DOWNLOAD PDF PEOPLE AND GLACIERS.

Chapter 1 : People - Glacier National Park (U.S. National Park Service)

But glaciers are also a natural resource, and people all over the world use the meltwater that glaciers produce. Glaciers provide drinking water People living in arid climates near mountains often rely on glacial melt for their water for part of the year.

Johns Hopkins Inlet provides a glimpse into the world of ice! Driscoll What is a Glacier? A glacier is born high in the mountains, where the only precipitation that falls is snow, and the snow that falls does not melt away each year. A slight depression on the mountainside catches this snow. Year after year, the snowflakes pile up into a deep snowpack. Soon the sheer weight of this vast accumulation presses down on itself, deforming the snowflakes beneath. The fluffy flakes first change to granular snow - like round ice grains - and eventually morph into solid ice. Glacier ice is different from the ice in your refrigerator. The ice crystals form slowly under pressure and individual crystals can grow to be the size of a football. Air trapped between the snowflakes is also frozen into the ice at pressure. Ice near the bottom of the glacier is under tremendous pressure, which allows it to flow almost like a plastic over the bedrock beneath. Friction between the glacier and the bedrock produces meltwater which further lubricates the bedrock allowing the ice to slide. Eventually, the weight of the ice is too much for the depression to hold against gravity and the ice begins to slowly flow downhill seeking equilibrium. Like a river, the glacier flows down the mountain choosing the path of least resistance. As it moves, it incorporates rocks into its lower layers. Like stone tools, these acquired rocks grind away at the bedrock on the bottom and sides of the glacier. In time, the glacial ice will polish and carve deep u-shaped valleys into the mountainside. When the ice reaches lower, warmer elevations, it begins to melt. Eventually the loss through melting is greater than the supply of ice flowing down the mountain. The glacier ceases to make further progress, though the body of ice is still moving down the mountain. At this point, the glacier is like a one-way conveyer belt moving ice out of the mountains into the lower valleys. Glaciologists have identified different types of glaciers based on their characteristics. For example, a glacier that remains confined within valley walls is a valley glacier. If it flows out of the valley and spreads out onto lowlands, it is a piedmont glacier. But the type of glacier most Glacier Bay visitors are interested in is the type that ends with its snout in the sea. Tidewater Glaciers If a glacier is fed by enough snow to flow out of the mountains and down to the sea, we call it a "tidewater" glacier - the type many people come to Glacier Bay to see. The park and preserve includes 7 tidewater glaciers that break off or "calve" into saltwater at sea level, and a few others that reach the sea at high tide only. Compared to glacial ice, seawater is warm and highly erosive. As waves and tides undermines some ice fronts, great blocks of ice up to feet may high calve or break loose and crash into the sea. The explosive sound and towering splash can be spectacular. Icebergs may last a week or more. They provide perches for bald eagles, cormorants, and gulls, as well as haul-outs for harbor seals. When passing close by, kayakers can hear splashes and crackles as melting water drips and the ice deteriorates. White bergs hold many trapped air bubbles. Blue bergs are dense and are likely recently calved. Greenish-blackish bergs may have calved off glacier bottoms. Dark-striped brown bergs carry morainal rubble â€” rocks that the glacier acquired on its journey down the mountain. Barring significant climate changes, each glacier is in a constant state of renewal. New snow will continue to fall in the mountain basin to replace the snow that has compacted into ice and traveled downhill. The length of time it takes for a snowflake that falls in the mountains to emerge at the end, or terminus, of a glacier varies, depending upon the speed at which the ice is flowing.

Chapter 2 : 17 Famous Glaciers of the World That Definitely Demand a Visit

Glaciers can affect people negatively by ruining good farmland. Glaciers are dangerous because they can cause massive flooding and large avalanches. Icebergs are dangerous too because they get in the way of ships that are delivering supplies to other countries.

