SCHOOL NAME: Saint Stanislaus

TOPIC: Stewardship and the Environment

TITLE: Watershed Stewards: Using Oysters to Connect with Our Creator

DESCRIPTION: This cross-curricular lesson, designed for high school juniors and seniors, helps students explore stewardship of their watershed by studying it both in their marine science class and in their religion class. This enables students to experience a "both-and" parallel approach to defining their responsibilities in participating in God's ongoing act of creation while studying a concrete example of human impact on the watershed and the creatures that live in it.

Check the following link for an overview of this lesson plan: Saint Stanislaus

ESSENTIAL QUESTIONS:

1. As a Christian/Catholic, what is your responsibility within the environment? How does your faith call you to care for the environment, in particular your watershed, beyond your own personal needs and wants?
2. How can science enable you to participate with God in perfecting His creation?
3. Where God's creation is being damaged, either directly or indirectly, how can you help heal it?

METHOD:

SCIENCE Day 1 - What is a Watershed?

Objective: Explore what a watershed is, identify which watershed you live in, and evaluate the health of your watershed.

Time: 50 minute class period. Depending on the amount of discussion that is generated, this could be a two day lesson.

Discussion: The teacher will lead a discussion about watersheds, with emphasis on the Gulf of Mexico (and/or other watersheds of interest - see resources listed below). The teacher should emphasize the total drainage area of the Mississippi River Watershed (it drains 41% of the continental United States and is the largest U.S. drainage basin) before steering the discussion into eutrophication (nutrient pollution), nonpoint and point source pollution, and freshwater runoff. The teacher will guide the discussion to identify specific types of pollutants that are found within our watershed (i.e. agricultural fertilizers and pesticides in the Midwest, industrial pollutants from the Northeast, "normal" everyday pollutants from homeowners, etc.). Then, emphasis will be placed on weather events and seasonal changes (snow melt and spring

flooding) that would cause these pollutants, from farther upstream, to end up in the Gulf of Mexico (or other water bodies).

Optional Activity: The teacher may want to demonstrate a quick activity to help visualize these events that occur within watersheds. A Crumpled Watershed Model is a great activity that can be easily modified. Or the teacher may want to utilize images and/or information from other resources listed below to help students visualize a watershed.

Discussion/Assessment: Ensure that students are able to understand how all landscapes, storm drains, and water bodies (and their pollutants) eventually lead to the ocean or another body of water. Remind students that what they saw happen in the Crumpled Watershed Model is something that actually occurs, not just in their area – but everywhere! Ask students to explain the link between pollutants and nutrients, how the pollutants in their area could end up in the ocean, and what sort of issues this runoff could create in the Gulf of Mexico (or other local water bodies). Teacher may want to create a formal assessment or use an exit card to gauge student understanding. Student responses should lead to discussions (or research) on:

- Change in water quality
    - More freshwater = lower salinity
    - Increased sedimentation (suspended solids)
    - More pollutants = excess nutrients = Algal blooms
        - Algal blooms can potentially be harmful (HABS) which release toxins
        - Algal blooms can lead to dead zones
- Loss of species - impacts to the food chain
- Loss of habitat
- Impacts to local fishermen
- Loss of tourism
- Impacts to restaurants and other businesses
- Recent environmental issues (e.g. 2019 opening of the Bonnet Carre Spillway which lasted February - July and resulted in a HAB which lasted June - September)

Science Extensions:

- Show chapter/clip from the Ocean Frontiers documentary entitled “Iowa Farmers and the Gulf of Mexico.”
- Have students research common pollutants in their area (home, neighborhood, city, and state). Tell students to think about all the fertilizers used in agriculture and yards, all the vehicles on the road and all the cleaning products in their house that are just poured down the drain. Students are to make a list of all the pollutants they can find (especially the phosphates containing household cleaning products) and then record the pollutant and common information about the pollutant. This should include information such as: where the pollutants come from (locally or from another region), what are the main sources of these pollutants, what are the known side effects of this pollutant in an ecosystem, where do these pollutants end up, etc.
- Have students identify and explore other watersheds.

