



# **COASTAL PROTECTION AT LYME REGIS**

**ROCKWATCH FIELD TRIP SERIES  
ALAN HOLIDAY**

# INTRODUCTION

In this field trip from home we will explore these questions:

- Why is Lyme Regis such a great place to visit as a geologist?
- What events might occur as a result of the geology at Lyme Regis?
- Spoiler! Why are landslides so dangerous and how can they be prevented?
- What do we mean by coastal defenses and why are they so important?
- What examples of coastal defenses are there at Lyme Regis?
- And finally are the coastal defenses working?

# QUESTION:

**Why is Lyme Regis such a great place to visit as a geologist?**

# WHY IS LYME REGIS A GEOLOGISTS HAVEN?

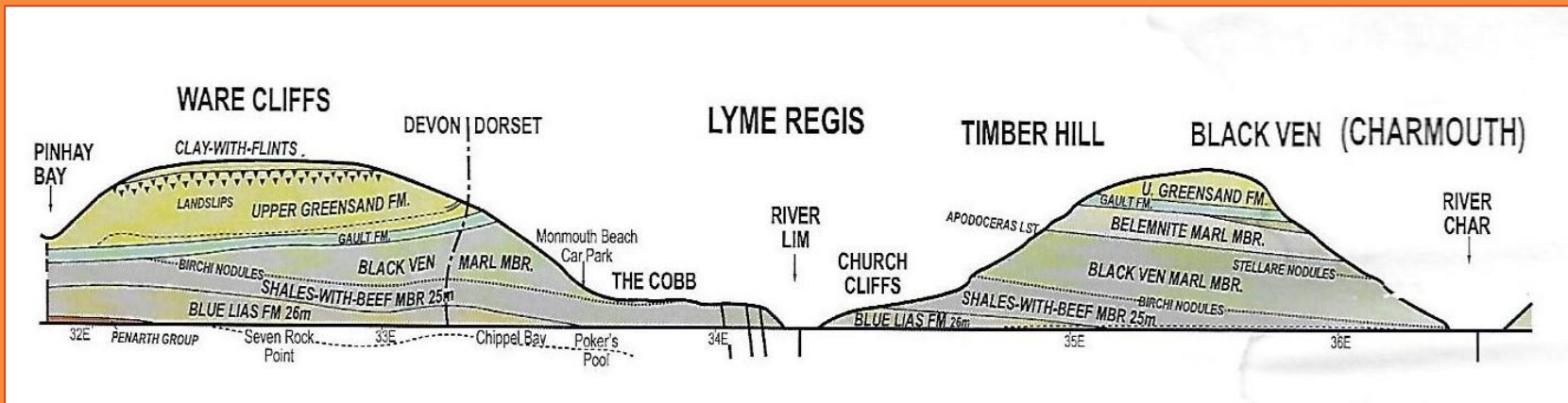
- Lyme Regis is a haven for geologists because it is part of a long stretch of important Coastline in the UK, known as the Jurassic Coast.
- The Jurassic Coast spans an impressive 95 miles in the south of England from Dorset to Devon, encompassing 185 million years of geological history.
- It boasts World Heritage Site status because it holds such special scientific interest.
- Lyme Regis was where famous geologist Mary Anning made many of her important geological discoveries in the early 1800s.
- It continues to fascinate geologists around the world, and remains an important place of scientific discovery.

# BACKGROUND GEOLOGY

- But first some background geology.
- The rock succession at Lyme Regis is mostly Lower Jurassic Lower Lias clay and limestone, which is called the **Blue Lias Formation**.
- Above this is the Shales with Beef Member.
- There is then an unconformity (gap in the succession) with a capping of Cretaceous Upper Greensand.
- See the next slide to see the different rock layers in a diagram.

# BACKGROUND GEOLOGY IN PICTURES

The strata dip gently to the east and younger Lower Lias rocks are exposed east of Lyme and around Charmouth, for example at Black Ven.



