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| **TGC Fellow Unit Template \*** |
| Prepared by: Cinda Murray School/Location: Northwestern High / Albion PA |
| Subject: Environmental Science Grade: 11/12 Unit Title: Global Impact of Invasive Species Time Needed: 4 wks |
| Unit Summary: Students will be learning about local, regional, national, and global invasive species. They will be investigating the presence of invasive species as well as the ecological, cultural, and economical impact. They will specifically examine species native to the US that have spread and impacted other nations. They will analyze their own practices to help prevent the spread of invasive species. |
| **Stage 1 Desired Results** |
| ESTABLISHED GOALS:**PA State Environment & Ecology Standards:**4.6.12.C. Analyze how human action and natural changes affect the balance within an ecosystem.4.7.12.A. Analyze biological diversity as it relates to the stability of an ecosystem.4.7.12.B. Examine the effects of extinction, both natural and human caused, on the environment.4.7.12.C. Analyze the effects of threatened, endangered or extinct species on human and natural systems.4.8.12.D. Analyze the international implications of environmental occurrences.4.9.12.A. Analyze environmental laws and regulations as they relate to environmental issues.**PA Common Core Reading and Writing in the Sciences**CC.3.6.11-­12.A.     Write  arguments  focused  on  *discipline-­specific   content.* CC.3.6.11­12.E.     Use  technology,  including  the  Internet,  to  produce,   publish,  and  update  individual  or  shared  writing   products  in  response  to  ongoing  feedback,  including   new  arguments  or  information. CC.3.6.11­12.F.     Conduct  short  as  well  as  more  sustained  research   projects  to  answer  a  question  (including  a self –generated question) or solve a problem;  narrow  or   broaden  the  inquiry  when  appropriate; synthesize   multiple  sources  on  the  subject,  demonstrating   understanding  of  the  subject  under  investigation.CC.3.6.11­12.G.     Gather relevant information from multiple authoritative print  and  digital  sources,  using  advanced   searches  effectively;;  assess  the  strengths  and   limitations  of  each  source  in  terms  of  the  specific   task,  purpose,  and  audience;;  integrate  information   into  the  text  selectively  to  maintain  the  flow  of  ideas,   avoiding  plagiarism  and  overreliance  on  any  one   source  and  following  a  standard  format  for  citation.CC.3.6.11­12.H.     Draw  evidence  from  informational  texts  to  support   analysis,  reflection,  and  research.CC.3.6.11­12.I.     Write  routinely  over  extended  time  frames  (time  for   reflection  and  revision)  and  shorter  time  frames  (a   single  sitting  or  a  day  or  two)  for  a  range  of   discipline-­specific  tasks,  purposes,  and  audiences.CC.3.5.11-12.I. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.C:C2.3 Learn to work cooperatively as a team member.**American School Counselor Association National Standards (adopted in PA)** PS:A1.9 Demonstrate appropriate behavior in groups.PS:A2.2 Respect alternative points of view.PS:A2.4 Recognize, accept and appreciate ethnic and cultural diversity.PS:A2.6 Use effective communication skills.PS:A2.7 Know that communication involves speaking, listening, and nonverbal behavior.PS:B1.1 Use a decision-making and problem-solving model PS:B1.2 Understand consequences of decisions and choices PS:B1.3 Identify alternative solutions to a problem PS:B1.9 Demonstrate a respect and appreciation for individual and cultural differences PS:B1.11 Identify alternative ways of achieving goals Use persistence and perseverance in acquiring knowledge and skills PS: B1.12 Develop an action plan to set and achieve realistic goals**PA Academic Standards for Geography**7.1.12.A. Use **geographic tools** to analyze information about the interaction between people, **places,** and the **environment**.7.1.12.B. Assess how physical changes to a **region** may have global impact.7.2.12.A. Analyze the physical characteristics of **places** and **regions,** including the interrelationships among the components of Earth’s physical systems.7.3.12.A. Analyze the human characteristics of **places** and **regions** using the following criteria: • Population • Culture • Settlement • Economic activities • Political activities7.4.12.A. Analyze the global effects of changes in the physical systems.7.4.12.B. Analyze the global effects of human activity on the physical systems.PA Standards for Economics6.1.12.A. Predict the long-term consequences of decisions made because of **scarcity**.6.1.12.C. Analyze the **opportunity cost** of decisions made by individuals, businesses, communities, and nations.6.1.12.D. Predict how changes in **incentives** may affect the choices made by individuals, businesses, communities, and nations.6.2.12.A. Evaluate the flow of **goods** and **services** in an international economy.6.2.12.E. Evaluate the health of an economy (local, regional, national, global) using economic indicators.6.3.12.B. Assess the government's role in regulating and stabilizing the state and national economy..3.12.D. Evaluate the role that governments play in international **trade**.6.4.12.B. Assess the growth and impact of international **trade** around the world.6.4.12.C. Evaluate the impact of **multinational corporations** and other non-government organizations.6.4.12.D. Analyze how changes in transportation, communication networks, and technology affect economic **interdependence** around the world in the 21st century.