Outline of geography

It has been suggested that this article or section be merged with Index of geography articles. (Discuss) Proposed since August 2011.

See also: Index of geography articles

The following outline is provided as an overview of and topical guide to geography:

Geography – science that studies the lands, features, inhabitants, and phenomena of Earth.[1[

The physical world.

The human world.

an academic discipline – a body of knowledge given to - or received by - a disciple (student); a branch or sphere of knowledge, or field of study, that an individual has chosen to specialize in. Modern geography is an all-encompassing discipline that seeks to understand the Earth and all of its human and natural complexities—not merely where objects are, but how they have changed and come to be. Geography has been called 'the world discipline'.[2[

a field of science – widely-recognized category of specialized expertise within science, and typically embodies its own terminology and nomenclature. Such a field will usually be represented by one or more scientific journals, where peer reviewed research is published. There are many geography-related scientific journals.

a natural science – field of academic scholarship that explores aspects of natural environment (physical geography.(

a social science – field of academic scholarship that explores aspects of human society (human geography.(

an interdisciplinary field – a field that crosses traditional boundaries between academic disciplines or schools of thought, as new needs and professions have emerged. Many of the branches of physical geography are also branches of Earth science.

Etymology of geography

Etymology of "geography": from Greek γεωγραφία - geographia, lit. "earth describe-write"[3[

geo- – a prefix taken from the Greek word γη or γαια meaning "earth", usually in the sense of "ground or land". Geo- is a prefix for many words dealing in some way with the earth.

- graphy – an English suffix. Words that include this suffix usually are about a work, an art, or a field of study.

Branches of geography

As "the bridge between the human and physical sciences," geography is divided into two main branches:

All the branches are further described below...

Physical geography

Physical geography – examines the natural environment and how the climate, vegetation & life, soil, water, and landforms are produced and interact.[7[

Fields of physical geography

Geomorphology – study of landforms and the processes that shape them, and more broadly, the evolution of processes controlling the topography of any planet. Seeks to understand why landscapes look the way they do, to understand landform history and dynamics, and to predict future changes through a combination of field

Hydrology – study of the movement, distribution, and quality of water throughout the Earth, including the hydrologic cycle, water resources and environmental watershed sustainability.

Glaciology – study of glaciers, or more generally ice and natural phenomena that involve ice.

Oceanography – studies a wide range of topics pertaining to oceans, including marine organisms and ecosystem dynamics; ocean currents, waves, and geophysical fluid dynamics; plate tectonics and the geology of the sea floor; and fluxes of various chemical substances and physical properties within the ocean and across its boundaries.

Biogeography – study of the distribution of species spatially and temporally. Over areal ecological changes, it is also tied to the concepts of species and their past, or present living 'refugium', their survival locales, or their interim living sites. It aims to reveal where organisms live, and at what abundance.[8[

Climatology – study of climate, scientifically defined as weather conditions averaged over a period of time.[9[

Meteorology is the interdisciplinary scientific study of the atmosphere that focuses on weather processes and short term forecasting (in contrast with climatology.(

Pedology – study of soils in their natural environment[10] that deals with pedogenesis, soil morphology, and soil classification.

Palaeogeography – study of what the geography was in times past, most often concerning the physical landscape, but also the human or cultural environment.

Coastal geography – study of the dynamic interface between the ocean and the land, incorporating both the physical geography (i.e. coastal geomorphology, geology and oceanography) and the human geography (sociology and history) of the coast. It involves an understanding of coastal weathering processes, particularly wave action, sediment movement and weather, and also the ways in which humans interact with the coast.

Quaternary science – focuses on the Quaternary period, which encompasses the last 2.6 million years, including the last ice age and the Holocene period.

Landscape ecology – the relationship between spatial patterns of urban development and ecological processes on a multitude of landscape scales and organizational levels.[11][12][13[

Human geography – one of the two main subfields of geography, it is the study of human use and understanding of the world and the processes which have affected it. Human geography broadly differs from physical geography in that it focuses on the built environment and how space is created, viewed, and managed by humans as well as the influence humans have on the space they occupy.[7[

Fields of human geography

Cultural geography – study of cultural products and norms and their variations across and relations to spaces and places. It focuses on describing and analyzing the ways language, religion, economy, government and other cultural phenomena vary or remain constant, from one place to another and on explaining how humans function spatially.[14[

Children's geographies – study of places and spaces of children's lives, characterized experientially, politically and ethically. Children's geographies rests on the idea that children as a social group share certain characteristics which are experientially, politically and ethically significant and which are worthy of study. The pluralisation in the title is intended to imply that children's lives will be markedly different in differing times and places and in differing circumstances such as gender, family, and class. The range of focii within children's geographies include:

Children and the city

Children and the countryside

Children and technology

Children and nature,

Children and globalization

Methodologies of researching children's worlds

Ethics of researching children's worlds

Otherness of childhood

Animal geographies – studies the spaces and places occupied by animals in human culture, because social life and space is heavily populated by animals of many differing kinds and in many differing ways (e.g. farm animals, pets, wild animals in the city). Another impetus that has influenced the development of the field are ecofeminist and other environmentalist viewpoints on nature-society relations (including questions of animal welfare and rights.(

Language geography – studies the geographic distribution of language or its constituent elements. There are two principal fields of study within the geography of language:

Geography of languages – deals with the distribution through history and space of languages,[15[

Linguistic geography – deals with regional linguistic variations within languages.[16][17][18][19][20[

Sexuality and space – encompasses all relationships and interactions between human sexuality, space, and place, including the geographies of LGBT residence, public sex environments, sites of queer resistance, global sexualities, sex tourism,[21] the geographies of prostitution and adult entertainment, use of sexualised locations in the arts,[22][23] and sexual citizenship.[24[

Religion geography – study of the impact of geography, i.e. place and space, on religious belief.[25[

Development geography – study of the Earth's geography with reference to the standard of living and quality of life of its human inhabitants. Measures development by looking at economic, political and social factors, and seeks to understand both the geographical causes and consequences of varying development, in part by comparing More Economically Developed Countries (MEDCs) with Less Economically Developed Countries (LEDCs.(

Economic geography – study of the location, distribution and spatial organization of economic activities across the world. Subjects of interest include but are not limited to the location of industries, economies of agglomeration (also known as "linkages"), transportation, international trade and development, real estate, gentrification, ethnic economies, gendered economies, core-periphery theory, the economics of urban form, the relationship between the environment and the economy (tying into a long history of geographers studying culture-environment interaction), and globalization.

Marketing geography – a discipline within marketing analysis which uses geolocation (geographic information) in the process of planning and implementation of marketing activities.[26] It can be used in any aspect of the marketing mix – the product, price, promotion, or place (geo targeting.(

Transportation geography – branch of economic geography that investigates spatial interactions between people, freight and information. It studies humans and their use of vehicles or other modes of traveling as well as how markets are serviced by flows of finished goods and raw materials.

Health geography – application of geographical information, perspectives, and methods to the study of health, disease, and health care, to provide a spatial understanding of a population's health, the distribution of disease in an area, and the environment's effect on health and disease. It also deals with accessibility to health care and spatial distribution of health care providers.

Time geography – study of the temporal factor on spatial human activities within the following constraints:

Authority - limits of accessibility to certain places or domains placed on individuals by owners or authorities

Capability - limitations on the movement of individuals, based on their nature. For example, movement is restricted by biological factors, such as the need for food, drink, and sleep

Coupling - restraint of an individual, anchoring him or her to a location while interacting with other individuals in order to complete a task

Historical geography – study of the human, physical, fictional, theoretical, and "real" geographies of the past, and seeks to determine how cultural features of various societies across the planet emerged and evolved, by understanding how a place or region changes through time, including how people have interacted with their environment and created the cultural landscape.

Political geography – study of the spatially uneven outcomes of political processes and the ways in which political processes are themselves affected by spatial structures. Basically, the inter-relationships between people, state, and territory.

Electoral geography – study of the relationship between election results and the regions they affect (such as the environmental impact of voting decisions), and of the effects of regional factors upon voting behavior.

Geopolitics – analysis of geography, history and social science with reference to spatial politics and patterns at various scales, ranging from the level of the state to international.

Strategic geography – concerned with the control of, or access to, spatial areas that have an impact on the security and prosperity of nations.

Military geography – the application of geographic tools, information, and techniques to solve military problems in peacetime or war.

Population geography – study of the ways in which spatial variations in the distribution, composition, migration, and growth of populations are related to the nature of places.

Tourism geography – study of travel and tourism, as an industry and as a social and cultural activity, and their impact on places, including the environmental impact of tourism, the geographies of tourism and leisure economies, answering tourism industry and management concerns and the sociology of tourism and locations of tourism.

Urban geography – the study of urban areas, in terms of concentration, infrastructure, economy, and environmental impacts.

Human geography

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The "north-south divide". A key feature of Development and Economic Geography

***Human geography** is one of the two major sub-fields of the discipline of geography. Human geography is a branch of the social sciences that studies the world, its people, communities, and cultures[1] with an emphasis on relations of and across space and place. Human geography differs from physical geography mainly in that it has a greater focus on studying human activities and is more receptive to qualitative research methodologies. As a discipline, human geography is particularly diverse with respect to its methods and theoretical approaches to study.*

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History

Main article: History of geography

Geographical knowledge, both physical and social, has a long history. In the history of geography, geographers have often recorded and described features of the Earth that might now be considered the remit of human, rather than physical, geographers. For example Hecataeus of Miletus, a geographer and historian in ancient Greece, described inhabitants of the ancient world as well as physical features.

It was not until the 18th and 19th centuries, however, that geography was recognised as a formal academic discipline.

The Royal Geographical Society was founded in England in 1830, [2] although the United Kingdom did not get its first full Chair of geography until 1917. The first real geographical intellect to emerge in United Kingdom geography was Halford John Mackinder, appointed reader at Oxford University in 1887.

The National Geographic Society was founded in the USA in 1888 and began publication of the National Geographic magazine which became and continues to be a great populariser of geographic information. The society has long supported geographic research and education.

Original map by John Snow showing the clusters of cholera cases in the London epidemic of 1854

One of the first examples of geographic methods being used for purposes other than to describe and theorise the physical properties of the earth is John Snow's map of the 1854 Broad Street cholera outbreak. Though a physician and a pioneer of epidemiology, the map is probably one of the earliest examples of Health geography.

The now fairly distinct differences between the subfields of physical and human geography developed at a later date. This connection between both physical and human properties of geography is most apparent in the theory of ***Environmental determinism***, made popular in the 19th century by Carl Ritter and others, and with close links to evolutionary biology of the time. Environmental determinism is the theory that a people's physical, mental and moral habits are directly due to the influence of their natural environment. However, by the mid-19th century, environmental determinism was under attack for lacking methodological rigour associated with modern science, and later as serving to justify racism and imperialism.

A similar concern with both human and physical aspects is apparent in the later ***Regional geography***, during the later 19th and first half of the 20th centuries. The goal of regional geography, through regionalization, was to delineate space into regions and then understand and describe the unique characteristics of each region, in both human and physical aspects. With links to possibilism and cultural ecology, some of the same notions of causal effect of the environment on society and culture, as with environmental determinism remained.

By the 1960s, however, the ***quantitative revolution*** lead to strong criticism of regional geography. Due to a perceived lack of scientific rigour in and overly descriptive nature of the discipline, and a continued separation of geography from geology and the two subfields of physical and human geography, geographers in the mid-20th century began to apply statistical and mathematical model methods to solving spatial problems.[1] Much of the development during the quantitative revolution is now apparent in the use of Geographic information systems; the use of statistics, spatial modelling and positivist approaches is still important to many branches of human geography. Well-known geographers from this period are Fred K. Schaefer, Waldo Tobler, William Garrison, Peter Haggett, Richard J. Chorley, William Bunge, and Torsten Hägerstrand.

From the 1970s a number of critiques of the positivism now associated with geography emerged. Known under the term ***critical geography*** this signalled another turning point in the discipline. Behavioural geography emerged for some time as a means to understand how people

*spaces and places, and made locational decisions. More influentially, **radical geography** emerged in the 1970s and 1980s, drawing heavily on Marxist theory and techniques, and is associated with geographers such as David Harvey and Richard Peet. Seeking to say something 'meaningful' about the problems recognised through quantitative methods,[3] to provide explanations rather than descriptions, to put forward alternatives and solutions and to be politically engaged,[4] rather than the detachment associated with positivist methods. (The detachment and objectivity of the quantitative revolution was itself critiqued by radical geographers as being a tool of capital). Radical geography and the links to Marxism and related theories remain an important part of contemporary human geography (See: Antipode (Journal)) Critical geography also saw the introduction of **humanistic geography**, associated with the work of Yi-Fu Tuan, which, though similar to behavioural geography, pushed for a much more qualitative approach in methodology.*

The changes under critical geography have led to contemporary approaches in the discipline such as Feminist geography, New cultural geography, and the engagement with postmodern and post structural theories and philosophies.

Fields

The main fields of study in human geography focus around the core fields of:

Culture

Cultural geography is the study of cultural products and norms and their variation across and relations to spaces and places. It focuses on describing and analysing the ways language, religion, economy, government, and other cultural phenomena vary or remain constant from one place to another and on explaining how humans function spatially.[5]

- *Subfields include: Children's geographies, Animal geographies, Language geography, Sexuality and Space and Religion geography*

Development

Development Geography is the study of the Earth's geography with reference to the Standard of living and the Quality of life of its human inhabitants, study of the location, distribution and spatial organization of economic activities, across the Earth. The subject matter investigated is strongly influenced by the researcher's methodological approach.

Economic

Economic geography examines relationships between human economic systems, states, and other factors, and the biophysical environment.

- *Subfields include Marketing geography and Transportation geography*

Health

Health geography is the application of geographical information, perspectives, and methods to the study of health, disease, and health care.

Historical

Historical Geography is the study of the human, physical, fictional, theoretical, and "real" geographies of the past. Historical geography studies a wide variety of issues and topics. A common theme is the study of the geographies of the past and how a place or region changes through time. Many historical geographers study geographical patterns through time, including how people have interacted with their environment, and created the cultural landscape.

- *Subfields include Time geography*

Political

Political geography is concerned with the study of both the spatially uneven outcomes of political processes and the ways in which political processes are themselves affected by spatial structures.

- *Subfields include Electoral geography, Geopolitics, Strategic geography and Military geography*

Population

Population geography is the study of the ways in which spatial variations in the distribution,

migration, and growth of populations are related to the nature of places.

Settlement

Settlement geography, including urban geography, is the study of urban and rural areas with specific regards to spatial, relational and theoretical aspects of settlement. That is the study of areas which have a concentration of buildings and infrastructure. These are areas where the majority of economic activities are in the secondary sector and tertiary sectors. In case of urban settlement, they probably have a high population density.

Physical geography

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For other uses, see Physiographic regions of the world.

True-color image of the Earth's surface and atmosphere. NASA Goddard Space Flight Center image.

Physical geography (also known as geosystems or physiography) is one of the two major subfields of geography.[1] Physical geography is that branch of natural science which deals with the study of processes and patterns in the natural environment like the atmosphere, hydrosphere, biosphere, and geosphere, as opposed to the cultural or built environment, the domain of human geography.

Within the body of physical geography, the Earth is often split either into several spheres or environments, the main spheres being the atmosphere, biosphere, cryosphere, geosphere, hydrosphere, lithosphere and pedosphere. Research in physical geography is often interdisciplinary and uses the systems approach.

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Sub-fields

A natural arch.

Physical Geography can be divided into several sub-fields, as follows:

Geomorphology is the field concerned with understanding the surface of the Earth and the processes by which it is shaped, both at the present as well as in the past. Geomorphology as a field has several sub-fields that deal with the specific landforms of various environments e.g. desert geomorphology and fluvial geomorphology, however, these sub-fields are united by the core processes which cause them; mainly tectonic or climatic processes. Geomorphology seeks to understand landform history and dynamics, and predict future changes through a combination of field observation, physical experiment, and numerical modeling (Geomorphometry). Early studies in geomorphology are the foundation for pedology, one of two main branches of soil science.

Meander formation.

Hydrology is predominantly concerned with the amounts and quality of water moving and accumulating on the land surface and in the soils and rocks near the surface and is typified by the hydrological cycle. Thus the field encompasses water in rivers, lakes, aquifers and to an extent glaciers, in which the field examines the process and dynamics involved in these bodies of water. Hydrology has historically had an important connection with engineering and has thus developed a largely quantitative method in its research; however, it does have an earth science side that embraces the systems approach. Similar to most fields of physical geography it has sub-fields that examine the specific bodies of water or

and ecohydrology.

Alpine glacier.

Glaciology is the study of glaciers and ice sheets, or more commonly the cryosphere or ice and phenomena that involve ice. Glaciology groups the latter (ice sheets) as continental glaciers and the former (glaciers) as alpine glaciers. Although, research in the areas are similar with research undertaken into both the dynamics of ice sheets and glaciers the former tends to be concerned with the interaction of ice sheets with the present climate and the latter with the impact of glaciers on the landscape. Glaciology also has a vast array of sub-fields examining the factors and processes involved in ice sheets and glaciers e.g. snow hydrology and glacial geology.

Wallace line.

Biogeography is the science which deals with geographic patterns of species distribution and the processes that result in these patterns. Biogeography emerged as a field of study as a result of the work of Alfred Russel Wallace, although the field prior to the late twentieth century had largely been viewed as historic in its outlook and descriptive in its approach. The main stimulus for the field since its founding has been that of evolution, plate tectonics and the theory of island biogeography. The field can largely be divided into five sub-fields: island biogeography, paleobiogeography, phylogeography, zoogeography and phytogeography

Climate trends.

Climatology is the study of the climate, scientifically defined as weather conditions averaged over a long period of time. Climatology examines both the nature of micro (local) and macro (global) climates and the natural and anthropogenic influences on them. The field is also sub-divided largely into the climates of various regions and the study of specific phenomena or time periods e.g. tropical cyclone rainfall climatology and paleoclimatology.

Meteorology is the interdisciplinary scientific study of the atmosphere that focuses on weather processes and short term forecasting (in contrast with climatology). Studies in the field stretch back millennia, though significant progress in meteorology did not occur until the eighteenth century. Meteorological phenomena are observable weather events which illuminate and are explained by the science of meteorology.

Nitrogen cycle.

Pedology is the study of soils in their natural environment. It is one of two main branches of soil science, the other being edaphology. Pedology mainly deals with pedogenesis, soil morphology, soil classification. In physical geography pedology is largely studied due to the numerous interactions between climate (water, air, temperature), soil life (micro-organisms, plants, animals), the mineral materials within soils (biogeochemical cycles) and its position and effects on the landscape such as laterization.

Palaeogeography is a cross-disciplinary study that examines the preserved material in the stratigraphic record in order to determine the distribution of the continents through geologic time. Almost all the evidence for the positions of the continents comes from geology in the form of fossils or paleomagnetism. The use of this data has resulted in evidence for continental drift, plate tectonics and supercontinents. This in turn has supported palaeogeographic theories such as the Wilson cycle.

High-energy coastline.

Coastal geography is the study of the dynamic interface between the ocean and the land, incorporating both the physical geography (i.e. coastal geomorphology, geology and oceanography) and the human geography of the coast. It involves an understanding of coastal weathering processes, particularly wave action, sediment movement and weathering, and also the ways in which humans interact with the coast. Coastal geography although predominantly geomorphological in its research is not just concerned with coastal landforms, but also the causes and influences of sea level change.

Thermohaline circulation.

Oceanography is the branch of physical geography that studies the Earth's oceans and seas. It covers a wide range of topics, including marine organisms and ecosystem dynamics (biological oceanography); ocean currents, waves, and geophysical fluid dynamics (physical oceanography); plate tectonics and the geology of the sea floor (geological oceanography); and fluxes of various chemical substances and physical properties within the ocean and across its boundaries (chemical oceanography). These diverse topics reflect multiple disciplines that oceanographers blend to further knowledge of the world ocean and understanding of processes within it.

Quaternary science is an inter-disciplinary field of study focusing on the Quaternary period, which encompasses the last 2.6 million years. The field studies the last ice age and the recent interstadial the Holocene and uses proxy evidence to reconstruct the past environments during this period to infer the climatic and environmental changes that have occurred.

Habitat fragmentation.

Landscape ecology is a sub-discipline of ecology and geography that address how spatial variation in the landscape affects ecological processes such as the distribution and flow of energy, materials and individuals in the environment (which, in turn, may influence the distribution of landscape "elements" themselves such as hedgerows). The field was largely founded by the German geographer Carl Troll Landscape ecology typically deals with problems in an applied and holistic context. The main difference between biogeography and landscape ecology is that the latter is concerned with how flows or energy and material are changed and their impacts on the landscape whereas the former is concerned with the spatial patterns of species and chemical cycles.

Digital elevation model.

