

welcome students the topic that i am going to discuss today is from the course title fundamentals of geography for fifth semester geography students of bachelor of arts program. , I'm Mr Kiran Prakash Naik, Assistant Professor, Department of Geography from Government College of Arts science, Commerce, Quepem Goa. The title of the unit is geomorphic landforms and processes which is unit 3 and the model name is glacial landforms in this session i am going to discuss with you all about the concept of glacial landforms glacial erosion and glacier deposition and various erosional and depositional landforms that are caused due to glacial processes followed by conclusion and references at the end of this module students will be able to understand the concept of glacial landforms they will also get in-depth knowledge about the different types of erosional and depositional landforms produced by glaciers

Glaciers are the masses of ice moving as a sheet over the land flowing down the slopes of the mountains the movement of the glacier is normally slower unlike the water flow the movement can be either few centimeters to few meters a day or even less or more than that glaciers move basically because of the force of gravity so glaciers are involved in the process of erosion and deposition this also giving rise to different types of erosional and depositional landforms what is glacial erosion glacial erosion is caused by a huge mass of glacier sliding over the rocks and eroding themselves by its weight under the influence of gravity there are two important principles for taking the erosional activities by glacier and that is abrasion and plucking abrasion is the grinding and crushing of rocks which is not accomplished by the eyes itself as it is too soft but the rock depth is frozen in into the lower layers of the eyes the debris length acts rather a coarse sandpaper and also abrades itself as it is moved by the glacier next process is plucking and quarrying which occurs in the response of the drag exerted by the moving of ice on the red rock as the tensile strains of ice is not very great plucking is more effective where the rock has already become or being well jointed meaning the glaciers there are various erosional landforms caused by glacial processes such as sir arid horn pass or coal glacier valley trough u-shape valley hanging valley alps rose mountain or sheep rock and fjords which i'll discuss this one by one in detail now.

Cirque is also known as corey it is a valley resulting from glacial erosion it is shaped like a amphitheater with a great opening on the down hill side and a steep curb section with the cliff like slopes on three sides the height of these sides is called as head walls and the floor of this valley is bowl shaped it is

found in mountains in different parts of the world second landform is arid it is a narrow reach of rock between two valleys it occurs when two glaciers erode two parallel u-shaped valleys or two glacier socks headwatts the ridges in between them stand out as a arid when the sucks from two sides of the mountains are enlarged and extended towards each other the upper part of the mountains begin to destroy this results in the summit line becomes serious and thin line like knife is formed called as eric next is horn horn are formed when three or more than three sucks cut back into the sides of a summit and meet one another on their back the sharply pointed and angular reach remain in between the sucks is called as glacial horn the pyramidal peak is formed and this peak is most extreme form of glacial horn mount mortenhorn in zermath is an example of paramedical peak

Next we have is coal or pass this coal or pass is formed when the subs from the opposite side of the hill develop and meet each other the summit line is lowered it creates pass and many passes are formed in this way as you can see in the diagram next glacial and form we have is glacier valley trough the glacier moves over some earlier form valleys or depression the glacier abrades its bottom onto the broad one its sides appear to rise like wall and such vessels formed by glacier is known as glaciated trough and valleys they have broad floors and relatively smooth and steep sides the valley may contain liter debris or debris shaped as moraine with swampy appearance next line form we have is u-shaped valleys u-shaped valleys are glacial curved landforms that exhibits a characteristics of u-shape this valleys have a flat rounded bottom their slopes are steep and roughly straight these u-shaped valleys are formed by the scrubbing action of glaciers as they move down slope after the glacier's house the rock valley floor becomes physical small boulders called glacial till that were transported with the glacial landform remains dispered throughout the valley float.

Next landform we have is hanging valley the hanging valleys are formed when the glaciers have many tributary glaciers the eyes of the tributary glaciers descends to the main glaciers in the form of leaf when later on the eyes of the tributary glaciers had retreated the tributary valleys look hanging over the main valley tributary glaciers of the main glaciers most often carve out v-shaped valley that are shallower than the created by the main glacier waterfall often drop down the edges of such hanging valleys next erosional feature is alps the wall of the glacier valley stands almost vertical a terrace is formed between the

top of the wall and the mountains above them this terraces is an interrupted between the steep slope of the mountains and the vertical wall of the glaciers many villagers and fields have been developed over the terraces which are known as elves next we have is rose mountain which is also known as sheep rock there are many swells of hard rocks in the coast of the glaciers the glaciers do not avoid but rides over them and descend down to continue their journey abrasion action is the main activity in the descending sides ice plugs the rocks and roughens the surface and makes its more sloppy the rocks wells which have gentle slope and poly surface on one side but rough surface on the steeper sides as you can see in the diagram on the other sides which is known as rose mountain or sheep rock next land form we have is fears the fears are formed by the submergence of u-shaped valleys of the glaciers the lower end of such valleys is drows in in the sea steep sided narrow entrance like features at the coast where the stream meets the coast fjords are formed in norway's greenlands and new Zealand.

