

2. KLIMAZONEN DER ERDE – WIRD DAS KLIMA SICH VERÄNDERN?

2.1 *Weather and climate*

Es wird davon ausgegangen, daß die Schülerinnen und Schüler bereits in den vorangegangenen Jahrgangsstufen - auch im Rahmen des Erweiterten Englischunterrichts - Grundkenntnisse zum Themenkomplex WEATHER erworben haben, so dass jetzt eine Weiterführung möglich ist.

Fachliche Inhalte

Raum und Ressourcen	Mensch und Raum	Raum und Zukunft
Wetter und Klima; Klimaschwankungen; Klimaveränderungen – mögliche Ursachen	Bedeutung von Klima und Klimaveränderungen für Landschaft und Mensch	Handlungsmöglichkeiten und deren Konsequenzen

Kommunikative Tätigkeiten/Arbeitsformen

- Untersuchung von Wettervorhersagen in den verschiedenen Medien
- Erstellung eines detaillierten Wetterberichts über mehrere Tage (arbeitsteilige Gruppenarbeit)
- Verbalisieren einer Wetterkarte
- Umsetzen eines verbalen Wetterberichts in eine Wetterkarte
- Auswertung von Klimadaten, Auswertung von Sachtexten und aktuellen Texten
- Analyse und eigene Erstellung graphischer Darstellungen
- Durchführen von Versuchen zu bestimmten Wetterphänomenen (fächerübergreifend mit Physik)
- geographische Zuordnung von Klimazonen
- Untersuchung des Zusammenhangs zwischen klimatischen Bedingungen und Flora/Fauna und der Lebensweise von Menschen
- Zusammenstellen von Informationen aus verschiedenen Medien über Klimaveränderungen und deren mögliche Ursachen

Materialien

LEHRWERKE

Biederstädt, W. u.a.: There & Then: p. 14: The Weather

Hesterberg, G. u.a.: Fun and Practice 2: p. 5: The Weather; p. 56: Weather Report

Jennings, T.: Our Universe: p. 5: The sun; p. 6: The solar system; p. 9: The atmosphere; S: 11; The seasons; p. 12: The moon; p. 13: How the moon affects us

Jennings, T.: The Earth: p. 18: Day and night; p. 19: The seasons; p. 33: The atmosphere; p. 34: Plants and the air; p. 35: Weather; p. 36: Dew, frost and ice; p. 37: Climate; p. 38: Changing climates; p. 39: The water cycle

Beddis, R.: A Sense of Place. Workbook 2: p. 9: The world's wettest areas; p. 13: Arid areas of the world; p. 15: The Monsoon; p. 16: Cyclones and other tropical storms; p. 22: Rainfall in California

Beddis, R. u.a.: A Sense of Place. Alternative Workbook 2A: p. 4: There is a link between climate, vegetation and animal life; p. 15: The Monsoon climate; p. 18: The Arctic is very cold; p. 24: In the mid latitudes the climate is often milder

Biederstädt, W.: Around the World. Volume 1: p. 14: Climatic regions; p. 17: Weather, climate and vegetation

Landesinstitut für Schule und Weiterbildung Soest - Otten, E./Thürmann, E.(Hg.): California: p. 8: "It never rains in Southern California"

Landesinstitut Schleswig-Holstein für Praxis und Theorie der Schule (IPTS) (Hrsg.): Band 4: Materialien zum Bilingualen Unterricht Erdkunde. 7. Jahrgang/Gymnasium: p. 1: Precipitation; p. 5: Climographs/Climate Graphs; p. 13: The Seasons; p. 18: Climatic Regions of the World; p. 131: Tropical Climates

Kemp, R. u.a.: Access to Geography 1: p. 6: The effects of weather

Rae-Brown, J.: Canada A to Z: p. 88: Weather and Seasons

Rose, D.: Basic Skills in Geography. Book 3: p. 16: The Countryside

Watt, F.: The Usborne Book of the Earth: p. 16: Weather; p. 18: Climates

Waugh, D./Bushel, T.: Key Geography: Connections: p. 4: Weathering, rivers and coasts; Foundations: p. 16: Weather and climate

