

# Human Impacts on Marine Ecosystems

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Human exploitation of the ocean's resources and destruction of marine habitats are driving species extinction, destroying fisheries, generating pollution, and creating ecological imbalances throughout the world. The ocean, once thought to be a limitless and resilient reservoir, is showing signs of irreparable damage. In this module, students will write an informative essay outlining the current status of the world's oceans, as well as explaining the strategy of Marine Protected Areas (MPAs) for preserving marine habitats.

**GRADES** 

10 - 12

DISCIPLINE

**COURSE** 

AP
Environmental
Science

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# Section 1: What Task?

## Teaching Task

#### Task Template 21 - Informational or Explanatory

How have humans negatively impacted marine ecosystems? After reading scientific articles and credible news reports, write an essay in which you analyze possible strategies to remedy the current state of the world's oceans, providing examples to clarify your analysis.



What conclusions or implications can you draw?

#### Standards

# Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

#### CCR.R.1

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

#### CCR.R.2

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

#### CCR.R.4

Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

#### **CCR.R.10**

Read and comprehend complex literary and informational texts independently and proficiently.

#### CCR.W.2

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

#### CCR.W.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

#### CCR.W.5

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

#### CCR.W.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

#### CCR.W.10

Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

#### **Texts**

- % L.A. Times "Altered Oceans" Series
- L.A. Times: "A Primeval Tide of Toxins"
- % "End of the Line" Video (must acquire a copy)
- % "Troubled Waters" Video
- % Ocean Priorities Podcast
- "Oceans of Trouble" by Kowalski, Kathiann Current Health Teens (Oct 2010): The article focuses on ocean pollution which puts sea creatures at risk as well as the people who eat them. It also mentions the Deepwater Horizon explosion which killed 11

people and triggered oil spill into the Gulf of Mexico. It says that due to polychlorinated biphenyl (PCB) pollution, the U.S. Environmental Protection Agency (EPA) cautions people against eating too much fish such as shark, tilefish, king mackerel and swordfish.

- "Threatening Ocean Life from the Inside Out" by Hardt, Marah & Carl Safina Scientific American (Aug 2010): The article discusses threats to ocean life associated with escalating concentrations of atmospheric carbon dioxide and associated ocean acidification. As oceans serve as a sink for carbon dioxide in the atmosphere, ocean acidification is said to lessen the effects of atmospheric carbon dioxide on climate change. An estimated one third of anthropogenic carbon dioxide is absorbed by the world's oceans. Impacts of such acidification on the reproductive success of marine life including copepods, snails, and sea urchins are noted. Envisioned food chain disruptions resulting from these trends are noted to require human intervention.
- "The Future of Our Oceans" by Coan, Stephen

  Vital Speeches of the Day (Feb 2012): The article presents the speech "Healthy Oceans Are "Critical to

  Our Economic Well-Being in Staggering Terms," delivered by Sea Research Foundation's chief

  executive officer Stephen M. Coan at the Metropolitan Club in New York City on October 14, 2011 in

  which Coan discussed the outlook for the earth's oceans and marine life, environmental and economic

  reasons why oceans need to be protected, and effective planning for water demands.
- "How Healthy is Your Ocean?" by Halpern, Benjamin
  Scientific American (Sep 2012): The article presents charts and an image depicting data from the Ocean
  Health Index, a measure derived from 171 coastal countries which assesses ocean health in light of
  goals for sustainable food provision, fishing and tourism opportunities, and biodiversity conservation.
- Time (7/18/2011): The article focuses on the growth of aquaculture and genetically modified fish. It states that the United Nations reports the over-exploitation and depletion of 32 percent of global fish stocks. It talks about inefficiencies in aquaculture of popular carnivorous fishes which require wild fish being ground up into fish meal, and a shift toward more suitable fish such as the tilapia and the barramundi, which are vegetarians. It comments on pollution from aquaculture and innovations such as integrated multitrophic aquaculture that use fish waste to fertilize seaweed and feed mussels to function as ecosystems do. It talks about genetically engineered salmon which are being reviewed by the U.S. Food and Drug Administration.
- "To Save a Reef" by Levin, Ted

  National Wildlife (Feb/Mar 1999): Discusses the need to conserve the coral reefs of Florida. Features of
  Florida's coral reefs; Description of the development of corals and coral reefs; Description of some
  corals; Links between the Florida corals reefs and the Everglades; Evidence of the destruction of the
  reefs; Causes of the coral destruction; Creation of national marine sanctuaries in the area.

