earthna
عضو في مؤسسة قطر
Member of Qatar Foundation

Eco-Schools

Open Gulf Ecosystem

The Lesson Plan and Nature-based activities
were developed by Dr. Aspa D. Chatziefthimiou

Edited by Ruba Hinnawi

Al Khor. Photo source: Aspa D. Chatziefthimiou

Open Gulf Ecosystem

The Lesson Plan and Nature-based activities

November 2023

Acknowledgment to the Earthna Center

Earthna, a Center for a Sustainable Future, is a Qatar Foundation center aimed to provide a holistic view of environmental, social, and economic prosperity as part of Qatar's ambition to enhance sustainability at the national and global levels. Earthna leverages Qatar Foundation's unique ecosystem of experts in research, academia, and innovation and collaborates with leading international institutions to enhance the depth and breadth of Qatar's sustainability efforts.

The vision of Earthna is to develop sustainable societies in arid and water-scarce environments. Its mission is to support sustainability by advocating evidence-based policy action, encouraging behavioral change in the community, and positioning Qatar as a leading voice for sustainability issues in arid and water-scarce environments.

For more information about Earthna and to stay updated on our latest initiatives, please visit www.earthna.qa

Report Team

Dr. Aspa D. Chatziefthimiou
Doha, Qatar

Ruba Hinnawi
Qatar Foundation, Earthna
Doha, Qatar

Editorial board

P.O. Box: 5825, Doha, Qatar
Telephone: (+974) 4454 0242; internet: www.earthna.qa

PI: EEF-2023-003

Contents

Task 1:
Before-you-begin

Introduction

Task 2:
In-class Activities

6-9 Years
- Introduction
- Environmental Review
- Action Plan
- Resource

10-13 Years
- Introduction
- Environmental Review
- Action Plan
- Resource

14-17 Years
- Introduction
- Environmental Review
- Action Plan
- Resource

Task 3:
Nature-based Activities

6-9 Years
- Introduction
- Environmental Review
- Action Plan
- Resource

10-13 Years
- Introduction
- Environmental Review
- Action Plan
- Resource

14-17 Years
- Introduction
- Environmental Review
- Action Plan
- Resource

Task 1

Ecosystem: Open Gulf Before-you-begin

Task 1: Before-you-begin

The Arabian, or Persian Gulf, is a semi-enclosed sea, with just one opening on its southern margin at the Strait of Hormuz and the Gulf of Oman, where it meets the Arabian Sea and the Indian Ocean. The Gulf covers an area the size of 34 soccer fields (about 240,000 km^2). It is 1,000 kilometers long, 350 kilometers at its widest, and 120 meters at its deepest. Qatar takes up 15% of the total Gulf sea region, and its waters go as deep as 60 meters. The Gulf is fairly shallow, and because it is surrounded by deserts, its temperature is very high during the year (15-36 °C). It is also quite saline (38-50 ppt), because the heat evaporates seawater, leaving the salt behind.

The Gulf has not always been submerged in water. Until about 18,000 years ago, it was a dry desert, like the countries that surround it are now. Slowly, river waters from Mesopotamia in the north and Saudi Arabia in the west, as well as Arabian Sea water flooded the Gulf to current sea levels to an average depth of 40 meters starting at about 8,000 years ago. This is the reason it is often referred to as a "young sea".

The Gulf is an extreme environment in which it is difficult to make a living because it is a very hot and saline sea. Despite this, there are many organisms that make the Gulf their permanent or seasonal home during periods of migration. In approximate numbers, there are 200 different species of fish; 79 species of marine mammals; 32 species of sharks; 25 species of rays; five species of sea turtles; 10 species of sea snakes; innumerable species of free-floating luminescent phytoplankton; and many others.