- Have students conduct water quality monitoring within a local water body.
    - Salinity, dissolved oxygen, nitrogen, phosphorus, turbidity, phytoplankton, etc.

RELIGION Day 1 - The Earth as Our Home

Time: 50 minute class period

Journal/Reflection Prompt: The teacher will lead a guided meditation to have students imagine themselves at home on the water (swimming, in a boat, at the beach, etc.) Have students write a vivid description of the scene.
Include questions such as:

What does it smell like?
What physical feelings do you have?
What emotions are you feeling?
What other life do you observe around you?
Who is with you?

Have volunteers share their reflection.

Discussion: The teacher will introduce the topic of the day: "the earth as our home." Begin by reading the second account of creation and emphasize the beauty and joy of nature. Emphasis should be placed on the constant dialog between God and humans. Lead students to a discussion that creation is a constant communication between us and God. Creation should lead us to discover the Creator.

Explain to students that for the next several days the class will examine the faith component of the environment which is the home we live in. Through it we are in constant communication with God, and we can discover God expressed in all he has created. We will examine our call to stewardship of what God has created, in particular of our watershed. We will examine in conjunction with lessons on the watershed and the oyster gardening project in Marine Science class.

Faith/Science Link: The teacher will group Marine Science students with students who have not taken the class to share knowledge of watersheds. This would serve a three-fold purpose: renewed knowledge for those who have had the course; cementing the science lesson for those doing it now; educating those who have not taken it. The group concept could carry through for this entire lesson. (Using a KWL would be good here).

Guide students to recall the algal bloom of the summer of 2019 and explain how it disrupted life on the water. Help students recognize that not only were recreational activities disrupted, the livelihoods of many individuals were severely impacted. Have students offer an explanation of how the water went from the water of favorite memories to the water poisoned by the algal bloom. Discuss how this event relates to God's original plan for our created home.

Introduce students to Pope Francis' encyclical *Laudato Si* which calls the earth "our common home," which will be referred to throughout the discussion of the environment.

SCIENCE Day 2 - Impacts to Local Species with Emphasis on Oysters (Part I)

Objective: Use a local resource, specifically oysters, to study environmental impacts in our watershed. Part I - Introduction of the oyster and *its ability to filter water.*

Time: 50 minute class period

(Note: If the teacher does not want to/cannot do the filtration activity, and only wants to show the time-lapse videos, Science Day 2 and Day 3 lessons could be combined into one lesson).

Activity - Observing Oyster Filtration
At the beginning of class tell your students that they will be observing the filtering abilities of a group of live oysters and that you have already set up two aquarium tanks filled with Bay water. (May also add concentrated algae to the tanks for additional food sources). Tank one will be the control and no oysters will be placed in that tank. Use this time to explain what a control is, if needed. Then, place the cluster of live oysters in tank two.

Assignment: Immediately after the teacher sets up the activity, have students record their observations of the water in both tanks, and have them make a hypothesis about what is going to happen in both tanks. At the end of class, have your students record their observations of the water in both tanks again, and encourage them to formulate their own conclusions as to what happened.

If you choose not to conduct the filtration activity, show the following videos (or similar) instead:

1) Time-lapse: Mississippi Oysters Filter Feeding Time-Lapse MS Oysters Filter Feeding.mov

2) Time-lapse: Oysters Filtering Water http://www.youtube.com/watch?v=1Zm-yMpHsaQ which is an excerpt from the Chesapeake Bay Foundation's documentary" Common Ground"

Discussion/Assessment: While the oysters are filtering, the teacher should discuss (or assign as a mini-research project for homework beforehand) a local species of bivalve mollusk - the oyster - or other species of concern (filter feeder) in your area. Topics to be covered include: oysters as a cultural resource in the Gulf of Mexico, their role as a filter feeder, their place in the food chain, the habitat they create, and their role in shoreline stabilization.

