



This pack will help you to explain why protecting whales and dolphins will help to stabilise the changing climate and what children can do to help. Work through the PowerPoint and activities sequentially or dip in and out to suit your class. All activities included in this pack are suitable for children in Key Stage 2 and links can be found to the National Curriculum.

## Whales are Climate Giants

Whales play an amazing role in an ecosystem that keeps every creature on Earth alive, including you! Whales are our allies in fighting the climate and biodiversity crisis.

Humans have done enormous damage to the planet including killing millions of whales and wiping out up to...**90%**...of some populations.

Yet few people, let alone governments, are aware that recovering whale and dolphin populations can undo some of the damage we've caused.

**If blue whales in the Southern Ocean recovered to pre-whaling levels, they could provide enough nutrients for phytoplankton to store over 6 billion trees worth of carbon.**



Scan this QR code to view a YouTube video animation created by WDC that consolidates the information contained in this document



**Whales are like **giant swimming trees**. They absorb huge amounts of carbon over their long lifetime.**



## **How do whales support the marine ecosystem?**

**Whales act as 'ecosystem engineers'.** Whales dive deep into the ocean to feed and then come to the surface to breathe and poo, whilst doing so they circulate huge amounts of nutrients, particularly iron and nitrogen. Whale poo is a brilliant fertiliser for microscopic plants called phytoplankton, which are at the base of the entire marine ecosystem. Phytoplankton remove millions of tonnes of carbon from the atmosphere and produce massive amounts of oxygen. This process is known as the ... **'Whale Pump'**

As whales undertake their long migrations, from nutrient-rich areas to nutrient-poor areas, they transport essential nutrients across the ocean in a process known as the **'Great Whale Conveyor belt'**. Carbon in the atmosphere is a significant cause of climate change. Climate change is the greatest threat to all life on Earth. So, the more whales there are, the more phytoplankton can grow, and the more carbon is taken out of the atmosphere.

## **'Whale Fall'**

Even in death, whales sustain life. When they die, whales sink to the seabed, where they become oases for marine life, taking huge amounts of carbon with them to the seabed.

Researchers estimate that the surviving large whales store approximately nine million tonnes less carbon now than they did before large-scale whaling (as their populations were much larger before whaling). Planet Earth needs a healthy ocean. And a healthy ocean needs whales. It isn't enough to conserve species, populations, and individuals.

We need to restore their ocean environment and allow populations to recover to levels that existed before industrial-scale whaling and fishing devastated the ocean.

