

Physical World Subject Knowledge Organiser :

How natural processes form beautiful landscapes looking at arid, glacial and fluvial processes and how humans interact with these.



How do Glaciers move?

Glaciers move down a slope because of gravity. Glaciers in most mountain regions move mostly by basal slippage. There is a layer of meltwater between the glacier and the bedrock and this lubricates the movement. Glaciers in polar regions move by individual layers of ice sliding over one another (plastic flow) as the glacier is frozen onto the bedrock. Basal slippage causes erosion of the bedrock by abrasion (sharp rocks stuck in the basal ice grind away the bedrock). Freezing of ice onto fractured bedrock causes erosion by plucking out chunks of rock.

How do upland glacial landforms form?

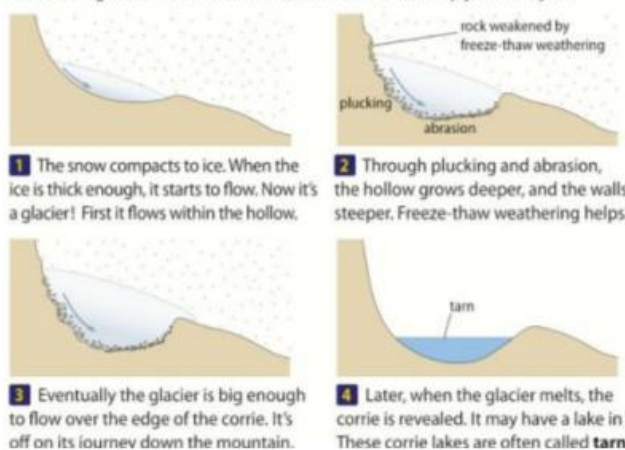
Snow collects in hollows on the sides of mountains. If temperatures are cold enough in summer it does not melt but gradually turns into ice and becomes a glacier. The glacier slides out of the hollow and enlarges it creating a corrie. Abrasion produces grooves on bedrock under the glacier. Harder areas of bedrock form mounds (roche moutonee) by abrasion and plucking. As several corries on a mountain erode backwards, sharp ridges (arêtes) form between them. If three or more corries erode backwards the mountain top can become a pyramidal peak. Glaciers moving down V shaped river valleys erode them into wider U shaped valleys (glacial troughs).

How are lowland depositional landforms formed?

Glaciers eventually move into warmer areas and melt faster than they move down. As the ice melts it deposits the rock debris it is carrying, large chunks of rock become erratics. Finer sediments are deposited as layers of glacial till and can be moulded into ridges (moraines) and oval shaped hills (drumlins).

Corrie

A corrie begins as a sheltered hollow, where snow builds up year after year.

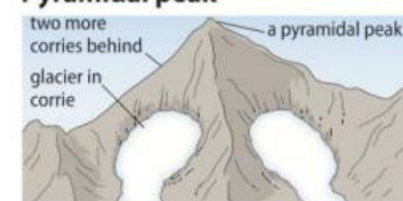


Arête



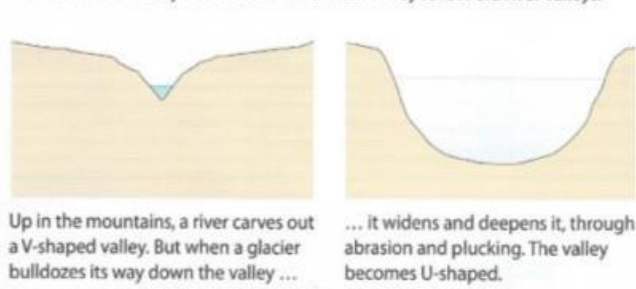
Sometimes two corries form side by side. The glaciers erode the rock between them, leaving a sharp ridge of rock. It is called an **arête**.

Pyramidal peak



Imagine three or four corries around a mountain top. The glaciers erode their back walls, cutting into the mountain top. It becomes a **pyramidal peak**.