The teacher should then connect the dots between the role the oyster plays in our ecosystem and how those functions would be impacted by runoff within the watershed. Have the students specifically address the following, in regard to the oyster: how impacts from freshwater,

sediment, and pollutants would affect their filter feeding ability and subsequently their survival. Teacher may want to create a formal assessment or use an exit card to gauge student understanding. Responses should include: mortality due to decrease in salinity (they have a salinity threshold of 5 ppt) and increase in sedimentation (they will be smothered). Mortality due to disruption of food source (change in plankton species, and quantity), with the possibility of dead zones (no/low oxygen levels in the water) and possible harmful algal blooms (plankton species that release toxins into the water). These contaminants/pollutants/toxins could also biomagnify through the food chain resulting in a collapse within the oyster industry, and other fisheries, with subsequent losses to fishermen and businesses. Not to mention the loss of habitat for other species, and loss of storm protection.

Science Extensions: Oysters as a Cultural Resource

- Show the documentary "A Life on the Water," which focuses on Mississippi Oystermen.
- Have an oysterman come into your classroom. If this is not possible, have your students conduct the research ahead of time, and discuss their findings in class. The students can conduct personal interviews with oystermen beforehand. If oystermen are not in your area, have your students conduct a research project using your library resources on oystermen. Use the topics mentioned below to guide their research. Have your students lead the class discussion by presenting their research to the class. Topics to be addressed include: How are oysters caught? Where do oysters live? How do the oystermen find the oysters? How many oysters do they usually catch? When is the oyster season? How is the season determined? How long has this oysterman been in this business? Has he noticed any changes to the oysters, the industry, the habitat, their range etc. over the years? What kind of changes? Do oysters have any predators? What is their life cycle? How do they grow? Does he know anything about using oysters in restoration projects?
- Oyster farming - show the documentaries:
  "The Gospel of the Alabama Oyster" https://www.youtube.com/watch?v=Fk124t_W6fI
  "For the Love of Oysters: Alabama's Oyster Farmer"
  https://www.youtube.com/watch?v=K-hZlCuOaXI

RELIGION Day 2 - Dignity of ALL Creation

Time: 50 minute class period

Journal/Reflection Prompt: Do humans have a greater right to the earth than other creatures?

Discussion: Lead a discussion about the difference in meaning between "subduing the earth" Genesis 1:28, versus "tilling and keeping the earth" Genesis 2:15. Lead students to an understanding that there is a tension between those two understandings of how to live in our home. Subduing the earth denotes selfish exploitation of the earth, while tilling and keeping denotes a nurturing relationship respecting the natural rhythm, cycles and resources.

Faith/Science Link: Have students break into groups to discuss the structure of an oyster and its role in the ecosystem. Further have students identify the role of the watershed in the life of the oyster. Discuss the complexity of the oyster as a reflection of the complexity of God's sustaining and continuance of creation. How does this affect our understanding of the importance of the "creature" of the oyster versus the human "creature." Have each group identify human actions that impact the watershed without regard to the dignity of the "creature" of the oyster. In science we can see how human actions affect the watershed.

SCIENCE Day 3 - Impacts to Local Species with Emphasis on Oysters (Part II)

Objective: Use a local resource, specifically oysters, to study environmental impacts in our watershed. Part II - Introduction of the oyster and *its ability to create habitat/reefs.*

Time: 50 minute class period

Activity - Oyster Shells as Habitat
The instructor should have a bucket of "blank" oyster shells prepared before class starts. The teacher should also have a table available to dump the shells onto. After getting the class' attention, the teacher will dump out the entire bucket of oyster shells onto a table (or dumping the entire bucket may be the attention getter). Ask your students to *think* about the following statement: How can these blank, broken, and dry shells be ecologically important to the Gulf Coast ecosystem? Distribute shells to students at this time.

