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Susan Mayhew

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How to use this book

This dictionary provides coverage in one volume of the terms used in both human and physical geography. There are over 6000 definitions across the following fields: cartography, surveying, remote sensing, statistics, meteorology, climatology, biogeography, ecology, simple geology, soils, geomorphology, population, migration, settlement, agriculture, industry, transport, development, and diffusion.

Headwords are printed in bold type and appear in alphabetical order. However, some entries contain further definitions. These have been included under the headword to avoid unnecessary repetition and to indicate some of the wider applications of the headword. Many entries have an asterisk. This points the reader to cross-references. In a very few cases the cross-reference as indicated does not have the exact wording as in the entry, but is close enough to make further reference possible.

References to geographical authors include surname, initials and date. The use of these details in a card or electronic library catalogue will yield the book referred to.

A

aa *See* *block lava.

abîme An upright or near vertical shaft in an area of *karst geomorphology.

abiotic Not living, non-biological, usually describing factors in an ecosystem such as atmospheric gases, inorganic salts, mineral soil particles, and water. This expression is also used to describe the chemical and physical factors, such as salinity and humidity, which influence organisms. An **abiotic environment** is one without any life.

ablation Loss of snow and ice from a glacier by, for example, melting and evaporation. Ablation also results from *sublimation, the *calving of icebergs, and *avalanches. In temperate and subpolar regions melting is the most important process in ablation, whereas in the Antarctic the most important ablation process is calving. The rate of loss varies with the meteorological factors of air temperature, relative humidity, wind speed, and *insolation, together with *aspect and the nature of the surface. The **ablation sub-system** is the zone of a glacial system between the *firn line and the snout where there is an annual net loss of ice since annual ablation exceeds annual *accumulation. The zone of net ice loss from a glacier is the **ablation zone**.

At the edges of the glaciers, where ablation has occurred, large quantities of *debris are released and accumulate to form **ablation moraines (ablation till)**.

Abney level A surveying instrument which can measure angles to within 10 seconds of an arc.

aborigine A member of an indigenous people existing in a land before invasion or colonization by another race. This term is especially used for the original inhabitants of Australia.

abrasion The grinding away of bedrock by fragments of rock which may be incorporated in ice (**glacial abrasion**), water (**marine abrasion, fluvial abrasion**), or wind (**aeolian abrasion**). In *fluvial environments, the main agent of abrasion is the *bed load. The mass of solid material removed varies with the size, density, and velocity of the particles, and the density of the *vector bearing these particles. Ice ceases to be an effective agent for abrasion when the weight of the ice is thick enough to bring about *plastic flow. Abrasion is an alternative term for *corrasion. *See* *striations.

abrasion platform *Wave-cut platform.

abrasion terrace A former *wave-cut platform, now above sea level

because of either tectonic uplift of the mainland or eustatic lowering of sea level. Abrasion terraces are thus indicative of *emerging coastlines.

abscissa The horizontal, or *x* axis, of a graph. Where a *causal factor or an *independent variable can be clearly defined, it is recorded along the abscissa.

absenteeism A failure to show up for work.

absolute drought In the UK, this is a period of 15 days, on none of which more than 0.25 mm of rain falls. National definitions vary with climate; in Libya, droughts are recognized only after two years without rain. These arbitrary definitions give no indication of the impact of drought. *See* *Palmer Drought Severity Index (PDSI).

absolute humidity The density of the water vapour present in a mixture of air and water vapour, that is, the ratio of the mass of water vapour to the volume occupied by the mixture, usually measured in grams per cubic centimetre. Cold air cannot contain as much water vapour as warm air, so cold air has a lower absolute humidity than warm air. *See also* *relative humidity.

absolute plate motion The movement of a *crustal *plate in relation to a fixed point, such as a *hot spot.

absolute zero The lowest temperature theoretically obtainable: −273.15 °C.

absorption The process by which a material or system takes in another material or system. *See also* *adsorption.

abstraction The selection and conceptualization of a phenomenon, or some aspect of it. Abstraction is an essential part of *model building where some aspect or part of the real world is extracted and simplified. Unfortunately, during the process of simplification, so much information has to be jettisoned that the resulting model may have very limited success.

