

## INTRODUCTION

African Black Oystercatchers (Oyks) live on rocky shores or sandy beaches where they make their nest on bare scrapes in the sand or rock a few meters above the high-water mark. Oyks feed day and night to take advantage of the low tides to be able to feed in the intertidal zone (the area between the high-water mark and low-water mark). On Sandy beaches, they mainly feed on sand mussels whereas on rocky shores their diet is more varied, consisting of mussels, limpets, polychaete worms and invertebrates. They use their long, chisel-shaped bill to pry open the valves of mussels to scissor out the meat inside.

Oyks play an important role in the ecosystem: On islands where they breed, Oyks produce nutrient rich guano, which lands in the sea and gets absorbed by algae. The algae then grow and reproduce faster, increasing the food supply to fish and filter feeders. This, in turn, increases the food supply to Oyks and other coastal birds. Furthermore, Oyks also control the numbers of their prey populations, maintaining a balance in the ecosystem.

The beach ecosystem is complex and is home to several different organisms that are adapted to occupy specific niches. This includes all the various shorebirds that share the shores with Oyks. Shorebirds, such as the White-fronted Plover have a lot in common with Oyks in terms of where they breed and their nest defence behaviour. This means that they are also vulnerable to the same human disturbances. There are also other shorebirds that, although they share the same ecosystem, show many differences in terms of their use, such as how and where they breed, how and what they feed on, and other behaviours. They are also vulnerable to human disturbances but are not always affected in the same way as Oyks.

Oyks are ideal beach ambassadors for other shorebirds especially because they are so easy to see and show to people with their black and red colouration.

## AIM AND PURPOSE OF LESSON

The aim of this lesson plan is to introduce students to the Oyks ecological role in the ecosystem that they live in and some of the bird species that they share it with. The purpose is for students to learn about sandy and rocky shore ecology and how the shorebirds make use of it.

## DURATION OF LESSON

Approximately 90 minutes

## VOCABULARY

**Algae:** aquatic (water-living) photosynthetic organisms.

**Ambassador:** representative or promoter, in this case, of the plight of shorebirds.

**Breeding:** mating and production of offspring by animals.

**Ecology:** the study of living organisms and the interactions and relationships between themselves and their physical surroundings.

**Ecosystem:** community of living organisms that interact with each other and with the non-living environment.

**Filter Feeders:** aquatic animal that feeds on particles or small organisms that they filter out of water as they circulate it through their system: includes most of the stationary feeders, as clams, oysters, barnacles, corals, sea squirts, and sponges.

**Guano:** excrement of seabirds and bats, used as fertilizer.

**Habitat:** natural environment in which an organism lives.

**High-water Mark:** level reached by the sea during each high tide or by a lake or river in time of flood.

**Human Disturbance:** threats from human activities that change, destroy and disturb habitats for the species living in it.

**Intertidal Zone:** area between the low-water and high-water marks.

**Low-water Mark:** the level reached by the sea during each low tide or by a lake or river at its driest point.

**Nest Defence Behaviour:** the way birds behave when their eggs or chicks are threatened.

**Niche:** the area a species live in that he is specifically adapted (has learned to live there) for.

**Organisms:** living animal or plant.

**Reproduce:** in this case, when birds have chicks.

**Rocky Shores:** intertidal area of seacoasts that is mostly solid rock.

**Sandy Shores:** loose deposits of sand, gravel or shells that cover the shoreline.

**Shorebirds:** birds commonly found along sandy or rocky shorelines, mudflats, and shallow waters. In some regions, shorebirds are considered wading birds.

**Tides:** because of the gravitational pull of the sun and moon on the sea water, the sea level move from a high-water mark to a low-water mark and back again around every 12 hours.