Assignment: Ask students to analyze these oyster shells and come up with their own reasoning for oyster shells playing a significant role to the ecology of the Gulf Coast region – both underwater and to the land. Have students record their thoughts in their scientific notebooks.

Discussion/Assessment: The goal of this assignment is for the students to draw their own conclusions, based upon what they have already learned about oysters and come up with the correct answers on their own. Ideally, you would want your students to come up with the following ideas:

- the oyster shells could be used to form reefs
- the oyster reefs could serve as nurseries for juvenile organisms
- the oyster shells can provide habitat for other marine species to live
- the oyster shells will provide suitable substrate for organisms, like other oysters, to attach to
- the oysters that grow on them will filter the water and thus improve the water quality in the area
- the oyster shells can be used as reefs in an effort to restore eroding shorelines
- if these shells were used in restoration techniques they may also help create new land and encourage vegetation growth
- etc.

Next, introduce students to the concept of oyster gardening by placing the blank oyster shells into a gardening basket - as a visual. Ask students what they think would happen to these shells if the basket was lowered into the water and left for nature to take its course versus if the shells were already covered in baby oysters (spat) and then lowered into the water and left to grow? Have students record hypotheses for each scenario.

Ensure that students connect the dots between the role that oysters play in the ecosystem and how environmental impacts throughout our watershed have significantly impacted their population in our area. (In some areas there was 99% mortality in the oyster population within the Mississippi Sound after the opening of the Bonnet Carre Spillway last spring (2019). Hence the need to try to help restore our oyster populations.

Consider showing the videos listed below: Oyster Gardening Part I and Part II, to help illustrate and explain how oyster gardening can be used for restoration purposes.

Science Extension: Identify other species that create essential habitat and evaluate their overall health as a result of environmental influences.

RELIGION Day 3 - Consumerism vs. Stewardship

Time: 50 minute class period

Journal/Reflection Prompt: Reflect on the meaning of a steward and the meaning of consumer. What attributes of a steward do you have? What attributes of a consumer do you think you have?

Discussion: Lead a class discussion on the meaning of stewardship versus the meaning of consumerism. In particular direct the class to a discussion of the root causes or motivation behind stewardship and behind consumerism. It is important to note that stewardship very often involves selfless action, while consumerism is often rooted in selfishness/greed and connects to the sinful social structures that guide our modern world. The discussion will include the "technocratic mindset" discussed by Pope Francis wherein technology is seen as the principle key to human existence. Discussion will also include the idea that, especially in the face of an environmental crisis, we need to learn to live with less. As Gandhi said, "Live simply so others can simply live."

Faith/Science Link: Break into student groups and discuss the data collected in the Mississippi Oyster Gardening Project and the algal bloom of 2019. In particular have students connect the destruction of the oyster population with the introduction of the pollutants into the water containing the oyster beds. Extend the discussion to include the actions taken to cause the pollutants and the motivation behind such actions. In other words, how did the watershed become infected? Continue the discussion by making the connection that the poor and

vulnerable were the first victims of the damage that was done. In particular, the livelihood of local oystermen and shrimpers, and migrant workers was compromised.

SCIENCE Day 4 - Introduction to Oyster Gardening

Objective: Participate in a restoration project for the state of Mississippi and the Gulf of Mexico. Hands on experience.

Please note: Oyster gardening is a permitted and state regulated activity. If oyster gardening is not a possibility, utilize the resources and videos below to illustrate oyster gardening in the classroom. With the possibilities of technology and distance learning these days - the Saint Stanislaus Marine Science Program (who is permitted to participate in oyster gardening for the state of MS) could "go live" on social media for all to see and/or arrange a zoom meeting with interested parties to see us in action. Do not hesitate to reach out to us!

Time: 50 minute class period

Activity: Students will oyster garden. Then students will compare and contrast oyster gardens (spat set on shell) with ecosystem/habitat (blank oyster shell) baskets in the field. (See note above regarding this activity).

Assignment/Assessment: Students should record their observations and data in their scientific notebook.