Check new design of our homepage! Why not consider hiking in some of the most scenic and beautiful glaciers our planet has to offer. Here are a few of the famous glaciers of the world that you can choose from. ThrillSpire Staff Last Updated: Mar 19, Did You Know? Glaciers around the world attract a lot of tourists throughout the year. Long stretches of pristine, white landscapes and tranquil air is indeed enchanting and spellbinding. For a long time, glaciers have captured the fantasy of the adventure-seeking travelers, but in recent times, they have been in headlines for all the wrong reasons. Due to the rise in overall temperature of our planet over the last decade, glacial ice is melting at a rapid pace, and as a result, these blankets of ice are receding. Slowly, they creep downwards from the high mountain terrains to the lowlands, and cover enormous expanses of the polar regions. For millions and millions of years, these glaciers have been forming and melting, and have, thus, shaped some of the finest landscapes that Earth has. Despite their unpredictable moods, people have been fascinated by the beauty of these serenely white sheets of ice that cover enormous landmasses, and have been drawn towards them time and again. Lambert Glacier lies in an extremely isolated part of Antarctica, owing to which it is not very easy to reach there. It requires a long and an expensive voyage. Moreover, the overall stay on the continent also involves a lot of expenses. Tourists rarely visit this glacier, and according to Lonely Planet, a maximum of two tourist ships sail to the place in a year. Tourists are allowed to take guided scenic hikes on the glacier. Perito Moreno Glacier Country: Located in the Los Glaciares National Park in southwest Santa Cruz province of Argentina, this glacier is one of the major tourist attractions. Owing to its easy accessibility, several walking and trekking tours of the glacier have gained popularity in recent times. Several tour companies organize these tours for people. Over the last century, most of the glacial ice has disappeared. Kilimanjaro a century ago. This is the main reason why the glacier is melting at a fast pace. Mount Kilimanjaro, over which the glacier rests, is part of the Kilimanjaro National Park. Tourists are allowed to hike to the summit of the mountain, and also to camp right next to the glacier. The funicular railway that takes tourists to the glacier is also a major attraction in the region. People can go up to the peak by cable cars to see some of the most awe-inspiring views of the surrounding areas. The glacier has been promoted as a major tourist spot in New Zealand. Alongside guided and unguided excursions on and around the glacier, people are also seen taking helicopter rides and engaging in skydiving. Franz Josef Glacier Country: Named after the Austrian Emperor Franz Josef I, it runs over a stretch of 12 km, and is the steepest glacier in the country. Another major tourist attraction of the West Coast, this site offers several picturesque views of the region. Guided and unguided tours of the glacier are possible, however, of late, owing to its unstable terminal face, helicopter rides are encouraged more than walking excursions. The United States Type: Along with its surrounding landscape, the glacier forms part of a protected area, called the Mendenhall Glacier Recreation Area that falls under a federally designated unit of the Tongass National Forest. The lake is a unique ecosystem in itself, and has grown to become a popular location for sport fishing. The Mendenhall Glacier Visitor Center is being operated near the site by the United States Forest Service, which offers several educational programs for adults and children all through the year. The visitor center also houses a restaurant, a library, a souvenir shop, and a small museum. Several guided trails of the glacier are also offered. Owing to this, it is more easily accessible. The Icefield Interpretive Center is located near the site, which offers guided sightseeing of the glacier. There is also a sightseeing tour ticket counter in the Center. Visitors can reach the edge of the glacier by standard buses, after which they have to take the special snow coaches, in order to climb upwards. Entry to the glacier is closed in winter, from mid-October to mid-April. The United States, Canada Type: It offers a sight to behold, but trekking on the glacier is not allowed. Moreover, it is a known fact that the Hubbard constantly calves off colossal icebergs, some even as tall as ten-storied buildings. Though trekking on this glacier is not allowed as mentioned earlier, tourists can take helicopter tours of the Hubbard