**Vulnerable:** easily effected by outside disturbances, effecting breeding success and population numbers.

## MATERIALS NEEDED

All material (except the videos) are downloadable from the BirdLife South Africa website:

<http://www.birdlife.org.za/documents/bird-of-the-year>

The teacher will need:

1. Lesson Plan 4 – *Beach Ecology and Shorebirds*.
2. A computer with internet connection to view the suggested videos.
3. Fact Sheet 1 – *African Black Oystercatcher*.
4. Fact Sheet 5 – *African Black Oystercatcher – Ambassador for Shorebirds*.
5. Video 1: *Habitat 4 - Sandy Beaches* (5:46 min) <https://youtu.be/5IK6566D4CM>
6. Video 2: *Habitat 5 – Rocky Shore* (4:56 min) <https://youtu.be/5IK6566D4CM>
7. Video 3: *AEWA – Species Conservation Damara Tern* (4:30 min - watch from 1:00 min) [https://youtu.be/I\\_dktuMG\\_L8](https://youtu.be/I_dktuMG_L8)
8. Video 4: *Island of Gulls - Earth Touch* (2:34 min) <https://youtu.be/gute8aWAr3w>

9. Video 5: *#ShareTheShores: NVT White-fronted Plover Research and Conservation* (3:32 min) <https://vimeo.com/260050966>
10. Video 6: *Adult Oyk eats mussel* (0:26 min) [https://www.hbw.com/sites/default/files/ibc/v/converted/498189/Haematopus\\_moquini\\_BHD\\_mp4\\_sd\\_1487931923.mp4](https://www.hbw.com/sites/default/files/ibc/v/converted/498189/Haematopus_moquini_BHD_mp4_sd_1487931923.mp4)
11. Video 6: *African Black Oystercatcher* (1:20 min) <https://www.arkive.org/african-black-oystercatcher/haematopus-moquini/video-00.html>
12. Video 7: *Piper* (3:20) <https://youtu.be/e7v2zDZBf6g>
13. OPTIONAL – projector and sound system to watch the videos.
14. Answer Sheets 1 Appendix A (found at the end of this lesson plan).
15. Questionnaire 1 Appendix B (found at the end of this lesson plan).
16. Game-show game material: Balls or any other object that can be thrown into a container e.g. crumpled paper; any large container, e.g. waste basket, into which the objects can be thrown.

The Students will need:

1. Fact Sheet 1 – African Black Oystercatcher.
2. Fact Sheet 5 – African Black Oystercatcher – Ambassador for Shorebirds.
3. Questionnaires 1 in Appendix B
4. Pen and paper.

## OBJECTIVES AND OUTPUTS

The student will:

- Discuss what they already know about sandy shore and rocky shore ecology.
- Discuss what they already know about shorebirds that live on the beach.
- Watch the videos about beach ecology.
- Watch the videos about the various shorebirds.
- Read up on the various shorebirds and the life cycle of Oyks in the Fact Sheets.
- Discuss what they have learned from the videos and reading material in their allocated groups.
- Report back to the teacher in their allocated groups.
- Have a better understanding of beach ecology and the shorebirds that live there.

## PROCEDURE

1. [Duration 4 min] The teacher should read through the introduction of this lesson plan (Lesson Plan 4) to prepare for the lesson. [OPTIONAL] The teacher (or students) can also choose to read the introduction to the class, but this is not necessary.
2. [Duration 5 min] Begin the lesson with an entry task where students must think and discuss what they know about beach ecology, specifically rocky shores and sandy shores. Ask the following questions to the whole class and give them a few opportunities to raise their hands and answer the questions (it is not important that they get the answers right at this stage):
  - a. What is a rocky shore?
  - b. What is a sandy shore?