Science Extension: Have students research the specific environmental and anthropogenic events that have occurred within our watershed that have led to the NEED for us to oyster garden.

RELIGION Day 4 - How Can We Do Better/How Can We Heal and Protect the Earth?

Time: 50 minute class period

Journal/Reflection Prompt: List and reflect on activities you are currently undertaking, either individually or in a group, to heal and protect the earth. Please be specific and descriptive.
Discussion: Lead a discussion of our individual role in healing and protecting the earth. Discuss what we are called to do with an emphasis that a personal commitment has to lead to a community response. Discuss the plea of Pope Francis, in *Laudato Si*, to awaken our hearts and move toward an "ecological conversion." Discuss how this conversion comes when we truly see the beautiful and powerful connection between God and all of creation. There has to be a change of heart or conversion as Pope Francis calls it that leads us to respond to "the cry of the earth and the cry of the poor."

Faith/Science Link: In student groups use responses from the journal prompt to discuss the effectiveness of the individual actions on healing and protecting the earth and, in particular, whether these individual actions would positively impact the oyster population. Lead the discussion to include the effectiveness of individual action versus group action (solidarity). Point out the effectiveness of the Saint Stanislaus Marine Science Class as a network of change. Additionally, examine the ways the environment "healed" during Corona quarantine.

SCIENCE Day 5 - Assessing Environmental Impacts to Oyster Gardening Over Time

Objective: Analyze the oyster gardening data collected by the Saint Stanislaus Marine Science Program, over the past three years, to determine the relationship between oyster growth and environmental influences.

Time: 50 minute class period

Activity: Now that students know how to oyster garden, for restoration purposes, and they have seen the habitat that oysters and their shells create over time (ecosystem baskets), analyze the data shown in Table 1 below.

Assignment and Assessment: After analyzing the data shown in Table 1, develop your own synthesis that clearly explains how specific environmental influences in the Mississippi River Watershed resulted in not only the need for oyster gardening, but such variation in the quantity and size of oysters that have been gardened to date.

Year	# Grown by SSC	Avg Size at SSC (cm)	# Grown in MS	# of Sites in MS	Environmental Influences
2017	7,614	5.0	14,354	**?** Waiting on # from state. Will add ASAP	T.S. Cindy, low salinity most of growing season (~5 ppt)
2018	9,669	5.7	37,500	35	High salinity most of growing season (~15 ppt), minimal rainfall
2019	3,600	4.14	48,558	**?** Waiting on # from state. Will add ASAP	Significant freshwater impacts from the opening of the Bonnet Carre Spillway and subsequent HAB

Table 1: Oyster Gardening in Mississippi. The number of oysters grown by SSC and all MS gardeners from 2017 - 2019.

(Data provided by the Saint Stanislaus (SSC) Marine Science Program and the Mississippi Oyster Gardening Program).

*Note: All oysters depicted in this table have been planted on undisclosed reefs in Mississippi by the MS Department of Marine Resources.

Science Extensions:

- If runoff throughout the watershed impacted the oyster growth in such ways, what other impacts have there been - to other species or other areas within our watershed (along the coast) or to other watersheds?
- Marine debris - nurdles

RELIGION Day 5 - Addressing the Essential Questions

Time: 50 minute class period

Assessment: Assessment would take the form of written reflection in response to the essential questions posed at the beginning of the lesson and composition of a personal prayer.

1. As a Christian/Catholic, what is your responsibility within the environment? How does your faith call you to care for the environment, in particular your watershed, beyond your own personal needs and wants?
2. How can science enable you to participate with God in perfecting His creation?
3. Where God's creation is being damaged, either directly or indirectly, how can you help heal it?
4. Create (compose) a prayer to the Creator asking for the help you need and the obstacles you want to overcome so you can make a conversion from being a consumer of the created world to being its steward.