Unequivocally, the dugong, the whale shark, and the hawksbill turtle are the three most charismatic species in the Gulf, and are threatened by extinction to different degrees. For these reasons, they have been chosen as the flagship species to support biodiversity conservation in the region. Dugongs are vulnerable to extinction, and aggregate in the hundreds in northwest Qatar to feed on seagrass and give birth in the cooler months of winter. Whale sharks, the biggest fish in the world, are endangered. In summertime, they aggregate in northeast Qatar with many of their friends to feast on tuna mackerel fish eggs and then dive into deep waters to cool off. Hawksbill turtles are critically endangered, and the only species of sea turtle that lays eggs on the shores of Qatar in the summer. The birthing is the culmination of a journey that may take up to three years across their feeding grounds, mostly chewing on sponges, to build up their energy for the demanding nesting ceremony.

Photo Source: Shutterstock

Threats:

Pollution from industrial and recreational activities (plastic, chemical and noise from boat engines and water skis); boat strikes; overfishing; climate change; increase in the salinity; habitat destruction; sediment dredging from construction activities; channelization of near-coastal bays.

Bibliography

Burt JA, et al. 2017.
Improving management of future coastal development in Qatar through ecosystem-based management approaches.
Ocean and Coastal Management. 148: 171-181.

http://dx.doi.org/10.1016/j.ocecoaman.2017.08.006

Carpenter KE et al, 1997.
FAO species identification guide for fishery purposes. The living marine resources of Kuwait,
Eastern Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates. Rome, FAO. 1997. 293 p., 17 colour plates.

http://www.fao.org/3/v8729e/v8729e00.htm

Chapuis L, et al. 2019.
The effect of underwater sounds on shark behavior. Scientific Reports. 9: 6924.

https://doi.org/10.1038/s41598-019-43078-w

Jawad LA, and Al-Mamry JM. 2018.
Field atlas to the fiches of the Arabian Sea coast of Oman. Ministry of Agriculture and Fisheries, Muscat, Oman.

https://www.researchgate.net/publication326131811_Field_Atlas_to_the_
Fishes_of_the_Arabian_sea_cost_of_Oman_AAcompressed-ilovepdf-compressed

Johns WE, et al. 1999.
Arabian Marginal Seas and Gulfs. University of Miami RSMAS, Technical Report 2000-1, p 60.

https://www2.whoi.edu/site/bower-lab/wp-content/uploads/sites/12/2018/03/TechRpt_ArabianMarginal.pdf

Bibliography

Heileman S, et al. 2008.
VI-9 Arabian Sea. UNEP large marine ecosystem briefs no. 32.

http://lme.edc.uri.edu/LME/images/Content/LME_Briefs/lme_32.pdf.

Accessed 28 Oct 2020

Marshall CD, et al. 2018.
Large dugong (Dugong dugong) aggregations persist in coastal Qatar. Marine Mammal Science. 3(4): 1154-1163.

https://onlinelibrary.wiley.com/doi/abs/10.1111/mms.12497

Pilcher NJ, et al. 2015.
Population structure of marine turtles in coastal waters of Qatar. Endangered Species Research. 28(2): 163-174.

DOI:10.3354/esr00688

Robinson DP, et al. 2016.
Population structure, abundance and movement of whale sharks in the Arabian Gulf and the Gulf of Oman. PLoS ONE. 11(6): e0158593.

https://doi.org/10.1371/journal.pone.0158593

Task 2

Eco-schools 6-9 Years

Introduction:

The Arabian, or Persian Gulf, is a semi-enclosed and very shallow sea, surrounded by desert countries. Environmental extremes in salinity and temperature have conspired to select some of the most resilient species, and a diverse community of charismatic organisms. The Gulf holds many surprises and new discoveries as it is yet not well studied. Environmental awareness is lacking when it comes to the plethora of ecosystem services it provides, and the threats it faces.

The lesson plan familiarizes the students with the Gulf ecosystem, its food chain, and the life-cycle of the dugong.

The learning process includes an exchange of information on the topic, classroom interaction, and art presentation assignments.