and see some immensely captivating views. Walking tours are available, but these need special permissions and a professional guide. However, despite rising temperature, the high rate of snowfall that the region experiences is the source of the considerable amount of ice that the glacier still holds. Hiking is allowed on the Jostedalsbreen Glacier, however, guided hikes are encouraged more in the area. Past this point, the Aletsch continues towards the Rhone Valley until it gives birth to the Massa River. While guided trekking and walking tours are available for the adventure-seekers, the glacier is no less attractive for the sightseeing enthusiasts as well. They can take a cable car, and witness some of the most spellbinding views of the glacier and surrounding areas. The region around the glacier is sparsely populated, and there is also not much tourist influx in the region. However, certain guided climbing excursions of the glacier are available. Tourists indulge in mountaineering and trekking excursions on the Baltoro glacier, however, it is regularly patrolled by the Pakistan army, owing to some regional tensions. It stretches over a length of nearly 10 km, but recent stats show that it is retreating. But, with the passage of time, it broke up to form what are now five separate glaciers. However now, owing to its depletion, the glacier can no longer be seen from there. Tourists have to hire a commercial boat across the lake in order to seen the Portage. Glacier Bay National Park and Preserve Occupying the northernmost portion of the southeastern Alaska coastline, between the Gulf of Alaska and Canada, the Glacier Bay National Park and Preserve is an American national park that spreads over the land area of 3,, acres. Home to a large glacier, now repleting at a rapid pace, this national park is a major tourist spot in Alaska. The park offers several excursions, alongside activities such as sport hunting and sport fishing. Now is the time to visit and explore these glaciers, these natural wonders, because if global warming has its way, then probably by the end of the century, most of these glaciers will be wiped out from the face of our planet.

Chapter 3 : How do Glaciers Effect People?

People living in Peru and Bolivia rely on water from melting glaciers and ice caps to provide water during the dry spells of the year. Increased warming is causing the ice to melt for a longer period each year.

Glaciers and Their Importance Like large rivers or sheets of ice , glaciers move slowly down mountains and hills, carving out the land. Glaciers occur when snow falls faster than it can melt and becomes ice. Over millions of years, this ice becomes dense and compacted. Glaciers are found in cold parts of the world like Alaska, Greenland and the Antarctic. The water evaporates and rain brings new water. Glaciers are the same way. The ice slowly melts over time and then new ice forms. During the last Ice Age, glaciers covered 32 percent of the Earth. This is water that can be used for drinking. Glaciers cover over 5. Glacier ice sometimes looks blue. This happens because the dense ice absorbs other colors in the color spectrum but reflects blue back. Sometimes glaciers will break off and slide into the water. This is called a shelf. Sometimes glaciers speed up briefly, which is called a glacial surge. A video animation explaining about glaciers. How fast do glaciers move? Most glaciers move very slowly. The Kutiah Glacier in Pakistan moved more than 7. This is the record for glacial surges. Do glaciers move into the water? Once in the water, chunks of ice can break off, forming icebergs.

Chapter 4 : Glaciers / Glacial Features - Glacier Bay National Park & Preserve (U.S. National Park Service

Glaciers in the Garhwal Himalaya in India are retreating so fast that researchers believe that most central and eastern Himalayan glaciers could virtually disappear by