The KNOWLEDGE that students participating in this lesson will gain is:

1. Articulate a Catholic understanding of stewardship versus consumerism.
2. Demonstrate an understanding that the effects of environmental damage have a profound impact on the poor and vulnerable.
3. Demonstrate an understanding that scientific data and knowledge support an understanding of God's ongoing presence in creation.
4. Describe a watershed and understand factors that affect its health.
5. Understand the role that oysters (and/or other species of concern) play in the overall health of an ecosystem.
6. Demonstrate an awareness that what you do in the environment will have an impact on all life.

The SKILLS that students participating in this lesson will gain will be:

1. Transfer scientific data and information into personal life decisions and actions.
2. Evaluate personal interactions with the watershed in light of Catholic Social Teaching.
3. Identify and evaluate the negative effects of consumerism and the technocratic mindset.
4. Analyze their role in their watershed and identify specific ways in which they can be stewards for it.
5. Participate in a restoration project (and other on-going scientific research projects) within Mississippi.
6. Evaluate the need for restoration efforts, such as oyster gardening, as a result of anthropogenic impacts within watersheds.
7. Compose a prayer of awe and reverence for God's creation.
8. Read, analyze and apply relevant Scripture, religious documents and Church doctrine, including Papal encyclicals, the Catechism of the Catholic Church, and Catholic Social Teaching.

The STANDARDS satisfied in this lesson are:

NGSS Standards:

HS-LS2-6 Ecosystems: Interactions, Energy, and Dynamics

Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

HS-LS2-7 Ecosystems: Interactions, Energy, and Dynamics

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*

HS-LS2-8 Ecosystems: Interactions, Energy, and Dynamics

Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.

HS-LS4-5 Biological Evolution: Unity and Diversity

Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

HS-LS4-6 Biological Evolution: Unity and Diversity

Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*

HS-ESS3-1 Earth and Human Activity

Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

HS-ESS3-3 Earth and Human Activity

Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

HS-ESS3-4 Earth and Human Activity

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*

HS-ESS3-6 Earth and Human Activity

Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Religion Standards:

The Six Tasks of Catechesis-National Directory for Catechesis

1. Promote Knowledge of Faith - Teach the "basics" of faith as revealed in the signs of creation, Sacred Scripture, Catholic tradition and human experience

3. Moral Formation- Teach the moral teachings of the Church which are fulfillment of the Commandments

4. Teaching to Pray – Teach that a "climate of prayer" and participation in prayer invites individuals into a personal relationship with God.

5. Education for Community Life- Teach that the human person needs to live in society. Society is not optional, but a requirement of human nature

6. Missionary Initiative - Teach that all Christian service is an expression of love and is performed by Christians for the purpose of building up the Kingdom of God on earth.

USCCB Framework (2008)

- God is revealed in many ways, the first of which is natural revelation, attested to in the Book of Genesis. *(The Revelation of Jesus Christ I.B.1)*
- We live the mission of Jesus Christ by putting Jesus' moral and spiritual teaching into practice; by serving the poor and marginalized; and by fulfilling our responsibility for stewardship. *(Mission of Jesus/ Paschal Mystery V.C.5-8)*
- Scripture is useful for teaching, for refutation, for correction, and for formation so that we can be equipped for every good work. We must clarify the faith teachings in the primeval history in the Book of Genesis by clarifying its figurative language (*Sacred Scripture II.B.I*)
- Students are to learn how Christ's concern for others, especially the poor and needy, is present today in the Church's social teaching and mission: solidarity for the common good; stewardship of God's creation; the concept of social sin. *(Living as a Disciple of Jesus Christ in Society (III.F&G. IV.A.)*

ASSESSMENTS:

Science

- Participation in class discussions
    - Utilization of exit cards to measure student understanding
- Recording observations, hypotheses, data, and conclusions in scientific notebook
- Research extensions, at the discretion of the teacher

Note: This is part of a much larger unit within Marine Science class where the material learned on watersheds would be a major discussion question/essay on a formal test.