Geomatics is the field of gathering, storing, processing, and delivering of geographic information, or spatially referenced information. Geomatics includes geodesy (scientific discipline that deals with the measurement and representation of the earth, its gravitational field, and other geodynamic phenomena, such as crustal motion, oceanic tides, and polar motion) and GIS (a computer based system for capturing, storing, analyzing and managing data and associated attributes which are spatially referenced to the earth) and remote sensing (the short or large-scale acquisition of information of an object or phenomenon, by the use of either recording or real-time sensing devices that are not in physical or intimate contact with the object.(

Salinization.

Environmental geography is a branch of geography that analyzes the spatial aspects of interactions between humans and the natural world. The branch bridges the divide between human and physical geography and thus requires an understanding of the dynamics of geology, meteorology, hydrology, biogeography, and geomorphology, as well as the ways in which human societies conceptualize the environment.

research than at present with theories such as environmental determinism linking society with the environment. It has largely become the domain of the study of environmental management or anthropogenic influences.

Journals and literature

Physical geography and Earth Science journals communicate and document the results of research carried out in universities and various other research institutions. Most journals cover a specific field and publish the research within that field, however unlike human geographers, physical geographers tend to publish in inter-disciplinary journals rather than predominantly geography journal; the research is normally expressed in the form of a scientific paper. Additionally, textbooks, books, and magazines on geography communicate research to laypeople, although these tend to focus on environmental issues or cultural dilemmas. Examples of journals that publish articles from physical geographers are:

Earth Surface Processes and Landforms

Journal of Biogeography

Journal of Quaternary Science

Journal of Coastal Research

Geomorphology

Palaeogeography

Polar Research

The Professional Geographer

Natural Hazards and Earth System Science

Soil Science

Climatic Change

Journal of Glaciology

Earth Interactions

Journal of Climate

Remote Sensing of Environment

Journal of Geocryology

Progress in Physical Geography

Landscape Ecology

Transactions of the Institute of British Geographers

Journal of Hydrology

Sedimentology

Bulletin of the American Meteorological Society

Geophysical Research Letters

Journal of Hydrometeorology

Nature

Journal of Geography and Geology

Historical evolution of the discipline

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From the birth of geography as a science during the Greek classical period and until the late nineteenth century with the birth of anthropogeography or Human Geography, Geography was almost exclusively a natural science: the study of location and descriptive gazetteer of all places of the known world. Several works among the best known during this long period could be cited as an example, from Strabo (Geography), Eratosthenes (Geography) or Dionisio Periegetes (Periegesis Oiceumene) in the Ancient Age to the Alexander von Humboldt (Cosmos) in the century XIX, in which geography is regarded as a physical and natural science, of course, through the work Summa de Geografía of Martín Fernández de Enciso from the early sixteenth century, which is indicated for the first time the New World.

During the eighteenth and nineteenth centuries, a controversy exported from Geology, between supporters of James Hutton (uniformitarianism Thesis) and Georges Cuvier (catastrophism) strongly influenced the field of geography, because geography at this time was a natural science since Human Geography or Antropogeography had just developed as a discipline in the late nineteenth century.

Two historical events during the nineteenth century had a great effect in the further development of physical geography. The first was the European colonial expansion in Asia, Africa, Australia and even America in search of raw materials required by industries during the Industrial Revolution. This fostered the creation of geography departments in the universities of the colonial powers and the birth and development of national geographical societies, thus giving rise to the process identified by Horacio Capel as the institutionalization of geography.

One of the most prolific empires in this regard was the Russian. A mid-eighteenth century many geographers are sent by the Russian altamirazgo different opportunities to perform geographical surveys in the area of Arctic Siberia. Among these is who is considered the patriarch of Russian geography: Mikhail Lomonosov who in the mid-1750s began working in the Department of Geography, Academy of Sciences to conduct research in Siberia, their contributions are notable in this regard, shows the soil organic origin, develops a comprehensive law on the movement of the ice that still governs the basics, thereby founding a new branch of Geography: Glaciology. In 1755 his initiative was founded Moscow University where he promotes the study of geography and the training of geographers. In 1758 he was appointed director of the Department of Geography, Academy of Sciences, a post from which would develop a working methodology for geographical survey guided by the most important long expeditions and geographical studies in Russia. Thus followed the line of Lomonosov and the contributions of the Russian school became more frequent through his disciples, and in the nineteenth century we have great geographers as Vasily Dokuchaev who performed works of great importance as a "principle of comprehensive analysis of the territory" and "Russian Chernozem" latter being the most important where introduces the geographical concept of soil, as distinct from a simple geological strata, and thus founding a new geographic area of study: the Pedology. Climatology also receive a strong boost from the Russian school by Wladimir Köppen whose main contribution, climate classification, is still valid today. However, this great geographer also contributed to the Paleogeography through his work "The climates of the geological past" which is considered the father of Paleoclimatology. Russian geographers who made great contributions to the discipline in this period were: NM Sibirtsev, Pyotr Semyonov, K. D. Glinka, Neustrayev, among others.

The second important process is the theory of evolution by Darwin in mid-century (which decisively influenced the work of Ratzel, who had academic training as a zoologist and was a follower of Darwin's ideas) which meant an important impetus in the development of Biogeography.

event in the late nineteenth and early twentieth century will give a major boost to development of geography and will take place in United States. It is the work of the famous geographer William Morris Davis who not only made important contributions to the establishment of discipline in his country, but revolutionized the field to develop geographical cycle theory which he proposed as a paradigm for Geography in general, although in actually served as a paradigm for Physical Geography. His theory explained that mountains and other landforms are shaped by the influence of a number of factors that are manifested in the geographical cycle. He explained that the cycle begins with the lifting of the relief by geological processes (faults, volcanism, tectonic upheaval, etc.).. Geographical factors such as rivers and runoff begins to create the V-shaped valleys between the mountains (the stage called "youth"). During this first stage, the terrain is steeper and more irregular. Over time, the currents can carve wider valleys ("maturity") and then start to wind, towering hills only ("senescence"). Finally, everything comes to what is a plain flat plain at the lowest elevation possible (called "baseline") This plain was called by Davis' "peneplain" meaning "almost plain" Then the rejuvenation occurs and there is another mountain lift and the cycle continues. Although Davis's theory is not entirely accurate, it was absolutely revolutionary and unique in its time and helped to modernize and create Geography subfield of Geomorphology. Its implications prompted a myriad of research in various branches of Physical Geography. In the case of the Paleogeography this theory provided a model for understanding the evolution of the landscape. For Hydrology, Glaciology and Climatology as a boost investigated as studying geographic factors shape the landscape and affect the cycle. The bulk of the work of William Morris Davis led to the development of a new branch of Physical Geography: Geomorphology whose contents until then did not differ from the rest of Geography. Shortly after this branch would present a major development. Some of his disciples made significant contributions to various branches of physical geography such as Curtis Marbut and his invaluable legacy for Pedology, Mark Jefferson, Isaiah Bowman, among others.

History of geography

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Another major

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Geography

History of geography

Graeco-Roman

Chinese

Islamic

Age of Discovery

History of cartography

Environmental determinism

Regional geography

Quantitative revolution

Critical geography

OrteliusWorldMap.jpeg

The history of geography includes various histories of geography which have differed over time and between different cultural and political groups. In more recent developments, geography has become a distinct academic discipline. 'Geography' derives from the from Greek γεωγραφία - geographia,[1] a literal translation of which would be "to describe or write about the Earth". The first person to use the word "geography" was Eratosthenes (276-194 BC). However there is evidence for recognizable practices of geography, such as cartography (or map-making) prior to the use of the term geography.

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Babylon

See also: Babylonian Map of the World

The oldest known world maps date back to ancient Babylon from the 9th century BC.[2] The best known Babylonian world map, however, is the Imago Mundi of 600 BC.[3] The map as reconstructed by Eckhard Unger shows Babylon on the Euphrates, surrounded by a circular landmass showing Assyria, Urartu[4] and several cities, in turn surrounded by a "bitter river" (Oceanus), with seven islands arranged around it so as to form a seven-pointed star. The accompanying text mentions seven outer regions beyond the encircling ocean. The descriptions of five of them have survived.[5[

In contrast to the Imago Mundi, an earlier Babylonian world map dating back to the 9th century BC depicted Babylon as being further north from the center of the world, though it is not certain what that center was supposed to represent.[2[

Greco-Roman world

See also: List of Graeco-Roman geographers

The ancient Greeks saw the poet Homer as the founder of geography. His works the Iliad and the Odyssey are works of literature, but both contain a great deal of geographical information. Homer describes a circular world ringed by a single massive ocean. The works show that the Greeks by the 8th century BC had considerable knowledge of the geography of the eastern Mediterranean. The poems contain a large number of place names and descriptions, but for many of these it is uncertain what real location, if any, is actually being referred to.

Thales of Miletus is one of the first known philosophers known to have wondered about the shape of the world. He proposed that the world was based on water, and that all things grew out of it. He also laid down many of the astronomical and mathematical rules that would allow geography to be studied scientifically. His successor Anaximander is the first person known to have attempted to create a scale map of the known world and to have introduced the gnomon to Ancient Greece.

Hecataeus of Miletus initiated a different form of geography, avoiding the mathematical calculations of Thales and Anaximander he learnt about the world by gathering previous works and speaking to the sailors who came through the busy port of Miletus. From these accounts he wrote a detailed prose account of what was known of the world. A similar work, and one that mostly survives today, is Herodotus' Histories. While primarily a work of history, the book contains a wealth of geographic descriptions covering much of the known world.

Persia, and Asia Minor are all described in great detail. Little is known about areas further a field, and descriptions of areas such as India are almost wholly fanciful. Herodotus also made important observations about geography. He is the first to have noted the process by which large rivers, such as the Nile, build up deltas, and is also the first recorded as observing that winds tend to blow from colder regions to warmer ones.

Pythagoras was perhaps the first to propose a spherical world, arguing that the sphere was the most perfect form. This idea was embraced by Plato and Aristotle presented empirical evidence to verify this. He noted that the Earth's shadow during an eclipse is curved, and also that stars increase in height as one moves north. Eudoxus of Cnidus used the idea of a sphere to explain how the sun created differing climatic zones based on latitude. This led the Greeks to believe in a division of the world into five regions. At each of the poles was an uncharitably cold region. While extrapolating from the heat of the Sahara it was deduced that the area around the equator was unbearably hot. Between these extreme regions both the northern and southern hemispheres had a temperate belt suitable for human habitation.

Hellenistic period

These theories clashed with the evidence of explorers, however. Hanno the Navigator had traveled as far south as Sierra Leone, and it is possible other Phoenicians had circumnavigated Africa. In the 4th century BC the Greek explorer Pytheas traveled through northwest Europe, and circled the British Isles. He found that the region was considerably more habitable than theory expected, but his discoveries were largely dismissed as fanciful by his contemporaries because of this. Conquerors also carried out exploration, for example, Caesar's invasions of Britain and Germany, expeditions/invasions sent by Augustus to Arabia Felix and Ethiopia (Res Gestae 26), and perhaps the greatest Ancient Greek explorer of all, Alexander the Great, who deliberately set out to learn more about the east through his military expeditions and so took a large number of geographers and writers with his army who recorded their observations as they moved east.

Egypt, Scythia,

The ancient Greeks divided the world into three continents, Europe, Asia, and Libya (Africa). The Hellespont formed the border between Europe and Asia. The border between Asia and Libya was generally considered to be the Nile river, but some geographers, such as Herodotus objected to this. Herodotus argued that there was no difference between the people on the east and west sides of the Nile, and that the Red Sea was a better border. The relatively narrow habitable band was considered to run from the Atlantic Ocean in the west to an unknown sea somewhere east of India in the east. The southern portion of Africa was unknown, as was the northern portion of Europe and Asia, so it was believed that they were circled by a sea. These areas were generally considered uninhabitable.

The size of the Earth was an important question to the Ancient Greeks. Eratosthenes attempted to calculate its circumference by measuring the angle of the sun at two different locations. While his numbers were problematic, most of the errors cancelled themselves out and he got quite an accurate figure. Since the distance from the Atlantic to India was roughly known, this raised the important question of what was in the vast region east of Asia and to the west of Europe. Crates of Mallus proposed that there were in fact four inhabitable land masses, two in each hemisphere. In Rome a large globe was created depicting this world. That some of the figures Eratosthenes had used in his calculation were considerably in error became known, and Posidonius set out to get a more accurate measurement. This number actually was considerably smaller than the real one, but it became accepted that the eastern part of Asia was not a huge distance from Europe.

Roman period

A 15th century depiction of the Ptolemy world map, reconstituted from Ptolemy's Geographia (c. 150(

of almost all earlier geographers have been lost, many of them are partially known through quotations found in Strabo. Strabo's seventeen volume work of geography is almost completely extant, and is one of the most important sources of information on classical geography. Strabo accepted the narrow band of habitation theory, and rejected the accounts of Hanno and Pytheas as fables. None of Strabo's maps survive, but his detailed descriptions give a clear picture of the status of geographical knowledge of the time. A century after Strabo Ptolemy launched a similar undertaking. By this time the Roman Empire had expanded through much of Europe, and previously unknown areas such as the British Isles had been explored. The Silk Road was also in operation, and for the first time knowledge of the far east began to be known. Ptolemy's Geographia opens with a theoretical discussion about the nature and techniques of geographical inquiry, and then moves to detailed descriptions of much the known world. Ptolemy lists a huge number of cities, tribes, and sites and places them in the world. It is uncertain what Ptolemy's names correspond to in the modern world, and a vast amount of scholarship has gone into trying to link Ptolemaic descriptions to known locations.

Pliny the Elder's Natural History also has sections on geography. For the most part Ancient Greek geography was an academic field. There is little evidence that maps or charts were used for navigation. It does, however, seem that at least in Athens the people were acquainted with maps and that several were on public display. It was the Romans who made far more extensive practical use of geography and maps.

China

Main article: Chinese geography

See also: History of cartography: China

An early Western Han Dynasty (202 BC – 9 AD) silk map found in tomb 3 of Mawangdui, depicting the Kingdom of Changsha and Kingdom of Nanyue in southern China (note: the south direction is oriented at the top, north at the bottom.(

The Yu Ji Tu, or Map of the Tracks of Yu Gong, carved into stone in 1137, located in the Stele Forest of Xian. This 3 ft squared map features a

While the works graduated scale of 100 li for each rectangular grid. China's coastline and river systems are clearly defined and precisely pinpointed on the map. Yu Gong is in reference to the Chinese deity described in the geographical chapter of the Classic of History, dated 5th century BC.

In China, the earliest known geographical Chinese writing dates back to the 5th century BC, during the beginning of the Warring States (481 BC-221 BC).[6] This was the 'Yu Gong' ('Tribute of Yu') chapter of the book Shu Jing (Classic of History). The book describes the traditional nine provinces, their kinds of soil, their characteristic products and economic goods, their tributary goods, their trades and vocations, their state revenues and agricultural systems, and the various rivers and lakes listed and placed accordingly.[6] The nine provinces in the time of this geographical work was very small in terrain size compared to what modern China occupies today. In fact, its description pertained to areas of the Yellow River, the lower valleys of the Yangtze, with the plain between them and the Shandong peninsula, and to the west the most northern parts of the Wei River and the Han River were known (along with the southern parts of modern day Shanxi province).[6[

In this ancient geographical treatise (which would greatly influence later Chinese geographers and cartographers), the Chinese used the mythological figure of Yu the Great to describe the known earth (of the Chinese). Apart from the appearance of Yu, however, the work was devoid of magic, fantasy, Chinese folklore, or legend.[7] Although the Chinese geographical writing in the time of Herodotus and Strabo were of lesser quality and contained less systematic approach, this would change from the 3rd century onwards, as Chinese methods of documenting geography became more complex than found in Europe (until the 13th century).[8[

The earliest extant maps found in archeological sites of China date to the 4th century BC and were made in the ancient State of Qin.[9] The earliest known reference to the application of a geometric grid and mathematically graduated scale to a map was contained in the writings of the cartographer

(224–271).[10] From the 1st century AD onwards, official Chinese historical texts contained a geographical section, which was often an enormous compilation of changes in place-names and local administrative divisions controlled by the ruling dynasty, descriptions of mountain ranges, river systems, taxable products, etc.[11] The ancient Chinese historian Ban Gu (32–92) most likely started the trend of the gazeteer in China, which became prominent in the Southern and Northern Dynasties period and Sui Dynasty.[12] Local gazeteers would feature a wealth of geographic information, although its cartographic aspects were not as highly professional as the maps created by professional cartographers.[12[

From the time of the 5th century BC Shu Jing forward, Chinese geographical writing provided more concrete information and less legendary element. This example can be seen in the 4th chapter of the Huainanzi (Book of the Master of Huainan), compiled under the editorship of Prince Liu An in 139 BC during the Han Dynasty (202 BC-202 AD). The chapter gave general descriptions of topography in a systematic fashion, given visual aids by the use of maps (di tu) due to the efforts of Liu An and his associate Zuo Wu.[13] In Chang Chu's Hua Yang Guo Chi (Historical Geography of Szechuan) of 347, not only rivers, trade routes, and various tribes were described, but it also wrote of a 'Ba Jun Tu Jing' ('Map of Szechuan'), which had been made much earlier in 150.[14] The Shui Jing (Waterways Classic) was written anonymously in the 3rd century during the Three Kingdoms era (attributed often to Guo Pu), and gave a description of some 137 rivers found throughout China.[15] In the 6th century, the book was expanded to forty times its original size by the geographers Li Daoyuan, given the new title of Shui Jing Zhu (The Waterways Classic Commented).[15[

In later periods of the Song Dynasty (960-1279) and Ming Dynasty (1368-1644), there were much more systematic and professional approaches to geographic literature. The Song Dynasty poet, scholar, and government official Fan Chengda (1126–1193) wrote the geographical treatise known as the Gui Hai Yu Heng Chi.[16] It focused primarily on the topography of the land, along with the agricultural, economic and commercial products of each region in China's southern provinces.[16] The polymath Chinese scientist Shen Kuo (1031–1095) devoted a significant amount of his written work to geography, as well as a hypothesis of land formation (geomorphology) due to the evidence of marine fossils found far inland, along with bamboo fossils found underground in a region far from where bamboo was suitable to grow. The 14th century Yuan Dynasty geographer Na-xin wrote a treatise of archeological topography of all the regions north of the Yellow River, in his book He Shuo Fang Gu Ji.[17] The Ming Dynasty geographer Xu Xiake (1587–1641) traveled throughout the provinces of China (often on foot) to write his enormous geographical and topographical treatise, documenting various details of his travels, such as the locations of small gorges, or mineral beds such as mica schists.[18] Xu's work was largely systematic, providing accurate details of measurement, and his work (translated later by Ding Wenjiang) read more like a 20th century field surveyor than an early 17th century scholar.[18[

The Chinese were also concerned with documenting geographical information of foreign regions far outside of China. Although Chinese had been writing of civilizations of the Middle East, India, and Central Asia since the traveler Zhang Qian (2nd century BC), later Chinese would provide more concrete and valid information on the topography and geographical aspects of foreign regions. The Tang Dynasty (618-907) Chinese diplomat Wang Xuance traveled to Magadha (modern northeastern India) during the 7th century. Afterwards he wrote the book Zhang Tian-zhu Guo Tu (Illustrated Accounts of Central India), which included a wealth of geographical information.[17] Chinese geographers such as Jia Dan (730–805) wrote accurate descriptions of places far abroad. In his work written between 785 and 805, he described the sea route going into the mouth of the Persian Gulf, and that the medieval Iranians (whom he called the people of the Luo-He-Yi country, i.e. Persia) had erected 'ornamental pillars' in the sea that acted as lighthouse beacons for ships that might go astray.[19] Confirming Jia's reports about lighthouses in the Persian Gulf, Arabic writers a century after Jia wrote of the same structures, writers such as al-Mas'udi and al-Muqaddasi. The later Song Dynasty ambassador Xu Jing wrote his accounts of voyage and travel throughout Korea in his work of 1124, the Xuan-

Li Tu Jing (Illustrated Record of an Embassy to Korea in the Xuan-He Reign Period).[17] The geography of medieval Cambodia (the Khmer Empire) was documented in the book Zhen-La Feng Tu Ji of 1297, written by Zhou Daguan.[17[

Medieval Islamic world

Unbalanced scales.svg

This article may be unbalanced towards certain viewpoints. Please improve the article by adding information on neglected viewpoints, or discuss the issue on the talk page. (April 2010(

Main article: Geography and cartography in medieval Islam

In the Middle East, Muslim geographers such as al-Idrisi, al-Yaqubi, al-Masudi, Ibn Khurdadhbih, Ibn al-Faqih, al-Istakhri, Ibn Battuta, Ibn Khaldun, etc. maintained the Greek and Roman techniques and developed new ones. The Islamic empire stretched from Spain to India, and Arab and Jewish traders (known as Radhanites) travelled throughout Eurasia, Africa and the Indian Ocean. The Arabs added a great deal of knowledge to expand and correct the classical sources. There were some representatives of the West that produced geographical works of quality, such as the Syrian bishop Jacob of Edessa (633-708), but this paled in comparison to the virtual mountain of work published by Islamic writers of the Middle Ages (who were largely responsible for the foundations of knowledge present in later Western geography).[8[