WHALE AND  
DOLPHIN  
CONSERVATION

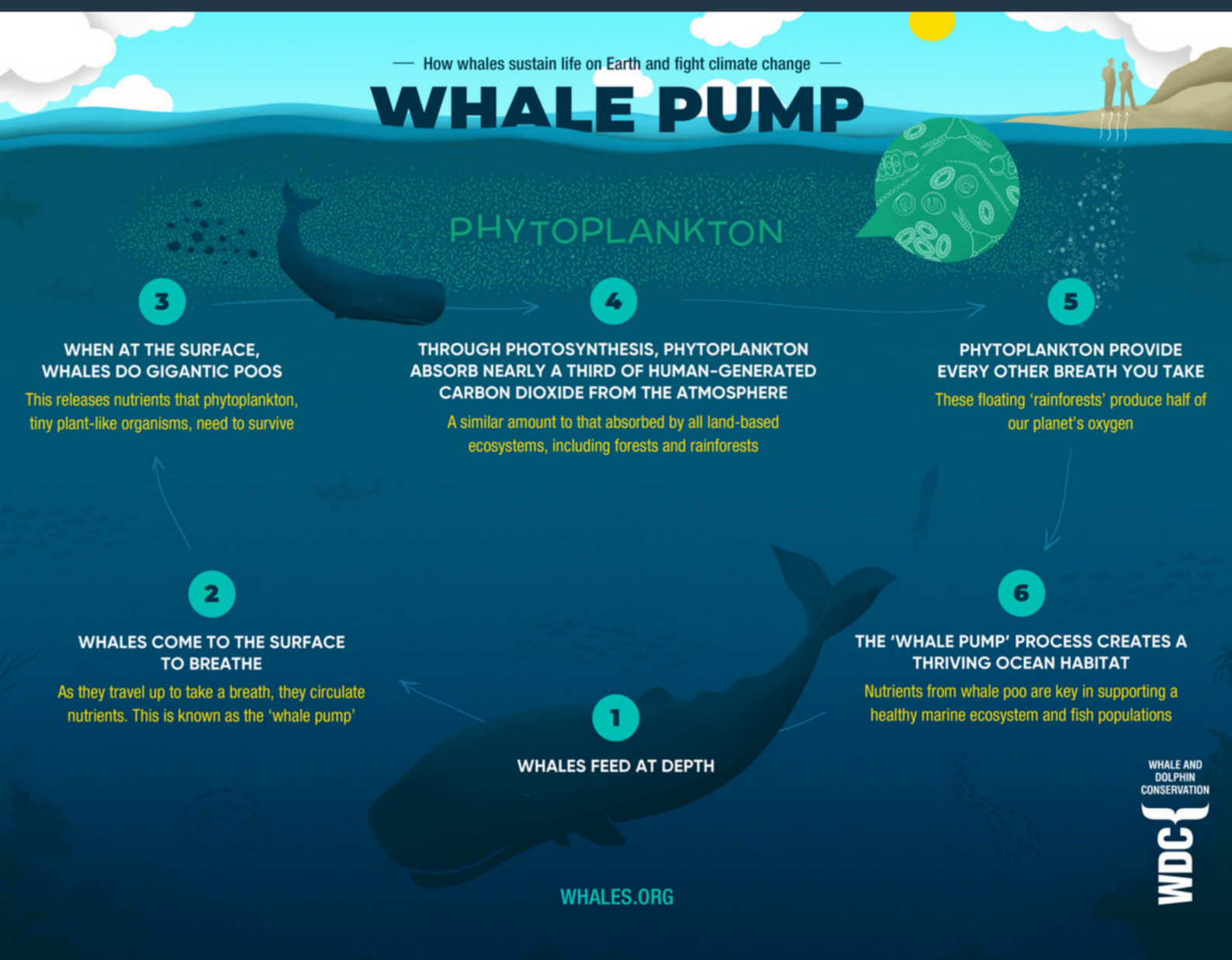
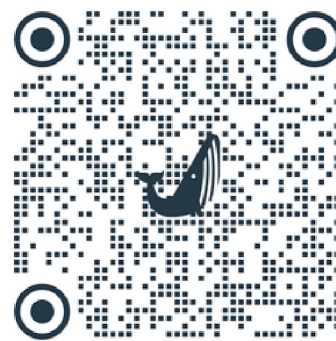




## Infographics and Whale Guardian Online Course:

Within this pack we have included two useful infographics that detail the whale pump, how whales sustain life on earth and help to stabilise climate, and Whale Fall to help to visualize the carbon sequestration of the great whales and the ecosystems they help to sustain at benthic ocean levels; full-size printable PDFs of these infographics are available by emailing [info@whales.org](mailto:info@whales.org).

This QR links to a Whale Guardian online course that children can embark on and become an official ITZA Whale Guardian. The course is a tour of all things whales including their diversity, behaviour, history and threats - but more importantly what you can do to protect them. Just scan the QR code below to access the course and find out more.





# WHALE FALL

1

WHEN A WHALE DIES, THEIR CARCASS SINKS TO THE OCEAN FLOOR

This is called a 'whale fall'

2

REBUILDING WHALE POPULATIONS WOULD LEAD TO

## 145,000 TONNES

OF CLIMATE HARMING CARBON BEING LOCKED AWAY INSIDE WHALE CARCASSES EVERY YEAR

This is equivalent to the weight of:



3

THE WHALE CARCASSES STORE THE CARBON FOR THOUSANDS OF YEARS

This process prevents the carbon from being released back into the atmosphere,  
helping to combat climate change

4

WHALE CARCASSES ALSO PROVIDE FOOD AND A  
HOME FOR UP TO 200 SPECIES



# Green Whales are Important Ocean Mixers

Whales are impressive ocean mixers. Whales dive into deeper ocean layers to hunt and when they resurface, the whirlpool movement they create transports important nutrients from the deep layers of the ocean upwards.