Age Group: Eco-Schools 6-9 years

Eco-Schools Steps: Environmental Review, Action Plan, Curriculum Linkages, Inform and Involve, Monitoring and Evaluation

Objectives:

Students will be able to:

- Describe the Arabian Gulf ecosystem, and list threats
- Illustrate the Arabian Gulf food chain
- Explain the dugong's life cycle
- Develop an awareness on how to protect the seas and oceans

Time required/ Duration:

Classroom Session 1: 45 minutes
(15 minutes to introduce the dugong in the context of the Arabian Gulf ecosystem, 15 minutes to complete the Gulf food chain sketch, 5 minutes to complete the dugong maze, 10 minutes to devise positive actions for ecosystem protection).
It is left up to the facilitator's discretion to expand the timings as needed to allow students to better assimilate the information and to properly devise positive actions.

Environmental Review:

Resources Required: "Before-you-begin":
Open Gulf ecosystem

Key concepts: overview of the open Arabian Gulf ecosystem; physical formation; biodiversity; charismatic species; animal behavior; salinity; adaptations; threats.

Online Resources

www.iucnredlist.org
Key concept: dugong biology, distribution, conservation status

Al Jazeera English
Key concept: dugong populations in Qatar

www.iucnredlist.org
Key concepts: showcase the four different seagrass species found in Qatar.

www.cbd.int
Key concepts: Marine and terrestrial Protected Areas in Qatar (p. 17)

Photo source: Aspa D. Chatziefthimiou

- Brainstorm with the students ideas on why this ecosystem is important, how and which human activities threaten the health of this ecosystem, and what we can do to help protect the seas and oceans.

- Resource 1 (Dugong species description)
- Resource 2 (Gulf food chain sketch sheet)
- Resource 3 (Dugong maze)
- Student stationary, pencils, colored markers

Action Plan:

Action Plan 1

- Use the Dugong species description (Resource 1) and the online resources to introduce students to the life of the dugong. Include information on their distribution, diet, mating season, etc., and place an emphasis on the information we have on dugongs in Qatar.
- Present the students with the four species of seagrass that we find in Qatar, which form the diet of the dugong.
- Ask the students questions to ignite their interest. For example; why do we call dugongs sea cows? Why do we mistake dugongs for manatees and what are their anatomic differences?
- Discuss with the students what is the community of organisms that the dugong shares the Arabian Gulf with.

Action Plan Activity 1

- Help the students make drawings of these animals using the provided Gulf food chain sketch sheet (Resource 2).
- Explain the dugong's life cycle.
- Help students re-unite the baby calf with her mother using the Dugong maze (Resource 3). In which month will the calf be looking for her mother in the Gulf?

Action Plan:

Action Plan 2

- Use National Geographic's "10 Things you can do to help the Ocean" article

https://www.nationalgeographic.com/environment/article/10-things-you-can-do-to-save-the-ocean

to showcase and provide ideas to the students of the possible positive actions they can take individually, and as a school, to protect the Arabian Gulf Sea. Use Marine Conservation Institute's

https://marine-conservation.org/30x30/

or HAC for Nature and People's

https://www.hacfornatureandpeople.org/why-30x30

to introduce the students to the call for action to protect 30% of our oceans and seas by 2030, and emphasize that protecting the physical habitat is essential for each species' survival. Make students aware of Qatar's marine protected areas (Al Thakira and Khor Al Adaid).

Action Plan Activity 2

- Ask the students to list one action they can take individually and as a school to help protect the Arabian Gulf Sea and its inhabitants, in Qatar.

3. Curriculum Linkages: Environmental Science, Ecology, Biology, Animal Behavior, Art

4. Inform and Involve

- Student food chain sketches should be displayed on the Eco-Schools bulletin board to inform and involve the whole school community.

Evaluation:
Review the students sketches to understand what they know about the Gulf food chain. Quiz the students while they are working on the maze, to understand whether they have retained the dugong life cycle.