Glaciers What is a glacier? A glacier is a thick mass of ice that covers a large area of land. Most glaciers are located near the North or South Poles , but glaciers also exist high in mountain ranges such as the Himalayas and the Andes. How do glaciers form? When enough snow builds up the weight of the snow will compress and turn into solid ice. It can take hundreds of years for a large glacier to form. Glaciers Move Although glaciers are made of ice and appear to be sitting still, they are actually moving. The weight of a glacier will cause it to move slowly downhill, sort of like a very slow moving river. The speed of glaciers varies widely with some moving as slow as a few feet a year while others may move several feet per day. Types of Glaciers Scientists have given names to different types of glaciers. Here are a few of the main types: Calving - A calving glacier is one that ends in a body of water like a lake or an ocean. The term calving comes from icebergs that break off the glacier or "calve" into the water. If the body of water has tides like the ocean , the glacier may also be called a tidewater glacier. Cirque - Cirque glaciers form on the slopes of mountains. They are also called alpine or mountain glaciers. Hanging - Hanging glaciers form on the side of a mountain above a glacial valley. They are called hanging because they do not reach the valley where the main glacier is located. Ice cap - An ice cap is formed when ice completely covers an area of land such that no part of the land, not even mountain peaks, poke through the top of the ice cap. Ice field - An ice field is when ice completely covers a flat area. Piedmont - A piedmont glacier is formed when a glacier flows into a plain at the edge of a mountain range. Polar - A polar glacier is one that is formed in an area where the temperature is always below the freezing point. Temperate - A temperate glacier is one that coexists with liquid water. Valley - A valley glacier is one that fills a valley between two mountains. Glacier Features Ablation zone - The ablation zone is the area below the accumulation zone where the glacial ice exists. In this area there is a loss in ice mass due to ablation such as melting and evaporation. Accumulation zone - This is the area of the glacier where snow falls and accumulates. It is located above the ablation zone. It is separated from the ablation zone by the equilibrium line. Crevasses - Crevasses are giant cracks that occur on the surface of glaciers typically where the glacier flows the fastest. Firn - Firn is a type of compacted snow that lies between the new snow and the glacial ice. Head - The glacier head is where the glacier starts. Terminus - The terminus is the end of the glacier. It is also called the glacier foot. A glacier crevasse Glaciers Change the Land When glaciers move they can change the land creating many interesting geological features. Here are some of the geological features that are created by glaciers. Arete - An arete is a steep ridge formed by two glaciers that erode on opposite sides of a ridge. Cirque - A cirque is a bowl-shaped landform in the side of a mountain made by the head of a glacier. Drumlin - A drumlin is a long oval-shaped hill created by glacial ice movement. Fjord - A fjord is a U-shaped valley between steep cliffs created by glaciers. Horn - A horn is a pointy-shaped mountain peak created when many glaciers erode the same mountain top. Moraine - A moraine is an accumulation of material called till left behind by a glacier. Examples include rocks, sand, gravel, and clay. Tarn - Tarns are lakes that fill up cirques once the glacier has melted. Interesting Facts about Glaciers Most of the country of Greenland is covered with a giant icecap that is nearly two miles thick in areas. Because of friction , the top of a glacier moves faster than the bottom. Sometimes glaciers will move much faster than normal. This is called a glacial "surge. A scientist who studies glaciers is called a glaciologist. Activities Take a ten question quiz about this page.

Chapter 5 : Glaciers | Earth processes | OneGeology Kids | eXtra | OneGeology

Recent and rapid melting of glaciers around the world Climatologically we are in unfamiliar territory, and the world's ice cover is responding dramatically.