LEKTÜREN

Carlson-Kreibohm, K.: California Dreams

Fenner, P.: Down Under. Images of Australia

AUDIOVISUELLE MEDIEN

Dias, Filme (auch deutschsprachige) der Bildstellen
Wetterberichte in den Medien

Filme

National Geographic: An Introduction to Weather/ The Forces of Nature
Spielberg: Twister

Interaktive Materialien/CD-Roms

Internet: Wetterkarten
Microsoft: Encarta 96 Encyclopedia

National Geographic:
Seasons
Weather in Action Kit

Videos

National Geographic:
Cyclone!
Telling the Weather
Weather: Come Rain, Come Shine

WEITERE MATERIALIEN

Pädagogisches Zentrum Bad Kreuznach: PZ-Information 7/94: p. 37: Seasons

Landesinstitut für Erziehung und Unterricht Stuttgart (Hrsg.): First Steps to Geography: p. 27: The weather; p. 36: Climate graphs; p. 43: Why does it rain more in some places than others?

Pädagogisches Zentrum Bad Kreuznach: PZ-Information 9/94

Klett: Dictionary of Geography

Mayhew, S.: A Dictionary of Geography

Planungsskizze: Klimazonen der Erde - Wird das Klima sich verändern?

Themenaspekte	Kommunikative Tätigkeiten/Aufgaben	Materialien
Die Wetterelemente	Sch. äußern ihr Vorwissen über Wetter und Wetterelemente	Arbeitsblatt: Originalwetterkarte, Text oder Video; Tabelle
Wetterkartensymbole	Sammlung, Zuordnung und Sicherung der Wetterelemente, Wetterkartensymbole, Meßinstrumente und Maßeinheiten	Meßinstrumente
Meßinstrumente		weather log book
Erfassen und Dokumentieren von Werten, auch grafisch	Bau von einfachen Meßgeräten und unterrichtsbegleitendes "weather log book"	Waugh, D.: Key Geography. Foundations, p. 22/23
Versuch	Auswertung des "log books": Durchschnittstemperatur, Gesamtniederschlag und graphische Darstellung, daraus Ableitung der Definitionen von "Wetter" und "Klima"	Watt, F.: Weather & Climate
Wetterkarte interpretieren		Clarke, C.: The Physical Environment. Themes in Geography
Wetter - Klima	Versuch: Suppe mit Knäckebrot; Sch. erarbeiten Ursachen von Luftmassenbewegungen (Ursachen und Auswirkungen von Hoch- und Tiefdruck)	Buck, A.. et al.: Choice Longman Geography
	Gruppenarbeit: Erarbeiten und Vorstellen verschiedener Niederschlagsformen	Wetterkarten Folien
	Sch. wenden ihre Kenntnisse an, indem sie Wetterkarten interpretieren und eigene Wettervorhersagen erstellen	Biederstädt, W.: Around the World. Volume I, p. 14ff
Klimazonen	geographische Zuordnung von Klimazonen	Beddis, R.: A Sense of Place. Workbook 2, p. 16
	Untersuchung des Zusammenhangs zwischen klimatischen Bedingungen und Flora/Fauna und der Lebensweise von Menschen	
	Entwicklung von Szenarien	
	Zusammenstellen von Informationen aus verschiedenen Medien über Klimaveränderungen und deren mögliche Ursachen	

WEATHER AND CLIMATE

The Weather

Weather is not the same as *Climate*. Be careful when you use the words *weather* and *climate* because they mean two different things. What you see outside at the moment is what the *weather* is like right now. But today's weather is different from yesterday's and tomorrow's. And the weather can change even within the course of the day.

The *climate* is what the weather in a certain place is like over a long period of time. Some places are generally warmer or cooler than others. In some places there is a lot of rain, or there may be long dry periods.

The Elements of Weather

Weather is made up of a lot of different elements. Here are some of the most important ones:

Temperature is a measure of how cold or hot it is. It is measured with a thermometer. This is a glass tube that is usually filled with mercury. The warmer the air, the higher the mercury rises in the tube.

Precipitation is water in the air that falls to ground. The water falls in one of several forms. Four of these are rain, snow, sleet and hail.