# LDC Student Work Rubric - Informational or Explanatory

	Not Yet	Approaches Expectations	Meets Expectations	Advanced
	1	2	3	4
Focus	Attempts to address prompt, but lacks focus or is off-task.	Addresses prompt appropriately, but with a weak or uneven focus.	Addresses prompt appropriately and maintains a clear, steady focus.  D: Addresses additional demands sufficiently.	Addresses all aspects of prompt appropriately and maintains a strongly developed focus. D: Addresses additional demands with thoroughness and makes a connection to controlling idea.
Controlling Idea	Attempts to establish a claim, but lacks a clear purpose.	Establishes a controlling idea with a general purpose.	Establishes a controlling idea with a clear purpose maintained throughout the response.	Establishes a strong controlling idea with a clear purpose maintained throughout the response.
Reading/Research	Attempts to present information in response to the prompt, but lacks connections or relevance to the purpose of the prompt.	Presents information from reading materials relevant to the purpose of the prompt with minor lapses in accuracy or completeness.	Presents information from reading materials relevant to the prompt with accuracy and sufficient detail.	Accurately presents information relevant to all parts of the prompt with effective selection of sources and details from reading materials.
Development	Attempts to provide details in response to the prompt, including retelling, but lacks sufficient development or relevancy.	Presents appropriate details to support the focus and controlling idea.	Presents appropriate and sufficient details to support the focus and controlling idea.	Presents thorough and detailed information to strongly support the focus and controlling idea.
Organization	Attempts to organize ideas, but lacks control of structure.	Uses an appropriate organizational structure to address the specific requirements of the prompt, with some lapses in coherence or awkward use of the organizational structure.	Maintains an appropriate organizational structure to address the specific requirements of the prompt.	Maintains an organizational structure that intentionally and effectively enhances the presentation of information as required by the specific prompt.
Conventions	Attempts to demonstrate standard English conventions, but lacks cohesion and control of grammar, usage, and mechanics. Sources are used without citation.	Demonstrates an uneven command of standard English conventions and cohesion. Uses language and tone with some inaccurate, inappropriate, or uneven features. Inconsistently cites sources.	Demonstrates a command of standard English conventions and cohesion, with few errors. Response includes language and tone appropriate to the audience, purpose, and specific requirements of the prompt. Cites sources using an appropriate format with only minor errors.	Demonstrates and maintains a well-developed command of standard English conventions and cohesion, with few errors. Response includes language and tone consistently appropriate to the audience, purpose, and specific requirements of the prompt. Consistently cites sources using an appropriate format.
Content Understanding	Attempts to include disciplinary content in explanations, but understanding of content is weak; content is irrelevant, inappropriate, or inaccurate.	Briefly notes disciplinary content relevant to the prompt; shows basic or uneven understanding of content; minor errors in explanation.	Accurately presents disciplinary content relevant to the prompt with sufficient explanations that demonstrate understanding.	Integrates relevant and accurate disciplinary content with thorough explanations that demonstrate in-depth understanding.

#### **Background for Students**

This module is part of a unit on aquatic ecology and water pollution. The students have some background knowledge on general human impacts on aquatic systems, but this is their first exposure to the way humans have impacted marine ecosystems. Hopefully through this module students will gain a greater understanding of how human activities such as overfishing and overdevelopment have negatively impacted the worlds' oceans, and what is currently being done to remedy the situation.