During the Muslim conquests of the seventh and early 8th centuries, Arab armies established the Islamic Arab Empire, reaching from Central Asia to the Iberian Peninsula. An early form of globalization began emerging during the Islamic Golden Age, when the knowledge, trade and economies from many previously isolated regions and civilizations began integrating due to contacts with Muslim explorers, sailors, scholars, traders, and travelers. Subhi Y. Labib has called this period the Pax Islamica, and John M. Hobson has called it the Afro-Asiatic age of discovery, in reference to the Muslim Southwest Asian and North African traders and explorers who travelled most of the Old World, and established an early global economy[20] across most of Asia, Africa, and Europe, with their trade networks extending from the Atlantic Ocean and Mediterranean Sea in the west to the Indian Ocean and China Seas in the east,[21] and even as far as Japan, Korea[22] and the Bering Strait.[23] Arabic silver dirham coins were also being circulated throughout the Afro-Eurasian landmass, as far as sub-Saharan Africa in the south and northern Europe in the north, often in exchange for goods and slaves.[24] In England, for example, the Anglo-Saxon king Offa of Mercia (r. 757-796) had coins minted with the Shahadah in Arabic.[25] These factors helped establish the Arab Empire (including the Rashidun, Umayyad, Abbasid and Fatimid caliphates) as the world's leading extensive economic power throughout the 7th–13th centuries.[20[

In the 9th century, Alkindus was the first to introduce experimentation into the Earth sciences.[26] An early adherent of environmental determinism was the medieval Afro-Arab writer al-Jahiz, who explained how the environment can determine the physical characteristics of the inhabitants of a certain community. He used his early theory of evolution to explain the origins of different human skin colors, particularly black skin, which he believed to be the result of the environment. He cited a stony region of black basalt in the northern Najd as evidence for his theory.[27] In the early 10th century, Abū Zayd al-Balkhī, originally from Balkh, founded the "Balkhī school" of terrestrial mapping in Baghdad. The geographers of this school also wrote extensively of the peoples, products, and customs of areas in the Muslim world, with little interest in the non-Muslim realms.[28] Suhrāb, a late 10th century Muslim geographer, accompanied a book of geographical coordinates with instructions for making a rectangular world map, with equirectangular projection or cylindrical equidistant projection.[28] In the early 11th century, Avicenna hypothesized on the geological causes of mountains in The Book of Healing (1027.(

In mathematical geography, Abū Rayhān al-Bīrūnī, around 1025, was the first to describe a polar equi-azimuthal equidistant projection of the celestial

sphere.[29] He was also regarded as the most skilled when it came to mapping cities and measuring the distances between them, which he did for many cities in the Middle East and western Indian subcontinent. He often combined astronomical readings and mathematical equations, in order to develop methods of pin-pointing locations by recording degrees of latitude and longitude. He also developed similar techniques when it came to measuring the heights of mountains, depths of valleys, and expanse of the horizon, in The Chronology of the Ancient Nations. He also discussed human geography and the planetary habitability of the Earth. He hypothesized that roughly a quarter of the Earth's surface is habitable by humans, and also argued that the shores of Asia and Europe were "separated by a vast sea, too dark and dense to navigate and too risky to try" in reference to the Atlantic Ocean and Pacific Ocean.[citation needed[

At the age of 17, al-Biruni calculated the latitude of Kath, Khwarazm, using the maximum altitude of the Sun.[citation needed] Al-Biruni also solved a complex geodesic equation in order to accurately compute the Earth's circumference, which were close to modern values of the Earth's circumference.[30] His estimate of 6,339.9 km for the Earth radius was only 16.8 km less than the modern value of 6,356.7 km. In contrast to his predecessors who measured the Earth's circumference by sighting the Sun simultaneously from two different locations, al-Biruni developed a new method of using trigonometric calculations based on the angle between a plain and mountain top which yielded more accurate measurements of the Earth's circumference and made it possible for it to be measured by a single person from a single location.[31] By the age of 22, al-Biruni had written several short works, including a study of map projections, Cartography, which included a method for projecting a hemisphere on a plane.[32[

John J. O'Connor and Edmund F. Robertson write in the MacTutor History of Mathematics archive:

" Important contributions to geodesy and geography were also made by al-Biruni. He introduced techniques to measure the earth and distances on it using triangulation. He found the radius of the earth to be 6339.6 km, a value not obtained in the West until the 16th century. His Masudic canon contains a table giving the coordinates of six hundred places, almost all of which he had direct knowledge."[33[

The Tabula Rogeriana, drawn by Al-Idrisi for Roger II of Sicily in 1154. Note that in the original map, the north is at the bottom and south at the top, in contrast to modern cartographic conventions.

The Arab geographer Al-Idrisi's Mappa Mundi incorporated the knowledge of Africa, the Indian Ocean and the Far East gathered by Arab merchants and explorers with the information inherited from the classical geographers to create one of the most accurate maps of the world to date. The Tabula Rogeriana was drawn by Al-Idrisi in 1154 for the Norman King Roger II of Sicily, after a stay of eighteen years at his court, where he worked on the commentaries and illustrations of the map. The map, written in Arabic, shows the Eurasian continent in its entirety, but only shows the northern part of the African continent.

Ibn Battuta (1304–1368) was a traveler and explorer, whose account documents his travels and excursions over a period of almost thirty years, covering some 73,000 miles (117,000 km).[citation needed] These journeys covered most of the known Old World, extending from North Africa, West Africa, Southern Europe and Eastern Europe in the west, to the Middle East, Indian subcontinent, Central Asia, Southeast Asia and China (then the Mongol Yuan Empire) in the east, a distance readily surpassing that of his predecessors and his near-contemporary Marco Polo. The universal use of Arabic in the Muslim world and his status as judge trained in law gave him access to royal courts at most locations he visited.[34[

Medieval Europe

See also: Exploration of Asia

During the Early Middle Ages, geographical knowledge in Europe regressed (though it is a popular misconception that they thought the world was flat), and the simple T and O map became the standard depiction of the world.

The trips of Venetian explorer Marco Polo throughout Mongol Empire in the 13th century, the Christian Crusades of the 12th and 13th centuries, and the Portuguese and Spanish voyages of exploration during the 15th and 16th centuries opened up new horizons and stimulated geographic writings.

During the 15th century, Henry the Navigator of Portugal supported explorations of the African coast and became a leader in the promotion of geographic studies. Among the most notable accounts of voyages and discoveries published during the 16th century were those by Giambattista Ramusio in Venice, by Richard Hakluyt in England, and by Theodore de Bry in what is now Belgium.

Early modern period

Portrait of Marco Polo.

See also: Age of Discovery

Following the journeys of Marco Polo, interest in geography spread throughout Europe. From around c. 1400, the writings of Ptolemy and his Islamic successors provided a systematic framework to tie together and portray geographical information. The great voyages of exploration in 16th and 17th centuries revived a desire for both accurate geographic detail, and more solid theoretical foundations. The Geographia Generalis by Bernhardus Varenius and Gerardus Mercator's world map are prime examples of the new breed of scientific geography.

Surviving fragment of the first World Map of Piri Reis (1513(

The Mongols also had wide ranging knowledge of the geography of Europe and Asia, based in their governance and ruling of much of this area and used this information for the undertaking of large military expeditions. The evidence for this is found in historical resources such as The Secret History of Mongols and other Persian chronicles written in 13th and 14th centuries. For example, during the rule of the Great Yuan Dynasty a world map was created and is currently kept in South Korea. See also: Maps of the Yuan Dynasty

The Muslim Ottoman cartographer Piri Reis drawn navigational maps in his Kitab-ı Bahriye. The work includes an atlas of charts for small segments of the Mediterranean, accompanied by sailing instructions covering the sea. In the second version of the work, he included a map of the Americas.[35] The Piri Reis map drawn by the Ottoman cartographer Piri Reis in 1513 is an early surviving map to show the Americas.[36][37][38[

١٩th century

By the 18th century, geography had become recognized as a discrete discipline and became part of a typical university curriculum in Europe (especially Paris and Berlin), although not in the United Kingdom where geography was generally taught as a sub-discipline of other subjects.

One of the great works of this time was Kosmos: a sketch of a physical description of the Universe, by Alexander von Humboldt, the first volume of which was published in German in 1845. Such was the power of this work that Dr Mary Somerville, of Cambridge University intended to scrap publication of her own Physical Geography on reading Kosmos. Von Humboldt himself persuaded her to publish (after the publisher sent him a copy.(

In 1877, Thomas Henry Huxley published his Physiography with the philosophy of universality presented as an integrated approach in the study of the natural environment. The philosophy of universality in geography was not a new one but can be seen as evolving from the works of

Alexander von Humboldt and Immanuel Kant. The publication of Huxley physiography presented a new form of geography that analysed and classified cause and effect at the micro-level and then applied these to the macro-scale (due to the view that the micro was part of the macro and thus an understanding of all the micro-scales was need to understand the macro level). This approach emphasized the empirical collection of data over the theoretical. The same approach was also used by Halford John Mackinder in 1887. However, the integration of the Geosphere, Atmosphere and Biosphere under physiography was soon over taken by Davisian geomorphology.

Over the past two centuries the quantity of knowledge and the number of tools has exploded. There are strong links between geography and the sciences of geology and botany, as well as economics, sociology and demographics.

The Royal Geographical Society was founded in England in 1830, although the United Kingdom did not get its first full Chair of geography until 1917. The first real geographical intellect to emerge in United Kingdom geography was Halford John Mackinder, appointed reader at Oxford University in 1887.

The National Geographic Society was founded in the USA in 1888 and began publication of the National Geographic magazine which became and continues to be a great popularizer of geographic information. The society has long supported geographic research and education.

۲۰th century

In the West during the second half of the 19th and the 20th century, the discipline of geography went through four major phases: environmental determinism, regional geography, the quantitative revolution, and critical geography.

Environmental determinism

Main article: Environmental determinism

Environmental determinism is the theory that a people's physical, mental and moral habits are directly due to the influence of their natural environment. Prominent environmental determinists included Carl Ritter, Ellen Churchill Semple, and Ellsworth Huntington. Popular hypotheses included "heat makes inhabitants of the tropics lazy" and "frequent changes in barometric pressure make inhabitants of temperate latitudes more intellectually agile." Environmental determinist geographers attempted to make the study of such influences scientific. Around the 1930s, this school of thought was widely repudiated as lacking any basis and being prone to (often bigoted) generalizations. Environmental determinism remains an embarrassment to many contemporary geographers, and leads to skepticism among many of them of claims of environmental influence on culture (such as the theories of Jared Diamond.(

Regional geography

Main article: Regional geography

Regional geography was coined by a group of geographers known as possibilists and represented a reaffirmation that the proper topic of geography was study of places (regions). Regional geographers focused on the collection of descriptive information about places, as well as the proper methods for dividing the earth up into regions. Well-known names from these period are Alfred Hettner in Germany and Paul Vidal de la Blache in France. The philosophical basis of this field in United States was laid out by Richard Hartshorne, who defined geography as a study of areal differentiation, which later led to criticism of this approach as overly descriptive and unscientific.

The Quantitative revolution

Main article: Quantitative revolution

The quantitative revolution in geography began in the 1950s. Geographers formulated geographical theories and subjected the theories to empirical tests, usually using statistical methods (especially

hypothesis testing). This quantitative revolution laid the groundwork for the development of geographic information systems.[citation needed] Well-known geographers from this period are Fred K. Schaefer, Waldo Tobler, William Garrison, Peter Haggett, Richard J. Chorley, William Bunge, and Torsten Hägerstrand.

Critical geography

Main article: Critical geography

Though positivist approaches remain important in geography, critical geography arose as a critique of positivism. The first strain of critical geography to emerge was humanistic geography. Drawing on the philosophies of existentialism and phenomenology, humanistic geographers (such as Yi-Fu Tuan) focused on people's sense of, and relationship with, places. More influential was Marxist geography, which applied the social theories of Karl Marx and his followers to geographic phenomena. David Harvey and Richard Peet are well-known Marxist geographers. Feminist geography is, as the name suggests, the use of ideas from feminism in geographic contexts. The most recent strain of critical geography is postmodernist geography, which employs the ideas of postmodernist and poststructuralist theorists to explore the social construction of spatial relations.

Royal Geographical Society

From Wikipedia, the free encyclopedia

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Royal Geographical Society

Abbreviation *RGS-IBG*

Formation *۱۸۳۰*

Type *Learned society*

Headquarters *Kensington, London, United Kingdom*

Membership

۴,۵۰۰Ordinary Members

۱۰,۱۰۰Fellows

۴۰۰Chartered Geographers

President *Judith Rees*

Website *www.rgs.org*

Remarks *Patron: Queen Elizabeth II*

The Royal Geographical Society (with the Institute of British Geographers) is a British learned society founded in 1830 for the advancement of geographical sciences. Today, it is a world centre for geography: supporting research, education, expeditions and fieldwork, and promoting public engagement and informed understanding of the world's peoples, places and environments.

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History

Lowther Lodge, Royal Geographical Society (with IBG) headquarters, designed by Richard Norman Shaw

The Geographical Society of London was founded in 1830 under the name Geographical Society of London as an institution to promote the 'advancement of geographical science'. It later absorbed the older African Association, which had been founded by Sir Joseph Banks in 1788, as well as the Raleigh Club and the Palestine Association. Like many learned societies, it had started as a dining club in London, where select members held informal dinner debates on current scientific issues and ideas.

Founding members of the Society included Sir John Barrow, Sir John Franklin and Francis Beaufort. Under the patronage of King William IV it later became known as The Royal Geographical Society (RGS) and was granted its Royal Charter under Queen Victoria in 1859.

From 1830 - 1840 the RGS met in the rooms of the Horticultural Society in Regent Street, London and from 1854 -1870 at 15 Whitehall Place, London. In 1870, the Society finally found a home when it moved to 1 Saville Row, London – an address that quickly became associated with adventure and travel. The Society also used a lecture theatre in Burlington Gardens, London which was lent to it by the Civil Service Commission. However, the arrangements were thought to be rather cramped and squalid.

The Society has been a key associate and supporter of many famous explorers and expeditions, including those of:

Charles Darwin

James Kingston Tuckey

David Livingstone

William Ogilvie

Robert Falcon Scott

Richard Francis Burton

John Hanning Speke

George W. Hayward

Percy Fawcett

Henry Morton Stanley

Ernest Shackleton

Sir Edmund Hillary

A new impetus was given to the Society's affairs in 1911, with the election of Earl Curzon, the former Viceroy of India, as the Society's President (1911–1914). The premises in Saville Row were sold and the present site, Lowther Lodge in Kensington Gore, was purchased for £100,000[1] and opened for use in April 1913. In the same year the Society's ban on women was lifted.

Lowther Lodge was built in 1874 for the Hon William Lowther by Norman Shaw, one of the most outstanding domestic architects of his day. Extensions to the east wing were added in 1929, and included the New Map Room and the 750 seat Lecture Theatre. The extension was formally opened by HRH the Duke of York (later King George VI) at the Centenary Celebrations on 21 October 1930.

The history of the Society was closely allied for many of its earlier years with 'colonial' exploration in Africa, the Indian subcontinent, the polar regions, and central Asia especially. It has been a key associate and supporter of many notable explorers and expeditions, including those of Darwin, Livingstone, Stanley, Scott, Shackleton, Hunt and Hillary. From the middle of the 19th century until the end of World War I, expeditions sponsored by the Royal Geographical Society were frequently front page news, and the opinions of its President and Council would be avidly sought by journalists and editors.

The early history of the Society is inter-linked with the history of British Geography, exploration and discovery. Information, maps, charts and knowledge gathered on expeditions was sent to the RGS, making up its now unique geographical collections. The Society published its first journal in 1831 and from 1855, accounts of meetings and other matters were published in the Society Proceedings. In 1893, this was replaced by The Geographical Journal which is still published today.

The Society was also pivotal in establishing Geography as a teaching and research discipline in British universities, and funded the first Geography positions in the Universities of Oxford and Cambridge.

۲۰۱۲Poster for exhibition in the glass Pavilion on centenary of Scott's final expedition to the South Pole

With the advent of a more systematic study of geography, the Institute of British Geographers (IBG) was formed in 1933, by some academic Society fellows, as a sister body to the Society. Its activities included organising conferences, field trips, seminars and specialist research groups. Its journal, Transactions of the Institute of British Geographers, is now one of the foremost international journals of geographical research, publishing 'landmark' research from across the discipline.

The RGS and IBG co-existed for 60 years until 1992 when a merger was discussed. In 1994, members were balloted and the merger agreed. In January 1995, the new Royal Geographical Society (with the Institute of British Geographers) was formed.

Today the RGS-IBG is a voice and home for geography, both nationally and internationally. It is the largest Geographical Society in Europe and one of the largest in the world. It operates on a regional scale, with eight branches in the UK and one in Hong Kong.

It supports and promotes many aspects of geography including geographical research, education and teaching, field training and small expeditions, the public understanding and popularisation of Geography, and the provision of geographical information. The Society also works together with other existing bodies serving the geographical community, in particular the Geographical Association and the Royal Scottish Geographical Society.

In 2004, The Society's historical Collections relating to scientific exploration and research, which are of national and international importance, were opened to the public for the first time. In the same year, a new category of membership was introduced to widen access for people with a general interest in geography. The new Foyle Reading Room and glass Pavilion exhibition space were also opened to the public in 2004 – unlocking the Society intellectually, visually and physically for the 21st century. For example, in 2012 the RGS held an exhibition, in the glass Pavilion, of photographs taken by Herbert Ponting on Captain Robert Falcon Scott's expedition to the South Pole in 1912.[2[

Governance and past Presidents

Council

Statue of Shackleton by Charles Sargeant Jagger outside the society headquarters

The Society is governed by its Board of trustees called the Council, which is chaired by its President. The members of Council and the President are elected from its Fellowship. The council consists of 36 members, 22 of which are elected by Fellows and serve for a three year term. In addition to the elected trustees, there are Honorary members (who include the Duke of Kent as Honorary President) who sit on the council.

Committees

The society has five specialist committees that it derives advice from

- *Education Committee*
- *Research Committee*
- *Expedition and Fieldwork Committee*
- *Information Resources Committee*
- *Finance Committee*

Longer list at Presidents of the Royal Geographical Society.

Membership

There are four categories of individual membership:

Ordinary membership

Anyone with an interest in geography is eligible to apply to become a member of the RGS-IBG.

Young Geographer

People aged between 14 and 24 currently studying, a recent graduate of geography or a related subject.

Fellowship

Fellowship of the Society is conferred to anyone over 21 who has a deep involvement with geography (through research, publication, profession, etc.) or who has been an ordinary member of the society for five previous years. The applicant must be proposed and seconded by existing Fellows and elected by the Council. Fellows are granted the right to use the initials "F.R.G.S." after their names.

Postgraduate Fellow of the Society

Is open to anyone who is a postgraduate student in Geography or an allied subject at a United Kingdom university.

Chartered Geographer

Since 2002 the Society has been granted the power to award the status of Chartered Geographer. The status of Chartered Geographer can be obtained only by those who have a degree in geography or related subject and at least 6 years' geographical experience, or 15 years' geographical work experience for those without a degree. Being awarded the status of Chartered Geographer allows the use of the post-nominal letters C Geog and is evidence of a commitment to continuing professional development and the highest professional standards.