The glacier deposition is also taking place and the rock debris is carried out by the glacier down the slope is known as glacier drift the rock debris is deposited at the base of the glacier through the movement of slowly moving ice masses down the slopes melting and evaporation separates the depositions of the glaciers and landform generally formed here includes morins and drumlings there are various depositional landforms caused by the glaciers which we will discuss now in detail we have moren drumlin iskas kem kettle hole retics glacial tills and outwash planes caused by the glacier is more moraine are the long ranges of deposits of glacial tills the glaciers brings with it a small pebbles or cobbles or sands and the till which cannot be carried out by the glaciers is deposited at the various parts of the glaciers they are sufficiently long and their height is usually 30 meters the size of the deposits in moorings varies from tiny particles to of sense to large boulders the deposits accumulates on the surface in an unstratified manner without any types of sorting as you can see in the diagram these are the morales which is the deposition done by the glaciers.

There are different types of moraines when the deposition are at the ends of the glacier they are called as terminal morin when this deposition is done on the both sides they are called as lateral more when the lateral moraine of two glaciers joined together they are medial morings when the lateral mornings of both sides of the glaciers joined together it forms the horse shoe shape ground morins are the deposition left behind in areas once covered by the glaciers

second depositional feature is drumling drumlin is smooth over shape reached like topographies composed primarily of glacial teals with masses of gravel and scents brahmans are formed in the morinic areas which appears as the back of the whale and messes are formed between them these dumb lines are elongated in shape they are longer sides represent the flow of ice it is formed due to dumping of rock debris underneath heavily loaded ice through fissures in the glaciers the long axis of dumplings are parallel to the direction of the eyes movement third feature is eskers these are widening ranges formed of tin and are found in spread of meandering forms the height ranges from few meters to 100 meters the slope on the either side is steep they are usually formed of washed sands and gravel when glaciers melt the water flow on the surface of the eyes or leaks down along the margins this waters a mass underneath the glaciers and flew like streams in a channel beneath the eyes next we have a scheme it is a hill or mount that lacks the proper shape.

Canes are composed of teal gravel and scents that can observe after the retreats of the glaciers such features is usually formed when the debris from a rock fall or other large volumes of debris fall through the glaciers and accumulate in the depression lot of till accumulates at the mouth of the glaciers when ice melts and when the ice glacier retreats the came becomes visible on an elevation of land on the bedrock through which the glaciers previously form the till takes the forms of a reach next landform we have is kettle holes a kettle holes is a hollow typical filled by the lake resulting from the melting of miles of ice trapped in a glacial deposits this cattle hose usually are pebbles and other fragments that are found underlying in the glaciers when the glaciers melt the pebbles and the fragment subsides and form the depression the eyes becoming buried in the sediments and when the eye smells a depression is left called as kettle hole it creates a dimpled appearance on the outwash plane next landform we have is erratics erratics is a piece of rocks that is different in several respects from the rocks of the surrounding glaciers rocks are carried out by glaciers over long distance and deposited in the land where such rocks do not occur the size of erratics varies from pebbles to massive boulders such fragments has no similarity with those of the bedrock and are in the fact foreign to that area example of such type of erratics are big rock in alberta next landform we have is glacial teal and outwash plains when the glacier reaches its lowest point and melts it leaves behind a stratified depositional material consisting of rock debris clay sand gravel and so on this layered surface is called teal plane or an outwash plane usually such landforms are produced by valley glaciers as the glaciers

frown down to the mountain slope it picks up debris from the bedrock after flowing through a valley the glacier enters the wider and flatter planes here it deposits the sediments in a fan shaped body known as outwash fan so this portion is called as outwash plane as a conclusion i would like to say glaciers have played an very important role in the molding of landscapes the glacier movement occurs when the growing ice mass becomes too heavy to maintain its rigid shape and begins to flow by deformation glacial erosion is caused by huge mass of ice sliding over the rocks and eroding them by its own weight under the influence of gravity the rock depress is deposited at the base of the glaciers through the movement of slowly moving ice mass down the slopes this movement has resulted in the various erosional and depositional landforms these are the references it is expected that the students should visit these websites and refer these books for further references thank you