Other abstractions are based on *idealism; models are made of an 'ideal type' such as the Latin American city model. The problem is that it is quite possible to construct very different ideal types of the same phenomenon.

There are different **levels of abstraction**: global, national, societal, class, and so on.

abundance The total number of individuals of a certain species present in an area. Abundance is generally estimated by using one or more of a variety of sampling methods (such as capture–recapture) and may vary according to competition, predation, and resources. *See also* *diversity.

abyssal At great depths; over 3000 m below sea level; thus, **abyssal plain**—the deep sea floor with a gradient of less than 1 in 10 000—and **abyssal deposits**. **Abyssal hills** are hills of 50–250 m which interrupt the abyssal plain. The word abyssal for a rock has now been replaced by *plutonic.

abysso- At great depths. Hence **abyssopelagic zone**; that part of deep lakes, oceans, or seas characterized by specific pelagic organisms (forms of plankton and nekton which inhabit open water), and **abyssobenthic zone**; the bottom of a deep lake, ocean, or sea. *See* *benthos.

accelerated For accelerated soil erosion, *see* *soil erosion.

accelerator A factor which increases the momentum of a boom or slump in an economy so that a small change in demand, for example, leads to a greater industrial growth or decline.

acceptable-dose limit The highest safe level of an introduced substance; the maximum level at which the substance poses no health hazards to the environment in which it is used. Currently, the EU has ruled that nitrate levels in the water supply should not exceed 50 mg. nitrate/litre of water.

accessibility **1.** The ease of approach to one location from other locations. This may be measured in terms of the distance travelled, the cost of travel, or the time taken. In *network analysis, accessibility may be expressed by measures of *connectivity. Accessibility can be calculated by using a framework known as an **accessibility matrix**. Consider the five towns in the diagram below.

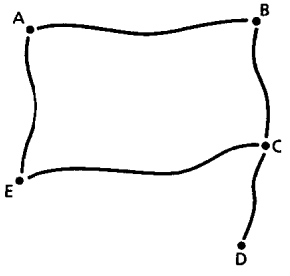

FIGURE 1: *Accessibility*

In the matrix derived from it the number of roads used to travel from each town in turn to each of the others is recorded. The total is noted in the column marked row sum. The town with the lowest total, C, is the most accessible because it needs the fewest roads to reach the others.

TOWN	A	B	C	D	E	ROW SUM
A	—	1	2	3	1	7
B	1	—	1	2	2	6
C	2	1	—	1	1	5
D	3	2	1	—	2	8
E	1	2	1	2	—	6

See also *node, *link.

2. The ease of access to a resource or service.

In the case of both resources and services, it is possible to distinguish between **physical accessibility** where a resource is within reach, and **social accessibility** whereby the individual actually has the means to reach the resource or location. For example, it is argued that class structures, income, age, educational background, gender, or race can limit people's access to services. *See also* *location.

accordant Complying with. Thus, **accordant drainage** is *drainage which has evolved in conformity with the underlying geological structure, so domes show a *radial pattern, and *trellised patterns develop on gently dipping scarplands, for example.

The **law of accordant junctions (Playfair's law)** states that tributaries join a stream or river at the same elevation as that of the larger watercourse; thus there is no sudden 'drop' in the level of the tributary. This means that tributaries are *graded to the level of the junction.

Accordant summits are hill or mountain tops of approximately the same elevation. The presence of accordant summits has been seen as confirmation of the theory of the *cycle of erosion.

accreting margin *See* *constructive margin.

accretion **1.** The growth of land by the offshore deposition of sediment. Accretion is most active in *estuaries, particularly within the Tropics. *Spits and *tombolos are features of accretion.