Chartered Geographer (Teacher) is a professional accreditation available to teachers who can demonstrate competence, experience and professionalism in the use of geographical knowledge or skills in and out of the classroom, and who are committed to maintaining their professional standards through ongoing continuing professional development (CPD.(

Research groups

The Society's Research and Study Groups bring together active researchers and professional geographers in particular areas of geography. There are 27 active research groups, with each group organising their own seminars, conferences, workshops and other activities.[3[

Research groups

Biogeography Research Group British Geomorphic Research Group

Climate Change Research Group Contract Research and Teaching Forum

Developing Areas Research Group Economic geography Research Group

Geographical Information Science Research Group Geography of Health Research Group

Geography of Lesiure and Tourism Research Group Higher Education Research Group

Historical Geography Research Group History and Philosophy of Geography Research Group

Mountain Research Group Participatory Geographies Working Group

Planning and Environment Research Group Political Geography Research Group

Population geography Research Group Postgraduate Forum

The Post-Socialist Geographies Research Group Quantitative Methods Research Group

Rural Geography Research Group Social and Cultural Geography Research Group

Space Sexualities and Queer Research Group Transport Geography Research Group

Urban geography Research Group Women and Geography Research Group

Awards and grants

The society also presents many awards to geographers that have contributed to the advancement of geography.[4[

The most prestigious of these awards are the Gold Medals (Founder's Medal 1830 and the Patron's Medal 1838). The award is given for "the encouragement and promotion of geographical science and discovery", and are approved by Queen Elizabeth II. The awards originated as an annual gift of fifty guineas from King William IV, first made in 1831, "to constitute a premium for the encouragement and promotion of geographical science and discovery". The Society decided in 1839 to change this monetary award into two gold medals: Founder's Medal and the Patron's. The award has been given to notable geographers including David Livingstone (1855), Nain Singh Rawat (1876),[5] Baron Ferdinand von Richthofen (1878), Alfred Russel Wallace (1892), and Frederick Courtney Selous (1893) to more recent winners including Professor William Morris Davis (1919), Sir Halford John Mackinder (1945), Professor L. Dudley Stamp (1949), Professor Richard Chorley (1987) and Professor David Harvey (1995). In 2004 Harish Kapadia was awarded the Patron's Medal for contributions to geographical discovery and mountaineering in the Himalayas, making him the second Indian to receive the award in its history. In 2005 the Founder's Medal was awarded to Professor Sir Nicholas Shackleton for his research in the field of Quaternary Palaeoclimatology and the Patron's Medal was awarded to Professor Jean Malaurie for a lifelong study of the Arctic and its people. In 1902 they awarded khan Bahadur Sher Jang a Sword of Honour (the Black Memorial) in recognition of his valuable services to geography

In total the society awards 17 medals and awards including Honorary Membership and Fellowships. Some of the other awards given by the Society include:

The Victoria Medal (1902) for "conspicuous merit in research in Geography"

The Murchison Award (1882) for the "publication judged to contribute most to geographical science in preceding recent years"

The Back Award (1882) for "applied or scientific geographical studies which make an outstanding contribution to the development of national or international public policy"

The Busk Medal for "conservation research or for fieldwork abroad in Geography or in a geographical aspect of an allied science"

The Cuthbert Peak Award (1883) for "those advancing geographical knowledge of human impact on the environment through the application of contemporary methods, including those of earth observation and mapping"

The Edward Heath Award (1984) for "for geographical research in either Europe or the developing world"

The society also offers 16 grants for various purposes ranging from established researcher grants to expedition and fieldwork teams to photography and media grants. The Ralph Brown and the Gilchrist Fieldwork grants are the largest grants awarded by the society each worth £15,000.

National Geographic Society

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National Geographic Society

Logo of the National Geographic Society

Logo of the National Geographic Society

Abbreviation NGS

Motto "Inspiring people to care about the planet."[1[

Formation Gardiner Greene Hubbard, January 27, 1888 (124 years ago(

Location Washington, D.C., USA

Membership ۸.۵million

Chairman John M. Fahey, Jr.

Main organ Board of Trustees

Website NationalGeographic.com

Not to be confused with American Geographical Society.

The National Geographic Society (NGS), headquartered in Washington, D.C. in the United States, is one of the largest non-profit scientific and educational institutions in the world. Its interests include geography, archaeology and natural science, the promotion of environmental and historical conservation, and the study of world culture and history. The National Geographic Society's logo is a yellow portraitframe – rectangular in shape – which appears on the margins surrounding the front covers of its magazines and as its television channel logo.

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Overview

A dancer of the cafes, Algeria, 1917 photograph from the National Geographic Magazine

Geographic Society's historical mission is "to increase and diffuse geographic knowledge while promoting the conservation of the world's cultural, historical, and natural resources."[2] Its purpose is to inspire people to care about their planet, according to John M. Fahey, Jr., President and CEO since March 1998 and Chairman since January 2010. The Society is governed by a Board of Trustees whose 22 members include distinguished educators, business executives, former government officials, and conservationists.

The organization sponsors and funds scientific research and exploration. The Society publishes an official journal, National Geographic Magazine, in 34 languages. It also publishes other magazines, books, school products, maps, other publications, and web and film products in numerous languages and countries. Its educational foundation gives grants to education organizations and individuals to improve geography education.[3] Its Committee for Research and Exploration, which has given grants for scientific research for most of the Society's history, recently awarded its 10,000th such grant.

Its various media properties reach about 360 million people monthly.[4] National Geographic maintains a museum for the public in its Washington, D.C., headquarters. It has helped to sponsor popular traveling exhibits, such as an early 2010s "King Tut" exhibit featuring magnificent artifacts from the tomb of the young Egyptian Pharaoh; "The Cultural Treasures of Afghanistan" which opened in May 2008 and traveled to other cities for 18 months; and an exhibition of China's Terracotta Warriors in its Washington headquarters in 2009–10.

In November 2008, National Geographic opened a major retail store in London.

History

The official diploma presented to Italian Admiral Ernesto Burzagli when he was awarded membership in the National Geographic Society in 1928.

The National Geographic Society began as a club for an elite group of academics and wealthy patrons interested in travel.[5] On January 13, 1888, 33 explorers and scientists gathered at the Cosmos Club, a private club then located on Lafayette Square in Washington, D.C., to organize "a society for the increase and diffusion of geographical knowledge." After preparing a constitution and a plan of organization, the National Geographic Society was incorporated two weeks later on January 27. Gardiner Greene Hubbard became its first president and his son-in-law, Alexander Graham Bell, eventually succeeded him in 1897 following his death. In 1899 Bell's son-in-law Gilbert Hovey Grosvenor was named the first full-time editor of National Geographic Magazine and served the organization for fifty-five years (1954), and members of the Grosvenor family have played important roles in the organization since.

Bell and his son-in-law, Grosvenor, devised the successful marketing notion of Society membership and the first major use of photographs to tell stories in magazines. The current Chairman of the Board of Trustees of National Geographic is Gilbert Melville Grosvenor, who received the Presidential Medal of Freedom in 2005 for the Society's leadership for Geography education. In 2004, the National Geographic Headquarters in Washington, D.C. was one of the first buildings to receive a "Green" certification[6] from Global Green USA.[7] The National Geographic received the prestigious Prince of Asturias Award for Communications and Humanity in October 2006 in Oviedo, Spain.

Publications

National Geographic

Main article: National Geographic (magazine(

Cover of January 1915 National Geographic

The National Geographic Magazine, later shortened to National Geographic, published its first issue (October 1888) nine months after the Society was founded as the Society's official

journal, a benefit for joining the tax exempt National Geographic Society. The magazine has had for many years a trademarked yellow border around the edge of its cover.

There are 12 monthly issues of National Geographic per year, plus at least four additional map supplements. On rare occasions, special issues of the magazine are also created. The magazine contains articles about geography, popular science, world history, culture, current events and photography of places and things all over the world and universe. The National Geographic magazine is currently published in 32 language editions in many countries around the world. Combined English and other language circulation is nearly nine million monthly with more than fifty million readers monthly.

Other publications

In addition to its flagship magazine, the Society publishes six other periodicals in the United States:

National Geographic Kids: launched in 1975 as National Geographic World, it adopted its current name in 2001. It has a U.S. circulation of over 1.5 million. There are also currently 18 local language editions of NG Kids, with another half million in circulation. An Arabic edition of the children's magazine was launched in Egypt in early 2007, and more than 42,000 copies are distributed to all the public schools in Egypt, in addition to another 15,000 single copy sales. More recently, an Albanian and Polish edition were launched.

National Geographic Little Kids: for children aged 3–6

National Geographic Traveler: launched in 1984. There are 15 local-language editions of NG Traveler.

National Geographic Adventure: launched in 1999

National Geographic Explorer: classroom magazine launched in 2001 as National Geographic for Kids, which has grown to about 2½ million circulation.

National Geographic Green Guide: Launched in 2003, tips to consumers of how to live a "greener" life. The print version was discontinued in January 2009.[8[

Glimpse Magazine (in association with National Geographic(

National Geographic Exploring History, which made its debut in Fall, 2011

Treasures of the Earth a collection about minerals and gemstones

The Society also runs an online news outlet called National Geographic News.

The Society previously published:

The National Geographic School Bulletin, magazine similar to the National Geographic but aimed at grade school children, was published weekly during the school year from 1919 to 1975, when it was replaced by National Geographic World.

During the 1980s and 1990s, it published a research journal which later closed.

The Society has published maps, atlases, filmstrips, and numerous books. It also lends its license to other publishers, for example to Thames & Kosmos for a line of science kits.

In October 2007, National Geographic created a new Global Media group composed of its magazine, book publishing, television, film, music, radio, digital media and maps units. Tim Kelly, 51, president and CEO of National Geographic Ventures, has been named president, Global Media.

Main article: National Geographic Channel

Programs by the National Geographic Society are also broadcast on television. National Geographic television specials as well as television series have been aired on PBS and other networks in the United States and globally for many years. The Geographic series in the U.S. started on CBS in 1964, moved to ABC in 1973 and shifted to PBS (produced by WQED, Pittsburgh) in 1975. National Geographic Channel, launched in January 2001, is a joint venture of National Geographic Television & Film and Fox Cable Networks. It has featured stories on numerous scientific figures such as Louis Leakey, Jacques Cousteau, or Jane Goodall that not only featured their work but helped make them world-famous and accessible to millions. A majority of the specials were narrated by various actors, including Glenn Close, Stacy Keach, Richard Kiley, Susan Sarandon, Alexander Scourby, Martin Sheen and Peter Strauss. The specials' theme music, by Elmer Bernstein, was also adopted by the National Geographic Channel. The National Geographic Channel has begun to launch a number of subbranded channels in international markets, such as Nat Geo Wild, Nat Geo Adventure, Nat Geo Junior, and Nat Geo Music.

National Geographic Films, a wholly owned taxable subsidiary of the National Geographic Society, has also produced a feature film based on the diary of a Russian submarine commander starring Harrison Ford in K-19: The Widowmaker, and most recently retooling a French-made documentary for U.S. distribution with a new score and script narrated by Morgan Freeman called March of the Penguins, which received an Academy Award for the Best Documentary in 2006. After a record $77 million theatrical gross in the United States, over four million DVD copies of March of the Penguins have been sold. National Geographic Films launched a new feature film in July 2007 called Arctic Tale, featuring the story of two families of walrus and polar bears. Queen Latifah is the narrator of this film. Inspired by a National Geographic Magazine article, National Geographic opened a 3-D large format and Reality 3-D film called Sea Monsters, with a musical score by Peter Gabriel, in October of that year. National Geographic Films is co-producing with Edward Norton and Brad Pitt the 10-hour mini series of Steven Ambrose's award-winning Undaunted Courage: Meriwether Lewis, Thomas Jefferson and the Opening of the American West for HBO.

Other ventures

The Society currently licenses its trademark to The Vitec Group, a British photo and video equipment company best known as owner of the well-known Manfrotto brand. Vitec sells a line of camera bags and camera supports (tripods, monopods, and heads) under the National Geographic name and trademark.

Support for research and projects

National Geographic Society's Administration Building in Washington, D.C.

The Society has helped sponsor many expeditions and research projects over the years, including:

Codex Tchacos – Conservation and translation of the only known surviving copy of the Gospel of Judas

Ian Baker – Discovers hidden waterfall of the Tsangpo Gorge, Tibet

Robert Ballard – RMS Titanic (1985) and John F. Kennedy's PT-109 (2002) discovery

Robert Bartlett – Arctic Exploration (1925–45(

George Bass – Underwater archaeology – Bronze Age trade

Lee Berger – Oldest footprints of modern humans ever found

Hiram Bingham – Machu Picchu Excavation (1915(

Richard E. Byrd – First flight over South Pole (1929(

Jacques-Yves Cousteau – Undersea exploration

Mike Fay – MegaTransect (1999) and MegaFlyover (2004) in Africa

Dian Fossey – Mountain gorillas

Birute Galdikas – Orangutans

Jane Goodall – Chimpanzees

Robert F. Griggs – Valley of Ten Thousand Smokes (1916(

Heather Halstead – World Circumnavigations of Reach the World

Louis and Mary Leakey – Discovery of manlike Zinjanthropus, more than 1.75 million years old

Gustavus McLeod – First flight to the North Pole in an open-air cockpit aircraft

Robert Peary and Matthew Henson – North Pole Expedition (1905(

Paul Sereno – Dinosaurs

Will Steger – Polar Exploration & First Explorer-in-Residence 1996[9[

Spencer Wells – The Genographic Project

Xu Xing – Discovery of fossil dinosaurs in China that have distinct feathers

The Society supports many socially based projects including AINA, a Kabul-based organization dedicated to developing an independent Afghan media, which was founded by one of the Society's most famous photographers, Reza.

The Society also sponsors the National Geographic Bee, an annual geographic contest for American middle-school students. More than four million students a year begin the geography competition locally, which culminates in a national competition of the winners of each state each May in Washington, D.C. Alex Trebek, host of Jeopardy!, has moderated the final competition since the competition began some seventeen years ago. Every two years, the Society conducts an international geography competition of competing teams from all over the world. The most recent was held in Mexico City on July 15, 2009, and had representatives from 15 national teams. The team from Canada emerged as the winner, with teams from the United States and Poland in second and third place.

Awards

Hubbard Medal

Anne Morrow Lindbergh's customized medal detailing her flight route

The Hubbard Medal is awarded by the National Geographic Society for distinction in exploration, discovery, and research. The medal is named for Gardiner Greene Hubbard, the first National Geographic Society president. The Hubbard Medal has been presented 35 times as of 2010, the most recent award going to Don Walsh.

Alexander Graham Bell Medal

Not to be confused with IEEE Alexander Graham Bell Medal.

The National Geographic Society also awards, rarely, the Alexander Graham Bell Medal, for exceptional contributions to geographic research. The award is named after Alexander Graham Bell, scientist, inventor and the second president of the NGS. Up to mid-2011, the medal has been twice

Health geography

From Wikipedia, the free encyclopedia

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Hepatitis A prevalence worldwide, 2005.

Health geography is the application of geographical information, perspectives, and methods to the study of health, disease, and health care.

Contents

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۲ *History of health geography*
۳ *Areas of study*
۳.۱ *Geography of Health Care Provision*
۴ *Health Geographers*
۵ *See also*
۶ *References*
۷ *External links*

Overview

Adopting a socio-ecological rather than the bio-medical model, health geography adopts a more holistic approach, emphasizing treatment of the whole person and not just components of the system. Under this model, new illnesses (e.g., mental ill health) are recognised, and other types of medicine (e.g., complementary or alternative medicine) are combined with traditional medicine.

This alternative methodological approach means that medical geography is broadened to incorporate philosophies such as structuration, structuralism, social interactionism, feminism, et cetera. Thus the field of health geography was born.

History of health geography

A classic piece of research in health geography was done in 1854 as a cholera outbreak gripped a neighborhood in London. Death tolls rang around the clock and the people feared that they were being infected by vapors coming from the ground. John Snow thought that if he could locate the source of the disease, it could be contained. He drew maps showing the homes of people who had died of cholera and the locations of water pumps. He found that one pump, the public pump on Broad Street, was central to most of the victims. He figured that infected water from the pump was the culprit. He instructed the authorities to remove the handle to the pump, making it unusable. After that the number of new cholera cases decreased.

Areas of study

Health geography can provide a spatial understanding of a population's health, the distribution of disease in an area, and the environment's effect on health and disease. It deals also with accessibility to health care and spatial distribution of health care providers. The field is considered a subdiscipline of human geography, however, it requires an understanding of other fields such as epidemiology, climatology.

Geography of Health Care Provision

Although health care is a public good, it is not equally available to all individuals. The geography of health care provision has much to do with this. Demand for public services is continuously distributed across space, broadly in accordance with the distribution of population, but these services are only provided at discrete locations. Inevitably therefore, there will be inequalities of access in terms of the practicality of using services, transport costs, travel times and so on. Geographical or 'locational' factors (e.g. physical proximity, travel time) are not the only aspects which influence access to health care. Other types (or dimensions) of accessibility to health care except for geographical (or spatial) are social, financial and functional. Social accessibility to health care depends on race (like separate hospitals for white and black people), age, sex and other social characteristics of individuals, important here is also relationship between patient and the doctor. Financial depends upon the price

of a particular health care and functional reflects the amount and structure of provided services. This can vary among different countries or regions of the world. Access to health care is influenced also by factors such as opening times and waiting lists that play an important part in determining whether individuals or population sub-groups can access health care – this type of accessibility is termed 'effective accessibility.'

The location of health care facilities depends largely on the nature of the health care system in operation, and will be heavily influenced by historical factors due to the heavy investment costs in facilities such as hospitals and surgeries. Simple distance will be mediated by organisational factors such as the existence of a referral system by which patients are directed towards particular parts of the hospital sector by their GP. Access to primary care is therefore a very significant component of access to the whole system. In a 'planned' health care system, we would expect the distribution of facilities to fairly closely match the distribution of demand. By contrast, a market-oriented system might mirror the locational patterns that we find in other business sectors, such as retail location. We may attempt to measure either potential accessibility or revealed accessibility, but we should note that there is a well-established pattern of utilisation increasing with access, i.e. people who have easier access to health care use it more often.

Regional geography

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Geography

History of geograph

Graeco-Roman

Chinese

Islamic

Age of Discovery

History of cartography

Environmental determinism

Regional geography

Quantitative revolution

Critical geography

OrteliusWorldMap.jpeg

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This article is incomplete. Please help to improve the article, or discuss the issue on the talk page. (January 2011(

این قسمت که برجسته شده متن کنکور سال ۱۳۹۱ می باشد.

Regional geography is the study of world regions. Attention is paid to unique characteristics of a particular region such as natural elements, human elements, and regionalization which covers the techniques of delineating space into regions.

Regional geography is also a certain approach to geographical study, comparable to quantitative geography or critical geography. This approach prevailed during the second half of the 19th century and the first half of the 20th century, a period when then regional geography paradigm was central within the geographical sciences. It was later criticised for its descriptiveness and the lack of theory. Strong criticism was leveled against it in particular during the 1950s and the quantitative revolution. Main critics were G. H. T. Kimble[1] and Fred K. Schaefer.[2/

The regional geography paradigm has had an impact on many other geographical sciences, including economic geography and

geomorphology. Regional geography is still taught in some universities as a study of the major regions of the world, such as Northern and Latin America, Europe, and Asia and their countries. In addition, the notion of a city-regional approach to the study of geography gained some credence in the mid-1990s through the work of geographers such as Saskia Sassen, although it was also criticized, for example by Peter Storper.

Notable figures in regional geography were Alfred Hettner in Germany, with his concept of chorology; Paul Vidal de la Blache in France, with the possibilism approach (possibilism being a softer notion than environmental determinism); and, in the United States, Richard Hartshorne with his concept of areal differentiation.

Some geographers have also attempted to reintroduce a certain amount of regionalism since the 1980s. This involves a complex definition of regions and their interactions with other scales.[3[

Cultural ecology

From Wikipedia, the free encyclopedia

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Cultural ecology is the study of human adaptations to social and physical environments. Human adaptation refers to both biological and cultural processes that enable a population to survive and reproduce within a given or changing environment.[1] This may be carried out diachronically (examining entities that existed in different epochs), or synchronically (examining a present system and its components). The central argument is that the natural environment, in small scale or subsistence societies dependent in part upon it - is a major contributor to social organization and other human institutions.

In the academic realm, when combined with study of political economy, the study of economies as polities, it becomes political ecology, another academic subfield. It also helps interrogate historical events like the Easter Island Syndrome.

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۲ *Cultural ecology in anthropology*

۳ *Cultural ecology as a transdisciplinary project*

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Coining the term

Anthropologist Julian Steward (1902-1972) coined the term, envisioning cultural ecology as a methodology for understanding how humans adapt to such a wide variety of environments. In his Theory of Culture Change: The Methodology of Multilinear Evolution (1955), cultural ecology

represents the "ways in which culture change is induced by adaptation to the environment." A key point is that any particular human adaptation is in part historically inherited and involves the technologies, practices, and knowledge that allow people to live in an environment. This means that while the environment influences the character of human adaptation, it does not determine it. In this way, Steward wisely separated the vagaries of the environment from the inner workings of a culture that occupied a given environment. Viewed over the long term, this means that environment and culture are on more or less separate evolutionary tracks and that the ability of one to influence the other is dependent on how each is structured.

It is this assertion - that the physical and biological environment affects culture - that has proved controversial, because it implies an element of environmental determinism over human actions, which some social scientists find problematic, particularly those writing from a Marxist perspective. Cultural ecology recognizes that ecological locale plays a significant role in shaping the cultures of a region.

Steward's method was to:

document the technologies & methods used to exploit the environment - to get a living from it.

look at patterns of human behavior/culture associated with using the environment.

assess how much these patterns of behavior influenced other aspects of culture (e.g., how, in a drought-prone region, great concern over rainfall patterns meant this became central to everyday life, and led to the development of a religious belief system in which rainfall and water figured very strongly. This belief system may not appear in a society where good rainfall for crops can be taken for granted, or where irrigation was practiced.(

Steward's concept of cultural ecology became widespread among anthropologists and archaeologists of the mid-20th century, though they would later be critiqued for their environmental determinism. Cultural ecology was one of the central tenets and driving factors in the development of processual archaeology in the 1960s, as archaeologists understood cultural change through the framework of technology and its effects on environmental adaptation.