Religion

Days 1-4

- Completion of Journal/Reflection
    - A complete entry will:
        - Record the date and the correct prompt
        - Be written in complete sentences
        - Offer personal insight directly connected to the prompt
        - Include at least one question raised by the prompt, if appropriate
        - Possible rubric for journal reflection https://s3.studylib.net/store/data/007133220_1-6106c0b972e75460b909c39f49ad77d7.png

- Participation in class discussion and completion of small group assignments if applicable
- Teacher may want to use exit cards to assess student knowledge (KWL)

Day 5

- Written response to Essential Questions, ***including references to appropriate scientific and religious documents***
- Composition of a personal prayer
- Student will complete the "L" section of the KWL

RESOURCES:

Day 1 - Science Resources:

What is a Watershed? https://oceanservice.noaa.gov/facts/watershed.html
The Rivers of the Mississippi River Watershed https://svs.gsfc.nasa.gov/4493
What is Nutrient Pollution? https://oceanservice.noaa.gov/facts/nutpollution.html
What is the Biggest Source of Pollution in the Ocean?
https://oceanservice.noaa.gov/facts/pollution.html
Runoff: Surface and Overland Water Runoff
https://www.usgs.gov/special-topic/water-science-school/science/runoff-surface-and-overland-water-runoff?qt-science_center_objects=0#qt-science_center_objects
Watersheds: Role, Importance, & Stewardship
http://extension.msstate.edu/publications/publications/watersheds-role-importance-stewardship?page=1
Surf Your Watershed https://www.epa.gov/waterdata/surf-your-watershed
How's My Waterway? https://watersgeo.epa.gov/mywaterway/
Science in Your Watershed: Locate Your Watershed https://water.usgs.gov/wsc/map_index.html
A Crumpled Watershed Model A Crumpled Watershed Model
Ocean Frontiers: The New Era in Ocean Stewardship
https://ocean-frontiers.org/the-films/ocean-frontiers/

Day 1 - Religion Resources:

Classroom Prayer for Science and Religion Class

For Journal Prompt to be used throughout the week

Prayers for the Environment (Jesuit Resource - Free Online Resources)
https://docs.google.com/document/d/1dV9_wTNJu-tOKqhCkGEVxnKXSGUfTTC5TUcznBnoT0E/edit?usp=sharing

Hymn Laudato Si https://www.youtube.com/watch?v=0tCkCfyg5bU

Canticle of Brother Sun https://www.youtube.com/watch?v=scOXOCqYHfI

Water Sounds https://www.youtube.com/watch?v=QBa-e45o6eM

Stewardship https://www.youtube.com/watch?v=hvVrY_SFOhY

We, Stewards of God's Creation https://youtu.be/tkXF4jWzaxE

For Algal Bloom Prompt

https://docs.google.com/presentation/d/18gHJvTJ_gB5fOCTJV5K4pIw5AqcdeqnyXgJQ9NpLKgs/edit?usp=sharing

Encyclicals

Laudato Si'
http://www.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

Articles:

Top Ten Takeaways from *Laudato Si* by James Martin, S.J.
https://www.americamagazine.org/faith/2015/06/18/top-ten-takeaways-laudato-si

Short Videos:

https://www.youtube.com/watch?v=KXA5_juFgDg
https://www.youtube.com/watch?v=a_lqFTYLc_4

Day 2 - Science Resources:

Eastern Oyster https://www.fisheries.noaa.gov/species/eastern-oyster

Eastern Oyster (*Crassostrea virginica*)
https://tpwd.texas.gov/huntwild/wild/species/easternoyster/

Day 2 - Religion Resources:

Google Slides:

Wonders of oysters Powerpoint Presentation
https://docs.google.com/presentation/d/1EoMZhJSgaFLW9M3qrYKJqySr-0aOD543PUteCs8Si7o/edit?usp=sharing

Books

In the Beginning: A Catholic Understanding of the Story of Creation and the Fall by Pope Benedict XVI, in particular pages 33-39.