- c. Can you name the different tides?
  - d. Do you know what is meant by tidal zones? How many are there and what are they called?
  - e. Can you name some shorebirds other than Oyks?
  - f. How do the various shorebirds, including Oyks, make use of these zones and the zone above it?
5. [Duration 10 min] Divide the students into small discussion groups and hand out to each group Fact Sheet 1 – *African Black Oystercatcher* and Fact Sheet 5 – *African Black Oystercatcher – Ambassador for Shorebirds*. Allow them 10 minutes to read through the Fact Sheets and discuss it amongst themselves.
  6. [Duration 12 min] Set up the projector / TV / Computer and watch the following videos: Video 1: *Habitat 4 - Sandy Beaches* (5:46 min) Video 2: *Habitat 5 – Rocky Shore* (4:56 min). As they watch, ask them to focus on the following, keeping in mind what they have learned from the Fact Sheets:
    - a. What part of the sandy and rocky shore does the Oyk occupy when it breeds and feeds?
    - b. Can you think of other shorebirds and what parts of the shore they will utilize?
    - c. What are the various tidal zones and how does it affect the feeding and breeding of the oyks?
  7. [Duration 5 min] In their groups, allow the students 5 minutes to discuss what they have learned and remembered from the videos. Ask them to write down what they remembered and discussed.
  8. OPTION 1 [Duration 15 min] Game Show Game: Students will now answer questions based on the videos. Each group should sit together and choose one person that can throw well. Place a waste basket or any open container in the middle of the groups so that it is equal distance away from the throwers. Just like in a game show, the group that answers the most questions correctly wins. As soon as a group knows the answer to a question, the thrower should throw the ball in the basket to indicate that they have the answer. The group that manages to get the ball in the basket first, can answer the question. If the group answers wrong, the other groups can have a turn to throw and answer until the correct answer is given. They can use the Fact Sheets and the notes they made during group discussions to remind them of what they have learned. Use Answer Sheet 1 to ask the questions and to ensure that the answers are correct.
  9. OR OPTION 2 [Duration 15 min] Use Answer Sheet 1 to ask the students specific questions based on the video or hand out Questionnaire 1 and give them 15 minutes to answer the questions individually or in their groups.
  10. [Duration 12 min] Watch the following videos: Video 3: *AEWA – Species Conservation Damara Tern* (4:30 min - watch from 1:00 min); Video 4: *Island of Gulls - Earth Touch* (2:34 min); Video 5: *#ShareTheShores: NVT White-fronted Plover Research and Conservation* (3:32 min); Video 6: *Adult Oyk eats mussel* (0:26 min); Video 6: *African Black Oystercatcher* (1:20 min); Video 7: *Piper* (3:20). Allocate one or more videos to each group depending on how many groups there are and ask them to pay special attention to their allocated video. As they watch, ask them to focus on the following, keeping in mind what they have learned from the Fact Sheets:
    - a. What part of the sandy and rocky shore does the species in the video occupy when it breeds and feeds?
    - b. Describe the feeding behaviour of the various birds and what they eat.

- c. What do the birds eat in the specific zones they occupy?
  - d. Where do they nest and what does the nest look like?
  - e. Can you describe the nesting behaviour of some of these birds?
  - f. How will the threats to Oyks also affect the birds in these videos?
  - g. Some of these birds make their nest directly on the sand making them vulnerable to disturbance. What simple things can you do to save a nest when you visit the beach?
11. [Duration 5 min per group] In their groups, allow the students 5 minutes per group to report back to the class what they have seen and learned from their allocated video based on the questions in point 10 (refer to Appendix C for possible answers).
12. [Duration 5 min] Allow the students to go back to their seats and end the lesson by asking the same questions that was asked in the beginning of the lesson (refer to Appendix D for possible answers):
- a. What is a rocky shore?
  - b. What is a sandy shore
  - c. Can you name the different tides?
  - d. Do you know what is meant by tidal zones? How many are there and what are they called?
  - e. Can you name some shorebirds other than Oyks?
  - f. How do the various shorebirds, including Oyks, make use of these zones and the zone above it?

## APPENDIX A

### ANSWER SHEET 1: BEACH ECOLOGY AND SHOREBIRDS

**1. How are sandy beaches formed?**

Sand is formed when rocks, coral and shells are smashed into pieces by waves, worn away by rain or ground up by animals.

**2. There are four main zones. What are they and where are they positioned with the tides?**

Ordered from high to low tide: Splash Zone – dry most of the time; Upper Intertidal Zone – wet during high tide; Middle Intertidal zone – wet and dry; Lower Intertidal Zone – Usually wet.

**3. Why do animals in the rocky shores need to be adaptable?**

Strong wave action: Animals on rocky shores need to be adapted to live with strong waves and changing environment from wet to dry. The salinity and temperature of these pools vary therefore animals must be able to adapt to changes

**4. Name a few animals that occur in the rocky shores.**

Barnacles, limpets, mussels, sea snails, crabs, and mudskippers.