Cultural ecology in anthropology

Cultural ecology as developed by Steward is a major subdiscipline of anthropology. It derives from the work of Franz Boas and has branched out to cover a number of aspects of human society, in particular the distribution of wealth and power in a society, and how that affects such behaviour as hoarding or gifting (e.g. the tradition of the potlatch on the Northest North American coast.(

Cultural ecology as a transdisciplinary project

One recent conception of cultural ecology is as a general theory that regards ecology as a paradigm not only for the natural and human sciences, but for cultural studies as well. In his Die Ökologie des Wissens (The Ecology of Knowledge), Peter Finke explains that this theory brings together the various cultures of knowledge that have evolved in history, and that have been separated into more and more specialized disciplines and subdisciplines in the evolution of modern science (Finke 2005). In this view, cultural ecology considers the sphere of human culture not as separate from but as interdependent with and transfused by ecological processes and natural energy cycles. At the same time, it recognizes the relative independence and self-reflexive dynamics of cultural processes. As the dependency of culture on nature, and the ineradicable presence of nature in culture, are gaining interdisciplinary attention, the difference between cultural evolution and natural evolution is increasingly acknowledged by cultural ecologists. Rather than genetic laws, information and communication have become major driving forces of cultural evolution (see Finke 2005, 2006). Thus, causal deterministic laws do not apply to culture in a strict sense, but there are nevertheless productive analogies that can be drawn between ecological and cultural processes.

Gregory Bateson was the first to draw such analogies in his project of an Ecology of Mind (Bateson 1973), which was based on general principles of complex dynamic life processes, e.g. the concept of feedback loops, which he saw as operating both between the mind and the world and within the mind itself. Bateson thinks of the mind neither as an autonomous metaphysical force nor as a mere neurological function of the brain, but as a "dehierarchized concept of a mutual dependency between the (human) organism and its (natural) environment, subject and object, culture and nature", and thus as "a synonym for a cybernetic system of information circuits that are relevant for the survival of the species." (Gersdorf/ Mayer 2005: 9.(

Finke fuses these ideas with concepts from systems theory. He describes the various sections and subsystems of society as 'cultural ecosystems' with their own processes of production, consumption, and reduction of energy (physical as well as psychic energy). This also applies to the cultural ecosystems of art and of literature, which follow their own internal forces of selection and self-renewal, but also have an important function within the cultural system as a whole (see next section.(

Cultural ecology in literary studies

The vital interrelatedness between culture and nature has been a special focus of literary culture from its archaic beginnings in myth, ritual, and oral story-telling, in legends and fairy tales, in the genres of pastoral literature, nature poetry. Important texts in this tradition include the stories of mutual transformations between human and nonhuman life, most famously collected in Ovid's Metamorphoses, which became a highly influential text throughout literary history and across different cultures. This attention to culture-nature interaction became especially prominent in the era of romanticism, but continues to be characteristic of literary stagings of human experience up to the present. The mutual opening and symbolic reconnection of culture and nature, mind and body, human and nonhuman life in a holistic and yet radically pluralistic way seems to be one significant mode in which literature functions and in which literary knowledge is produced.

From this perspective, literature can itself be described as the symbolic medium of a particularly powerful form of "cultural ecology" (Zapf 2002). Literary texts have staged and explored, in ever new scenarios, the complex feedback relationship of prevailing cultural systems with the needs and manifestations of human and nonhuman "nature." From this paradoxical act of creative regression they have derived their specific power of innovation and cultural self-renewal.

German ecocritic Hubert Zapf argues that literature draws its cognitive and creative potential from a threefold dynamics in its relationship to the larger cultural system: as a "cultural-critical metadiscourse," an "imaginative counterdiscourse," and a "reintegrative interdiscourse" (Zapf 2001, 2002). It is a textual form which breaks up ossified social structures and ideologies, symbolically empowers the marginalized, and reconnects what is culturally separated. In that way, literature counteracts economic, political or pragmatic forms of interpreting and instrumentalizing human life, and breaks up one-dimensional views of the world and the self, opening them up towards their repressed or excluded other. Literature is thus, on the one hand, a sensorium for what goes wrong in a society, for the biophobic, life-paralyzing implications of one-sided forms of consciousness and civilizational uniformity, and it is, on the other hand, a medium of constant cultural self-renewal, in which the neglected biophilic energies can find a symbolic space of expression and of (re-)integration into the larger ecology of cultural discourses. This approach has been applied and widened in a recent volume of essays by scholars from over the world (Zapf 2008.(

Cultural ecology in geography

In geography, cultural ecology developed in response to the "landscape morphology" approach of Carl O. Sauer. Sauer's school was criticized for being unscientific and holding an [what? missing text] of cultural ecology applied ideas from ecology and systems theory to understand the adaptation of humans to their environment. These cultural ecologists focused on flows of energy and

materials, examining how beliefs and institutions in a culture regulated its interchanges with the natural ecology that surrounded it. In this perspective humans were as much a part of the ecology as any other organism. Important practitioners of this form of cultural ecology include Karl Butzer and David Stoddard.

The second form of cultural ecology introduced decision theory from agricultural economics, particularly inspired by the works of Alexander Chayanov and Ester Boserup. These cultural ecologists were concerned with how human groups made decisions about how they use their natural environment. They were particularly concerned with the question of agricultural intensification, refining the competing models of Thomas Malthus and Boserup. Notable cultural ecologists in this second tradition include Harold Brookfield and Billie Lee Turner II.

Starting in the 1980s, cultural ecology came under criticism from political ecology. Political ecologists charged that cultural ecology ignored the connections between the local-scale systems they studied and the global political economy. Today few geographers self-identify as cultural ecologists, but ideas from cultural ecology have been adopted and built on by political ecology, land change science, and sustainability science.

Conceptual views of culture and ecology

The Human Species

Books about culture and ecology began to emerge in the 1950s and 1960s. One of the first to be published in the United Kingdom was The Human Species by a zoologist, Anthony Barnett. It came out in 1950-subtitled The biology of man but was about a much narrower subset of topics. It dealt with the cultural bearing of some outstanding areas of environmental knowledge about health and disease, food, the sizes and quality of human populations, and the diversity of human types and their abilities. Barnett's view was that his selected areas of information "....are all topics on which knowledge is not only desirable, but for a twentieth-century adult, necessary". He went on to point out some of the concepts underpinning human ecology towards the social problems facing his readers in the 1950s as well as the assertion that human nature cannot change, what this statement could mean, and whether it is true. The third chapter deals in more detail with some aspects of human genetics.

Then come five chapters on the evolution of man, and the differences between groups of men (or races) and between individual men and women today in relation to population growth (the topic of 'human diversity'). Finally, there is a series of chapters on various aspects of human populations (the topic of "life and death"). Like other animals man must, in order to survive, overcome the dangers of starvation and infection; at the same time he must be fertile. Four chapters therefore deal with food, disease and the growth and decline of human populations.

Barnett anticipated that his personal scheme might be criticised on the grounds that it omits an account of those human characteristics, which distinguish humankind most clearly, and sharply from other animals. That is to say, the point might be expressed by saying that human behaviour is ignored; or some might say that human psychology is left out, or that no account is taken of the human mind. He justified his limited view, not because little importance was attached to what was left out, but because the omitted topics were so important that each needed a book of similar size even for a summary account. In other words, the author was embedded in a world of academic specialists and therefore somewhat worried about taking a partial conceptual, and idiosyncratic view of the zoology of Homo sapiens.

The Ecology of Man

Moves to produce prescriptions for adjusting human culture to ecological realities were also afoot in North America. Paul Sears, in his 1957 Condon Lecture at the University of Oregon, titled "The Ecology of Man," he mandated "serious attention to the ecology of man" and demanded "its skillful application to human affairs." Sears was one of the few prominent ecologists to successfully

write for popular audiences. Sears documents the mistakes American farmers made in creating conditions that led to the disastrous Dust Bowl. This book gave momentum to the soil conservation movement in the United States.

Man's Impact on Nature

During this same time was J.A. Lauwery's Man's Impact on Nature, which was part of a series on 'Interdependence in Nature' published in 1969. Both Russel's and Lauwerys' books were about cultural ecology, although not titled as such. People still had difficulty in escaping from their labels. Even Beginnings and Blunders, produced in 1970 by the polymath zoologist Lancelot Hogben, with the subtitle Before Science Began, clung to anthropology as a traditional reference point. However, its slant makes it clear that 'cultural ecology' would be a more apt title to cover his wide-ranging description of how early societies adapted to environment with tools, technologies and social groupings. In 1973 the physicist Jacob Bronowski produced The Ascent of Man, which summarised a magnificent thirteen part BBC television series about all the ways in which humans have moulded the Earth and its future.

Changing the Face of the Earth

By the 1980s the human ecological-functional view had prevailed. It had become a conventional way to present scientific concepts in the ecological perspective of human animals dominating an overpopulated world, with the practical aim of producing a greener culture. This is exemplified by I. G. Simmons book Changing the Face of the Earth, with its telling subtitle "Culture, Environment History" which was published in 1989. Simmons was a geographer, and his book was a tribute to the influence of W.L Thomas' edited collection, Man's role in 'Changing the Face of the Earth that came out in 1956.

Simmons' book was one of many interdisciplinary culture/environment publications of the 1970s and 1980s, which triggered a crisis in geography with regards its subject matter, academic sub-divisions, and boundaries. This was resolved by officially adopting conceptual frameworks as an approach to facilitate the organisation of research and teaching that cuts cross old subject divisions. Cultural ecology is in fact a conceptual arena that has, over the past six decades allowed sociologists, physicists, zoologists and geographers to enter common intellectual ground from the sidelines of their specialist subjects.

Relationship in the 21st Century

In the first decade of the 21st century, there are publications dealing with the ways in which humans can develop a more acceptable cultural relationship with the environment. An example is sacred ecology, a sub-topic of cultural ecology, produced by Fikret Berkes in 1999. It seeks lessons from traditional ways of life in Northern Canada to shape a new environmental perception for urban dwellers. This particular conceptualisation of people and environment comes from various cultural levels of local knowledge about species and place, resource management systems using local experience, social institutions with their rules and codes of behaviour, and a world view through religion, ethics and broadly defined belief systems.

Despite the differences in information concepts, all of the publications carry the message that culture is a balancing act between the mindset devoted to the exploitation of natural resources and that, which conserves them. Perhaps the best model of cultural ecology in this context is, paradoxically, the mismatch of culture and ecology that have occurred when Europeans suppressed the age-old native methods of land use and have tried to settle European farming cultures on soils manifestly incapable of supporting them. There is a sacred ecology associated with environmental awareness, and the task of cultural ecology is to inspire urban dwellers to develop a more acceptable sustainable cultural relationship with the environment that supports them.

Geographic information system

From Wikipedia, the free encyclopedia

) Redirected from Geographic information systems(

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"GIS" redirects here. For other uses, see GIS (disambiguation.(

Geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. The acronym GIS is sometimes used for geographical information science or geospatial information studies to refer to the academic discipline or career of working with geographic information systems.[1] In the simplest terms, GIS is the merging of cartography, statistical analysis, and database technology.

A GIS can be thought of as a system—it digitally creates and "manipulates" spatial areas that may be jurisdictional, purpose, or application-oriented. Generally, a GIS is custom-designed for an organization. Hence, a GIS developed for an application, jurisdiction, enterprise, or purpose may not be necessarily interoperable or compatible with a GIS that has been developed for some other application, jurisdiction, enterprise, or purpose. What goes beyond a GIS is a spatial data infrastructure, a concept that has no such restrictive boundaries.

In a general sense, the term describes any information system that integrates, stores, edits, analyzes, shares, and displays geographic information for informing decision making. GIS applications are tools that allow users to create interactive queries (user-created searches), analyze spatial information, edit data in maps, and present the results of all these operations.[2] Geographic information science is the science underlying geographic concepts, applications, and systems.[3[

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Applications

GIS is a relatively broad term, that can refer to a number of technologies and processes, so it is attached to many operations, in engineering, planning, management, transport/logistics and analysis.

History of development

One of the first applications of spatial analysis in epidemiology is the 1832 "Rapport sur la marche et les effets du choléra dans Paris et le département de la Seine".[4] The French geographer Charles Picquet represented the 48 districts of the city of Paris by halftone color gradient according to the percentage of deaths by cholera per 1,000 inhabitants.

In 1854 John Snow depicted a cholera outbreak in London using points to represent the locations of some individual cases, possibly the earliest use of a geographic methodology in epidemiology.[5] His study of the distribution of cholera led to the source of the disease, a contaminated water pump (the Broad Street Pump, whose handle he had disconnected, thus terminating the outbreak) within the heart of the cholera outbreak.

E. W. Gilbert's version (1958) of John Snow's 1855 map of the Soho cholera outbreak showing the clusters of cholera cases in the London epidemic of 1854

While the basic elements of topography and theme existed previously in cartography, the John Snow map was unique, using cartographic methods not only to depict but also to analyze clusters of geographically dependent phenomena.

The early 20th century saw the development of photozincography, which allowed maps to be split into layers, for example one layer for vegetation and another for water. This was particularly used for printing contours – drawing these was a labour intensive task but having them on a separate layer meant they could be worked on without the other layers to confuse the draughtsman. This work was originally drawn on glass plates but later plastic film was introduced, with the advantages of being lighter, using less storage space and being less brittle, among others. When all the layers were finished, they were combined into one image using a large process camera. Once colour printing came in, the layers idea was also used for creating separate printing plates for each colour. While the use of layers much later became one of the main typical features of a contemporary GIS, the photographic process just described is not considered to be a GIS in itself – as the maps were just images with no database to link them to.

Computer hardware development spurred by nuclear weapon research led to general-purpose computer "mapping" applications by the early 1960s.[6[

The year 1960 saw the development of the world's first true operational GIS in Ottawa, Ontario, Canada by the federal Department of Forestry and Rural Development. Developed by Dr. Roger Tomlinson, it was called the Canada Geographic Information System (CGIS) and was used to store, analyze, and manipulate data collected for the Canada Land Inventory – an effort to determine the land capability for rural Canada by mapping information about soils, agriculture, recreation, wildlife, waterfowl, forestry and land use at a scale of 1:50,000. A rating classification factor was also added to permit analysis.

CGIS was an improvement over "computer mapping" applications as it provided capabilities for overlay, measurement, and digitizing/scanning. It supported a national coordinate system that spanned the continent, coded lines as arcs having a true embedded topology and it stored the attribute and locational information in separate files. As a result of this, Tomlinson has become known as the "father of GIS", particularly for his use of overlays

in promoting the spatial analysis of convergent geographic data.[7[

CGIS lasted into the 1990s and built a large digital land resource database in Canada. It was developed as a mainframe-based system in support of federal and provincial resource planning and management. Its strength was continent-wide analysis of complex datasets. The CGIS was never available commercially.

In 1964 Howard T. Fisher formed the Laboratory for Computer Graphics and Spatial Analysis at the Harvard Graduate School of Design (LCGSA 1965–1991), where a number of important theoretical concepts in spatial data handling were developed, and which by the 1970s had distributed seminal software code and systems, such as SYMAP, GRID, and ODYSSEY – that served as sources for subsequent commercial development—to universities, research centers and corporations worldwide.[8[

By the early 1980s, M&S Computing (later Intergraph) along with Bentley Systems Incorporated for the CAD platform, Environmental Systems Research Institute (ESRI), CARIS (Computer Aided Resource Information System), and ERDAS (Earth Resource Data Analysis System) emerged as commercial vendors of GIS software, successfully incorporating many of the CGIS features, combining the first generation approach to separation of spatial and attribute information with a second generation approach to organizing attribute data into database structures. In parallel, the development of two public domain systems (MOSS and GRASS GIS) began in the late 1970s and early 1980s.[9[

By the end of the 20th century, the rapid growth in various systems had been consolidated and standardized on relatively few platforms and users were beginning to explore viewing GIS data over the Internet, requiring data format and transfer standards. More recently, a growing number of free, open-source GIS packages run on a range of operating systems and can be customized to perform specific tasks. Increasingly geospatial data and mapping applications are being made available via the world wide web.[10[

Several authoritative articles on the history of GIS have been published.[11][12[

GIS techniques and technology

Modern GIS technologies use digital information, for which various digitized data creation methods are used. The most common method of data creation is digitization, where a hard copy map or survey plan is transferred into a digital medium through the use of a CAD program, and geo-referencing capabilities. With the wide availability of ortho-rectified imagery (both from satellite and aerial sources), heads-up digitizing is becoming the main avenue through which geographic data is extracted. Heads-up digitizing involves the tracing of geographic data directly on top of the aerial imagery instead of by the traditional method of tracing the geographic form on a separate digitizing tablet (heads-down digitizing.(

Relating information from different sources

GIS uses spatio-temporal (space-time) location as the key index variable for all other information. Just as a relational database containing text or numbers can relate many different tables using common key index variables, GIS can relate unrelated information by using location as the key index variable. The key is the location and/or extent in space-time.

Any variable that can be located spatially, and increasingly also temporally, can be referenced using ahdhjda GIS. Locations or extents in Earth space–time may be recorded as dates/times of occurrence, and x, y, and z coordinates representing, longitude, latitude, and elevation, respectively. These GIS coordinates may represent other quantified systems of temporo-spatial reference (for example, film frame number, stream gage station, highway mile-marker, surveyor benchmark, building address, street intersection,

entrance gate, water depth sounding, POS or CAD drawing origin/units). Units applied to recorded temporal-spatial data can vary widely (even when using exactly the same data, see map projections), but all Earth-based spatial–temporal location and extent references should, ideally, be relatable to one another and ultimately to a "real" physical location or extent in space–time.

Related by accurate spatial information, an incredible variety of real-world and projected past or future data can be analyzed, interpreted and represented to facilitate education and decision making.[13] This key characteristic of GIS has begun to open new avenues of scientific inquiry into behaviors and patterns of previously considered unrelated real-world information.

GIS uncertainties

GIS accuracy depends upon source data, and how it is encoded to be data referenced. Land surveyors have been able to provide a high level of positional accuracy utilizing the GPS-derived positions.[14] the high-resolution digital terrain and aerial imagery,[15] the powerful computers, Web technology, are changing the quality, utility, and expectations of GIS to serve society on a grand scale, but nevertheless there are other source data that has an impact on the overall GIS accuracy like: paper maps that are not found to be very suitable to achieve the desired accuracy since the aging of maps affects their dimensional stability.

In developing a digital topographic data base for a GIS, topographical maps are the main source of Aerial photography and satellite images are extra sources for collecting data and identifying attributes which can be mapped in layers over a location facsimile of scale. The scale of a map and geographical rendering area representation type are very important aspects since the information content depends mainly on the scale set and resulting locatability of the map's representations. In order to digitize a map, the map has to be checked within theoretical dimensions, then scanned into a raster format, and resulting raster data has to be given a theoretical dimension by a rubber sheeting/warping technology process.

A quantitative analysis of maps brings accuracy issues into focus. The electronic and other equipment used to make measurements for GIS is far more precise than the machines of conventional map analysis.[16] All geographical data are inherently inaccurate, and these inaccuracies will propagate through GIS operations in ways that are difficult to predict.

Data representation

Main article: GIS file formats

GIS data represents real objects (such as roads, land use, elevation, trees, waterways, etc.) with digital data determining the mix. Real objects can be divided into two abstractions: discrete objects (e.g., a house) and continuous fields (such as rainfall amount, or elevations). Traditionally, there are two broad methods used to store data in a GIS for both kinds of abstractions mapping references: raster images and vector. Points, lines, and polygons are the stuff of mapped location attribute references. A new hybrid method of storing data is that of identifying point clouds, which combine three-dimensional points with RGB information at each point, returning a "3D color image". GIS thematic maps then are becoming more and more realistically visually descriptive of what they set out to show or determine.

Data capture

Example of hardware for mapping (GPS and laser rangefinder) and data collection (rugged computer). The current trend for GIS is that accurate mapping and data analysis are completed while in the field. Depicted hardware (field-map technology) is used mainly for forest inventories, monitoring and mapping.

Data capture—entering information into the system—consumes much of the time of GIS practitioners. There are a variety of methods used to enter data into a GIS where it is stored in a digital format.

Existing data printed on paper or PET film maps can be digitized or scanned to produce digital data. A digitizer produces vector data as an operator traces points, lines, and polygon boundaries from a map. Scanning a map results in raster data that could be further processed to produce vector data.

Survey data can be directly entered into a GIS from digital data collection systems on survey instruments using a technique called coordinate geometry (COGO). Positions from a global navigation satellite system (GNSS) like Global Positioning System can also be collected and then imported into a GIS. A current trend in data collection gives users the ability to utilize field computers with the ability to edit live data using wireless connections or disconnected editing sessions. This has been enhanced by the availability of low-cost mapping-grade GPS units with decimeter accuracy in real time. This eliminates the need to post process, import, and update the data in the office after fieldwork has been collected. This includes the ability to incorporate positions collected using a laser rangefinder. New technologies also allow users to create maps as well as analysis directly in the field, making projects more efficient and mapping more accurate.