# **BLUE LIAS AT MONMOUTH BEACH, WEST OF LYME REGIS HARBOUR WITH SHALES WITH BEEF ABOVE**



# THE BLUE LIAS IS ALSO SEEN EAST OF LYME REGIS AT CHURCH CLIFFS





# **QUESTION:**

**What events might occur as a  
result of the geology of  
Lyme Regis cliffs?**

**ANSWER:**

# Landslides and landslips



# **QUESTION:**

**What's the difference between a landslide and a landslip?**

# ANSWER:

**A landslip is the sliding of a mass of land down a slope or cliff whereas a landslide is a natural disaster that involves the breakup and downhill flow of rock, mud, water and anything caught in the path including houses.**

# LANDSLIDES OCCUR BECAUSE OF THE GEOLOGY

The controlling factors are:

1. The geology
2. Gravity
3. The presence of water

On the coast, erosion by the waves cause steep cliffs which slump down through gravity and especially in the winter when it is wet.

# THE ROCKS HAVE VARYING PERMEABILITY

Permeability is the way in which water passes through the rock.

Rocks like sandstone (e.g. Upper Greensand) are permeable (i.e. water can seep through the rock) while clay and shale is impermeable (the rock can absorb water and may become liquid!) and loses all strength.





# RECENT LANDSLIDE AT MONMOUTH BEACH



Can you see anything in the cross-section of slide 6 that might explain this?

# **QUESTION:**

**Why are landslides  
so dangerous?**



# ANSWER:

Landslides are dangerous because they can injure or even kill people caught in the path, and cause damage to property, roads, pathways, water and other supplies to an affected area.

They can cause lots of disruption to a community and be very expensive to repair the damage caused. It can have a huge impact on local businesses and be costly to investigate the damage caused.

# QUESTION:

**How can you prevent landslides?**

# **ANSWER:**

**The risk of landslides can be reduced by putting in place measures to help prevent them. We call these coastal defenses.**



# **COASTAL DEFENSES**

**AT LYME REGIS**

# HOW CAN WE STOP SUCH MASS-MOVEMENT (SLUMPING)?

1. **Sea walls** prevent waves attacking the cliff
2. Water can be removed by adding **drainage** solutions
3. **Groynes** are built on the beaches

You can see one attempt at Lyme Regis in the next frame.

## CHURCH CLIFF COASTAL PROTECTION

Coastal protection has been tried over the years but is not always successful long term.

This is a photo of the sea wall constructed in 1953 at Church Cliff taken in 2008, which shows a poor state of repair due to coastal erosion.





## ANOTHER VIEW

It was also a hazard as people could get cut off by the tide as you could not walk along the top of the wall because it was covered by slumped clay.

In this picture you can also see wooden groynes.

## CONCRETE GROYNES

This is a photo of the remains of concrete groynes from the 1950s, taken in 2008.



**How do groynes help with coastal protection?**



Groynes trap sediment (sand and shingle) and limit movement of the sediment by long shore drift. In the case of Lyme Regis this is from west to east.



In the picture above groynes can be seen at Barton on Sea in Hampshire.

**Can you work out the long shore drift direction?**

## GROYNES

How do the groynes help?

The sediment trapped by the groynes absorbs wave energy so the waves do less damage.

In frame 11 there is little sediment because the supply is cut off by Lyme Regis promenade