**GLOBAL COMPETENCY:**Investigate the WorldWeigh PerspectivesCommunicate ideasProblem solving**Web Resources:**<http://seagrant.noaa.gov/Home.aspx><http://www.seagrant.wisc.edu/home/Default.aspx?tabid=492><http://www.issg.org/database/welcome/><http://www.gisin.org/DH.php?WC=/WS/GISIN/GISINDirectory/home_new.html&WebSiteID=4><http://www.takepart.com/photos/most-invasive-species-us-has-exported/red-white-and-exported><http://news.discovery.com/animals/top-10-invasive-species-exported-from-america-131018.htm><http://www.cbsnews.com/news/the-threat-of-invasive-species/><http://science.time.com/2013/12/04/forget-the-asian-carp-heres-a-new-great-lakes-invasive-species-to-worry-about/><http://www.invasives.org.za/resources/downloadable-resources/viewdownload/107-european-union-invasives/742-press-release-european-union-invasive-alien-species-regulations.html><http://www.invasives.org.za/resources/downloadable-resources/viewdownload/107-european-union-invasives/741-fact-sheet-european-union-invasives.html><http://www.invasives.org.za/resources/downloadable-resources/viewdownload/107-european-union-invasives/740-eu-invasive-species-regulations-2014.html><http://news.nationalgeographic.com/news/2012/01/120109-louisiana-crayfish-invasive-species-environment-africa-science/><http://neobiota2014.org><http://english.cntv.cn/2014/10/27/VIDE1414356127346422.shtml><http://www.bbc.com/news/uk-scotland-glasgow-west-29350840><http://blog.ted.com/2014/09/26/a-ted-fellow-wields-genes-to-protect-the-amazon/><https://www.google.com/earth/outreach/tutorials/user_experience.html> | ***Transfer***  |
| *Students will be able to independently use their learning to…(real world purpose)* T1. Investigate the world beyond their immediate environment.T2. Recognize perspectives.T3. Communicate ideas effectively with a diverse audience. |
| ***Meaning*** |
| UNDERSTANDINGS *Students will understand that…*U1. Invasive species impact local, regional, national, and global economies.U2. Humans contribute to the problem of invasive species. U3. Invasive species upset the balance of healthy ecosystems.U4. Policies and practices can be modified to prevent and respond to control the spread of invasive species.  | ESSENTIAL QUESTIONSWhat are invasive species?Where do invasive species come from? How do invasive species spread?How are invasive species a threat?Why should we control invasive species?How can invasive species be controlled?  |
| ***Acquisition*** |
| *Students will know… (Content)* *K1. Local, regional, national, and international invasive species.**K2. Specific threats associated with invasive species**K3. Geographic origins of invasive species**K4. Method or human practice which spreads or contributes to the spread of invasive species**K5. The impact of invasive species on the local, regional, national, and global economy.* | *Students will be able to… (Skills)* S1. Research and create a digital global map indicating case studies of invasive species to and from the US.S2. G2. Describe invasive species impacts in the US, Europe, and Africa.S3.Evaluate their Environment by performing an ecological investigation of their local and regional environments and record the presence of invasive species.S4. Interview experts (scientists, politicians, economists, etc.), investigate public records, and collaborate with native people to analyze the economic and environmental costs of invasive species locally, regionally, nationally, and globally using digital tools such as Skype, list serves, Blogs, etc.S5. Evaluate their own perspectives and practices that contributes to the problemS5. Work collaboratively with individuals in other regions or countries to design and implement an action plan to monitor and stop the spread of invasive species.S6. Review and evaluate their action planS7. Host a videoconference using Vokle to create awareness and communicate globally the results of their action plan. |
| **Stage 2 - Evidence** |
| **Assessment** | **Evaluation Criteria (Learning Target or Student Will Be Able To)** |
| Assessments **FOR** Learning: (ex: kwl chart, exit ticket, observation, draft, rehearsal)1. KWL Chart: Invasive Species Facts
2. Digital Global Map and Invasive Species Inventory Rubric to assess for Research Expert Texts / Websites /Interviews on Local, Regional, and Global Invasive Species
3. Teacher Observation of group work
4. Informal Student Interviews for Understanding
5. Student Reflective digital journals in Google Docs
6. Action Plan for Service Project
 | 1. Growth of knowledge on KWL chart.
2. Thorough research methods gathering evidence for digital global map and Invasive species inventory.
3. Collaborative listening and speaking skills. (Teacher Observation Rubric)
4. Demonstrate knowledge of the effects of Invasive species. (Interview Form / Checklist)
5. Have self-knowledge demonstrated by meta-cognitive awareness as students write about the meaning of learned information about invasive species in journal. (Rubric)
6. Demonstrate detailed and supported editing (Rubric- Self & Peer Evaluation; Teacher feedback)
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| Assessment **OF** Learning: (ex: performance task, project, final paper)1. Service Project to Stop the Spread of Invasive Species
2. Performance of Assigned Video Conference Component where students will tell others via Videoconference about their service project.
 | 1. Content and solutions addressing different perspectives on invasive species, the history, and the effects they have today. (Rubric Evaluation)
2. Demonstrate communication skills and use of technology. (Rubric Evaluation)
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| Other Evidence1. Matching Quizzes to assess general knowledge of Invasive species.