#### Vocabulary:

- marine ecosystem
- stakeholder
- Marine protected area
- ocean acidification
- overfishing
- Anthropogenic disturbance
- biodiversity
- habitat
- Marine Life Protection Act
- Marine park
- Marine reserve
- Marine sanctuary

#### Extension

Not provided

## Section 2: What Skills?

#### Preparing for the Task

**TASK ENGAGEMENT**: Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns.

TASK ANALYSIS: Ability to understand and explain the task's prompt and rubric.

## Reading Process

**TEXT SELECTION**: Ability to identify appropriate texts.

**ACTIVE READING**: Ability to identify the central point and main supporting elements of a text.

**ESSENTIAL VOCABULARY**: Ability to apply strategies for developing an understanding of text(s) by locating words and phrases that identify key concepts and facts or information.

**ACADEMIC INTEGRITY**: Ability to use and credit sources appropriately.

**NOTE-TAKING**: Ability to read purposefully and select relevant information; to summarize and/or paraphrase.

#### Transition to Writing

BRIDGING: Ability to begin linking reading results to writing task.

#### Writing Process

**CONTROLLING IDEA**: Ability to establish a controlling idea and consolidate information relevant to task.

**PLANNING**: Ability to develop a line of thought and text structure appropriate to an informational/explanatory task.

**DEVELOPMENT**: Ability to construct an initial draft with an emerging line of thought and structure.

**REVISION**: Ability to refine text, including line of thought, language usage, and tone as appropriate to audience and purpose.

**EDITING**: Ability to proofread and format a piece to make it more effective.

**COMPLETION**: Ability to submit final piece that meets expectations.

# Section 3: What Instruction?

SKILL AND DEFINITION	PRODUCT AND PROMPT	SCORING GUIDE	INSTRUCTIONAL STRATEGIES
ing for the Task			
Not Idea  Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns.	SHORT CONSTRUCTED RESPONSE In a quick write, write your first reaction to the task prompt. Add some notes of things you know about this issue.	No Scoring	<ul> <li>Link this task to earlier class content.</li> <li>Discuss student responses.</li> <li>Clarify timetable and support plans for the task.</li> </ul>
	list of human behaviors that threaten the stability of marine ecosystems. Teacher will write		
	board as they add to their own list. Teacher will prompt them to include behaviors such as		
	pollution, overfishing or overharvesting, and boating. Teacher will remind students that many		
	associated with the marine environment can also affect ocean ecosystems.		
	runoff and coastal development can cause marine pollution. Teacher		
	will ask students to generate more examples and add those examples to their list.		
	TASK ENGAGEMENT: Ability to connect the task and new content to existing knowledge, skills, experiences,	TASK ENGAGEMENT: Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns.  Students will brainstorm a list of human behaviors that threaten the stability of marine ecosystems. Teacher will write students' ideas on the board as they add to their own list. Teacher will prompt them to include behaviors such as pollution, overfishing or overharvesting, and boating. Teacher will remind students that many human activities not associated with the marine environment can also affect ocean ecosystems. For example, agricultural runoff and coastal development can cause marine pollution. Teacher will ask students to generate more examples and add those examples	TASK ENGAGEMENT: Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns.  Students will brainstorm a list of human behaviors that threaten the stability of marine ecosystems. Teacher will write students' ideas on the board as they add to their own list. Teacher will prompt them to include behaviors such as pollution, overfishing or overharvesting, and boating. Teacher will remind students that many human activities not associated with the marine environment can also affect ocean ecosystems. For example, agricultural runoff and coastal development can cause marine pollution. Teacher will ask students to generate more examples and add those examples

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Not provided	TASK ENGAGEMENT: Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns.	Students will watch three short videos about human activities that threaten the world's ocean.  Teacher will ask students to take a few notes as they watch each video and tell them to pay close attention to the ocean threats and actions people are taking to address those threats. After viewing each video ask:  • What is the main ocean threat discussed in this video? (Video 1: overfishing and destructive fishing practices; Video 2: coastal development; Video 3: pollution)  • What actions are people taking to address those threats? (Video 1: establish Marine Protected Areas, educate local fisherman and young people, impose limits on tourism; Video 2: research dugong populations, establish Marine Protected Area, regulate boat speeds and fishing nets, educate students; Video 3: establish artificial reefs, increase reef protection and restoration)  Divide students into three groups—one for each threat listed above. Give each group time to brainstorm a list of stakeholders who may be involved in the issue. Provide some examples, if needed. Have each group share their list. Compile the class list on the board.	Completed video notes     Completed stakeholder lists	Classroom lists and discussion