2. The increase in size of a continent by the addition of terranes (**accretion terranes**).

3. The growth of a landform by the addition of deposits; *seif dunes grow by accretion.

4. The increase in size of particles by additions to the exterior, as in the formation of *hailstones.

acculturation The adaptation to, and adoption of, a new culture. This may occur simultaneously as two cultures meet but more often occurs as an immigrant group takes to the behaviour patterns and standards of the receiving group. A major example is the acceptance of American norms by the millions of European immigrants who arrived in the USA in the first half of the twentieth century. *See also* *assimilation, *charter group.

accumulated temperature From a specific date, the length of time for which mean daily temperatures have been above, or below, a stated temperature; the total time for which temperatures varied from that standard. It is used, for example, to judge the fitness of a climate for a particular crop by showing how long temperatures are above the minimum required for that crop. *See also* *degree day.

accumulation **1.** The input of ice to a glacier. Observations from the Decade glacier, Baffin Island, suggest that accumulation is greatest in shaded upland areas. The **accumulation zone**, or **accumulation sub-system**, is that part of a glacier between the *firn line and the source where the

input of snow, firn, and ice exceeds losses by *ablation. The lower limit of the accumulation zone is at the *equilibrium line.

2. The reinvestment of surplus value in the form of capital in order to increase that capital. Accumulation is a key feature of *capitalism because, in order to remain in business, the capitalist has not only to preserve the value of the capital raised but also to add to the value of that capital. The effects of this 'imperative of accumulation' are, on the one hand, a class of capitalists who own the *means of production, and, on the other hand, a class of workers who sell their labour to the capitalists; an economic system that has had profound societal implications. A further effect of the imperative of accumulation is the necessity for technical change and economic growth. Among others, David Harvey (1982), argues that the obligatory accumulation of the capitalist system has been responsible for *uneven development.

Economists have classified two **regimes of accumulation**: *Fordism and *post-Fordism.

acid A substance containing hydrogen ions which can be neutralized by an *alkali. The *pH of acid is below 7. *See* *acid rain, *acid soil.

The term 'acid' as applied to rocks has an entirely different meaning. *See* *acid rocks.

acid rain When *fossil fuels are burned, dioxides of sulphur and nitrogen are released into the air. When inhaled, these dry deposits can lead to breathing problems. Industrial development, particularly in the mid-latitudes of the northern hemisphere, has been responsible for the emission of increasing quantities of such atmospheric pollutants, which can travel large distances, generally being carried eastwards by the prevailing westerly winds; the *OECD estimated in the early 1990s that 85% of the sulphur dioxide deposition on the Nordic countries was 'imported'. The primary sources were the former USSR, the reunified Germany, and Poland.

The pollutants dissolve in atmospheric water particles to form acid rain.

Any form of atmospheric water, such as rain, dew, or snow, with a *pH of less than 5.6 is properly termed **acid precipitation**. (Note that the pH scale is logarithmic, so that an increase of one point represents a tenfold increase in acidity.) When the concentration of sulphur dioxide reaches 0.2 p.p.m., acid precipitation is toxic to vegetation. Extensive damage has been reported, for example, in the Black Forest, Germany. Humans are at risk when the concentration rises above 1 p.p.m.

Within soils, acidification seems to limit bacterial activity, displace nutrient ions by hydrogen ions, and liberate toxic heavy metals such as aluminium and lead, which may contaminate drinking water. High levels of aluminium in lake water in Scandinavia have been linked to acid emissions from the UK, and have caused the destruction of aquatic flora and fauna. Aquatic ecosystems seem to react more rapidly than terrestrial systems to acidification. Acid precipitation may also attack building-stone containing calcium and magnesium carbonates.

acid rock In geology, an *igneous rock containing more than 60% of silica or silicates by weight, over 10% of this being free quartz. Examples include *granite, granodiorites, and rhyolites. Compare with *basic rock.

acid soil A soil with a *pH of less than 7. Acidity in a soil may be due to the *leaching out of *cations when *precipitation exceeds *evapotranspiration. The cations are replaced by hydrogen ions. Other factors promoting acidity in a soil include the nature of the vegetation, and thus the *humus, and the acidity of the parent rock. Examples of acid soils are *podzols and *brown earths.

acidification A soil-forming process whereby the presence of organic acids (developed through the incorporation of humus into the soil) results in increasing hydrogen ion concentration. In humid temperate forest regions, acidification transforms *brown-earth soils into acid brown earths.

acre A unit of area, defined in British law as 4840 square yards (about 0.4 hectares).

actinometer A device measuring the intensity of electromagnetic radiation (radiant energy); usually that of the sun. It is used to record *insolation at the earth's surface.

action space The area in which an individual moves and makes decisions about her or his life, including, for example, shopping, studying, or working; the set of places which an individual is aware of. See *mental map.