Wind speed tells us how strong the wind is. We can get a good idea of this when we look at smoke and trees. The Beaufort scale is used to express wind speed.

Wind direction is the direction the wind is blowing from. A wind vane shows you the direction.

Visibility is the distance that you can see. It is expressed in metres.

Cloud cover is the amount of the sky covered by clouds. It is expressed in eighths.

Air pressure is the weight of the air in the atmosphere. It is measured with a barometer and expressed in millibards.

(adapted from: Biederstädt, W.: There and Then, p. 15f.)



Watch the weather report on TV and write down the informations you get.

Temperature:

Precipitation:

Wind speed and direction:

Visibility:

Cloud cover:

Air pressure:

My personal weather report for tomorrow in

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Do you remember a situation you were very interested in the weather forecast?

Climatic Regions

The climate is not the same all over the Earth because different places get different amounts of sunlight, heat and rain. The temperature steadily increases as you move towards the equator. The higher you climb, the lower the temperature. In summer the oceans heat up more slowly than the land, so the coastal areas are cooler than the middle of the continents. In winter, the opposite is true. Ocean currents, winds and precipitation all affect our climate.

The four main climate regions are the tropical, the subtropical, the temperate and the polar regions. Within the tropical region, there are the rainforest, the monsoon, savannah and hot desert regions. Within the subtropical region, there are the dry subtropical, or Mediterranean climate and the wet subtropical climate. In the temperate region are the maritime and continental climates. In the polar region are the polar or Arctic climate and the subpolar or tundra climate.

Tropical climate

There are two basic types of tropical climate, the equatorial rainfall belt and the belt with a dry season.

The rainforest belt along the equator has rainfall all year round. In some places, at least 2,000 mm of rain falls every day. The rain is called convectional rain. This means that the land is heated by the sun so that the heated air raises, expands and then cools. The water vapour in the air condenses, forms clouds and starts to fall as rain. The mean annual temperature is around 25 °C and varies only slightly throughout the year. There are no seasons, but the temperature may vary as much as 10° C between night and day. Between the regions of the equatorial climate, particularly the Sahara and the Australian deserts, lies a belt which is influenced by the trade winds and convectional rains. This is known as the savanna region. Temperatures are similar to those in the equatorial region. However, during the dry season the temperature rises up to 50° C during the day and can drop to 10° C at night. Convectional rain falls as the sun moves between the equator and the Tropic of Cancer (or Capricorn in the southern hemisphere). Some areas have two rainfall maxima every year, one as the sun moves from the equator to the tropic, and the second as the sun moves back to the equator. Winters are dry when the trade winds blow from the north-east in the northern hemisphere and from the south-east in the southern hemisphere.

Subtropical climate

The Subtropics are found within 25° to 40° of latitude in both hemispheres between the tropics and the temperate regions. The climate in this belt is warmer than in the temperate regions. The Mediterranean climate is mainly found in the western parts of the continents, as in the Mediterranean countries, California, central Chile and the Cape in South Africa. A Mediterranean climate typically has very long, warm and dry summers and mild, rainy winters. Rain falls on fewer than 100 days a year and is about 750 mm annually average. The wet subtropical climate is typical of the eastern sides of the continents. It is characterized by higher rainfalls. Most rain falls during the summer.

Temperate climate

The temperate lands lie between the tropics and the polar regions. The nearer you move towards the poles, the shorter the summer and the longer the winters. In this zone there are distinct seasons that are the result of the distribution of heat and light. Temperatures show clear differences between summer and winter. The prevailing westerly winds in the temperate zones bring precipitation to the west coasts at all times of the year. This is oceanic climate. Farther away from the coasts, precipitation decreases, and the differences between summer and winter precipitation increase. Short, warm summers and long, cold winters with lots of snow are characteristic of the continental climate.

Polar climate

The polar regions adjoin the temperate zones in the North and the south. The mean monthly temperature in the subpolar region in summer is 12° C. During the cold season there is a constant cover of snow of up to 300 days. Beyond the Arctic and Antarctic Circles, snow falls almost every day, and temperatures are always below -10° C.