Resource 1


Photo source: Shutterstock

Dugong species description (Copyright: Aspa D. Chatziefthimiou)

Common name: Dugong or sea cow

Local name: Baghr al-Bahr

Scientific name: *Dugong dugong*

Classification: Phylum – Chordata; Subphylum – Vertebrata; Class – Mammalia; Order – Sirenia; Family – Dugongidae

Size: The length of *Dugong dugong* ranges from 2.5 to 3.5 m, and the weight range is 230-360 Kg with maxima recorded at 4 m and 908 Kg. Newborns measure 1-1.2 m and weigh 20-35 Kg. Males and females do not exhibit stark dimorphism in their dimensions. Their flippers are modified forelimbs and measure 35-45 cm in length. They lack a dorsal fin.

Habitat: Dugongs are found in marine neritic and inter-tidal habitats, in shallow and medium deep waters, particularly in areas that support seagrass beds, the major nutritional source of their diet. They exhibit seasonal migration in search of optimum temperature conditions above 15-19° C.

Distribution: Currently, Dugongs are found in waters of countries in Eastern Africa, Southeastern Asia, Middle East, and Northern Australia. In historical times, they have been recorded and described in Mediterranean sea waters as well.

Conservation status: *Dugong dugong* is reported as vulnerable (VU; to extinction) based on the IUCN Red List's last assessment in 2015, and its population is decreasing.

Description: Dugongs belong to the same order and thus are relatives with the manatees, together being the only sea mammals able to use marine plants as a food source i.e., only known marine herbivores. Dugongs are different from the manatees in three ways: the male's upper incisors form short, thick and straight tasks, whereas manatees lack incisors; the tail fin is deeply notched, while in manatees it is rounded; the dugong is found strictly in marine waters, whereas manatees can be found in freshwater as well. The flippers are used by the young for swimming, while the adults use their tail, and grazing occurs only by mouth not by the flippers.
They are related to elephants and are thought to have consequently adapted to aquatic life. The order Sirenia gets its name from the mermaid-like suckling behavior of the young, feeding in an inverted position, often underwater.
Reproduction seasonality characteristics are not well understood because of its nomadic life. They may have calving intervals 3-7 years, reach sexual maturity at 9-10 years, giving birth to one calf, yet twins have been seen in rare occasions. A dugong generation is 20-23 years, similar to a human generation, with the oldest living dugong recorded in the wild being 73 years of age.
They are mainly solitary, yet they do aggregate in specific areas to take advantage of flourishing plant communities, to mate, and as a defense mechanism against predators especially sharks. In northwestern Qatar, dugongs have been observed to aggregate in groups of more than 600 individuals in the month of February.
Dugong's natural predators are sharks, killer whales and crocodiles. Other threats to this species include over-hunting by humans who seek to use dugong for teeth, bones for ivory artifacts, for its meat and oils as well as its hide for leather. Dugong coloration ranges from brownish gray to pinkish orange.

Resource 1

Sources:

Walker's Mammals of the World Book Nowak 1999

Marsh H, Sobtzick S. 2015. Dugong dugong. The IUCN Red List of Threatened Species 2015: e.T6909A43792211.

https://www.iucnredlist.org/species/pdf/160756767

https://oceana.org/marine-life/marine-mammals/dugong

Elisabeth M. Bik, Elizabeth K. Costello, Alexandra D. Switzer, Benjamin J. Callahan, Susan P. Holmes, Randall S. Wells, Kevin P. Carlin, Eric D. Jensen, Stephanie Venn-Watson & David A. Relman.