Cirque glaciers form on the crests and slopes of mountains. A glacier that fills a valley is called a valley glacier, or alternatively an alpine glacier or mountain glacier. Only nunataks protrude from their surfaces. The only extant ice sheets are the two that cover most of Antarctica and Greenland. Some drain directly into the sea, often with an ice tongue , like Mertz Glacier. As the ice reaches the sea, pieces break off, or calve, forming icebergs. Most tidewater glaciers calve above sea level, which often results in a tremendous impact as the iceberg strikes the water. Tidewater glaciers undergo centuries-long cycles of advance and retreat that are much less affected by the climate change than those of other glaciers. The ice of a polar glacier is always below the freezing point from the surface to its base, although the surface snowpack may experience seasonal melting. A sub-polar glacier includes both temperate and polar ice, depending on depth beneath the surface and position along the length of the glacier. In a similar way, the thermal regime of a glacier is often described by its basal temperature. A cold-based glacier is below freezing at the ice-ground interface, and is thus frozen to the underlying substrate. A warm-based glacier is above or at freezing at the interface, and is able to slide at this contact. Further crushing of the individual snowflakes and squeezing the air from the snow turns it into "glacial ice". This glacial ice will fill the cirque until it "overflows" through a geological weakness or vacancy, such as the gap between two mountains. When the mass of snow and ice is sufficiently thick, it begins to move due to a combination of surface slope, gravity and pressure. A packrafter passes a wall of freshly exposed blue ice on Spencer Glacier, in Alaska. Glacial ice acts like a filter on light, and the more time light can spend traveling through ice, the bluer it becomes. In temperate glaciers, snow repeatedly freezes and thaws, changing into granular ice called firn. Under the pressure of the layers of ice and snow above it, this granular ice fuses into denser and denser firn. Over a period of years, layers of firn undergo further compaction and become glacial ice. Glacier ice is slightly less dense than ice formed from frozen water because it contains tiny trapped air bubbles. Glacial ice has a distinctive blue tint because it absorbs some red light due to an overtone of the infrared OH stretching mode of the water molecule. Liquid water is blue for the same reason. The blue of glacier ice is sometimes misattributed to Rayleigh scattering due to bubbles in the ice. Glaciers are broken into zones based on surface snowpack and melt conditions. The equilibrium line separates the ablation zone and the accumulation zone ; it is the altitude where the amount of new snow gained by accumulation is equal to the amount of ice lost through ablation. The upper part of a glacier, where accumulation exceeds ablation, is called the accumulation zone. Ice in the accumulation zone is deep enough to exert a downward force that erodes underlying rock. After a glacier melts, it often leaves behind a bowl- or amphitheater-shaped depression that ranges in size from large basins like the Great Lakes to smaller mountain depressions known as cirques. The accumulation zone can be subdivided based on its melt conditions. The dry snow zone is a region where no melt occurs, even in the summer, and the snowpack remains dry. The percolation zone is an area with some surface melt, causing meltwater to percolate into the snowpack. This zone is often marked by refrozen ice lenses , glands, and layers. The snowpack also never reaches melting point. Near the equilibrium line on some glaciers, a superimposed ice zone develops. This zone is where meltwater refreezes as a cold layer in the glacier, forming a continuous mass of ice. The health of a glacier is usually assessed by determining the glacier mass balance or observing terminus behavior. A slight cooling led to the advance of many alpine glaciers between and , but since glacier retreat and mass loss has become larger and increasingly ubiquitous. In this case, the impediment appears to be some distance from the near margin of the glacier. Ice-sheet dynamics Glaciers move, or flow, downhill due to gravity and the internal deformation of ice. At the molecular level, ice consists of stacked layers of molecules with relatively weak bonds between layers. When the stress on the layer above exceeds the inter-layer binding strength, it moves faster than the layer below. In this process, a glacier slides over the terrain on which it sits, lubricated by the presence of liquid water. The water is created from ice that melts under high pressure from frictional heating. Basal sliding is dominant in