(adapted from: Biederstädt, W.: Around the World. Volume I, p. 14f.)

Weather, Climate and Vegetation

The Earth can be divided into natural regions. The borders of these zones run more or less parallel to the latitudes. Each region has a particular kind of climate and vegetation as well as characteristic land-forms and human activities.

The Arctic Deserts

The arctic deserts of ice and snow have no vegetation at all. During the winter snow falls regularly, and temperatures are always below freezing point. Small groups of people live along the fringes of the continents and islands, which are warmed by the sea. These people have learned to live in the difficult conditions. Many Eskimos are hunters and fishers, some Lapps are still herders and stockbreeders, others work as miners.

The Tundra

The tundra is a type of natural vegetation with moss, lichen and small shrubs. The word 'tundra' means barren land. It is located in Arctic or Alpine regions where no trees grow. Only plants that can tolerate cold can survive in this environment. Alpine tundra occurs above the tree line on high mountains, including those in the Tropics. Air temperature in the Arctic tundra are low the whole year round. Precipitation, much of it in form of snow, is low and irregular and is seldom over 250-300 mm annually except in areas near the ocean. During the short summers, ice melts at the soil surface, where the temperatures may reach 12-15° C, and some vegetation springs to life. Flowering plants and small shrubs cover the landscape, but this lasts for three month at the most. The soil only thaws at the surface for a few month of the year. From a certain depth onward, the soil is frozen all year round. This is called permafrost.

The Northern Coniferous Forests

A vast belt of evergreen coniferous forest (10 % of the Earth's surface) stretches across the north of North America, Europe and Asia. Spruce, pine trees, larches and birch trees are characteristic of these forests, which are home to many fur-bearing animals. In Siberia this woodland is called taiga. The climate is extreme. Summers are short and cool with temperatures around 12-15°C. Winters last seven to eight months, with average temperatures far below 0° C. In January they may drop as low as -75° C. Snow covers the ground for at least half the year. Permafrost underlies most of the northern coniferous forest.

The timber industry is very important in this belt. In addition, minerals such as gold, silver, copper, iron and uranium are mined.

The Deciduous and Mixed Forests

The climate of the temperate deciduous forests is very good for human activity. Most of the woodland has been cut down for farmland or towns and cities. The soil is often very fertile so that a lot of crops can be grown. The characteristic trees are beeches, oaks, maples, elms or linden. The high proportion of coniferous trees is a result of systematic forestry and wood processing.

The climate is not too extreme, with rainfall throughout the year. Summers are warm with average temperatures of around 16°C. In winter there are frosts and sometimes snow, but temperatures are usually above 0° C.

The Mediterranean Lands

The major areas of this vegetation type include the Mediterranean Sea basin, California, south-west South Africa and south-west Australia. The summers in the lands bordering the Mediterranean Sea are relatively dry, hot and sunny, with temperatures around 21° C. During this season millions of tourists come here to spend their holidays. Winters are mild, with temperatures around 10° C. Most rain falls during the winter time. The vegetation is adapted to the summer drought. The leaves are small, thick and leathery. Very often they are covered with wax or hair in order to reduce evaporation. Pine trees, cypresses and laurel trees are characteristic plants. Typical fruits of the region are grapes, olives, oranges, lemons, melons, tomatoes and grapefruit.

Originally the dominant vegetation of the Mediterranean area was mixed forest of conifers and broad-leaf evergreens. Since ancient times people have used these trees for building, and little of this forest remains.

The Temperate Grasslands

In the northern hemisphere, temperate grasslands are found in the middle of the continents, far away from the oceans. In the southern hemisphere, they are smaller and lie nearer to the equator. The differences between summer and winter are great here. In summer, average temperatures can be over 20° C, in the winter they may drop to below -20° C. The grasslands are wide prairies with hardly any trees or shrubs. As the soil is very fertile and the land very flat, wheat and corn are grown. Ranchers raise large herds of beef cattle. The prairies of North America were the home of the nomadic Indians and the wild buffalo.