https://doi.org/10.1038/ncomms10516

2016. Marine mammals harbor unique microbiotas shaped by and yet distinct from the sea. Nature Communications volume 7, Article number: 10516

https://animaldiversity.org/accounts/Dugong_dugon/classification/

https://onlinelibrary.wiley.com/doi/abs/10.1111/mms.12497

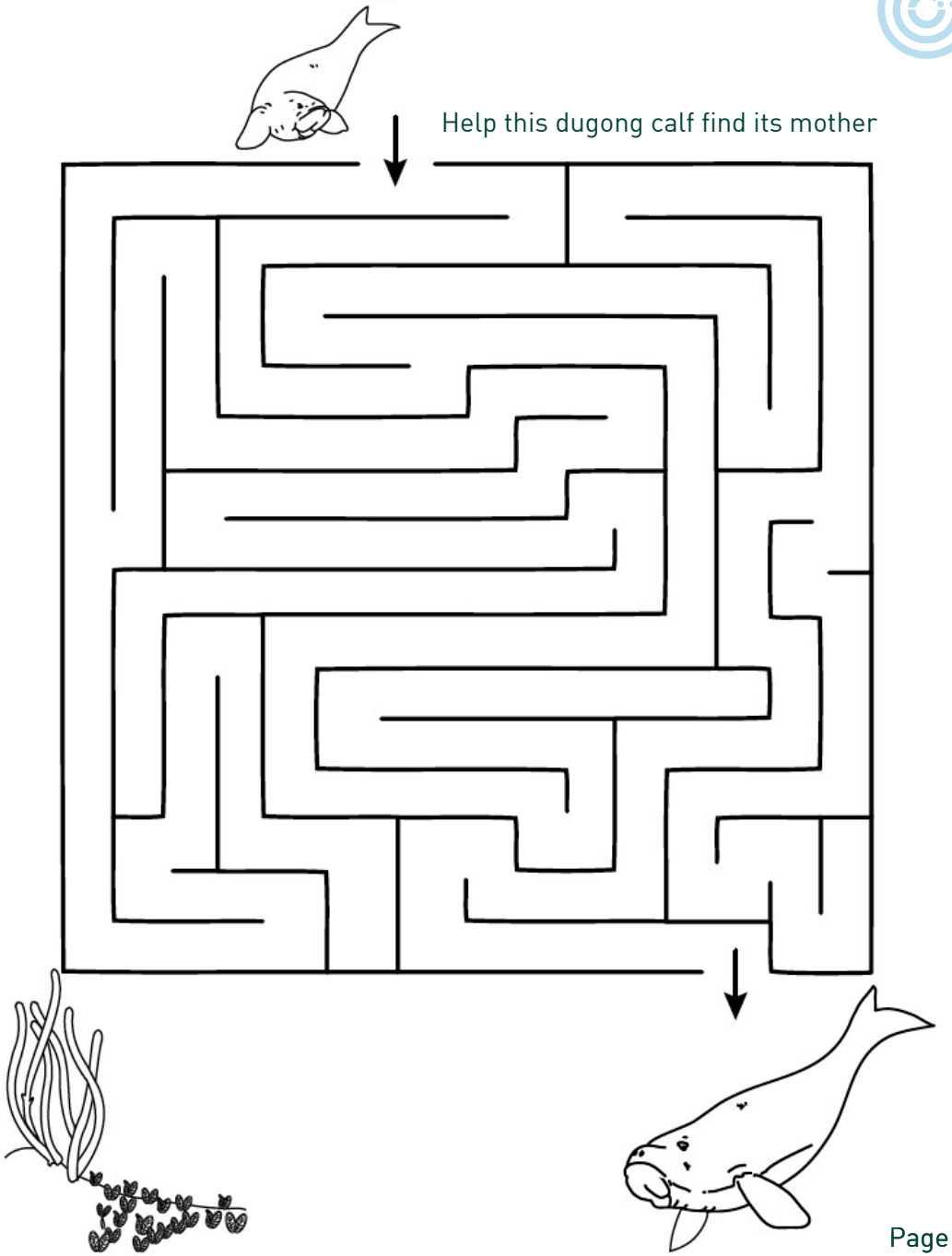
Resource 2

Gulf Food Chain Sketch Sheet		
Name of student:		
Instructions: name and draw the community of organisms that share the Arabian Gulf with the dugong.		
Organism: Drawing	Organism: Drawing	Organism: Drawing
Organism: Drawing	Organism: Drawing	Organism: Drawing
Organism: Drawing	Organism: Drawing	Organism: Drawing

Resource 3

Dugong maze

The dugong is a marine mammal which eats seagrass. Dugongs eat the part of seagrass plants which are buried in the mud or sand. These plant parts are called rhizomes and roots.