Remotely sensed data also plays an important role in data collection and consist of sensors attached to a platform. Sensors include cameras, digital scanners and LIDAR, while platforms usually consist of aircraft and satellites. Recently with the development of Miniature UAVs, aerial data collection is becoming possible at much lower costs, and on a more frequent basis. For example, the Aeryon Scout was used to map a 50-acre area with a Ground sample distance of 1 inch (2.54 cm) in only 12 minutes.[17[

The majority of digital data currently comes from photo interpretation of aerial photographs. Soft-copy workstations are used to digitize features directly from stereo pairs of digital photographs. These systems allow data to be captured in two and three dimensions, with elevations measured directly from a stereo pair using principles of photogrammetry. Analog aerial photos must be scanned before being entered into a soft-copy system, for high-quality digital cameras step is skipped.

Satellite remote sensing provides another important source of spatial data. Here satellites use different sensor packages to passively measure the reflectance from parts of the electromagnetic spectrum or radio waves that were sent out from an active sensor such as radar. Remote sensing collects raster data that can be further processed using different bands to identify objects and classes of interest, such as land cover.

When data is captured, the user should consider if the data should be captured with either a relative accuracy or absolute accuracy, since this could not only influence how information will be interpreted but also the cost of data capture.

After entering data into a GIS, the data usually requires editing, to remove errors, or further processing. For vector data it must be made "topologically correct" before it can be used for some advanced analysis. For example, in a road network, lines must connect with nodes at an intersection. Errors such as undershoots and overshoots must also be removed. For scanned maps, blemishes on the source map may need to be removed from the resulting raster. For example, a fleck of dirt might connect two lines that should not be connected.

Raster-to-vector translation

Data restructuring can be performed by a GIS to convert data into different formats. For example, a GIS may be used to convert a satellite image map to a vector structure by generating lines around all cells with the same classification, while determining the cell spatial relationships, such as adjacency or inclusion.

More advanced data processing can occur with image processing, a technique developed in the late

1960s by NASA and the private sector to provide contrast enhancement, false colour rendering and a variety of other techniques including use of two dimensional Fourier transforms. Since digital data is collected and stored in various ways, the two data sources may not be entirely compatible. So a GIS must be able to convert geographic data from one structure to another.

Projections, coordinate systems, and registration

Main article: Map Projection

The earth can be represented by various models, each of which may provide a different set of coordinates (e.g., latitude, longitude, elevation) for any given point on the Earth's surface. The simplest model is to assume the earth is a perfect sphere. As more measurements of the earth have accumulated, the models of the earth have become more sophisticated and more accurate. In fact, there are models called datums that apply to different areas of the earth to provide increased accuracy, like NAD27 for U.S. measurements, and the World Geodetic System for worldwide measurements.

Spatial analysis with GIS

GIS spatial analysis is a rapidly changing field, and GIS packages are increasingly including analytical tools as standard built-in facilities, as optional toolsets, as add-ins or 'analysts'. In many instances these are provided by the original software suppliers (commercial vendors or collaborative non commercial development teams), whilst in other cases facilities have been developed and are provided by third parties. Furthermore, many products offer software development kits (SDKs), programming languages and language support, scripting facilities and/or special interfaces for developing one's own analytical tools or variants. The website "Geospatial Analysis" and associated book/ebook attempt to provide a reasonably comprehensive guide to the subject.[18] The increased availability has created a new dimension to business intelligence termed "spatial intelligence" which, when openly delivered via intranet, democratizes access to geographic and social network data. GIS spatial analysis has also become a key element for security intelligence GEOINT.

Slope and aspect

Slope can be defined as the steepness or gradient of a unit of terrain, usually measured as an angle in degrees or as a percentage. Aspect can be defined as the direction in which a unit of terrain faces. Aspect is usually expressed in degrees from north. Slope, aspect, and surface curvature in terrain analysis are all derived from neighborhood operations using elevation values of a cell's adjacent neighbours.[19] Slope is a function of resolution, and the spatial resolution used to calculate slope and aspect should always be specified.[20] Authors such as Skidmore,[21] Jones[22] and Zhou and Liu[23] have compared techniques for calculating slope and aspect.

The following method can be used to derive slope and aspect:

The elevation at a point or unit of terrain will have perpendicular tangents (slope) passing through the point, in an east-west and north-south direction. These two tangents give two components, ∂z/∂x and ∂z/∂y, which then be used to determine the overall direction of slope, and the aspect of the slope. The gradient is defined as a vector quantity with components equal to the partial derivatives of the surface in the x and y directions.[24[

The calculation of the overall 3x3 grid slope S and aspect A for methods that determine east-west and north-south component use the following formulas respectively:

\tan S = \sqrt{\left (\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2 {

\tan A = \left ({\frac{\left ({\frac{-\partial z}{\partial y}}\right)}{\left ({\frac{\partial z}{\partial x}}\right)}}\right(

Zhou and Liu[23] describe another algorithm for calculating aspect, as follows:

A = 270^\circ + \arctan \left ({\frac{\left ({\frac{\partial z}{\partial x}}\right)}{\left ({\frac{\partial z}{\partial y}}\right)}}\right) - 90^\circ \left ({\frac {\left ({\frac {\partial z}{\partial y}}\right)}{\left |{\frac {\partial z}{\partial y}}\right |}}\right(

Data analysis

It is difficult to relate wetlands maps to rainfall amounts recorded at different points such as airports, television stations, and high schools. A GIS, however, can be used to depict two- and three-dimensional characteristics of the Earth's surface, subsurface, and atmosphere from information points. For example, a GIS can quickly generate a map with isopleth or contour lines that indicate differing amounts of rainfall.

Such a map can be thought of as a rainfall contour map. Many sophisticated methods can estimate the characteristics of surfaces from a limited number of point measurements. A two-dimensional contour map created from the surface modeling of rainfall point measurements may be overlaid and analyzed with any other map in a GIS covering the same area.

Additionally, from a series of three-dimensional points, or digital elevation model, isopleth lines representing elevation contours can be generated, along with slope analysis, shaded relief, and other elevation products. Watersheds can be easily defined for any given reach, by computing all of the areas contiguous and uphill from any given point of interest. Similarly, an expected thalweg of where surface water would want to travel in intermittent and permanent streams can be computed from elevation data in the GIS.

Topological modeling

A GIS can recognize and analyze the spatial relationships that exist within digitally stored spatial data. These topological relationships allow complex spatial modelling and analysis to be performed. Topological relationships between geometric entities traditionally include adjacency (what adjoins what), containment (what encloses what), and proximity (how close something is to something else.(

Geometric Networks

Geometric networks are linear networks of objects that can be used to represent interconnected features, and to perform special spatial analysis on them. A geometric network is composed of edges, which are connected at junction points, similar to graphs in mathematics and computer science. Just like graphs, networks can have weight and flow assigned to its edges, which can be used to represent various interconnected features more accurately. Geometric networks are often used to model road networks and public utility networks, such as electric, gas, and water networks. Network modeling is also commonly employed in transportation planning, hydrology modeling, and infrastructure modeling.

Hydrological modeling

GIS hydrological models can provide a spatial element that other hydrological models lack, with the analysis of variables such as slope, aspect and watershed or catchment area.[25] Terrain analysis is fundamental to hydrology, since water always flows down a slope.[25] As basic terrain analysis of a digital elevation model (DEM) involves calculation of slope and aspect, DEMs are very useful for hydrological analysis. Slope and aspect can then be used to determine direction of surface runoff, and hence flow accumulation for the formation of streams, rivers and lakes. Areas of divergent flow can also give a clear indication of

the boundaries of a catchment. Once a flow direction and accumulation matrix has been created, queries can be performed that show contributing or dispersal areas at a certain point.[25] More detail can be added to the model, such as terrain roughness, vegetation types and soil types, which can influence infiltration and evapotranspiration rates, and hence influencing surface flow. One of the main uses of hydrological modeling is in environmental contamination research.

Cartographic modeling

An example of use of layers in a GIS application. In this example, the forest cover layer (light green) is at the bottom, with the topographic layer over it. Next up is the stream layer, then the boundary layer, then the road layer. The order is very important in order to properly display the final result. Note that the pond layer was located just below the stream layer, so that a stream line can be seen overlying one of the ponds.

The term "cartographic modeling" was probably coined by Dana Tomlin in his PhD dissertation and later in his book which has the term in the title. Cartographic modeling refers to a process where several thematic layers of the same area are produced, processed, and analyzed. Tomlin used raster layers, but the overlay method (see below) can be used more generally. Operations on map layers can be combined into algorithms, and eventually into simulation or optimization models.

Map overlay

The combination of several spatial datasets (points, lines, or polygons) creates a new output vector dataset, visually similar to stacking several maps of the same region. These overlays are similar to mathematical Venn diagram overlays. A union overlay combines the geographic features and attribute tables of both inputs into a single new output. An intersect overlay defines the area where both inputs overlap and retains a set of attribute fields for each. A symmetric difference overlay defines an output area that includes the total area of both inputs except for the overlapping area.

Data extraction is a GIS process similar to vector overlay, though it can be used in either vector or raster data analysis. Rather than combining the properties and features of both datasets, data extraction involves using a "clip" or "mask" to extract the features of one data set that fall within the spatial extent of another dataset.

In raster data analysis, the overlay of datasets is accomplished through a process known as "local operation on multiple rasters" or "map algebra," through a function that combines the values of each raster's matrix. This function may weigh some inputs more than others through use of an "index model" that reflects the influence of various factors upon a geographic phenomenon.

Geostatistics

Main article: Geostatistics

Geostatistics is a branch of statistics that deals with field data, spatial data with a continuous index. It provides methods to model spatial correlation, and predict values at arbitrary locations (interpolation.(

When phenomena are measured, the observation methods dictate the accuracy of any subsequent analysis. Due to the nature of the data (e.g. traffic patterns in an urban environment; weather patterns over the Pacific Ocean), a constant or dynamic degree of precision is always lost in the measurement. This loss of precision is determined from the scale and distribution of the data collection.

To determine the statistical relevance of the analysis, an average is determined so that points (gradients) outside of any immediate measurement can be included to determine their predicted behavior. This is due to the limitations of the applied statistic and data collection methods, and interpolation is required to predict the behavior of particles, points, and locations that are not directly measurable.

Hillshade model derived from a Digital Elevation Model of the Valestra area in the northern Apennines (Italy(

Interpolation is the process by which a surface is created, usually a raster dataset, through the input of data collected at a number of sample points. There are several forms of interpolation, each which treats the data differently, depending on the properties of the data set. In comparing interpolation methods, the first consideration should be whether or not the source data will change (exact or approximate). Next is whether the method is subjective, a human interpretation, or objective. Then there is the nature of transitions between points: are they abrupt or gradual. Finally, there is whether a method is global (it uses the entire data set to form the model), or local where an algorithm is repeated for a small section of terrain.

Interpolation is a justified measurement because of a spatial autocorrelation principle that recognizes that data collected at any position will have a great similarity to, or influence of those locations within its immediate vicinity.

Digital elevation models, triangulated irregular networks, edge-finding algorithms, Thiessen polygons, Fourier analysis, (weighted) moving averages, inverse distance weighting, kriging, spline, and trend surface analysis are all mathematical methods to produce interpolative data.

Address geocoding

Main article: Geocoding

Geocoding is interpolating spatial locations (X,Y coordinates) from street addresses or any other spatially referenced data such as ZIP Codes, parcel lots and address locations. A reference theme is required to geocode individual addresses, such as a road centerline file with address ranges. The individual address locations have historically been interpolated, or estimated, by examining address ranges along a road segment. These are usually provided in the form of a table or database. The software will then place a dot approximately where that address belongs along the segment of centerline. For example, an address point of 500 will be at the midpoint of a line segment that starts with address 1 and ends with address 1,000. Geocoding can also be applied against actual parcel data, typically from municipal tax maps. In this case, the result of the geocoding will be an actually positioned space as opposed to an interpolated point. This approach is being increasingly used to provide more precise location information.

Reverse geocoding

Reverse geocoding is the process of returning an estimated street address number as it relates to a given coordinate. For example, a user can click on a road centerline theme (thus providing a coordinate) and have information returned that reflects the estimated house number. This house number is interpolated from a range assigned to that road segment. If the user clicks at the midpoint of a segment that starts with address 1 and ends with 100, the returned value will be somewhere near 50. Note that reverse geocoding does not return actual addresses, only estimates of what should be there based on the predetermined range.

Multiple Criteria Decision Analysis

Coupled with GIS, Multi-Criteria Decision Analysis methods support decision-makers in analysing a set of alternative spatial solutions, such as the most likely ecological habitat for restoration, against multiple criteria, such as vegetation cover or roads. MCDA uses decision rules to aggregate the criteria, which allows the alternative solutions to be ranked or prioritised.[26] GIS MCDA may reduce costs and time involved in identifying potential restoration sites.

Data output and cartography

Cartography is the design and production of maps, or visual representations of spatial data. The vast

majority of modern cartography is done with the help of computers, usually using GIS but production quality cartography is also achieved by importing layers into a design program to refine it. Most GIS software gives the user substantial control over the appearance of the data.

Cartographic work serves two major functions:

First, it produces graphics on the screen or on paper that convey the results of analysis to the people who make decisions about resources. Wall maps and other graphics can be generated, allowing the viewer to visualize and thereby understand the results of analyses or simulations of potential events. Web Map Servers facilitate distribution of generated maps through web browsers using various implementations of web-based application programming interfaces (AJAX, Java, Flash, etc.(.

Second, other database information can be generated for further analysis or use. An example would be a list of all addresses within one mile (1.6 km) of a toxic spill.

Graphic display techniques

Traditional maps are abstractions of the real world, a sampling of important elements portrayed on a sheet of paper with symbols to represent physical objects. People who use maps must interpret these symbols. Topographic maps show the shape of land surface with contour lines or with shaded relief.

Today, graphic display techniques such as shading based on altitude in a GIS can make relationships among map elements visible, heightening one's ability to extract and analyze information. For example, two types of data were combined in a GIS to produce a perspective view of a portion of San Mateo County, California.

The digital elevation model, consisting of surface elevations recorded on a 30-meter horizontal grid, shows high elevations as white and low elevation as black.

The accompanying Landsat Thematic Mapper image shows a false-color infrared image looking down at the same area in 30-meter pixels, or picture elements, for the same coordinate points, pixel by pixel, as the elevation information.

A GIS was used to register and combine the two images to render the three-dimensional perspective view looking down the San Andreas Fault, using the Thematic Mapper image pixels, but shaded using the elevation of the landforms. The GIS display depends on the viewing point of the observer and time of day of the display, to properly render the shadows created by the sun's rays at that latitude, longitude, and time of day.

An archeochrome is a new way of displaying spatial data. It is a thematic on a 3D map that is applied to a specific building or a part of a building. It is suited to the visual display of heat-loss data.

Spatial ETL

Spatial ETL tools provide the data processing functionality of traditional Extract, Transform, Load (ETL) software, but with a primary focus on the ability to manage spatial data. They provide GIS users with the ability to translate data between different standards and proprietary formats, whilst geometrically transforming the data en route.

GIS Data Mining

GIS or spatial data mining is the application of data mining methods to spatial data. Data mining, which is the partially automated search for hidden patterns in large databases, offers great potential benefits for applied GIS-based decision making. Typical applications including environmental monitoring. A characteristic of such applications is that spatial correlation between data

measurements require the use of specialized algorithms for more efficient data analysis.[27[

GIS developments

GeaBios – tiny WMS/WFS client (Flash/DHTML(

Many disciplines can benefit from GIS technology. An active GIS market has resulted in lower costs and continual improvements in the hardware and software components of GIS. These developments will, in turn, result in a much wider use of the technology[original research?] throughout science, government, business, and industry, with applications including real estate, public health, crime mapping, national defense, sustainable development, natural resources, landscape architecture, archaeology, regional and community planning, transportation and logistics. GIS is also diverging into location-based services, which allows GPS-enabled mobile devices to display their location in relation to fixed assets (nearest restaurant, gas station, fire hydrant), mobile assets (friends, children, police car) or to relay their position back to a central server for display or other processing. These services continue to develop with the increased integration of GPS functionality with increasingly powerful mobile electronics (cell phones, PDAs, laptops).[28[

OGC standards

Main article: Open Geospatial Consortium

The Open Geospatial Consortium is an international industry consortium of 384 companies, government agencies, universities, and individuals participating in a consensus process to develop publicly available geoprocessing specifications. Open interfaces and protocols defined by OpenGIS Specifications support interoperable solutions that "geo-enable" the Web, wireless and location-based services, and mainstream IT, and empower technology developers to make complex spatial information and services accessible and useful with all kinds of applications. Open Geospatial Consortium protocols include Web Map Service, and Web Feature Service.[29[

GIS products are broken down by the OGC into two categories, based on how completely and accurately the software follows the OGC specifications.

OGC standards help GIS tools communicate.

Compliant Products are software products that comply to OGC's OpenGIS Specifications. When a product has been tested and certified as compliant through the OGC Testing Program, the product is automatically registered as "compliant" on this site.

Implementing Products are software products that implement OpenGIS Specifications but have not yet passed a compliance test. Compliance tests are not available for all specifications. Developers can register their products as implementing draft or approved specifications, though OGC reserves the right to review and verify each entry.

Web mapping

Main article: Web mapping

In recent years there has been an explosion of mapping applications on the web such as Google Maps and Bing Maps. These websites give the public access to huge amounts of geographic data.

Some of them, like Google Maps and OpenLayers, expose an API that enable users to create custom applications. These toolkits commonly offer street maps, aerial/satellite imagery, geocoding, searches, and routing functionality. Other applications for publishing geographic information on the web include Cadcorp's GeognoSIS, ESRI's ArcIMS Server, Google Earth, Google Fusion Tables, and the open source alternatives of MapServer, Mapnik, and GeoServer.

Global climate change, climate history program and prediction of its impact

Maps have traditionally been used to explore the Earth and to exploit its resources. GIS technology, as an expansion of cartographic science, has enhanced the efficiency and analytic power of traditional mapping. Now, as the scientific community recognizes the environmental consequences of anthropogenic activities influencing climate change, GIS technology is becoming an essential tool to understand the impacts of this change over time.[30] GIS enables the combination of various sources of data with existing maps and up-to-date information from earth observation satellites along with the outputs of climate change models. This can help in understanding the effects of climate change on complex natural systems. One of the classic examples of this is the study of Arctic Ice Melting.

The outputs from a GIS in the form of maps combined with satellite imagery allow researchers to view their subjects in ways that literally never have been seen before. The images are also invaluable for conveying the effects of climate change to non-scientists.

Adding the dimension of time

The condition of the Earth's surface, atmosphere, and subsurface can be examined by feeding satellite data into a GIS. GIS technology gives researchers the ability to examine the variations in Earth processes over days, months, and years. As an example, the changes in vegetation vigor through a growing season can be animated to determine when drought was most extensive in a particular region. The resulting graphic, known as a normalized vegetation index, represents a rough measure of plant health. Working with two variables over time would then allow researchers to detect regional differences in the lag between a decline in rainfall and its effect on vegetation.

GIS technology and the availability of digital data on regional and global scales enable such analyses. The satellite sensor output used to generate a vegetation graphic is produced for example by the Advanced Very High Resolution Radiometer (AVHRR). This sensor system detects the amounts of energy reflected from the Earth's surface across various bands of the spectrum for surface areas of about 1 square kilometer. The satellite sensor produces images of a particular location on the Earth twice a day. AVHRR and more recently the Moderate-Resolution Imaging Spectroradiometer (MODIS) are only two of many sensor systems used for Earth surface analysis. More sensors will follow, generating ever greater amounts of data.

In addition to the integration of time in environmental studies, GIS is also being explored for its ability to track and model the progress of humans throughout their daily routines. A concrete example of progress in this area is the recent release of time-specific population data by the U.S. Census. In this data set, the populations of cities are shown for daytime and evening hours highlighting the pattern of concentration and dispersion generated by North American commuting patterns. The manipulation and generation of data required to produce this data would not have been possible without GIS.

Using models to project the data held by a GIS forward in time have enabled planners to test policy decisions using Spatial Decision Support Systems.

Critical geography

Critical geography takes a critical theory (Frankfurt School) approach to the study and analysis of geography. The development of critical geography can be seen as one of the four major turning points in the history of geography (the other three being environmental determinism, regional geography and quantitative revolution). Though post-positivist approaches remain important in geography the critical geography arose as a critique of positivism introduced by quantitative revolution.

Two main schools of thought emerged from human geography and one existing school (behavioural geography) which made a brief comeback. Behavioural geography sought to counter the perceived tendency of quantitative geography to deal with humanity as a statistical phenomenon. It

flourished briefly during the 1970s and sought to provide a greater understanding of how people perceived places and made locational decisions and sought to challenge mathematical models of society, in particular the use of econometric techniques. But the lack of a sound theoretical base left behavioural geography open to critique as merely descriptive and amounting to little more than a listing of spatial preferences.

Radical geography emerged during the 1970s and 1980s as the inadequacies of behavioralist methods became clear. It sought to counter the positivist quantitative methods with normative techniques drawn from Marxist theory: quantitative methods, it argued, were not useful unless alternatives or solutions were given to problems.