The Hot Deserts

Semi-deserts and deserts are the driest and hottest places on Earth. The hot arid deserts such as the giant Sahara Desert of Africa, the Thar Desert of India and the great Australian deserts are located in tropical and subtropical areas. Deserts are places that receive very little rain and can become very hot during the daytime. At night, however, the temperature falls quickly, sometimes as low as freezing point. That is because there are no clouds to hold in the heat from the day. There are very few plants in the deserts, just various kinds of shrubs. Some plants have drought-resistant seeds that can remain dormant for long periods. In the American deserts there are cactus plants that have very long roots and can tap underground water supplies or that can store water in their stems.

The Savannas

The savannas are found between the hot deserts and the tropical forests on both sides of the equator. They are grasslands with scattered trees or bushes. The typical tree of the African savanna is the baobab. Its trunk can reach 9m in diameter, and its fruit is edible. People make rope and cloth from its bark.

There is a hot, wet season and a period of drought. In the hot season the vegetation is green and everything grows very quickly. When the drought comes, the trees lose their leaves and the grass becomes brown.

The coolest time of the year is in the middle of the dry season, with temperatures of around 18° C. The temperatures during the hot season reach about 27° C. The amount of vegetation depends on how much rain there is. The nearer you get to the equator, the more rain there is and the more trees there are. The African savannas are famous for their wildlife. Large areas of the savannas are game reserves today. Because of the grass, great herds of cattle are reared on the savannas.

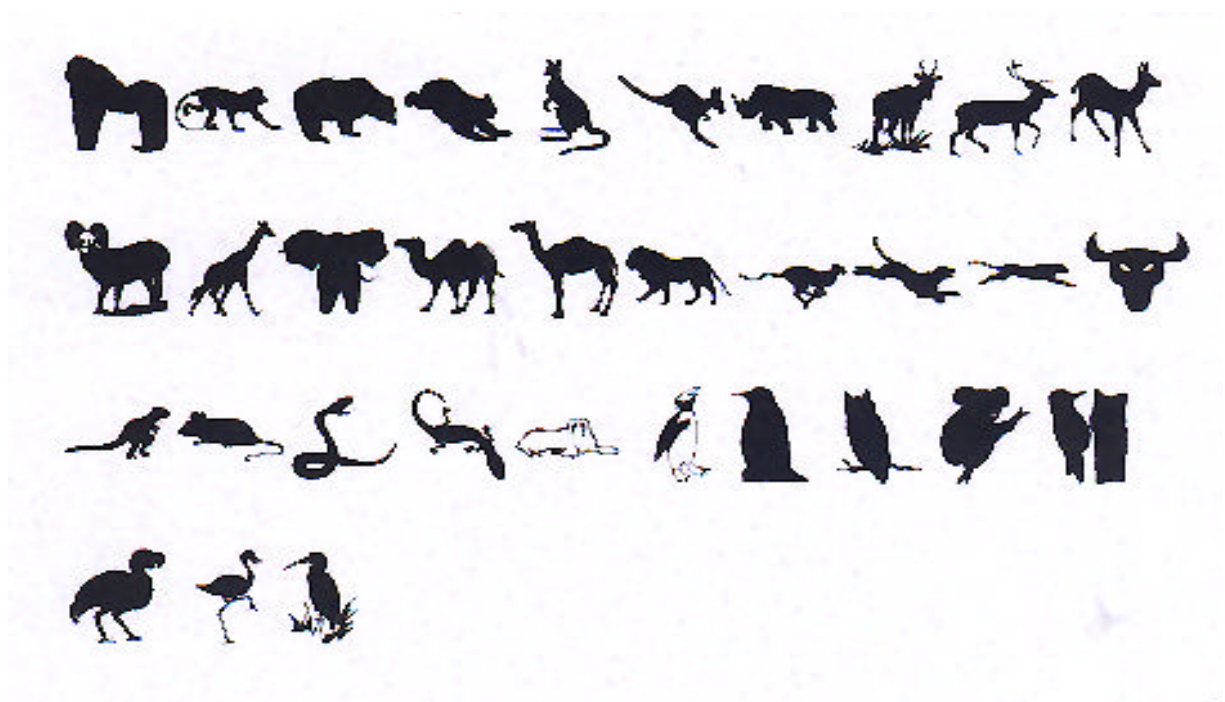
The Tropical Rain Forest

The tropical regions near the equator are always wet. Some parts have heavy thunderstorms nearly every day. The average monthly temperatures are round 27° C throughout the year. These high temperatures and heavy rainfall lead to very good conditions for plant life. The tropical rainforests contain a great variety of plants, birds, insects and other animals. As there are no seasons, all stages of plant life can be seen at the same time in the tropical rain forests. There are new leaves, blossoms, fruits and falling leaves - all on the same kind of plant.