PACING	SKILL AND DEFINITION	PRODUCT AND PROMPT	SCORING GUIDE	INSTRUCTIONAL STRATEGIES
	Additional Attachments:			
	"Troubled Waters" Gu	ided Note-Taking		
	End of the Line" Vide			
	Class Discussion Work	ksheet		
	% "End of the Line" Vide	o (must acquire a copy)		
	% "Troubled Waters" Vid	leo		
Not provided	TASK ENGAGEMENT: Ability to connect the task and new content to existing knowledge, skills, experiences, interests, and concerns.	NOTES Students will complete an anticipation guide Anticipation Guide where they agree or disagree with statements pertaining to the world's oceans. Students will then listen to a podcast Ocean Priorities Podcast from NPR about top threats to the world's oceans and take notes using a graphic organizer Note-Taking Organizer. After discussing the main issues presented in the podcast, students will fill out their anticipation guide and discuss whether or not their opinions have changed.	<ul> <li>Graphic organizer and anticipation guide is complete.</li> <li>Student participates in class discussion.</li> </ul>	Classroom discussion     Notes
	TASK ANALYSIS: Ability to understand and explain the task's prompt and rubric.	LIST In your own words, what are the important features of a good response to this prompt?	<ul><li>Student lists</li><li>Class discussion</li></ul>	<ul> <li>Students will individually read an example of an informative article from the <i>L.A. Times</i> series titled "Altered Oceans."</li> <li>Students will then pair up and complete a graphic organizer to summarize the main points of the</li> </ul>
				<ul> <li>article. Guided Reading Worksheet</li> <li>Students will then identify key features of the article with their partner.</li> <li>Students will share their ideas with the class as the teacher creates a list on the board.</li> </ul>

PACING	SKILL AND DEFINITION	PRODUCT AND PROMPT	SCORING GUIDE	INSTRUCTIONAL STRATEGIES
Not provided	TEXT SELECTION: Ability to identify appropriate texts.	NOTES For each text, list the needed bibliographic information. Add bullets on why you think the work is credible and/or worthy of study.	<ul> <li>Identifies author, title, publisher, date, and any other needed information (for example, the volume for a periodical or the editor for an anthology).</li> <li>Includes reasonable evidence that work is credible and/or worthy of study.</li> </ul>	<ul> <li>Teacher will provide citation guide and discuss why each element of citation is needed.</li> <li>Students will brainstorm what makes an author credible and/or worthy of study. Students will then share their ideas in a class discussion.</li> <li>For each article the student reads, they will identify the information mentioned above in a graphic organizer and keep this in their writers' notebooks.</li> </ul>
Not	ACTIVE READING: Ability to identify the central point and main supporting elements of a text.	SHORT CONSTRUCTED RESPONSE After reading the article, The Future of Our Oceans, students will answer the following questions independently and then pair with another student to share their thoughts.  What is the author trying to accomplish?  Which parts of the text show you that?  (L2) What competing arguments have you encountered or can you think of?  (L3) What historical or current examples can you note that relate to the task prompt?	Answers     questions with     credible     responses.	<ul> <li>After answering the questions individually, student will pair up and brainstorm ways to figure out any author's intent.</li> <li>Students will share and discuss their answers for each text with the class.</li> <li>After the discussion, allow them to add to their entries.</li> </ul>
Not provided	ESSENTIAL VOCABULARY: Ability to apply strategies for developing an understanding of text(s) by locating words and phrases that identify key concepts and facts or information.	LIST In your notebook, list words and phrases essential to the texts. Add definitions, and (if appropriate) notes on connotation in this context. Students will complete a vocabulary quad Notes Worksheet for each key term and keep these in their writer's notebook.	<ul> <li>Lists appropriate phrases.</li> <li>Provides accurate definitions.</li> </ul>	<ul> <li>After scoring, ask some students to share definitions of terms that others overlooked or misunderstood.</li> <li>After scoring, be willing to provide direct instruction or guide a close reading if needed to work through a key phrase most students missed.</li> </ul>