## EXPERIMENT - GREEN WHALE, THE MIXER

Whales play an important role in the marine ecosystem. Whales swim vertically up and down through the ocean layers whilst regularly returning to the surface from the depths to breathe. The following experiment shows how this works.

### You need:

- A large glass or jar (or another transparent container)
- Three liquids of different consistencies (e.g buttermilk, sunflower oil and water)
- Flaxseed (or other small grains)



### Method:

1. The three liquids represent different ocean layers.
  2. First, mix your thickest liquid (buttermilk in our example) with the seeds to symbolise the nutrients in the deep layers of the ocean.
  3. Pour this mixture gently into your glass.
  4. Then carefully pour the next liquid layer (in this example the sunflower oil) into your glass on top of the first layer.
- Tip: To prevent the second layer from accidentally dipping into the first layer, you can pour it over the back of a spoon to help spread it gently onto the first layer.
5. Now add the last layer which is the water.
  6. Now use a small spoon to represent a moving whale.

Slowly dip it once from top to bottom, make a loop in the deep layers and come up to the surface again. You can record this process with a smartphone or video camera in slow-motion mode.

Now you can clearly see how the ocean layers are mixed and nutrients are transported upwards as the whale dives down and then returns to the surface.

# EXPERIMENT - MAKE A CARTESIAN DIVING WHALE -

## Background Information

The survival of whales in the ocean greatly depends on their ability to dive and resurface. Various factors play a role in influencing their diving behaviour.

One key factor is buoyancy, marine mammals are equipped with blubber to stay warm, which is naturally buoyant and might be expected to hinder whales from diving. However, despite having buoyant blubber, whales are exceptional divers due to their unique body composition.

They achieve a state of neutral buoyancy, where their bodies are neither positively nor negatively buoyant. The idea of neutral buoyancy can be illustrated using a device known as a **Cartesian diver**.

In its simplest configuration, a Cartesian diver consists of a plastic container partially filled with water and sealed with an airtight membrane. Inside the container, there is a hollow object that is open at the bottom and contains just the right amount of air to enable it to float.

The air confined within the hollow object possesses weight and consequently applies pressure. (For reference, the air within a room can have a weight equivalent to about 100 kilograms, similar to the weight of a large individual.) This air can be compressed or condensed into a smaller volume by exerting pressure on the membrane or plastic bottle in the case of this experiment.

The act of compressing the air compels water to enter the hollow object, leading it to submerge. Conversely, when the membrane is released, the hollow object ascends.





# EXPERIMENT - MAKE A CARTESIAN DIVING WHALE - Instructions

## You need:

- A selection of old plastic bottles
- Water container
- Several plastic pen lids with no holes in the top
- Blue tack
- A selection of paper clips
- tap water

## Method:

1. Use the blue tack to attach a paperclip inside a pen lid.

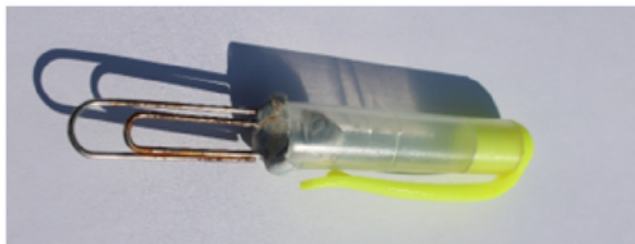
This is your whale.

2. Fill a water bottle with water.  
Try different amounts.

3. Insert the pen lid whale into the bottle with the paperclip facing downwards.

4. Screw on the lid.

5. Gently squeeze the bottle to make your whale dive down and release the squeeze to return the whale to the surface.



## Questions and further experimentation ideas:

Does it still work with a different bottle?

What about changing the mount of water?

Change the size of paperclip?

What does this show about whales in the ocean?