

CORONA CREEK ECOSYSTEM RESTORATION

Teachers: Jennifer Rose, Kristin Gornick		Duration: 2018-2019
Subject/Course: Seventh Grade Integrated Science	School: Kenilworth Junior High	Grade Level: 7
Collaborating Organizations: Friends of the Petaluma River Watershed Classroom, Students and Teachers Restoring a Wetland (STRA), and possibly others		
Standards Met (NGSS, CCSS, or otherwise) Please include full text of standards.	MS-LS2 Ecosystems: Interactions, Energy, and Dynamics MS-LS2-1 Analyze and interpret data to provide for the effects of resource availability on organism and populations of organisms in an ecosystem. MS-LS-2.2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. MS-LS-2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services. MS-PS-1-6 Undertake a design project to construct, test and modify a device that either releases or absorbs thermal energy by chemical processes.	
Project Summary (include student role, issue, problem or challenge, action taken, and purpose/beneficiary)	Students will engage in a yearlong study of Corona Creek, which flows through city land adjacent to the Kenilworth Junior High campus. During the course of the year students will become familiar with the Corona Creek vegetation, aquatic life, soil conditions, and water quality. As part of their data collection, students will identify make and record observations of birds, insects, fish, amphibians, reptiles and mammals that currently reside in the Corona Creek area. Water testing for turbidity, chemical runoff from agriculture, and pH will be performed when water is present in the creek and compared with existing data from previous years to determine water quality. Students will research similar creeks in a more natural and/or restored state and determine the elements of a healthy, well functioning seasonal creek ecosystem. We are hoping that Friends of the Petaluma River staff and possibly STRAW naturalists will be able assist us in learning about the flora and fauna that exist in similar areas nearby. Once their research is completed, students will identify factors that are currently preventing Corona Creek from being a healthy ecosystem, including items discarded in creek, degraded water quality, non-native species, and important native species that are missing. Students will then create a list of possible human actions that could be taken to improve the health of the Corona Creek ecosystem, and will identify one or two of those strategies that we would like to enact this year. Possible actions include removing debris (including bricks, cars, and trash) from the creek, removing non-native species, and planting native species to improve creek flow and habitat. Finally, students will work with Friends of the Petaluma River and STRAW to actively restore the creek, using one or more of	

	<p>their identified strategies.</p> <p>Fall of 2018 Students will be trained in observation skills, and will make a minimum of 2-3 trips to the creek to record observations of creek flora, fauna, and topography. Students will take photos, make sketches, take water samples to record PH, and soil core samples to record composition and layers.</p> <p>Winter-Spring 2019 Students will study the components of a healthy ecosystem, including food webs and the interrelationships between plants, animals, bacteria and abiotic factors in an ecosystem. Using this background knowledge, students will begin to research the components that should be present in a truly healthy Sonoma County seasonal creek ecosystem. We would like to have outside experts come and share this knowledge, possibly using nearby nature preserve and creek areas that have been restored as examples. Teams of students will also conduct research using online and printed resources, focusing on factors present in a healthy ecosystem, including: food webs, seasonal creek flow patterns that provide habitat, and how weather and water quality have changed over time. As a culminating activity for this research, groups of students will create a time-lapse video presentation illustrating one factor of a healthy seasonal creek ecosystem.</p> <p>Once students have an understanding of the multiple factors involved in a healthy seasonal creek, students will conduct observations of Corona Creek. They will keep nature journals where they record all observations of plant and animal life, water sample test results, types of rock, patterns of water movement, and other abiotic factors. They will chart their collective findings, identifying healthy factors that currently exist in the creek, invasive species that should not be there, and native species that appear to currently be missing. They will also assess patterns of water flow, comparing the ways that water should flow in natural seasonal creek to Corona Creek's current flow, and will identify factors that are currently impeding and/or altering the flow of water and the formation of habitat. Students will then propose answers the question: What can we do to improve the health and vitality of Corona Creek? As a class, students will select one or two restoration projects that they can begin to implement this year. With the help of Watershed Classroom and STRAW, they will make one or more trips to the river to actively participate in these restorative activities.</p> <p>We intend this year to be the first of a multi-year research and restoration project. Students will conduct similar research each year; however restoration projects will be sequential based on resources and the support and partnership of community organizations. Ideally we would like to do both clean up and reintroduction of native species.</p>
<p>Essential Question Question students will explore throughout the course of the unit.</p>	<p>This year-long unit will include three essential questions:</p> <ol style="list-style-type: none"> 1) What components are necessary for Corona Creek to be a healthy ecosystem? (What biotic and abiotic factors make up the ecosystem? What are the major plant and animal species, and how are their populations dependent upon one another? How do abiotic factors (such as seasonal water flows) affect life in the ecosystem?) 2) What factors are currently keeping Corona Creek from being a healthy, fully functioning ecosystem? 3) What can we do to remedy those factors, and improve the health of Corona Creek?