**5. What threats are there to the rocky and sandy shores? How does these threats affect shorebirds?**

Pollution such as oil spills and agricultural runoff can damage the habitat. This will affect the prey species of the birds making it difficult for them to feed. Coastal development along the shoreline can damage habitats and disrupt nesting sites for important animals such as turtles and shorebirds. Careless trampling may harm animals and birds. Rubbish washed up on-shore or left on beach may entangle birds and cause strangulation. Climate change increase erosion, due to increased storms and rising sea-levels which can flood nests.

**6. How are animals adapted to feed on the sandy shore? What do they usually eat? How can this possibly affect the way shorebirds feed on these animals?**

Animals are adapted to move quickly to keep above the waterline or burrow into the sand to avoid crashing waves. Most animals eat organic material washed up by the waves. Shorebirds need to move fast and have bills adapted to dig into sand. The bird would have to feed where the sand is soft and wet.

**7. Name a few animals that occur on the sandy shores.**

Ghost crabs, hermit crabs and sea turtles.

## APPENDIX B

### QUESTIONNAIRE 1: BEACH ECOLOGY AND SHOREBIRDS

1. How are sandy beaches formed?
2. There are four main zones. What are they and where are they positioned with the tides?
3. Why do animals in the rocky shores need to be adaptable?
4. Name a few animals that occur in the rocky shores.
5. What threats are there to the rocky and sandy shores? How does these threats affect shorebirds?
6. How are animals adapted to feed on the sandy shore? What do they usually eat? How can this possibly affect the way shorebirds feed on these animals?
7. Name a few animals that occur on the sandy shores.

## APPENDIX C

### POINT 10 QUESTIONS AND ANSWERS

- a. What part of the sandy and rocky shore does the species in the video occupy when it feeds and breeds?**
1. Oyks feed in the intertidal zone on rocky and sandy shores. Oyk nests are located above the high-water mark, in the dunes.
  2. Sanderlings do not breed on our shores. They feed on the upper intertidal zone on sandy beaches.
  3. Damara Terns feed in the shallow waters. In Namibia, they lay their eggs directly on the sand a few km inland. In South Africa, they lay their eggs closer to the beach in the dunes.
  4. Kelp Gulls feed in all the zones including the surf zone. They make their nests in dunes, cliffs, rocky outcrops and peninsulas.
  5. White-fronted Plovers feed in the upper intertidal zone. Their nests are bare scrapes directly on the sand, above the high-water mark.
- b. Describe the feeding behaviour of the various birds and what they eat.**
1. Oyks feed in the intertidal zone on mussels, limpets and other invertebrates. On the rocky shores, they have a varied diet, whereas in the sandy shores they mostly feed on sand mussels. Oyks use their long chisel-shaped bill to pry open the valves of mussels and limpets. Once opened, they scissor out the flesh.
  2. Sanderlings follow the water's edge on beaches to prod for small invertebrates, and fish scraps.
  3. Damara Terns feed in the shallow waters for small fish and squid. They hover above the water and once they spot a fish, they dive and catch the fish with their bill.
  4. Kelp Gulls are opportunists that eat a wide variety of food as well as carrion. They will sometimes aggressively steal food from other birds.
  5. White-fronted Plovers stir the sand for polychaete worms, crustaceans and tiny invertebrates.
- c. Where do they nest and what does the nest look like?**
1. Oyk nests are located above the high-water mark, in the dunes. Eggs are deposited directly on the sand or bare rock in shallow indentations.
  2. Sanderlings do not breed on our shores.
  3. Damara Terns, in Namibia, lay their eggs directly on the sand a few km inland. In South Africa, they lay their eggs closer to the beach in the dunes. The nests are only bare scrapes on the sand.
  4. Kelp Gulls make their nests in dunes, cliffs, rocky outcrops and peninsulas. Their nests are lined with vegetation and usually close to sheltered areas.
  5. White-Fronted Plover nests are bare scrapes directly on the sand, above the high-water mark.
- d. Can you describe the nesting behaviour of some of these birds?**
1. Oyks make their nest away from other oyks. The eggs and chicks blend in with their surroundings, making them hard to see. This is effective against natural predators,

but it makes the nests more vulnerable to trampling by humans, their toys and their pets. Oyks will walk away from their nests when disturbed and will try and distract the intruder with false brooding displays or distraction displays, like pretending to have a broken wing.