The final and, arguably, most successful of the three schools was humanistic geography, initially formed part of behavioural geography but fundamentally disagreed with the use of quantitative methods in assessing human behaviour and thoughts in favour of qualitative analysis. Humanistic geography used many of the techniques that the humanities use such as source analysis and the use of text and literature to try to 'get into the mind' of the subject(s). Furthermore, Cultural geography revived due to humanistic geography new areas of study such as Feminist geography, postmodernist and poststructuralist geography began to emerge.

Behavioral geography

Behavioral geography is an approach to human geography that examines human behavior using a disaggregate approach. Behavioral geographers focus on the cognitive processes underlying spatial reasoning, decision making, and behavior. In addition, behavioral geography is an ideology/approach in human geography that makes use of the methods and assumptions of behaviorism to determine the cognitive processes involved in an individual's perception of, and/or response and reaction to their environment.

Behavioral geography is that branch of human science, which deals with the study of cognitive processes with its response to its environment, through behaviorism.

Issues in behavioral geography

Because of the name it is often assumed to have its roots in behaviorism. While some behavioral geographers clearly have roots in behaviorism[1][2] due to the emphasis on cognition, most can be seen as cognitively oriented. Indeed, it seems that behaviorism interest is more recent[3] and growing.[1] This is particularly true in the area of human landscaping.

Behavioral geography draws from early behaviorist works such as Tolman's concepts of "cognitive maps". More cognitively oriented, behavioral geographers focus on the cognitive processes underlying spatial reasoning, decision making, and behavior. More behaviorally oriented geographers are materialists and look at the role of basic learning processes and how they influence the landscape patterns or even group identity.[4[

The cognitive processes include environmental perception and cognition, wayfinding, the construction of cognitive maps, place attachment, the development of attitudes about space and place, decisions and behavior based on imperfect knowledge of one's environs, and numerous other topics.

The approach adopted in behavioral geography is closely related to that of psychology, but draws on research findings from a multitude of other disciplines including economics, sociology, anthropology, transportation planning, and many others.

Feminist geography

Feminist geography is an approach in human geography which applies the theories, methods and

critiques of feminism to the study of the human environment, society and geographical space.[1[

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Areas of study

Rather than a specific sub-discipline of Geography, feminist geography is often considered part of a broader postmodern, critical theory approach, often drawing from the theories of Michel Foucault, Jacques Derrida, and Judith Butler among others. More recent influences include critiques of feminism from postcolonial theorists. Feminist geographers often focus on the lived experiences of individuals and groups in their own localities, upon the geographies that they live in within their own communities, rather than theoretical development without empirical work.[1[

Many feminist geographers study the same subjects as other geographers, but often with a focus on gender divisions.[2] This concern has developed into a concern with wider issues of gender, family, sexuality, race and class. Examples of areas of focus which stem from this include:

Geographic differences in gender relations and gender equality

The geography of women - spatial constraints, welfare geography

The construction of gender identity through the use and nature of spaces and places

Geographies of sexuality. (See also: Queer theory(

Children's geographies

In addition to societal studies, Feminist Geography also critiques Human Geography and other academic disciplines, arguing that academic structures have been traditionally characterized by a patriarchal perspective, and that contemporary studies which do not confront the nature of previous work reinforce the masculine bias of academic study.[3] The British Geographer Gillian Rose's Feminism and Geography[1] is one such sustained criticism, focused on Human Geography in Britain as being historically masculinist in its approach. This includes the writing of landscape as feminine (and thus as subordinate to male geographers), assuming a separation between mind and body. The following is referenced from Johnston & Sidaway (2004)[4], and further describes such a separation and its influence on geography:

'" Cartesian dualism underlines our thinking in a myriad of ways, not least in the divergence of the social sciences from the natural sciences, and in a geography which is based on the separation of people from their environments. Thus while geography is unusual in its spanning of the natural and social sciences and in focusing on the interralations between people and their environments, it is still assumed that the two are distinct and one acts on the other. Geography, like all of the social sciences, has been built upon a particular conception of mind and body which sees them as separate, apart and acting on each other (Johnston, 1989, cited in Longhurst, 1997, p. 492)' Thus, too, feminist work has sought to transform approaches to the study of landscape by relating it to the way that it is represented ('appreciated' so to speak), in ways that are analogous to the heterosexual male gaze directed towards the female body (Nash 1996). Both of these concerns (and others)- about the body as a contested site and for the Cartesian distinction between mind and body - have been challenged in postmodern and poststructuralist feminist geographies ".

Other Feminist Geographers have interrogated the ways in which the discipline of Geography itself represents and reproduces the heterosexual male gaze. Feminist Geographers such as Katherine McKittrick have asserted pointed critiques of the ways in which we see and understand space are fundamentally bound up in how we understand the hegemonic presence of the white male subject in History, Geography and in the materiality of everyday space. Building off of Sylvia Wynter's theories of the racialized production of public and private space, Katherine McKittrick challenges "social landscapes that presume subaltern populations have no relationship to the production of space" [5] and writes to document black female geographies in order to "allow us to engage with a narrative that locates and draws on black histories and black subjects in order to make visible social lives which are often displaced, rendered ungeographic" (x). [5] McKittrick's feminist approach to Geography stakes claim in the co-articulation of race and gender as they articulate space and she writes, "I am emphasizing here that racism and sexism are not simply bodily or identity based; racism and sexism are also spatial acts and illustrate black women's geographic experiences and knowledges as they are made possible through domination" (xviii).

Cultural geography

Cultural geography is a sub-field within human geography. Cultural geography is the study of cultural products and norms and their variations across and relations to spaces and places. It focuses on describing and analyzing the ways language, religion, economy, government and other cultural phenomena vary or remain constant, from one place to another and on explaining how humans function spatially.[1[

۱ *Areas of study*

۲ *History*

" ۳ *New cultural geography"*

۴ *See also*

۵ *References*

۶ *Further reading*

Areas of study

Globalization and Mall Culture in Jakarta

The areas of study of cultural geography are very broad. Among many applicable topics within the field of study are:

Globalization has been theorised as an explanation for cultural convergence.[2[

Westernization or other similar processes such as modernization, americanization, islamization and others.[3[

Theories of cultural hegemony or cultural assimilation via cultural imperialism.

Cultural areal differentiation, as a study of differences in way of life encompassing ideas, attitudes, languages, practices, institutions and structures of power and whole range of cultural practices in geographical areas.[4[

Study of cultural landscapes and cultural ecology.[5][6[

Other topics include spirit of place, colonialism, post-colonialism, internationalism, immigration, emigration and ecotourism.The word means the study of physical features.

History

Though the first traces of the study of different nations and cultures on Earth can be dated back to ancient geographers such as Ptolemy or Strabo, cultural geography as academic study firstly emerged as an alternative to the environmental determinist theories of the early Twentieth century, which had believed that people and societies are controlled by the environment in which they develop.[7] Rather than studying pre-determined regions based upon environmental classifications, cultural geography became interested in cultural landscapes.[7] This was led by Carl O. Sauer (called the father of cultural geography), at the

University of California, Berkeley. As a result, cultural geography was long dominated by American writers.

Sauer defined the landscape as the defining unit of geographic study. He saw that cultures and societies both developed out of their landscape, but also shaped them too.[8] This interaction between the 'natural' landscape and humans creates the 'cultural landscape'.[9] Sauer's work was highly qualitative and descriptive and was surpassed in the 1930s by the regional geography of Richard Hartshorne, followed by the quantitative revolution. Cultural geography was generally sidelined, though writers such as David Lowenthal continued to work on the concept of landscape.

In the 1970s, the critique of positivism in geography caused geographers to look beyond the quantitative geography for its ideas. One of these re-assessed areas was also cultural geography. However, as in many geographic subdisciplines, post-positivist cultural geography continues playing an important role.

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"New cultural geography"

Since the 1980s, a new cultural geography has emerged, drawing on a diverse set of theoretical traditions, including Marxist political-economic models, feminist theory, post-colonial theory, post-structuralism and psychoanalysis.

Drawing particularly from the theories of Michel Foucault and performativity in western academia, and the more diverse influences of postcolonial theory, there has been a concerted effort to deconstruct the cultural in order to make apparent the various power relations. A particular area of interest is that of identity politics and construction of identity.

Examples of areas of study include:

Feminist geography

Children's geographies

Some parts of Tourism geography

Behavioral geography

Sexuality and space

Some more recent developments in Political geography

Some within the new cultural geography have turned their attention to critiquing some of its ideas, seeing its views on identity and space as static. It has followed the critiques of Foucault made by other 'poststructuralist' theorists such as Michel de Certeau and Gilles Deleuze. In this area, non-representational geography and population mobility research have dominated. Others have attempted to incorporate these critiques back into the new cultural geography.

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Children's geographies

This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. (December 2009(

Children's geographies is an area of study within human geography and Childhood Studies which involves researching the places and spaces of children's lives.

Children's geographies is the branch of human geography which deals with the study of places and spaces of children's lives, characterised experientially, politically and ethically.

Ever since the cultural turn in geography, there has been recognition that society is not homogenous but heterogeneous. It is characterized by diversity, differences and subjectivities. While feminist geographers had been able to strengthen the need for examination of gender, class and race as issues affecting women, 'children' as an umbrella term encompassing children, teenagers, youths and young people, which are still relatively missing a 'frame of reference' in the complexities of 'geographies'. In the act of theorizing children and their geographies, the ways of doing research and the assumed ontological realities often "frame 'children' and 'adults' in ways that impose a bi-polar, hierarchical, and developmental model". This reproduces and enforces the hegemony of adult-centered discourses of children within knowledge production. Children's geographies has developed in academic human geography since the beginning of the 1990s, although there were notable studies in the area before that date. The earliest work done on children's geographies largely can be traced to William Bunge's work on spatial oppression of children in Detroit and Toronto where children are deemed as the ones who suffer the most under an oppressing adult framework of social, cultural and political forces controlling the urban built environment.

This development emerged from the realisation that previously human geography had largely ignored the everyday lives of children, who (obviously) form a significant section of society, and who have specific needs and capacities, and who may experience the world in very different ways. Thus children's geographies can in part be seen in parallel to an interest in gender in geography and feminist geography in so much as their starting points were the gender blindness of mainstream academic geography.

Children's geographies rests on the idea that children as a social group share certain characteristics which are experientially, politically and ethically significant and which are worthy of study. The pluralisation in the title is intended to imply that children's lives will be markedly different in differing times and places and in differing circumstances such as gender, family, and class.The current developments in children's geographies are attempting to link the frame of analysing children's geographies to one that requires multiple perspectives and the willingness to acknowledge the 'multiplicity' of their geographies.

Children's geographies is sometimes coupled with, and yet distinguished from the geographies of childhood. The former has an interest in the everyday lives of children; the latter has an interest in how (adult) society conceives of the very idea of childhood and how this impinges on children's lives in many ways. This includes imaginations about the nature of children and the related (spatial) implications.

There are a whole range of focii with children's geographies including children and the city, children and the countryside, children and technology, children and nature, children and globalisation, methodologies of researching children's worlds and the ethics of doing so; see the otherness of childhood.

There is now a Journal of Children's Geographies[1] which will give readers a good idea of the growing range of issues, theories and methodologies of this developing and vibrant sub-discipline.

Animal geographies

Animal geography is a subfield of the nature-society/human-environment branch of geography as well as a part of the larger, interdisciplinary umbrella of Human-Animal Studies (HAS). Animal geography is defined as the study of "the complex entanglings of human-animal relations with space, place, location, environment and landscape"[1] or "the study of where, when, why and how nonhuman animals intersect with human societies."[2] The Animal Geography Specialty Group of the Association of American Geographers was founded in 2009 by Monica Ogra and Julie Urbanik. The Animal Geography Research Network was founded in 2011 by Daniel Allen.

First Wave of Animal Geography

The first wave of animal geography, known as zoogeography, came to prominence as a geographic subfield from the late 1800s through the early part of the 20th century. During this time the study of animals was seen as a key part of the discipline and the goal was "the scientific study of animal life with reference to the distribution of animals on the earth and the mutual influence of environment and animals upon each other."[3] The animals that were the focus of studies were almost exclusively wild animals and zoogeographers were building on the new theories of evolution and natural selection. They mapped the evolution and movement of species across time and space and also sought to understand how animals adapted to different ecosystems. Key works include Newbigin's Animal Geography[4], Bartholomew, Clarke, and Grimshaw's Atlas of Zoogeography[5], and Allee and Schmidt's Ecological Animal Geography[6.[

By the middle of the 20th century, emerging disciplines such as biology and zoology began taking on the traditional zoogeographic cataloging of species, their distributions, and ecologies. In geography zoogeography exists today as the vibrant subfield of biogeography.

Second Wave of Animal Geography

The middle of the 20th century saw a turn away from zoogeography (while never fully relinquishing it) towards questions about and interest in the impact of humans on wildlife and in human relations with livestock. Two key geographers shaping this wave of animal geography were Carl Sauer and Charles Bennett. Sauer's interest in the cultural landscape – or cultural ecology (how human cultures are shaped and are shaped by their environment) – necessarily involved addressing the topic of animal domestication. In Sauer's research he focused on the history of domestication, and how human uses of livestock shaped the landscape (via fencing, grazing, and shelters)[7]. Bennett called for a 'cultural animal geography' that focused on the interactions of animals and human cultures such as subsistence hunting and fishing[8]. The shift from the first wave to the second wave of animal geography had to do with the species being studied. Second wave animal geography brought domesticated livestock into the view instead of just focusing on wildlife. For the next several decades animal geography, as cultural ecology, was dominated by research into the origins of domestication, cultural rituals around domestication, and different cultures livestock relations (sedentary versus nomadic herding). Key works include Simoons and Simoons' A Ceremonial Ox of India[9], Gades' work on the guinea pig[10], and Cansdale's Animals and Man[11]. Balwin[12] provides an excellent overview of second wave animal geography research.

Third Wave of Animal Geography

In the early 1990s several things happened to cause geographers with an interest in animals and human-animal relations to rethink what was possible within animal geography. The 1980s and early 1990s saw the rise of the world-wide animal advocacy movement addressing everything from pet overpopulation to saving endangered species, exposing cruelty to animals in industrial farming (factory farms or concentrated animal feeding operations), and protesting circuses, the use of fur, and hunting – all an effort to raise the visibility of how humans treat non-human others amongst the general public. In the academy, biologists and ethologists were studying animal behavior and species loss/discovery raising awareness about the experiential lives of animals as well as their perilous existence alongside humans. Social scientists were reassessing what it means to be a subject and breaking into the black box of nature to explore new understandings of the relations between humans and the rest of the planet. Animal geographers realized there was a whole spectrum of human-animal relations that should be addressed from a geographic perspective. At the forefront of this third wave of animal geography was Tuan's work on pets in Dominance and Affection[13] and a special topics issue of the journal Environment and Planning D: Society and Space edited by Wolch and Emel[14.[

The two key features of the third wave of animal geography that distinguish it from the earlier waves are (1) an expanded notion of human-animal relations to include all locations of human-animal encounters (rather than just wildlife or livestock), and (2) attempts to bring in the animals themselves as subjects. Since the 1995 publication there has been an explosion of case studies and theorizing. Three key works that bring together third wave animal geography are Wolch and Emel's Animal

Geographies: Place, Politics and Identity in the Nature-Culture Borderlands[15], Philo and Wilbert's Animal Spaces, Beastly Places: New Geographies of Human-Animal Relations[16], and Urbanik's Placing Animals: An Introduction to the Geography of Human-Animal Relations[17.[

There are presently nine areas of focus within animal geography[18:[

. ۱Theorizing animal geography. Two major works addressing how to think about human-animal relations as a whole are Whatmore's Hybrid Geographies[19] and Hobson's work on political animals through the practice of bear-file farming[20.[

. ۲Urban animal geography. Researchers in this area seek to understand that cities are, historically and today, multi-species spaces. Theoretical work comes from Wolch et al. on what constitutes a transspecies urban theory [21] and Wolch on manifesting a multi-species city[22], along with Philo's work on the historical context for the removal of livestock from the city[23.[

. ۳Ethics and animal geography. How space, place, and time shape what practices on other species are right or wrong is the concern of this area. Articles by Lynn on what he terms geoethics[24] and Jones on what he terms an ethics of encounter[25] are a good place to start.

. ۴Human identities and animals. How humans use animals to identify themselves as humans or to distinguish between human groups has a fascinating geographical history. Brown and Rasmussen examine the issue of bestiality[26], Elder et al. explore how animals are used to discriminate against human groups[27], and Neo studies how ethnicity comes into play with pig production in Malaysia.[28] These are all excellent case studies.

. ۵Animals as subjects. One of the most difficult aspects of studying animals is the fact that they can't talk back to us in human language. Animal geographers have been tackling how, exactly, to address the fact that individuals of other species are experiential entities. Examples include work by Bear on fish[29], Hinchliffe et al. on water voles[30], and Lorimer on nonhuman charisma[31.[

. ۶Pets. One of the most intimate relationships that people have with other species is often through the animals living in their homes. How we have shaped these animals to fit human lifestyles and what this means for negotiating a more-than-human existence is the concern here. Key articles include Fox on dogs[32], Lulka on the American Kennel Club[33], and Nast on critical pet studies[34.[

. ۷Working animals. Human uses of other species as labor are quite extensive both historically and today. From logging elephants to laboratory mice and zoo animals to military dogs and draft animals, the spaces and places of how animals work for us make fascinating geographies. For insight see Anderson's work on zoos[35], Davies' work on virtual zoos[36] and laboratory mice[37], and Urbanik's work on the politics of animal biotechnology[38.[

. ۸Farmed animals. How we raise and farm animals – both as food and for their parts (e.g., fur) – is the largest category of actual use of animals. Research in this area has focused on the development of industrial farming systems, the ethics of consuming animals, and how livestock relations impact notions of place. Buller and Morris discuss farm animal welfare[39], Holloway examines technological advances in dairy production[40], Hovorka looks at urban livestock in Africa[41], and Yarwood et al. explore the livestock landscape[42.[

. ۹Wild animals. To date, animal geographers have done the most work with this category of human-animal relations. From theoretical explorations of wildlife classification to case studies of human-wildlife conflict, wildlife tourism, to particular human-wild animal geographies, this has proven a dynamic avenue. Key articles include Emel's work on wolves[43], Lulka's work on wildlife and mobility[44], Vaccaro and Beltran's work on reintroductions[45], and Whatmore and Thorne's work on relational typologies of wildlife[46.[

Language geography

Language geography is the branch of human geography that studies the geographic distribution of language or its constituent elements. There are two principal fields of study within the geography of language: the "geography of languages", which deals with the distribution through history and space of languages,[1] and "linguistic geography", which deals with regional linguistic variations within languages.[2][3][4][5][6] Various other terms and subdisciplines have been suggested, including; a division within the examination of linguistic geography separating the studies of change over time and space;[7] 'geolinguistics', a study within the geography of language concerned with 'the analysis of the distribution patterns and spatial structures of languages in contact',[8] but none have gained much currency.[6[

Many studies have researched the effect of 'language contact',[9] as the languages or dialects of peoples have interacted.[6] This territorial expansion of language groups has usually resulted in the overlaying of languages upon existing speech areas, rather than the replacement of one language by another. An example could be sought in the Norman Conquest of England, where Old French became the language of the aristocracy, and Middle English remained the language of the majority of the population.[10[

Linguistic geography

Linguistic geography, as a field, is dominated by linguists rather than geographers.[4] Charles Withers describes the difference as resulting from a focus on "elements of language, and only then with their geographical or social variation, as opposed to investigation of the processes making for change in the extent of language areas."[6] To quote Trudgill, "linguistic geography has been geographical only in the sense that it has been concerned with the spatial distribution of linguistic phenomena."[5] In recent times[when?] greater emphasis has been laid upon explanation rather than description of the patterns of linguistic change.[4][6] The move has paralleled similar concerns in geography and language studies.[11] These studies have paid attention to the social use of language, and to variations in dialect within languages in regard to social class or occupation.[12] Regarding such variations, lexicographer Robert Burchfield notes that their nature "is a matter of perpetual discussion and disagreement". As an example, he notes that "most professional linguistic scholars regard it as axiomatic that all varieties of English have a sufficiently large vocabulary for the expression of all the distinctions that are important in the society using it." He contrasts this with the view of the historian Professor John Vincent, who regards such a view as

“ "a nasty little orthodoxy among the educational and linguistic establishment. However badly you need standard English, you will have the merits of non-standard English waved at you. The more extravagantly your disadvantages will be lauded as 'entirely adequate for the needs of their speakers', to cite the author of Sociolinguistics. It may sound like a radical cry to support pidgin, patois, or dialect, but translated into social terms, it looks more like a ploy to keep Them (whoever Them may be) out of the middle-class suburbs."[13 [”

Burchfield concludes that "Resolution of such opposite views is not possible", though the "future of dialect studies and the study of class-marked distinctions are likely to be of considerable interest to everyone".[14[

In England, linguistic geography has traditionally focussed upon rural English, rather than urban English.[15] A common production of linguistic investigators of dialects is the shaded and dotted map showing where one linguistic feature ends and another begins or overlaps. Various compilations of these maps for England have been issued over the years, including Joseph Wright's English Dialect Dictionary (1896–1905), the Survey of English Dialects (1962-8), and The Linguistic Atlas of England (1978).[16

Religion and geography

Religion and geography is the study of the impact of geography, i.e. place and space, on religious belief.[1[

Another aspect of the relationship between religion and geography is religious geography, in which geographical ideas are influenced by religion, such as early map-making, and the biblical geography that developed in the 16th century to identify places from the Bible.[2[

Traditional cultural geographical approaches to the study of religion mainly seek to determine religion's impact on the landscape. A more contemporary approach to the study of the intersections of geography and religion not only highlights the role of religion in effecting landscape changes and in assigning sacred meanings to specific places, but also acknowledges how in turn, religious ideology and practice at specific spaces are guided and transformed by their location.[2[

Religious experiences and the belief in religious meanings transforms physical spaces into sacred spaces. These perceptions and imaginings influence the way such spaces are used, and the personal, spiritual meanings developed in using such sacred spaces. These religiously significant spaces go beyond officially religious/spiritual spaces (such as places of worship) to include non-official religious spaces such as homes, schools and even bodies.[3][4] These works have focused on both material aspects of spaces (such as architectural distinctiveness) and socially constructed spaces (such as rituals and demarcation of sacred spaces) to present religious meaning and significance.