temperate, or warm-based glaciers. Although evidence in favour of glacial flow was known by the early 19th century, other theories of glacial motion were advanced, such as the idea that melt water, refreezing inside glaciers, caused the glacier to dilate and extend its length. As it became clear that glaciers behaved to some degree as if the ice were a viscous fluid, it was argued that "regelation", or the melting and refreezing of ice at a temperature lowered by the pressure on the ice inside the glacier, was what allowed the ice to deform and flow. James Forbes came up with the essentially correct explanation in the s, although it was several decades before it was fully accepted. This upper section is known as the fracture zone and moves mostly as a single unit over the plastically flowing lower section. When a glacier moves through irregular terrain, cracks called crevasses develop in the fracture zone. Crevasses form due to differences in glacier velocity. If two rigid sections of a glacier move at different speeds and directions, shear forces cause them to break apart, opening a crevasse. Beneath this point, the plasticity of the ice is too great for cracks to form. Intersecting crevasses can create isolated peaks in the ice, called seracs. Crevasses can form in several different ways. Transverse crevasses are transverse to flow and form where steeper slopes cause a glacier to accelerate. Longitudinal crevasses form semi-parallel to flow where a glacier expands laterally. Marginal crevasses form from the edge of the glacier, due to the reduction in speed caused by friction of the valley walls. Marginal crevasses are usually largely transverse to flow. Moving glacier ice can sometimes separate from stagnant ice above, forming a bergschrund. Crevasses make travel over glaciers hazardous, especially when they are hidden by fragile snow bridges. Crossing a crevasse on the Easton Glacier , Mount Baker , in the North Cascades , United States Below the equilibrium line, glacial meltwater is concentrated in stream channels. Meltwater can pool in proglacial lakes on top of a glacier or descend into the depths of a glacier via moulins. Streams within or beneath a glacier flow in englacial or sub-glacial tunnels. Friction makes the ice at the bottom of the glacier move more slowly than ice at the top. Velocity increases with increasing slope, increasing thickness, increasing snowfall, increasing longitudinal confinement, increasing basal temperature, increasing meltwater production and reduced bed hardness. A few glaciers have periods of very rapid advancement called surges. These glaciers exhibit normal movement until suddenly they accelerate, then return to their previous state. During these surges, the glacier may reach velocities far greater than normal speed. In glaciated areas where the glacier moves faster than one km per year, glacial earthquakes occur. These are large scale earthquakes that have seismic magnitudes as high as 6. In a study using data from January through October , more events were detected every year since , and twice as many events were recorded in as there were in any other year. They are linked to seasonal motion of glaciers; the width of one dark and one light band generally equals the annual movement of the glacier. Ogives are formed when ice from an icefall is severely broken up, increasing ablation surface area during summer. This creates a swale and space for snow accumulation in the winter, which in turn creates a ridge. List of glaciers and Retreat of glaciers since Black ice glacier near Aconcagua , Argentina Glaciers are present on every continent and approximately fifty countries, excluding those Australia, South Africa that have glaciers only on distant subantarctic island territories. Mountain glaciers are widespread, especially in the Andes , the Himalayas , the Rocky Mountains , the Caucasus , Scandinavian mountains and the Alps. Mainland Australia currently contains no glaciers, although a small glacier on Mount Kosciuszko was present in the last glacial period. During glacial periods of the Quaternary, Taiwan , Hawaii on Mauna Kea [36] and Tenerife also had large alpine glaciers, while the Faroe and Crozet Islands [37] were completely glaciated. The permanent snow cover necessary for glacier formation is affected by factors such as the degree of slope on the land, amount of snowfall and the winds. Even at high latitudes, glacier formation is not inevitable. Areas of the Arctic , such as Banks Island , and the McMurdo Dry Valleys in Antarctica are considered polar deserts where glaciers cannot form because they receive little snowfall despite the bitter cold. Cold air, unlike warm air, is unable to transport much water vapor. Even during glacial periods of the Quaternary , Manchuria , lowland Siberia , [38] and central and northern Alaska , [39] though extraordinarily cold, had such light snowfall that glaciers could not form. This is because these peaks are located near or in the hyperarid Atacama Desert. As glaciers flow over bedrock, they soften and lift blocks of rock into the ice. This process, called plucking, is caused by subglacial water that penetrates fractures in the bedrock and subsequently freezes and expands. This expansion causes the ice to act as a lever that loosens the rock by