2. Group Scenario problem solving exercise
3. Shows good use of time, understanding of concepts to the larger picture, understanding of global perspectives, connecting their roles as global citizens
 | 1. Correct Identification, origins, and facts about invasive species (Answer key used to assess)
2. Transfer of knowledge from case studies to predict possible outcomes if invasive species spread to new areas.
3. Observation of groups during
* research time
* communication with global partners
* collaboration/work time
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| **Stage 3 – Learning Plan** |
| *Summary of Key Learning Events and Instruction ( Make this a useful outline or summary of your unit, your daily lesson plans will be separate)**Week One: In this introductory week, students will communicate and assess their current knowledge about invasive species. Students will post their initial perspective regarding invasive species in their digital journals. An anchoring KWL will be used to evaluate student progress throughout the unit. Building upon the established pre-assessment of student prior knowledge, Traditional teaching methods will be used (presentations, videos, textbook exercises) to will be the recognition of local and regional invasive species. This week’s focus is on recognizing local familiar presence and impact of invasive species. This first week students are confined to investigating their own world and establishing initial perspectives. They are becoming experts on local invasive species).** *Lesson 1 KWL: What do you know about invasive species?*
* *Lesson 2 Recognizing invasive species: Who’s Who, Where did you come from?*
* *Lesson 3 Pennsylvania’s Worst and Most Wanted*
* *Lesson 4 Why does the PA Fish Commission Care?*
* *Lesson 5 What is being done locally to stop the invaders?*

*Week Two: This week’s focus will be Expanding knowledge to distant regions (****Investigate the World****) and nations along with the economical and environmental impact of invasive species (****Develop perspectives****). Testimonies of experts in the field will be viewed and analyzed. Students will perform research and create digital collections of information that relate solutions to the problems caused by invasive species. Students will collaborate and create a digital map displaying documented case studies of invasive species throughout the world. This is an ideal time to establish collaborations with others in other regions or internationally.** *Annotating Google Earth: Invasive Species Case Studies*

*Week Three: Using information and concepts from the past two weeks, students will create action plans to address the problem of a chosen invasive species. They will* ***collaborate with others*** *(locally but regionally or internationally ideally)**Week Four: Students will reevaluate their practices and role in spreading invasive species. They will act upon making changes by producing products that take action to change policy or practice that contributes to the spread of invasive species.****Follow up activity:*** *Students will help to design and host a video-conference that highlights their products and creates awareness about invasive species.**\*adapted from Understanding by Design Model* |

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| **TGC FELLOWS UBD Lesson Template** |
| Lesson Title: Annotating Google Earth: Invasive Species Case Studies Subject: Environmental Science Prepared by: Cinda MurrayMaterials Needed: Computers, Internet connection, hat with invasive species on paper tags, Google class map /Google Earth, uploaded research collection worksheet in Google class, Class Blog using Wordpress, Google translator if news articles are in languages other than English.Global Competency: Investigate the World & Communicate Perspectives |
| **W**here is the lesson going?SWBAT:1. Research and summarize international cases of invasive species in a class blog.
2. Locate and mark areas of concern on a Google map.
3. Communicate information by adding placemark description ballons on the Google map.
 | After reviewing case studies concerning global invasive species and their environmental and economic impacts, students will summarize the key concepts and post in a class blog. They will locate the area of concern on the Google Class world map. Then create *placemark description balloons* on the map to communicate important information.  |
| **H**ook: | **T**ailored Differentiation: |
| **As students enter the room they will see the Class Google world map displayed on the Smart Board. Students will log onto computers and link to the Google map and view the models.** | * Choose a variety of suggested sites to tailor to different student levels.
* Allow students to collaborate with resource personal via Google classrooms to receive help as needed prior to posting in the class blog.
* Allow for additional time and support beyond the classroom as dictated by Individualized Education Plans.
* Allow students to use video as a source as well as text to speech.
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| **E**quip: |
| Students will randomly choose an invasive species from a jar. They will use suggested resources (newspapers from various countries, videos, and other general Google searches) to investigate the chosen invasive species.  |
| **Rethink and revise:** |
| Students will summarize the research they found and post on the class blog, *Investigated Invasive Species.* They will rank the severity of the problem based upon a class-established scale (1 small concern to 5 devastating).They create a “ballon tag” for the invasive species on the Google map and link it to the post. |
| **Evaluate:**  |
| Students will read others blogs and comment. Rubric will be used for self, peer, and teacher evaluation. They will peer evaluate and comment on at least two blogs by cross-referencing the information using internet searches. Students will view and evaluate Google map for correct geographical *placemarks*. Depth of knowledge will be evidenced by the quality of the posts and *placemark ballon* descriptions. Students may enhance their posts with embedded videos and photos. |
| Notes: I’m working to link the blog and Google map through Google Classroom. |
| **O**rganization:  |
| Create Google Class Invasive Species Map and Blog prior to class period. Create at least two examples that model the expectations for students. (Both a post and a map marker).Create a list of suggested resources for students who need scaffolding to perform internet searches.  |