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| TGC Fellow Unit Plan  |
| Prepared by: Benjamin Dotson School/Location: Lincoln High School, Tacoma, WA |
| Subject: AP Environmental Science Grade: 11-12 Interdisciplinary Unit Title: Water Pollution and Human HealthTime Needed: 3 Weeks |
| **Unit Summary**: Students will be exposed to some of the challenges of maintaining clean water supplies for both human consumption and ecological stability. Students will investigate the sources of pollution that lead to the most common water-related human health issues, both in developed and developing countries. Varying perspectives will be addressed as to identify why some areas are more polluted than others, particularly regarding culturally-relevant locations. Students will communicate their understanding of the problem and research potential solutions through classroom presentations. Finally, students will take action by participating in a question and answer session with a recent immigrant from India to discuss the problems and need for solutions in developing nations. |
| STAGE 1: Desired Results |
| **GLOBAL COMPETENCY:**Investigate the world: students will learn about the most significant issues revolving around human use of water and the consequences of poor wastewater treatment. They will investigate the effects of various water-borne pathogens on human systems by choosing a country in which to investigate current water quality issues, how the people are being impacted, and identify solutions that are being considered.Recognize Perspectives: Students will discuss cultural and political impacts on water quality and how living in poverty leads to increased pollution. Students will also examine the water quality issues of developed regions, including Flint, Michigan, and drawing connections on how those in relative poverty suffer from environmental injustice.Communicate Ideas: Students will work in groups throughout the unit to investigate and solve problems. They will also present a summary of area-specific problems and potential solutions as a class presentation. Take Action: Students will use the information they have learned to facilitate a Q & A session with a recent immigrant from India who experienced severe pollution growing up**ESTABLISHED STANDARDS:**ESS3.C: Human Impacts on Earth SystemsScientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.HS-LS2-7. Design, evaluate, and refine a solution for Constructing Explanations and Designing SolutionsConstructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. reducing the impacts of human activities on the environment and biodiversity.Resources:*Environmental Science for AP**A Long Walk to Water*“Slumdog Millionaire”<https://www.theguardian.com/world/2017/jul/07/indian-yamuna-river-living-entity-ganges> | *Transfer* |
| *Students will be able to independently use their learning to understand the complex relationship humans have with water and be to articulate the importance of clean water on human health.* |
| *Meaning* |
| UNDERSTANDINGSStudents will understand that:* Pollution comes from both point and non-point sources.
* Water-borne pathogens are a major source of human health problems, especially in developing nations
* Poor or no wastewater management and a lack funding lead to health crises in developing nations
* Cultural influences impact the use of water systems.
* Water pollution can occur in three different states: Chemical, biological and physical
* Humans have developed a variety of systems to treat wastewater.
 | ESSENTIAL QUESTIONS* How are nonpoint sources of pollution different than point sources and how does that impact how they are managed?
* What pathogens are present in water polluted by industry? By wastewater?
* What is eutrophication? How does Nitrogen and Phosphorus contribute to it?
* What are the ways that developed nations use to handle wastewater? How is this different than developing nations or other areas in extreme poverty?
* Why is wastewater treatment often the key to addressing human health issues in developing nations?
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| *Acquisition* |
| *Students will know:** The three major types of water pollutants
* The identities of the major organisms that contribute to water pollution
* Different ways water is used culturally, other than cooking, cleaning, and drinking.
* That culture is defined by the rituals, relationships and restrictions of a group of people.
* The technologies humans have developed to treat wastewater.
 | *Students will be able to:** Apply the facts of water pollution to discuss the relationship between poverty, water quality and human health
* Work together in partners and small groups
* Express differing opinions respectfully
* Discover and share relevant topical information from a variety of news sources, including video, newspapers and magazines.
* Research and develop solutions that meet the specific needs of a region, including cultural considerations.
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| Stage 2: Evidence |
| **Assessment** | **Evaluation Criteria (Learning Target or Student Will Be Able To)** |
| Assessments FOR Learning: | Using expert groups to research various pathogensThey will write a KWL chart to monitor their own learningSee think wonder protocolExit ticketsEntry tasksElbow partnersFrayer ModelGraphic Organizers and Interactive notebooks |
| Assessments OF Learning: | *Group Presentations**Lab reports**Unit exam* |
| Stage 3: Learning Plan |
| Week 1: ***Wastewater & Disease Week*** *- human/animal wastewater treatment & health threats; diseases (both water borne & non).* Students will watch “A Long Walk to Water” then discuss the value of clean water and wastewater treatment systems. We will examine the science of wastewater treatment, the stages of wastewater treatment, and an introduction to human diseases. We end the week with a demonstration of the science of epidemics.*Week 2:* ***Water Pollution Week*** *- metals, oils, POPs, sediment, thermal, noise; sources, effects, solutions, laws.* Students will conduct a demonstration of point vs non-point pollution and look at the impacts of culture on water pollution. Students will work in groups to research a country to discuss cultural and religious issues that my impact quality, cumulating with group presentations.*Week 3:* ***Toxicology & Hazardous Substance Week*** *– s%!t that will kill you.* Students will watch a Dateline video on electronic recycling and a segment from the movie “Slumdog Millionaire” which shows solid waste and it’s impacts on water quality and human health in developing nations.. |