Task 2

Eco-schools 10-13 Years

Introduction:

The Arabian or Persian Gulf, is a semi-enclosed and very shallow sea, surrounded by desert countries. Environmental extremes of salinity and temperature have conspired to select some of the most resilient species, and a diverse community of charismatic organisms. The Gulf holds many surprises and new discoveries as it is yet not well studied, and environmental awareness is lacking when it comes to the plethora of ecosystem services it provides, and the threats it faces.

The lesson plan familiarizes the students with the Gulf ecosystem, its food chain, and the species of sea turtles in the Gulf.

The learning process includes an exchange of information on the topic, classroom interaction, group work, and presenting research results in the form of an infographic.

Age Group: Eco-Schools 10-13 Years

Eco-Schools Steps: Environmental Review, Action Plan, Curriculum Linkages, Inform and Involve, Monitoring and Evaluation

Objectives:

Students will be able to:

- Describe the Arabian Gulf ecosystem, and list threats
- List and explain differences among the turtle species in the Arabian Gulf
- Conceptualize infographics with this information for awareness raising
- Develop positive actions for the protection of seas and oceans

Time required/ Duration:

Classroom Session 1: 40 minutes for classroom interaction, conceptualization, survey research and display of collage, and 5 minutes to devise positive actions for ecosystem protection (multiple groups work simultaneously). It is left up to the facilitator's discretion to expand the timings as needed to allow students to better assimilate the information and to properly devise positive actions.

Environmental Review:

Resources Required: "Before-you-begin":
Open Gulf ecosystem

Key concepts: overview of the open Arabian Gulf ecosystem; physical formation; biodiversity; charismatic species; animal behavior; salinity; adaptations; threats.

Online Resources

qeci.org
Key concepts:
marine turtle species
in the Arabian Gulf

www.cbd.int
Key concepts:
Marine and
terrestrial Protected
Areas in Qatar (p. 17)

Photo source: Shutterstock

- Brainstorm with the students ideas on why this ecosystem is important, how and which human activities threaten the health of this ecosystem, and what we can do to help protect seas and oceans.

- Resource 1 (Worksheet 1)
- Student stationary, pencils, colored markers
- Dedicated display board

Action Plan:

Action Plan 1

- Use the questions in Worksheet 1 (Resource 1) as a guide for the activity and discussion.
- Have students choose the group that they would like to work for. Each group will be responsible for one of the turtle species.
- Help the class decide whether they are interested in working on all 5 turtle species we find in the Arabian Gulf or only on the three we find in Qatar (hawksbill turtle, green turtle, and leatherback turtle).
- Visit the QECI web site to discover which of these species we find in the Gulf

http://qeci.org/about-us/species/sea-turtles

- Provide the students with Worksheet 1 (Resource 1). Go through the list of questions with the students.
- Check out

http://www.qu.edu.qa/newsroom/esc/QU-protects-hawksbill-turtles-through-Qatar-Turtle-Project

and

https://www.qm.org.qa/en/culturepass

and

https://www.marhaba.qa/qatar-museums-to-facilitate-visits-to-hawksbill-turtle-nesting-grounds/

- Make students aware of the MME/QU/ESC Turtle Conservation Initiative and of the volunteer opportunities that are in place in the summertime in Fuwairit. Some years these programs are organized by MME and others by ESC. Qatar Museums organize guided tours to the nesting sites for their Culture Pass members during the summer as well.

Action Plan Activity 1

- Conceptualize with the students how each group can create an infographic-style drawing based on the answers to these questions, instead of using just text. For example, they could portray the maximum dimensions of their turtle species as compared to the size of an average human by having them side by side, and writing out their dimensions etc.
- Facilitate the students to answer the questions and find ways to best portray their answers.
- Group worksheets can be brought together as a collage.