PACING	SKILL AND DEFINITION	PRODUCT AND PROMPT	SCORING GUIDE	INSTRUCTIONAL STRATEGIES
Not provided	ACADEMIC INTEGRITY: Ability to use and credit sources appropriately.	SHORT CONSTRUCTED RESPONSE Define "plagiarism" and list ways to avoid it.	<ul> <li>Provides accurate definition.</li> <li>Lists several appropriate strategies.</li> </ul>	<ul> <li>Discuss respect for others' work to assemble evidence and create texts.</li> <li>Discuss academic penalties for stealing others thoughts and words.</li> </ul>
Not provided	NOTE-TAKING: Ability to read purposefully and select relevant information; to summarize and/or paraphrase.	NOTES From each text, make a list of the elements that look most important for answering the prompt. Do what you need to do to avoid plagiarism.  • L2(a): What strategies will you use to discern "credible sources"?  • L2(b): What implications can your draw? (Tasks 11,12)  • L3: Why is it important in the process of inquiry to "identify gaps" or "unanswered questions" about the topic?	Identifies     relevant     elements.     Includes     information to     support     accurate     citation (for     example, page     numbers for a     long text, clear     indication when     quoting     directly).	<ul> <li>Students will read the 2nd article in the <i>L.A. Times</i> series "Altered Oceans" and use the INSERT method of note-taking. INSERT Note-Taking Instructions</li> <li>Teacher will check student work to make sure that students are taking notes in the correct format and gathering information effectively.</li> <li>Students will partner up and share their information, adding any additional points to their notes.</li> </ul>
	Additional Attachments:  L.A. Times: "A Primevo Control of Control			
Transit	ion to Writing			
Not	BRIDGING: Ability to begin linking reading results to writing task.	Using a graphic organizer, students will write about what they know now that they have read about the current state of the world's oceans, the threats that still plague it, and strategies to improve the current state.  In small groups, students will share their lists, adding any information that they might gain from others.  Groups will then share their ideas as the teacher creates a class list on the board. Students will add to their list from classroom discussion.	<ul> <li>Students have lists about the content covered.</li> <li>Students participate in classroom discussion.</li> </ul>	<ul> <li>Discussion-based strategies, such as seminar.</li> <li>Small group discussion using question.</li> </ul>