Localities which are well known by individuals are more often chosen as the places in which to base their activities; the decision-maker evaluates all the locations within the relevant action space by accrediting each with *place utility but, if none of these sites offers adequate utility, then that individual will extend the action space by *search behaviour. Put in simple language, this means that a person will look for a suitable site for activity within the area best known to him or her. All possible sites are rated, according to how satisfactory they are. If none of the sites within the action space comes up to scratch, the decision-maker will widen the search area, become familiar with a new area, and thus extend the action space. *See also* *activity space.

active layer Also known as *annually thawed layer*, *depth of thaw*, and *depth to permafrost*, this is the highly mobile layer of soil, subject to periodic thawing, located above the *permafrost in *tundra regions such as Spitzbergen or Alaska, and ranging in depth from a few centimetres to 3 m. The thickness of the layer depends on factors such as slope angle and aspect, drainage, rock and/or soil type, depth of snow cover, and ground-moisture conditions. Thawing may occur daily or only in summer. On refreezing, the active layer may expand, especially if *silt-sized particles predominate.

The mobility of the active layer is due to the restricted nature of *tundra vegetation which does little to bind together this surface zone, so that it moves on slopes as gentle as 2°, and clearance of vegetation will increase the depth and mobility of the active layer. *See* *thermokarst.

Many *periglacial processes occur in the active layer, such as *frost heaving, *frost thrusting, *ice wedging, *gelifluction, and the formation of *patterned ground; most can cause havoc to buildings. *See also* *mollisol.

active margin A type of destructive *plate margin characterized by *ocean trenches, *earthquakes, *andesitic *volcanic chains, and young *fold mountains. Active margins are alternatively known as Pacific margins after the active margin found where the Nasca *plate collides with the South American plate.

active volcano A volcano known to have erupted in recent times, or which is likely to erupt. Examples include Mt. St Helens, USA, and Etna, Sicily.

activity allocation model A type of planning model used to determine the location of activity within an area.

The first stage is to make as accurate a forecast as possible of future population, industry, trade, housing, and so on. This may be done through *extrapolation, or through the use of methods such as *economic base theory. Future needs are indicated—the simplest way is to consider separate sub-models for each land use, such as residential, industrial, retail—and the planner then allocates new developments to the most suitable points in the area, often using the *gravity model. It is then possible to model the flows of people within the area which result from this planning to see how the various sub-models fit together.

activity index A measure of the extent to which a local authority develops policies to attract industry. Such policies may range from the provision of sites to the construction of factories.

activity rate The percentage of people of working age who are actually employed. This may be calculated for a region or a nation. A low activity rate indicates high unemployment.

activity segregation The *spatial separation of the sexes during the working day. An extreme example was the traditional mining village, where the mines were an exclusively male preserve and the kitchen an exclusively female one. *See also* *feminist geography.

activity space The space we live in from day to day; that part of *action space with which an individual interacts on a daily basis. There seems to be a hierarchy of activity spaces for most people, increasing in spatial extent from family space, to *neighbourhood, to economic space, and then to urban space. With movement up the hierarchy, the individual's knowledge of the space becomes less comprehensive. *See also* *mental map.

actuarial data *Demographic statistics having a bearing on calculation of risk for births and deaths.

adaptation Any change in the structure or functioning of an organism that makes it better suited to its environment.

adaptive radiation A surge of evolution from an original ancestral form as new forms 'fan out', adapting over time to new niches. The classic example must be the fourteen Galapagos finches examined by Darwin, all presumably descended from a common ancestral species, but each of which had a different mode of life.