Action Plan:

- Use National Geographic's "10 Things you can do to help the Ocean" article

https://www.nationalgeographic.com/environment/article/10-things-you-can-do-to-save-the-ocean

to showcase and provide ideas to the students of the possible positive actions they can take individually, and as a school, to protect the Arabian Gulf Sea. Use Marine Conservation Institute's

https://marine-conservation.org/30x30/

or HAC for Nature and People's

https://www.hacfornatureandpeople.org/why-30x30

to introduce the students to the call for action to protect 30% of our oceans and seas by 2030, and emphasize that protecting the physical habitat is essential for each species' survival. Make students aware of Qatar's marine protected areas (Al Thakira and Khor Al Adaid).

Action Plan Activity 2

- Ask the students to list one action they can take individually and as a school to help protect Arabian Gulf Sea and its inhabitants, in Qatar.

3. Curriculum Linkages: Environmental Science, Ecology, Biology, Animal Behavior, Conservation, Art

4. Inform and Involve

- Group worksheets or collages should be displayed on the Eco-Schools bulletin board to inform and involve others in the school community.

Evaluation:
Review the answers on worksheets to assess the students' knowledge on the species of turtles we find in the Gulf and their characteristics. Evaluate the students on their problem-solving skills and creativity in coming up with protections measures for the sea turtles.

Resource 1

Worksheet 1

Turtle species	
Names of group members:	
• Draw the carapace pattern of this species of turtle.	
• What can be the maximum dimensions of this species of turtle?	
• What is the life expectancy of this species?	
• Where are the feeding grounds of this species of turtle? (Which ecosystem(s)?	
• Which organisms make up the diet of this species of turtle?	
• Where does that place this species in the food web? (e.g., if they are omnivores, they would be at the top of the food web, etc.)	
• Which organisms make up the community of this species?	
• In the shores of which country(ies) does this species lay her eggs?	
• Which are some of the threats that all sea turtle species face during their life?	
• Got ideas on what we can do to help them?	

Task 2

Eco-schools 14-17 Years

Introduction:

The Arabian or Persian Gulf, is a semi-enclosed and very shallow sea, surrounded by desert countries. Environmental extremes of salinity and temperature have conspired in selecting some of the most resilient species, and a diverse community of charismatic organisms. The Gulf holds many surprises and new discoveries as it is yet not well studied, and environmental awareness is lacking when it comes to the plethora of ecosystem services it provides, and the threats it faces.

The lesson plan encourages investigation into conservation policy, devising effective means of transboundary communication and the management of biodiversity and natural resources.

The learning process includes researching and exchanging knowledge on the topic, classroom interaction, group work and discussions, and presenting resolutions in the form of articles.

Age Group: Eco-Schools 14-17 Years

Eco-Schools Steps: Environmental Review, Action Plan, Curriculum Linkages, Inform and Involve, Monitoring and Evaluation

Objectives:

Students will be able to:

- Describe the Arabian Gulf ecosystem as a transboundary body of water
- Explain how multi-stakeholders collaborate to bring forth new policy
- Research to find out information on whale sharks and their conservation
- Prepare reports on their resolutions to share with the Eco-school community
- Develop positive actions for the protection of seas, oceans and charismatic species

Time required/ Duration:

Classroom Session 1: 45 minutes for group assignments and survey research (multiple groups work simultaneously)

Classroom Session 2: 45 minutes
(40 minutes for the Model UN debate and summation of results, 5 minutes to devise positive actions for ecosystem protection). It is left up to the facilitator's discretion to expand the timings as needed to allow students to better assimilate the information and to properly devise positive actions.

Environmental Review:

Photo source: Aspa D. Chatziefthimiou

Resources Required: "Before-you-begin":

Open Gulf ecosystem

Key concepts: overview of the open Arabian Gulf ecosystem; physical formation; biodiversity; charismatic species; animal behavior; salinity; adaptations; threats.