(adapted from: Biederstädt, W.: Around the World. Volume I, p. 17)

Natural vegetation Region	Where	Temperatures (summer/winter)	Human activities	Typical plants	Typical animals

✂ and put the animals into the right region:



Cyclones and other tropical storms

Winds are masses of air moving from one place to another. Strong winds are known as storms. Violent storms that occur in tropical areas are given various names, e.g. cyclones (India and Bangladesh); hurricanes (United States and the West Indies) and typhoons (Japan and China). All are dangerous and cause enormous damage each year.

Another violent storm is the tornado. This is formed over land and covers a much smaller area than the cyclone.

Tropical cyclones form when a mass of moist air over a tropical sea is strongly heated by the sun. The air rises rapidly, and is replaced at sea level by air being drawn into the area of low pressure. The rising warm air and the in-blowing air swirls around the central area (clockwise in the southern hemisphere; anti-clockwise in the northern). The rising air form huge thunderclouds around the central cloudless eye. It is calm in the 'eye' of the storm, but the winds are violent immediately outside it, and are less powerful away from the eye. The whole storm moves along a storm track until it blows out, usually inland from the tropical sea where it formed.

(adapted from: Beddis, R.: A Sense of Place. Workbook 2, p. 16)

Weather and climate

Vocabulary

absolute humidity	absolute Luftfeuchtigkeit	humid	feucht
adjoining	benachbart	hunter	Jäger
ancient	alt	hurricane	Hurrikan
anti-clockwise	gegen den Uhrzeigersinn		
arid	trocken	irregular	unregelmäßig
to ascend	emporsteigen		
ascent	Aufstieg	larch	Lärche
		laurel	Lorbeer
basic	grundlegend	linden	Linde
beech	Buche		
beyond	über...hinaus	maple	Ahorn
to border	angrenzen	maritime	Meeres -
buildup of clouds	Wolkenentstehung	measurement	Messung
		melon	Melone
cactus	Kaktus	meteorologist	Meteorologe
characteristic	charakteristisch	moisture	Feuchtigkeit
chart	Tabelle	monsoon	Monsun
climate graph	Klimadiagramm		
to climb	klettern	observation	Beobachtung
clockwise	im Uhrzeigersinn		
cloud formation	Wolkenbildung	precipitation	Niederschlag
coastal	Küsten-	to prevail	vorherrschen
condensation	Kondensation	processing	Entwicklung
to condense	sich niederschlagen	proportion	Verhältnis
coniferous	immergrün		
to contribute	beitragen	rainforest	Regenwald
cyclone	Zyklon, Wirbelsturm	to reduce	vermindern
cypress	Zypresse	relatively	verhältnismäßig
deciduous forest	sommergrüner Laubwald	scale	Maßstab
to decrease	sinken, abnehmen	seldom	selten
density	Dichte	similar	ähnlich
diagram	Schaubild	to stem from	zurückgehen auf
dispersal of clouds	Wolkenauflösung	subtropic	subtropisch
to divide	teilen	to survive	überleben
to disperse	sich auflösen	swirl	Wirbel, Strudel
dominant	vorherrschend	systematic	systematisch
elm	Ulme	thundercloud	Gewitterwolke
equatorial	Äquatorial-	to tolerate	tolerieren
evergreen	immergrün	typhoons	Taifun
forecast	Vorhersage	vapour	Dampf
fur-bearing	felltragend		
growth	Wachstum	wax	Wachs
		weathering	Verwitterung
to heat	heizen	woodland	Waldland
to highlight	beleuchten		