PACING	SKILL AND DEFINITION	PRODUCT AND PROMPT	SCORING GUIDE	INSTRUCTIONAL STRATEGIES
Writing Process				
Not provided	CONTROLLING IDEA: Ability to establish a controlling idea and consolidate information relevant to task.	SHORT CONSTRUCTED RESPONSE Write an opening paragraph that includes a controlling idea and sequences the key points you plan to make in your composition.	<ul> <li>Writes a concise summary statement or draft opening.</li> <li>Provides direct answer to main prompt requirements.</li> <li>Establishes a controlling idea.</li> <li>Identifies key points that support development of the controlling idea.</li> </ul>	<ul> <li>Teacher will show several examples of opening paragraphs.</li> <li>Ask class to discuss what makes them strong or weak.</li> <li>Review the list that students created earlier to identify needed elements (from Cluster 1, skill 2).</li> </ul>
Not provided	PLANNING: Ability to develop a line of thought and text structure appropriate to an informational/explanatory task.	OUTLINE Create an outline based on your notes and reading in which you state your controlling idea, sequence your points, and note your supporting evidence.	<ul> <li>Creates an outline or organizer.</li> <li>Supports controlling idea.</li> <li>Uses evidence from texts read earlier.</li> </ul>	<ul> <li>Teacher will model an example of an outline/organizer for an informational essay.</li> <li>Invite students to generate questions in pairs about how the format works, and then take and answer questions.</li> </ul>
	Additional Attachments:  Essay Outline			
Not provided	DEVELOPMENT: Ability to construct an initial draft with an emerging line of thought and structure.	LONG CONSTRUCTED RESPONSE Write an initial draft complete with opening, development, and closing; insert and cite textual evidence.	<ul> <li>Provides         complete draft         with all parts.</li> <li>Supports the         opening in the         later sections         with evidence         and citations.</li> </ul>	Encourage students to re-read prompt partway through writing, to check that they are on track.
Not provided	REVISION: Ability to refine text, including line of thought, language usage, and tone as appropriate to audience and purpose.	LONG CONSTRUCTED RESPONSE Refine composition's analysis, logic, and organization of ideas/points. Use textual evidence carefully, with accurate citations. Decide what to include and what not to include.	<ul> <li>Provides         complete draft         with all parts.</li> <li>Supports the         opening in the         later sections         with evidence         and citations.</li> <li>Improves earlier         edition.</li> </ul>	<ul> <li>Students will move through revision stations throughout the classroom. Each station will be responsible for a different aspect of the paper.</li> <li>Students will self-assess their papers and make the necessary corrections as homework.</li> </ul>

PACING	SKILL AND DEFINITION	PRODUCT AND PROMPT	SCORING GUIDE	INSTRUCTIONAL STRATEGIES
Not provided	EDITING: Ability to proofread and format a piece to make it more effective.	LONG CONSTRUCTED RESPONSE Revise draft to have sound spelling, capitalization, punctuation, and grammar. Adjust formatting as needed to provide clear, appealing text.	<ul> <li>Provides draft free from distracting surface errors.</li> <li>Uses format that supports purpose.</li> </ul>	<ul> <li>Briefly review selected skills that many students need to improve.</li> <li>Students will switch papers with a peer and again move through the revision stations.</li> <li>Students will explain their assessment to their partners.</li> <li>Students will then make necessary corrections before turning in the final draft.</li> </ul>
Not provided	COMPLETION: Ability to submit final piece that meets expectations.	LONG CONSTRUCTED RESPONSE Turn in your complete set of drafts, plus the final version of your piece.	• Fits the "Meets Expectations" category in the rubric for the teaching task.	None

## Instructional Resources

No resources specified

# Section 4: What Results?

## Student Work Samples

#### Advanced



#### Meets Expectations



## Approaches Expectations



#### Not Yet



#### **Teacher Reflection**

Not provided

#### All Attachments

- S L.A. Times "Altered Oceans" Series: https://s.ldc.org/u/3tchh0ltuzw228hql3i6pcvl1
- L.A. Times: "A Primeval Tide of Toxins": https://s.ldc.org/u/a17x8mo5vsswix2ysk3q9xl3r
- % "End of the Line" Video (must acquire a copy): https://s.ldc.org/u/aw6r991y4r7hemxkqbm5gndi9
- % "Troubled Waters" Video: https://s.ldc.org/u/6q1mlhpo56l5sn7mn7250qzma
- Ocean Priorities Podcast: https://s.ldc.org/u/46wn46lpwv3itvqkxpz0djlfi
- Advanced #1: https://s.ldc.org/u/et4mh69dah7vjstfdb0h28cm2
- Meets #1: https://s.ldc.org/u/9jatagdx15y3gltxbc2oeuzha
- Meets #2: https://s.ldc.org/u/5cqrww8gixaaoewue5nfhd01a
- Approaches #1: https://s.ldc.org/u/cm0uhata5o7tprqffhnqvdsi7
- Approaches #2: https://s.ldc.org/u/196sdx423vi12onzt5um43mtb
- Not Yet #1: https://s.ldc.org/u/e6v7djhhkvf4jbgxm7fumklyo
- Not Yet #2: https://s.ldc.org/u/equ9ywxy51gbn97bwzd1uea4w