Key Learning Objectives and Assessments Concrete objectives for student skill building and comprehension and how these will be measured.	Learning Objective				Assessment		
	Students will understand and create a model for the ways energy flows through a seasonal creek in an oak savannah ecosystem. Models will include relationships between producers, primary and secondary consumers, and apex predators.				Group video presentations		
	Students will understand and model the ways that the flow of water in a seasonal creek changes throughout the year, and ways this seasonal movement of water supports habitat for plants and animals.				Group video presentations		
	Students will understand the relationships and interactions between various biotic and abiotic factors in an ecosystem, and how altering one factor will impact the others. Students will present proposals for modifying one or two factors in the ecosystem, showing how these changes will impact the others.				Students group proposals for creek restoration		
	Students will design, test, modify, and optimize a device that uses a chemical reaction to reach a specific temperature range, for portable reptile egg incubator, following the engineering design process.				Student designed and created incubators.		
Orientation	In-Class Visit Ideally an initial orientation and a follow up visit by naturalist.		Field Trip to River Heritage Center Walking field trips to Corona Creek		Other		If other, describe in timeline how you will meet entry activity requirements

<p>Making Products Public Include how student work will be shared with community members and/or organizations, who students will engage with during/at end of project, and which product(s) will be presented at the Watershed Classroom Student Showcase.</p>	<p>Student volunteers will participate in Watershed Classroom Student Showcase, sharing samples of key culminating projects. These may include:</p> <ul style="list-style-type: none"> *Video presentation on food webs in the seasonal creek ecosystem * Video presentation on water flow and habitat in the seasonal creek ecosystem * Group proposals for creek restoration * Student created reptile incubators

PROJECT TIMELINE

Please list all activities which are part of the unit in the order they will be implemented. Timeline must include pre and post-assessments, other in-class assessments, an entry activity, at least three outdoor fieldwork activities, a plan for participation in the student showcase, and any other supporting activities and classwork.

Activity	Type of Activity (Field Work, In-Class, Presentation, Assessment)	Description	Resources Needed	Exact or Approximate Dates
<i>Name the activity</i>	Field Work: Any hands-on outdoor lesson or field trips In-Class: Any in-class activity or project Presentation: Any activity during which students share their work with each other or an outside audience Assessment: Any written or oral exams given to assess student understanding and knowledge	<i>A thorough outline of the activity.</i>	<i>All reading materials, activity materials and equipment, transportation, third party help, or other resources needed to make the activity possible.</i>	<i>Please be as specific as possible so that we best know when to reach out with resources and tools to aid in implementation. Exact dates will be emitted from publicly shared version to protect student privacy.</i>
Orientation	In-Class	Introduction to Corona Creek as part of larger river system	Classroom visits for Orientation, introduction to watersheds and connection between Corona Creek and larger Bay Area ecosystem	ASAP November if possible
Teaching observation and data collection skills	In-Class Field Work	Students will be trained in observation skills, and will make a minimum of 2-3 trips to the creek to record observations of creek flora, fauna, and topography. Students will take photos, make sketches.		October (Rose) November (Gornick) with follow ups throughout the year
Understanding Watersheds Understanding ecosystems	In-Class	Students will study the components of a healthy ecosystem, including food webs and the interrelationships between plants, animals, bacteria and abiotic factors in an ecosystem.		November or December

	In-Class with visits from experts	Using this background knowledge, students will begin to research the components that should be present in a truly healthy Sonoma County seasonal creek ecosystem. We would like to have outside experts come and share this knowledge, possibly using nearby nature preserve and creek areas that have been restored as examples.	Classroom visits to share information about similar local ecosystems that are healthy, and/or farther along in restoration.	December and January
Research to answer the first essential question: What components are necessary for Corona Creek to be a healthy ecosystem?	In-Class	Teams of students will conduct research using online and printed resources, focusing on factors present in a healthy ecosystem, including: food webs, seasonal creek flow patterns that provide habitat, and how weather and water quality have changed over time.	Text and web resources for student research	January
Research presentations for first essential question	In-Class	As a culminating activity for this research, groups of students will create a time-lapse video presentation illustrating one factor of a healthy seasonal creek ecosystem		January/February
Research to answer the second essential question: What factors are currently keeping Corona Creek from being a healthy, fully functioning ecosystem?	Field Work In-Class	Once students have an understanding of the multiple factors involved in a healthy seasonal creek, students will conduct observations of Corona Creek. They will keep nature journals where they record all observations of plant and animal life, water sample test results, types of rock, patterns of water movement, and other abiotic factors.	Water sample test kits	When water is flowing in creek (December hopefully, or maybe Spring?)

	Field Work In-Class	Students will chart their collective findings, identifying healthy factors that currently exist in the creek, invasive species that should not be there, and native species that appear to currently be missing. They will also assess patterns of water flow, comparing the ways that water should flow in natural seasonal creek to Corona Creek's current flow, and will identify factors that are currently impeding and/or altering the flow of water and the formation of habitat.		March
Presentation activity for third essential question: What can we do to improve the health of Corona Creek?	In Class	Students will then propose answers the question: What can we do to improve the health and vitality of Corona Creek? Students will work in groups to prepare proposals for restoration, picking 1-2 actions to take, and explaining how and why these actions would positively affect the other factors in the ecosystem. As a class, students will select one or two restoration projects that they can begin to implement this year.		April
Restoration Activity: enacting our restoration plan	Field Work	With the help of Watershed Classroom and STRAW, students will make one or more trips to the river to actively participate in these restorative activities.	Adult guides, restoration tools, training for students in safe restoration, safe preparation of restoration site, possible help with removal of large items.	May

Please add more rows if needed. (Right click in last box, "Insert Row Below")

Other Notes:

We intend this year to be the first of a multi-year research and restoration project. Students will conduct similar research each year; however restoration projects will be sequential based on resources and the support and partnership of community organizations. Ideally we would like to do both clean up and reintroduction of native species.

We have a total of 250 middle school students: Jennifer Rose has five classes of 32, and Kristin Gornick has three classes of 32. All of our classes at Kenilworth are on block schedule, with class periods of 90 minutes. We have 2-3 classes each day. Thus, classroom visits and presentations have a large block of time available for each class; however presenters will need to meet multiple times and on multiple days.