additional worker hypothesis The view that a rise in unemployment leads to a rise in the working population. When the major wage earner becomes unemployed, other members of the family who were not in paid work now seek employment in order to sustain the household. This might be valid if part-time work is recognized.

adiabat A line plotted on a *thermodynamic diagram, usually on a *tephigram, showing as a continuous sequence the temperature and pressure states of a parcel of air with changing height. Dry adiabats show temperature change at the dry *adiabatic lapse rate.

adiabatic change, adiabatic process A change in temperature, pressure, or volume, involving no transfer of energy to or from another material or system. In an adiabatic process, compression is accompanied by warming, and expansion by cooling. An **adiabatic temperature change** thus results from a pressure change. The speed at which the temperature of rising air falls with altitude is the **adiabatic lapse rate**. Dry, rising air expands with height. The energy needed for this expansion comes from the air itself in the form of heat.

The resulting change in temperature is expressed in the equation:

$$\frac{Dt}{dz} = \frac{-g}{Cp}$$

where Dt is the temperature change, g is the acceleration due to gravity, dz is the height change, and Cp is the specific heat of the air parcel. This change is the **dry adiabatic lapse rate (DALR)**: 9.84 °C/1000 m. The temperature change sustained by any parcel of dry air is calculated using Poisson's equation.

If the rising air becomes saturated to *dew point, condensation of vapour will begin. This condensation is accompanied by the release of *latent heat, which partly offsets the cooling with height, so that the rate of cooling of moist air—the **saturated adiabatic lapse rate (SALR)**—is lower than the DALR. In the lower *troposphere, the vapour content of air is high so the latent heat of condensation is high; SALRs may be as low as 5 °C/1000 m. In the cold, dry, high *troposphere, though, there is little vapour ready for condensation, so the SALR may be close to the DALR. Quantitative expressions of the SALR are therefore quite complex. See also *sublimation.

Adiabatic changes rarely occur in the *stratosphere because this layer experiences very little vertical atmospheric motion.

adiabatic chart *See* *aerological diagram.

adit A tunnel driven horizontally into a hillside for the purpose of

mining. Such shafts were common in the early development, for example, of the South Wales coalfield.

administrative principle The principle advanced by Christaller (1933; trans. C. W. Baskin 1966) which proposes that, in a region with a highly developed system of central administration, settlement is so arranged that one major centre administers six centres of lesser rank, each of which, in turn, oversees a further six centres. The number of settlements at progressively lower levels, starting with the highest in rank, thus follows the sequence 1, 7, 49, 343 . . . This hierarchy is known as k = 7.

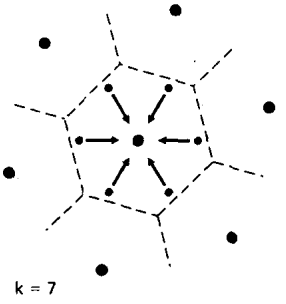

FIGURE 2: *Administrative principle*

adobe Bricks of sun-dried earth or clay; **adobe houses** are made from such bricks. The term has been extended to include alluvial clay and *playa clay, which is often found in dry, desert lake-beds, such as those in the south-west of the USA.

adret The sunny slope of a hill or valley side. In the northern hemisphere adret slopes face south; in the southern hemisphere they face north. Adret slopes are warmer because they receive more *insolation. This can have important implications for land use; along the Rhine rift valley, for example, the adret slopes are terraced for vines, while the north-facing *ubac slopes are largely forested. Similarly, in the Alps, villages are generally located on adret slopes.

adsorption In *soil science, the addition of ions or molecules to the electrically charged surface of a particle of clay or humus. In this way, minerals such as potassium, sodium, magnesium, or calcium become bonded to soil particles. The term **adsorption complex** is given to those soil particles which can absorb ions or molecules.

advanced economy, economically advanced economy A synonym for a more developed country, generally defined as having a per capita GNP in excess of $10 000 per annum (1995) and an agricultural workforce of less than 6% of the working population.

advanced gas-cooled reactor, AGR A nuclear reactor where the heat