lifting it. If a retreating glacier gains enough debris, it may become a rock glacier , like the Timpanogos Glacier in Utah. Abrasion occurs when the ice and its load of rock fragments slide over bedrock and function as sandpaper, smoothing and polishing the bedrock below. The pulverized rock this process produces is called rock flour and is made up of rock grains between 0. Abrasion leads to steeper valley walls and mountain slopes in alpine settings, which can cause avalanches and rock slides, which add even more material to the glacier. Glacial abrasion is commonly characterized by glacial striations. Glaciers produce these when they contain large boulders that carve long scratches in the bedrock. Similar to striations are chatter marks , lines of crescent-shape depressions in the rock underlying a glacier. They are formed by abrasion when boulders in the glacier are repeatedly caught and released as they are dragged along the bedrock. The rate of glacier erosion varies. Six factors control erosion rate:

Chapter 6 : Why do glaciers matter? - Extreme Ice Survey

Ice and glaciers come and go. There are many long-term weather patterns that the Earth goes through. The climate, on a global scale, is always changing, although usually not at a rate fast enough for people to notice.

Glaciers provide water for drinking and irrigating crops People living in Peru and Bolivia rely on water from melting glaciers and ice caps to provide water during the dry spells of the year. Increased warming is causing the ice to melt for a longer period each year. Whilst this means more plentiful water at the moment, if the melting continues the glaciers will retreat. This may lead to the loss of the water altogether. Although parts of Japan receive tremendous amounts of snow, there are no glaciers. Because the Japanese must endure frequent droughts, scientists are examining ways to create artificial glaciers that could provide more water for people when the weather is dry. India, Afghanistan, and Pakistan rely on glacial meltwater for both drinking and irrigation during the dry season. Although they experience very heavy rainfall during the monsoon season, it is not a reliable source for year round supplies. The Rhine and Rhone rivers in Europe start as glacial meltwater. If global warming continues and the Alpine glaciers melt, these rivers will possibly dry up, leaving parts of Europe lacking sufficient water supplies. Glaciers can generate hydroelectric power In Norway, Canada, New Zealand and the European Alps glacial waters are used to generate electricity by channeling it through hydro-electric turbines. In Svartissen, Norway, engineers combined a scheme to drain a dangerously high glacial lake with a hydro-electric scheme, making the glacier safer AND producing cheap electricity at the same time. Previously glaciated areas contain deep ribbon lakes- ideal natural reservoirs that can be dammed and used to generate electricity. Pump storage systems use corries high up in the hills to store water, which flows down to the power station via turbines. This generates electricity during the day. At night, where there is surplus energy, water is pumped back up to the reservoirsFebruary 23, Glaciers as tourist attractions In areas where glaciers are accessible, such as in the European Alps, glaciers attract tourists. In winter many glaciers acquire a thick layer of snow and become popular ski runs, so glaciated areas can be tourist attractions all year round. Previously glaciated landscapes attract hill walkers, climbers, mountaineers, photographers, and other outdoor enthusiasts. In winter, parts of Scotland become skiing destinations as the glaciated hills take on a covering of snow. Aviemoor, for example, survives on its winter tourist income. Agriculture and communications Hill sheep farming is usually the main type of agriculture on upland slopes where it is cold and the soils are poor. If the slopes are used for growing crops they are most likely to be planted with coniferous trees which can survive on the northern slopes of valleys. Growing trees as a crop is called silviculture. Lowland deposits of glacial till are often very good areas for agriculture. Being lowland, the temperatures are more suitable for crops and the glacial till is very fertile. Such soils are often poorly drained and need additional drainage before they become really good. In highland areas, the steep valley sides make it difficult to run roads up and down the hills, so communication routes usually follow the valley floors. In Scotland railways were often built along the edges of valleys, and in the English Lake District many roads follow the lake shores. This can lead to long road trips between places that are close together, but separated by mountains. Glaciers like these supply drinking water and water to irrigate fields during the dry season. Global warming is causing the glaciers to retreat. If this continues and the glaciers melt too much, the supply of melt water will dry up, causing severe problems for many countries in the area. It is unfortunate that the most accessible parts of glaciers are the dangerous lower sections, such as the snout. In this picture, taken from a tourist view point,you can see the snout of an Alpine glacier.

Chapter 7 : Glaciers In Alaska: Best Ways to See Alaska's Glaciers

Because water has been trapped in the glacier for so long, many people believe it has not been exposed to pollutants that liquid water is exposed to. Glaciers dug basins for most of the world's lakes and carved much of the Earth's most spectacular mountain scenery.

