions to be taken.

## Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- Ask the Expert (or Students as Experts) Divide students into groups. Each group will become experts on the major criteria used to determine the steps involved in waste water treatment (primary, secondary, tertiary, etc.). Have them rotate through expert stations to learn about how waste water is treated.
- Index Card Summaries/Questions Show students a diagram of the eutrophication process at the beginning or the end of class. On one side of an index card, have them summarize what they understand about the topic. On the other side, have them write what they don't understand. Address all questions that day or during the next class.
- One-Minute Essay Have students read the EPA's summary on Polychlorinated biphenyls (PCBs). Give them one minute to respond to the prompt: Explain the long-term effects of PCBs in the environment.

## Modifications

## Benchmark Assessments

Skills-based assessment

Reading response

Writing prompt

Lab practical

## Formative Assessment:

- Anticipatory Set
- Closure
- Quizzes on Indoor and Outdoor Pollution, Effects and Reduction of Air Pollution
- Warm-Up

## Summative Assessment:

- Alternate Assessment
- Marking Period 3 Assessment
- Quizzes on Sources of Pollution and Impacts, Waste Management, and Waste reduction
- Unit 8 Aquatic and Terrestrial Pollution Benchmark

## Alternative Assessments

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Reflective pieces

Concept maps

Case-based scenarios

Portfolios

## Resources & Materials:

- AP Environmental College Board Site
- Carolina Biological Lab Kits
- Cengage
- Exploring Environmental Science for AP® Updated