2. Sanderlings do not breed on our shores, but have a similar nesting behaviour to the Oyks and White-fronted Plover.
3. Damara Terns make their nests in small colonies. They aggressively defend their nests from intruders and will dive bomb the predator or human that comes close.
4. Kelp Gulls make their nests in colonies and also defend their nests from intruders with mobbing behaviour, similar to the Damara Tern.
5. White-fronted Plovers do not breed in colonies. They have similar nesting behaviour to Oyks in that they rely on camouflage to hide their nests and chicks. They will also leave their nests if disturbed and pretend to have a broken wing to lead the intruder away from the nest.

**e. How will the threats to Oyks also affect the birds in these videos?**

Threats to Oyks, such as driving on beaches, dogs off-leash, pollution, trampling of nests, red tide etc. will also directly affect other shorebirds. Damara Tern and White-fronted Plovers also make their nest directly on the sand making them vulnerable to be trampled. All the species are vulnerable to red tide poisoning. All the species are vulnerable to strangulation from fishing lines. White-fronted Plover nests are sometimes washed away by very high tides. Dogs chase gulls and their chicks.

**f. Some of these birds make their nest directly on the sand making them vulnerable to disturbance. What simple things can you do to save a nest when you visit the beach?**

1. Keep dogs on a leash.
2. Walk close to the water's edge and not in the dunes.
3. Heed beach nesting signs and keep clear of areas where there are nests.
4. Throw away trash in allocated bins.

## APPENDIX D

### POINT 12 QUESTIONS AND ANSWERS

**a. What is a rocky shore?**

A shoreline mostly covered in solid rock in the intertidal zone. Rocky shores are made up of tidal pools that are rich in sea life adaptable to the harsh conditions of wave action, changing tides and varied salinity. Filter feeders, such as limpets and mussels, filter out tiny particles from the water.

**b. What is a sandy shore?**

Loose deposits of sand, gravel or shells that cover the shoreline. Sandy shores are formed when rocks, coral and shells are smashed into pieces by waves, worn away by rain or ground up by animals. Sandy beaches are home to thousands of mobile animals that live alongside the shoreline. Animals are adapted to move quickly to keep above the waterline or burrow into the sand to avoid crashing waves. Most animals on the sandy shores eat organic material washed up by the waves.

**c. Can you name the different tides?**

High-tide and low-tide as well as spring high-tide and spring low-tide.

**d. Do you know what is meant by tidal zones? How many are there and what are they called?**

Tidal zones are the areas affected by the different tide levels. The Intertidal Zones are the zones between the high-water and low-water mark. There are four main zones: 1. Splash Zone which is dry most of the time; 2. Upper Intertidal Zone which is wet during high tide; 3. Middle Intertidal Zone which is wet and dry; and 4. Lower Intertidal Zone which is usually wet.

**e. Can you name some shorebirds other than Oykys?**

Sanderlings, Damara Terns, White-fronted Plovers and Kelp Gulls. There are many more.

**f. How do the various shorebirds, including Oykys, make use of these zones and the zone above it?**

Each shorebird occupies a different breeding and feeding niche.

1. Oykys feed in the intertidal zone on mussels, limpets and other invertebrates. On the rocky shores, they have a varied diet, whereas in the sandy shores they mostly feed on sand mussels. Oyk nests are located above the high-water mark, in the dunes. Eggs are deposited directly on the sand or bare rock in shallow indentations.
2. Sanderlings do not breed on our shores. They feed on the upper intertidal zone on sandy beaches, following the water's edge to prod for small invertebrates, and fish scraps.
3. Damara Terns feed in the shallow waters for small fish and squid. In Namibia, they lay their eggs directly on the sand a few km inland. In South Africa, they lay their eggs closer to the beach in the dunes.
4. Kelp Gulls feed in all the zones including the surf zone. They are opportunists that eat a wide variety of food as well as carrion. They make their nests in dunes, cliffs,

rocky outcrops and peninsulas. Their nests are lined with vegetation and usually close to sheltered areas.

5. White-fronted Plovers feed on polychaete worms, crustaceans and tiny invertebrates in the upper intertidal zone. Their nests are bare scrapes directly on the sand, above the high-water mark.