Comments The Waggonwaybreen glacier in Svalbard. Andreas Weith As can be seen above, the Waggonwaybreen glacier in Svalbard, Norway, has retreated substantially since Glaciers around the world have retreated at unprecedented rates and some have disappeared altogether. The melting of glaciers will affect people around the world, their drinking water supplies, water needed to grow food and supply energy, as well as global sea levels. The mixture of gases in the atmosphere such as carbon dioxide and methane as well as solar and volcanic activity are also contributing factors. The Aletsch Glacier is the largest glacier in the Swiss Alps. A glacier is a large accumulation of ice, snow, rock, sediment and water on land that is moving down slope under its own weight and gravity. Runoff from glaciers cools the streams below, providing habitat for plants and animals during dry periods. If the amount of snow and ice accumulated during winter is less than the melting that takes place in summer, the glacier is considered to have a negative mass balance and retreats. Today, nearly all glaciers have a negative mass balance due to global warming and changes in precipitation. New Zealand has over 3, glaciers. They figured out how long the rocks had been exposed, then reconstructed local glacial records and compared them to other records such as Antarctic ice cores, which reveal changing atmospheric carbon dioxide levels. Typically the interglacial between ice ages lasts 10, to 12, years, and we are already 12, years into this one. A natural cooling cycle should be starting, but even if it does, said Schaefer, we will not see evidence of it because humans have so altered conditions on the planet by burning fossil fuels. Schaefer has been working on a global survey of mountain glaciers, comparing glacier retreat over the last years to how glaciers behaved in the past, particularly at the end of the last ice age. The speed with which these glaciers are retreating has exponentially speeded upâ€¦and if you compare the rate of change, nothing ever happened like that in the geological past. When black carbon falls to earth with precipitation, it darkens the snow and ice, reduces their albedo the reflecting power of a surface , warms the snow, and speeds up melting. Marco Tedesco, a research professor at Lamont-Doherty, is researching the processes driving glacial melt in Greenland, including albedo reduction, bare ice exposure after snow layers melt away and atmospheric circulation patterns. Today there are more data available, more observations from space and the ground, and better and faster models. There will be more warming and more melt. All the things that could slow the melting down, like the cooling of the Arctic or more accumulation of snow in summer, are not going to happen. And even if they did, they would be short, just a bump in the road. The Aletsch Glacier, the largest in Switzerland, retreated 1. By , the Furtwangler Glacier on top of Mount Kilimanjaro in Tanzania was half the size it was in Communities around the world rely on glacial water that has been dammed for the production of hydropower. Retreating glaciers will increase the variability of flow or decrease it, which will affect power generation. The Rhone Glacier, France gets about 75 percent of its electricity from nuclear power plants, half of which are on the Rhone River, fed by the rapidly retreating Rhone Glacier. Over the last 15 years, the Rhone River twice became so hot and water levels were so low in summer that nuclear power plants had to be shut down. As a result of glacial melting, glacial lake outburst floods are increasing. As glaciers shrink, meltwater can form a lake that is dammed by glacial debris ice or soil and rock at the tongue of the glacier. Glacial lakes in Bhutan But those dams can be unstable and collapse under the pressure of more melting. Peru has experienced some of the most destructive glacial lake outburst floods; between and , three such floods killed 6, people. Glacial retreat can destablilize slopes, which can lead to landslides, and warming temperatures can trigger avalanches. The onrush lasted 7 minutes. In July , two avalanches occurred in Tibet, one of which killed nine people. Most sea level rise would come from Antarctica and Greenland in the Arctic, not mountain glaciers, which would contribute only about 20 inches. Recent research about melting glaciers in the Arctic which has been warming twice as fast as the rest of the world for the last half-century and Antarctica suggest that the low-end projections for sea level rise made by the Intergovernmental Panel on

Climate Change are too low. Miami, FL is already dealing with sea level rise In its most recent report, the Panel projected that if we are able to reduce emissions significantly, sea levels could rise 11 to 24 inches by ; if emissions remain high, we could see a rise of 20 to 38 inches. Sea level rise will cause coastal flooding, erosion, damage to infrastructure and buildings, ecosystem changes and compromised drinking water sources. The freshwater from glacial melt flowing into the oceans has an impact not only on sea levels, but also on ocean acidification, biological productivity and weather patterns. The amount of freshwater in the upper layers of the Arctic Ocean, which has increased 11 percent since its average, could also affect circulation in the Nordic Sea and the Atlantic Ocean. Pollutants like pesticides, heavy metals, persistent organic pollutants and PCBs, polychlorinated biphenyls, have made their way to the Arctic and Antarctica on ocean and wind currents. When the glaciers melt, pollutants once trapped in ice are released and can enter rivers, oceans and food webs where they bioaccumulate in marine creatures; those at the top of the food chain, like polar bears and humans, will be affected the most. Researchers have also found living bacteria and microbes in ,year-old ice cores and revived them. As glaciers melt, masses of microbes, some , years old, are released from the ice. When they reach the ocean, they could affect ocean chemistry and marine ecosystems, with unpredictable effects. And projections for the impacts on cities are going to be different from the impacts on food production or on GDP.

Chapter 8 : Geography Site: Glaciers - Human uses

A glacier is a large accumulation of ice, snow, rock, sediment and water on land that is moving down slope under its own weight and gravity. Today 10 percent of Earth's land is covered by glaciers (including Antarctica and Greenland).

Chapter 9 : The Glaciers Are Going

Glaciers not only transport material as they move, but they also sculpt and carve away the land beneath them. A glacier's weight, combined with its gradual movement, can drastically reshape the landscape over hundreds or even thousands of years.