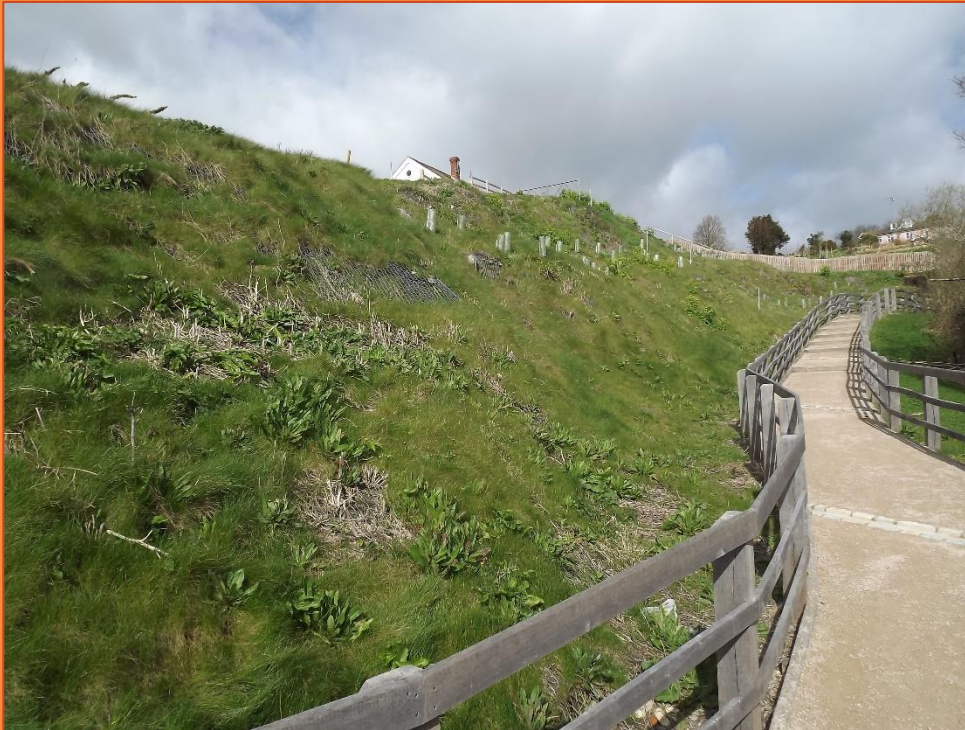
**How do this help to stabilise the slopes?**

## **NEW SEA WALL**

The coastal defences from 1953 had fallen into disrepair so a new sea wall was built.

This is a photo of the new sea wall and pedestrian access which was completed in 2014.

The project cost £19 million and included a new sea wall and promenade for walking on, providing access from the car park to the town centre and stabilisation of the slopes above the sea wall.



### ANSWER:

Vegetation helps to stabilise the slope.

Water is removed by drainage and the plants.



## OTHER COASTAL PROTECTION AT LYME REGIS

In 2006-7 the Langmore Gardens area was stabilised with drainage and piles into the slope.

In this picture you can see a new beach with imported shingle. A groyne at the far end slows down erosion and loss of shingle through longshore drift.



# **QUESTION:**

**What other coastal  
protection measures could  
be put in place?**

**ANSWER:**

**Construct new beaches and  
gardens around coastal areas**



## A NEW SANDY BEACH

The aim of the new beach was to provide a beach for holiday makers.

Routine maintenance seen in this picture and the next one is necessary at low spring tide as the sand is removed off shore by wave action especially during winter storms.



The Cobb harbour wall seen in the lower picture was extended to provide some protection from winter storm waves.





# LANGMOOR GARDENS REINSTATED AFTER 2007 ENGINEERING WORK



# **QUESTION:**

**Are Coastal defenses working  
in Lyme Regis?**



### ANSWER:

Yes, but it's an ongoing process!

Despite all the coastal defences rocks are still accessible with abundant fossils as seen in this picture of what is known as the Ammonite Graveyard on Monmouth Beach around 500 metres west of the Harbour (Cobb).

# ABOUT THE AUTHOR ALAN HOLIDAY

Professionally, Alan Holiday was a geography and geology teacher in the Weymouth area for 37 years and also had a year in the oil industry as a mud logger.

Alan enjoys an active role in local geological groups and is a regular Rockwatch Field Trip Ambassador, including our Annual Residential to Dorset.

His favourite fossil type is a trilobite. This example of Wenlock Limestone has a trilobite pygidium, collected at Ironbridge about 45 years ago.



# CREDITS

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