Encyclicals

Laudato Si' paragraphs 20-23
http://www.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

Scripture

Flood account in Genesis Chapters 8 and 9: God's covenant is with humans AND all bodily creatures of every species to "be fertile and multiply." God wants every species to be saved.

Catechism of the Catholic Church:

--The world was made for the glory of God. St. Bonaventure explains that God created all things "not to increase his glory, but to show it forth and to communicate it." (293)

-- Use of the mineral, vegetable, and animal resources of the universe cannot be divorced from respect for moral imperatives. (2415)

--There is a solidarity among all creatures arising from the fact that all have the same Creator and are all ordered to his glory. (344)

Articles

Hiers, Richard H. *Journal of Law and Religion, Vol. 13, No. 1*

"Reverence for Life and Environmental Ethics in Biblical Law and Covenant"

-- p.155 "I Implicit in [the] provisions [about animal sacrifices] is an understanding that in some way, before God, such animals and humans were of equal worth." 104

-- p. 128 "A great many biblical laws refer to treatment of animals, the land, trees, and vegetation. And two major biblical covenants embrace not only the people of Israel, but all human beings and all living creatures. ... Biblical law and covenant show much greater concern for the well-being of the environment and all living things than either proponents or critics of Judaism and Christianity generally have recognized."

Day 3 - Science Resources:

Refer to general resources on oysters used on Day 2, if needed.

Oyster Reef Habitat

https://www.fisheries.noaa.gov/national/habitat-conservation/oyster-reef-habitat

Oyster Reefs http://nrcsolutions.org/oyster-reefs/

The Mississippi Oyster Gardening Program http://msogp.com/

Oyster Gardening Introduction Part I Oyster Gardening Introduction Part 1

Oyster Gardening Part II Oyster Gardening Introduction Part 2

Saint Stanislaus Marine Science (Facebook) and/or sscmarinescience (Instagram)

Day 3 - Religion Resources:

United States Conference of Catholic Bishops

Seven themes of Catholic Social Teaching

http://www.usccb.org/beliefs-and-teachings/what-we-believe/catholic-social-teaching/seven-themes-of-catholic-social-teaching.cfm

Articles

Responsibility for Creation

https://www.uscatholic.org/articles/202005/do-catholics-have-care-creation-32070

Encyclicals

Laudato Si'

http://www.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

Videos

Care for Creation-The Pope Video 2016
https://www.youtube.com/watch?v=akK7diU4Kgc&feature=emb_title
Stewardship
https://www.youtube.com/watch?v=INt-nwQu14Q
Consumerism
https://www.youtube.com/watch?v=iFIMQAppIpg

Day 4 - Science Resources:

See resources listed under Day 3.
Letha Boudreaux, Saint Stanislaus Marine Science Program Director lboudreaux@ststan.com
Saint Stanislaus Marine Science (Facebook) and/or sscmarinescience (Instagram)
Saint Stanislaus Oyster Gardening Program Poster and Abstract presented at Ocean Sciences Meeting 2020 OSM - Oyster Gardening-2.pdf
Saint Stanislaus Oyster Gardening Program Poster and Abstract presented at Bays and Bayous Symposium 2019 Bays and Bayous Symposium Poster-Final.pdf
Saint Stanislaus Oyster Gardening Program Poster and Abstract presented at Ocean Sciences Meeting 2018 Oyster Gardening at SSC - OSM Poster - Final.pdf

Day 4 - Religion Resources:

United States Conference of Catholic Bishops

Seven themes of Catholic Social Teaching
http://www.usccb.org/beliefs-and-teachings/what-we-believe/catholic-social-teaching/seven-themes-of-catholic-social-teaching.cfm

Encyclicals

Laudato Si
http://www.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html

Videos

The Pandemic and the Planet https://www.youtube.com/watch?v=RTzsuK4Eq4c

Day 5 - Science Resources:

See resources listed under Day 4.
Nurdle Patrol https://nurdlepatrol.org/Forms/Home/