Online Resources

Al Jazeera English
Key concepts: whale shark populations in Qatar

www.iucnredlist.org
Key concepts: whale shark biology, distribution, diet, conservation status

www.cbd.int
Key concepts: Marine and terrestrial Protected Areas in Qatar

www.oceanunite.org
Key concept: conservation and protection of 30% of oceans and seas by 2030

www. hacfor natureandpeople.org
Key concept: conservation and protection of 30% of oceans and seas by 2030

- Brainstorm with students ideas on why this ecosystem is important, how and which human activities threaten the health of this ecosystem, and what we can do to help protect the seas and oceans.
- Resource 1 Sketch sheet for infographics
- Student computers, stationary, pencils, colored markers
- Dedicated display board

Action Plan:

Action Plan 1

- Break students into groups for the Model United Nations (Model UN) debate on Whale Shark Conservation, according to their preference out of the following choices:
  a. Country delegate (all countries with whale shark populations need to be represented);
  b. Expert witness (for example: oceanographers, marine biologists, conservationists, ecologists, policy maker etc.);
  c. NGO for environmental protection (for example WWF, Greenpeace, etc.);
  d. Country citizens / citizen scientists;
  e. Investigative reporters covering environmental issues.
- Offer creative license and allow students to include an additional group or modify the existing ones for the Model UN debate, if they think it is pertinent.
- Assist each group in conducting survey research online according to the topic they will advocate/support in the Model UN debate.
- Visit the IUCN website to get information on the whale shark.

https://www.iucnredlist.org/species/19488/2365291

This is a good starting point for all groups as it offers an overview of a species' distribution, basic biology, threats, conservation efforts, policy, etc.

Action Plan 1 Activity 1

- Encourage students to compile and synthesize the information in a compelling way using infographic and other visual aids. For example, each group can draw a map of the Gulf and the countries with coastlines on the Gulf, using the Sketch sheet for infographics (Resource 1). The expert witness can draw the distribution of the whale shark in the map, the delegates their country's policies etc.
- Convey/ help students understand that sound conservation of a species incorporates the conservation of its habitat, food source and community. How does this fact figure into their transboundary policy?
- Present the students with the idea that wildlife conservation can drive economic benefits through eco-tourism, for example. These funds can then be reverted to the conservation of the species. It can also have economic benefits for the local society if it is community-based tourism.

Action Plan1 Activity 2

1. Title of the Activity: Transboundary conservation - Model UN

- Have the students give short presentations to the class with their findings and make their case based on the group they have chosen to represent in Model UN.
- Brainstorm on ideas of how transboundary issues can be resolved and effective common policy can be achieved, even in times of conflict.
- Guide the students in coming up with resolutions that reflect each group's concerns, ideas, demands.
- Assist the investigative reporters in taking minutes of the discussion and resolutions that are passed so that they are able to report back to the Eco-Schools community.

Action Plan:

Action Plan 2

- Use National Geographic's "10 Things you can do to help the Ocean"

https://www.nationalgeographic.com/environment/article/10-things-you-can-do-to-save-the-ocean

to showcase and provide ideas to the students of the possible positive actions they can take individually and as a school to protect the Arabian Gulf Sea.

Action Plan Activity 2

- Ask the students to list one action they can take individually and as a school to help protect the Arabian Gulf Sea and its inhabitants, in Qatar.

3. Curriculum Linkages: Environmental Science, Ecology, Biology, Geography, Conservation, Political Science, Global Citizenship, Art

4. Inform and Involve
- The reports of the investigative journalists on the Model UN, should be displayed on the Eco-Schools bulletin board to inform and involve the school community.

Evaluation:
Evaluate the students' ability in working in groups and problem-solving complex issues with diplomacy. Review reports to assess their knowledge on how policy is developed, whale shark biology, and writing skills.

Resource 1

Sketch sheet for infographics

Use this sketch sheet to visually present the information you compiled during your survey research.