Glaciers take the easy route down a mountain. They follow old river valleys.



Glaciers provide important resources for people:

- Slowly melting glaciers feed some of the world's largest rivers (e.g. Ganges in India) and provide millions of people with freshwater for domestic use and crop irrigation
- Glacial deposits are used as a source of gravel for making concrete in construction
- Glaciated landscapes create opportunities for outdoor recreation and tourism (climbing, hiking, skiing etc). Climate change is causing rapid melting of glaciers. In the Himalayas in Nepal near to Mt Everest, rapidly melting glaciers are forming huge meltwater lakes held in place by unstable natural debris dams. Eventually the dams break and release catastrophic floods (glacial lake outburst floods) down the valleys destroying homes, crops, roads, bridges and killing people. A dangerous glacial lake was drained to a safe level in 2016. The Imja glacial lake, at nearly 5,000m high, was in danger of flooding downstream settlements, trekking trails and bridges. The lake, which was originally 149m deep in places, has had its water levels lowered by 3.4m by engineers cutting a drainage channel to release some of the water slowly.

Geographical Vocabulary

- ❑ **A glacier:** A long-standing mass of ice that moves very slowly downhill.
- ❑ **Glacial periods:** When there are long periods of time where the temperature has dropped significantly and ice covers many parts of the world.
- ❑ **Interglacial periods:** When temperatures start to heat up again, ice will start to melt and retreat around the world.
- ❑ **Abrasion=** As the glacier moves downhill, rocks frozen into the base of the glacier scrape the rock beneath like sandpaper. This gradually wears away the rock.
- ❑ **Plucking=** Rocks that are underneath and around the glacier are plucked away, as they become frozen into the glacier.
- ❑ **Freeze-thaw weathering=** When temperatures are higher, snow can melt into cracks in surrounding rock. This will freeze in colder temperatures which will make the crack expand. When this freezing and melting repeating, the crack keeps getting bigger until parts of the rock fall off.
- ❑ **Deposition:** The geological process in which sediments, soil and rocks are added to a landform or land mass. When a glacier loses energy, the material it was carrying will be deposited, building up layers of sediment.
- ❑ **Bulldozing** is when rocks and debris (moraine), found in front of the glacier, are pushed downhill by the sheer force of the moving ice.
- ❑ **Quarrying:** Quarrying is the process of removing rock, sand, gravel or other minerals from the ground in order to use them to produce materials for construction or other uses.
- ❑ **Hydroelectric power (HEP):** A form of energy that harnesses the power of water in motion—such as water flowing over a waterfall—to generate electricity.
- ❑ **Tourism:** The commercial organization and operation of holidays and visits to places of interest.

Skills and Enquiry

Describing the geographical location of glacial and glaciated regions using a variety of different maps, explaining human and physical geography features and processes.

You should be able to review development of differing glacial landform features using diagrams, a story-board and written text.

Compare and reflect upon challenges faced by stakeholders living and working in the regions studied.

Understand and explain the impact of climate change, past and present, on glaciers and glacial landforms. Extended writing

Understand and interpret photographs.

Analyse different graphs and charts to find evidence that supports your argument.

Carry out data analysis and data manipulation to analyze key charts and graphs.

The St Benet Biscop Geographer

It is important that we are aware of and understand the issues and challenges faced in glaciated/glacial areas. This allows us to have an appreciation for the wider world we live in, which we should strive to support and develop at all times. We are part of a global community, that we should show stewardship for. You need to be aware of conflicting sides of arguments for topical issues such as conflict of land-use in glaciated areas and sustainable tourism and land-use development in order to discuss potential solutions. By studying the Lake District of the UK, you will gather an appreciation for issues faced by stakeholders, to reiterate the premise that conflicts and challenges are in a range of areas with different socio-economic contexts. You will respect and understand the challenges in glaciated regions, being able to draw comparisons between different stakeholders from previous study.