A key focus in the study of sacred places is the politics of identity, belonging and meaning that are ascribed to sacred sites, and the constant negotiations for power and legitimacy. Particularly in multicultural settings, the contestation for legitimacy, public approval, and negotiations for use of particular spaces are at the heart of determining how communities understand, internalise and struggle to compete for the right to practice their religious traditions in public spaces.[2[

Community and identity

Religion may be a starting point to examine issues of ethnic identity formation and the construction of ethnic identity[5] Geographers studying the negotiations of religious identity within various communities are often concenred with the overt articulation of religious identity, for example, how adherents in different locations establish their distinctive (religious and cultural) identities through their own understandings of the religion, and how they externally present their religious adherence (in terms of religious practice, ritual and behaviour). As an overarching theme, the articulation of religious identity is concerned with material aspects of symbolizing religious identity (such as architecture and the establishment of a physical presence), with negotiations and struggles in asserting religious identity in the face of persecution and exclusion and with personal practices of religious ritual and behaviour that re-establishes one's religious identity[3][6][7[

New geographies of religion

As research on geography and religion has grown, one of the new focuses of geographical research examines the rise of religious fundamentalism, and the resulting impact this has on the geographical contexts in which it develops.[8[

In addition, migration processes has resulted in the development of religious pluralism in numerous countries, and the landscape changes that accompanies the movement and settlement of communities defined by religion is a key focus in the study of geography and religion.[9]More work needs to be done to examine the intersections and collisions that occur due to the movement of communities (for example, the migration of Muslim communities to western countries) and highlight how these communities negotiate their religious experiences in new spaces.[5[

Another new area of interest in the study of geography and religion explores different sites of religious practice beyond the 'officially sacred' – sites such as religious schools, media spaces, banking and financial practices (for example, Islamic banking) and home spaces are just some of the different avenues that take into account informal, everyday spaces that intersect with religious practice and meaning. [9]

Development geography

This article may require cleanup to meet Wikipedia's quality standards. No cleanup reason has been specified. Please help improve this article if you can. (January 2008(

High human development

Medium human development

Low human development

Unavailable

)colour-blind compliant map(

Development geography is a branch of geography with reference to the standard of living and quality of life of its human inhabitants. In this context, development is a process of change that affects people's lives. It may involve an improvement in the quality of life as perceived by the people undergoing change.[1] However, development is not always a positive process. Gunder Frank commented on the global economic forces that lead to the development of underdevelopment.[2] This is covered in his dependency theory.

In development geography, geographers study spatial patterns in development. They try to find by what characteristics they can measure development by looking at economic, political and social factors. They seek to understand both the geographical causes and consequences of varying development. Studies compare More Economically Developed Countries (MEDCs) with Less Economically Developed Countries (LEDCs). Additionally variations within countries are looked at such as the differences between northern and southern Italy, the Mezzogiorno.

Within development geography, sustainable development is also studied in an attempt to understand how to meet the needs of the present without compromising the needs of future generations to meet their own needs.[3[

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Quantitative indicators

Quantitative indicators are numerical indications of development.

Economic indicators include GNP (Gross National Product) per capita, unemployment rates, energy consumption and percentage of GNP in primary industries. Of these, GNP per capita is the most used as it measures the value of all the goods and services produced in a country, excluding those produced by foreign companies, hence measuring the economic and industrial development of the country. However, using GNP per capita also has many problems.

It does not take into account the distribution of the money which can often be extremely unequal as in the UAE where oil money has been collected by a rich elite and has not flowed to the bulk of the country.

GNP does not measure whether the money produced is actually improving people's lives and this is important because in many MEDCs there are large increases in wealth over time but only small increases in happiness.

The figure rarely takes into account the unofficial economy, which includes subsistence agriculture and cash-in-hand or unpaid work, which is often substantial in LEDCs. In LEDCs it is often too expensive to accurately collect this data and some governments intentionally or unintentionally release inaccurate figures[citation needed.[

The figure is usually given in US dollars which due to changing currency exchange rates can distort the money's true street value so it is often converted using purchasing power parity (PPP) in which the actual comparative purchasing power of the money in the country is calculated.

Social indications include access to clean water and sanitation (which indicate the level of infrastructure developed in the country) and adult literacy rate, measuring the resources the government has to meet the needs of the people.

Demographic indicators include the birth rate, death rate and fertility rate, which indicate the level of industrialization.[4[

Health indicators (a sub-factor of demographic indicators) include nutrition (calories per day, calories from protein, percentage of population with malnutrition), infant mortality and population per doctor, which indicate the availability of healthcare and sanitation facilities in a country.

Environmental indications include how much a country does for the environment.

Composite indicators

In the table below GDP stands for gross domestic product, which is generally taken to be equal to GNP.

Other composite measures include the PQLI (Physical Quality of Life Index) which was a precursor to the HDI which used infant mortality rate instead of GNP per capita and rated countries from 0 to 100. It was calculated by assigning each country a score of 0 to 100 for each indicator compared with other countries in the world. The average of these three numbers makes the PQLI of a country.

The HPI (Human Poverty Index) is used to calculate the percentage of people in a country who live in relative poverty. In order to better differentiate the number of people in abnormally poor living conditions the HPI-1 is used in developing countries, and the HPI-2 is used in developed countries. The HPI-1 is calculated based on the percentage of people not expected to survive to 40, the adult illiteracy rate, the percentage of people without access to safe water, health services and the percentage of children under 5 who are underweight. The HPI-2 is calculated based on the percentage of people who do not survive to 60, the adult functional illiteracy rate and the percentage of people living below 50% of median personal disposable income.

The GDI (Gender-related Development Index) measures gender equality in a country in terms of life expectancy, literacy rates, school attendance and income.

HDI rank Country GDP per capita

Qualitative indicators

Qualitative indicators include descriptions of living conditions and people's quality of life. They are useful in analysing features that are not easily calculated or measured in numbers such as freedom, corruption or security, which are mainly non-material benefits.

Geographic variations in development

The updated view of the north-south divide. Blue includes G8 nations, developed / first world nations, and Europe

There is a considerable spatial variation in development rates.

Global wealth also increased in material terms, and during the period 1947 to 2000, average per capita incomes tripled as global GDP increased almost tenfold (from $US3 trillion to $US30 trillion)... Over 25% of the 4.5 billion people in LEDCs still have life expectancies below 40 years. More than 80 countries have a lower annual per capita income in 2000 than they did in 1990. The average income in the world's five richest countries is 74 times the level in the world's poorest five, the widest it has ever been. Nearly 1.3 billion people have no access to clean water. About 840 million people are malnourished.

— Stephen Codrington[7[

The most famous pattern in development is the North-South divide. The North-South divide is the divide which separates the rich North or the developed world, from the poor South. This line of division is not as straightforward as it sounds and splits the globe into two main parts. It is also known as the Brandt Line.

The "North" in this divide is regarded as being North America, Europe, Russia, South Korea, Japan, Australia, New Zealand and the like. The countries within this area are generally the more economically developed. The "South" therefore encompasses the remainder of the Southern Hemisphere, mostly consisting of LEDCs. Another possible dividing line is the Tropic of Cancer with the exceptions of Australia and New Zealand. It is critical to understand that the status of countries is far from static and the pattern is likely to become distorted with the fast development of certain southern countries, many of them NICs (Newly Industrialised Countries) including India, Thailand, Brazil, Malaysia, Mexico and others.

These countries are experiencing sustained fast development on the back of growing manufacturing industries and exports.

Most countries are experiencing significant increases in wealth and standard of living. However there are unfortunate exceptions to this rule. Noticeably some of the former Soviet Union countries has experienced major disruption of industry in the transition to a market economy. Many African nations have recently experienced reduced GNPs due to wars and the AIDS epidemic, including Angola, Congo, Sierra Leone and others. Arab oil producers rely very heavily on oil exports to support their GDPs so any reduction in oil's market price can lead to rapid decreases in GNP. Countries which rely on only a few exports for much of their income are very vulnerable to changes in the market value of those commodities and are often derogatively called banana republics. Many developing countries do rely on exports of a few primary goods for a large amount of their income (coffee and timber for example), and this can create havoc when the value of these commodities drops, leaving these countries with no way to pay off their debts.

Within countries the pattern is that wealth is more concentrated around urban areas than rural areas. Wealth also tends towards areas with natural resources or in areas that are involved in tertiary (service) industries and trade. This leads to a gathering of wealth around mines and monetary centres such as New York, London and Tokyo.

Aid

Standard of living

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Standard of living refers to the level of wealth, comfort, material goods and necessities available to a certain socioeconomic class in a certain geographic area. The standard of living includes factors such as income, quality and availability of employment, class disparity, poverty rate, quality and affordability of housing, hours of work required to purchase necessities, gross domestic product, inflation rate, number of vacation days per year, affordable (or free) access to quality healthcare, quality and availability of education, life expectancy, incidence of disease, cost of goods and services, infrastructure, national economic growth, economic and political stability, political and religious freedom, environmental quality, climate and safety. The standard of living is closely related to quality of life.[1[

Standard of living is generally measured by standards such as real (i.e. inflation adjusted) income per person and poverty rate. Other measures such as access and quality of health care, income growth inequality, Disposable Energy (people's disposable income's ability to buy energy) and educational standards are also used. Examples are access to certain goods (such as number of refrigerators per 1000 people), or measures of health such as life expectancy. It is the ease by which people living in a time or place are able to satisfy their needs and/or wants.[citation needed[

The idea of a 'standard' may be contrasted with the quality of life, which takes into account not only the material standard of living, but also other more intangible aspects that make up human life, such as leisure, safety, cultural resources, social life, physical health, environmental quality issues, etc. More complex means of measuring well-being must be employed to make such judgements, and these are very often political, thus controversial. Even between two nations or societies that have similar material standards of living, quality of life factors may in fact make one of these places more attractive to a given individual or group.

However, there can be problems even with just using numerical averages to compare material standards of living, as opposed to, for instance, a Pareto index (a measure of the breadth of income

or wealth distribution). Standards of living are perhaps inherently subjective. As an example, countries with a very small, very rich upper class and a very large, very poor lower class may have a high mean level of income, even though the majority of people have a low "standard of living". This mirrors the problem of poverty measurement, which also tends towards the relative. This illustrates how distribution of income can disguise the actual standard of living.

Likewise Country A, a perfectly state capitalist country with a planned economy with very low average per capita income would receive a higher score for having lower income inequality than Country B with a higher income inequality, even if the bottom of Country B's population distribution had a higher per capita income than Country A. Real examples of this include former East Germany compared to former West Germany or North Korea compared to South Korea. In each case, the state capitalist country has a low income discrepancy (and therefore would score high in that regard), but lower per capita incomes than a large majority of their neighboring counterpart. This can be avoided by using the measure of income at various percentiles of the population rather than a highly relative and controversial overall income inequality measure.

Quality of life

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For other uses, see Quality of life (disambiguation.(

The term quality of life (QOL) references the general well-being of individuals and societies. The term is used in a wide range of contexts, including the fields of international development, healthcare, and politics. Quality of life should not be confused with the concept of standard of living, which is based primarily on income. Instead, standard indicators of the quality of life include not only wealth and employment, but also the built environment, physical and mental health, education, recreation and leisure time, and social belonging.[1[

According to ecological economist Robert Costanza:

While Quality of Life (QOL) has long been an explicit or implicit policy goal, adequate definition and measurement have been elusive. Diverse "objective" and "subjective" indicators across a range of disciplines and scales, and recent work on subjective well-being (SWB) surveys and the psychology of happiness have spurred renewed interest.[2[

Also frequently related are concepts such as freedom, human rights, and happiness. However, since happiness is subjective and hard to measure, other measures are generally given priority. It has also been shown that happiness, as much as it can be measured, does not necessarily increase correspondingly with the comfort that results from increasing income. As a result, standard of living should not be taken to be a measure of happiness.[1][3] Also sometimes considered related is the concept of human security, though the latter may be considered at a more basic level, and for all people.

Quantitative measurement

Unlike per capita GDP or standard of living, both of which can be measured in financial terms, it is harder to make objective or long-term measurements of the quality of life experienced by nations or other groups of people. Researchers have begun in recent times to distinguish two aspects of personal well-being: Emotional well-being, in which respondents are asked about the quality of their everyday emotional experiences—the frequency and intensity of their experiences of, for example, joy, stress, sadness, anger, and affection— and life evaluation, in which respondents are asked to think about their life in general and evaluate it against a scale.[4] Such and other systems and scales of measurement have been in use for some time. Research has attempted to examine the relationship between quality of life and productivity.[5[

Human Development Index

Main article: Human Development Index

Perhaps the most commonly used international measure of development is the Human Development Index (HDI), which combines measures of life expectancy, education, and standard of living, in an attempt to quantify the options available to individuals within a given society. The HDI is used by the United Nations Development Programme in their Human Development Report.

Other measures

The Physical Quality of Life Index (PQLI) is a measure developed by sociologist Morris David Morris in the 1970s, based on basic literacy, infant mortality, and life expectancy. Although not as complex as other measures, and now essentially replaced by the Human Development Index, the PQLI is notable for Morris's attempt to show a "less fatalistic pessimistic picture" by focussing on three areas where global quality of life was generally improving at the time, and ignoring Gross National Product and other possible indicators that were not improving.[6[

The Happy Planet Index, introduced in 2006, is unique among quality of life measures in that, in addition to standard determinants of well-being, it uses each country's ecological footprint as an indicator. As a result, European and North American nations do not dominate this measure. The 2012 list is instead topped by Costa Rica, Vietnam and Colombia.[7[

Gallup researchers trying to find the world's happiest countries found Denmark to be at the top of the list.[8] uSwitch publishes an annual quality of life index for European countries. France has topped the list for the last three years. [9[

A 2010 study by two Princeton University professors looked at 1,000 randomly selected U.S. residents over an extended period. It concludes that their life evaluations - that is, their considered evaluations of their life against a stated scale of one to ten - rise steadily with income. On the other hand, their reported quality of emotional daily experiences (their reported experiences of joy, affection, stress, sadness, or anger) levels off after a certain income level (approximately $75,000 per year); income above $75,000 does not lead to more experiences of happiness nor to further relief of unhappiness or stress. Below this income level, respondents reported decreasing happiness and increasing sadness and stress, implying the pain of life's misfortunes, including disease, divorce, and being alone, is exacerbated by poverty.[10[

Livability

The term quality of life is also used by politicians and economists to measure the livability of a given city or nation. Two widely known measures of livability are the Economist Intelligence Unit's quality-of-life index and Mercer's Quality of Living Reports. These two measures calculate the livability of countries and cities around the world, respectively, through a combination of subjective life-satisfaction surveys and objective determinants of quality of life such as divorce rates, safety, and infrastructure. Such measures relate more broadly to the population of a city, state, or country, not to individual quality of life.

Crimes

Some crimes against property (e.g., graffiti and vandalism) and some "victimless crimes" have been referred to as "quality-of-life crimes." American sociologist James Q. Wilson encapsulated this argument as the Broken Window Theory, which asserts that relatively minor problems left unattended (such as litter, graffiti, or public urination by homeless individuals) send a subliminal message that disorder in general is being tolerated, and as a result, more serious crimes will end up being committed (the analogy being that a broken window left unrepaired shows an image of general dilapidation.(

Wilson's theories have been used to justify the implementation of zero tolerance policies by many prominent American mayors, most notably Oscar Goodman in Las Vegas, Richard Riordan in Los Angeles, Rudolph Giuliani in New York City and Gavin Newsom in San Francisco. Such policies do not tolerate even minor crimes, it is argued, in order to improve the quality of life of local residents. However, critics of zero tolerance policies believe that such policies neglect investigation on a case-by-case basis and may lead to unreasonably harsh penalties for crimes.

Popsicle index

The Popsicle Index is a quality of life measurement coined by Catherine Austin Fitts as the percentage of people in a community who believe that a child

in their community can safely leave his home, walk to the nearest possible location to buy a popsicle, and walk back home.[11][12][13[

In healthcare

Main article: Quality of life (healthcare(

Within the field of healthcares, quality of life is often regarded in terms of how it is negatively affected, on an individual level, a debilitating weakness that is not life-threatening, life-threatening illness that is not terminal, terminal illness, the predictable, natural decline in the health of an elder, an unforeseen mental/physical decline of a loved one, chronic, end-stage disease processes. Researchers at the University of Toronto's Quality of Life Research Unit define quality of life as "The degree to which a person enjoys the important possibilities of his or her life" (UofT). Their Quality of Life Model is based on the categories "being", "belonging", and "becoming", respectively who one is, how one is not connected to one's environment, and whether one achieves one's personal goals, hopes, and aspirations.[14][15[

Use in international development

Quality of life is an important concept in the field of international development, since it allows development to be analyzed on a measure broader than standard of living. Within development theory, however, there are varying ideas concerning what constitutes desirable change for a particular society, and the different ways that quality of life is defined by institutions therefore shapes how these organizations work for its improvement as a whole.

Organizations such as the World Bank, for example, declare a goal of "working for a world free of poverty",[16] with poverty defined as a lack of basic human needs, such as food, water, shelter, freedom, access to education, healthcare, or employment.[17] In other words, poverty is defined as a low quality of life. Using this definition, the World Bank works towards improving quality of life through neoliberal means, with the stated goal of lowering poverty and helping people afford a better quality of life.

Other organizations, however, may also work towards improved global quality of life using a slightly different definition and substantially different methods. Many NGOs do not focus at all on reducing poverty on a national or international scale, but rather attempt to improve quality of life for individuals or communities. One example would be sponsorship programs that provide material aid for specific individuals. Although many organizations of this type may still talk about fighting poverty, the methods are significantly different.

Opportunities, education, health, security and a healthy environment contribute to the quality of life. Public policy plays a great role happiness, as Petra Pinzler points out in D+C Development and Cooperation.

Because of these differences in the theory and practice of development, there is also a wide range of quantitative measures used to describe quality of life

Economic geography

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For the journal, see Economic Geography (journal.(

The coffee trade is a worldwide industry

Economic geography is the study of the location, distribution and spatial organization of economic activities across the world.

Historically and generally, Economic Geography is regarded as a subfield of the discipline of geography, although during the last decades many economists have pursued interests that can be considered part of economic geography.[1]. Due to this fact, many believe that Economic Geography is part of the discipline of Economics, instead of Geography.

Given the variety of approaches, Economic Geography has taken to many different subject matters, including: the location of industries, economies of agglomeration (also known as "linkages"), transportation, international trade,

economic development, real estate, gentrification, ethnic economies, gendered economies, core-periphery theory, the economics of urban form, the relationship between the environment and the economy (tying into a long history of geographers studying culture-environment interaction), and globalization. This list is by no means exhaustive.

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۲ *Approaches to study*

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۴ *History of economic geography*

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۷ *See also*

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Theoretical background and influences

The subject matter investigated is strongly influenced by the researcher's methodological approach. Neoclassical location theorists, following in the tradition of Alfred Weber, tend to focus on industrial location and use quantitative methods. Since the 1970s, two broad reactions against neoclassical approaches have significantly changed the discipline: Marxist political economy, growing out of the work of David Harvey; and the new economic geography which takes into account social, cultural, and institutional factors in the spatial economy.

Economics

GDP PPP Per Capita IMF 2008.svg

Economies by region

- *Africa*
- *North America*
- *South America*
- *Asia*
- *Europe*
- *Oceania*

General categories

- *Microeconomics*
- *Macroeconomics*
- *History of economic thought*
- *Methodology*
- *Heterodox approaches*

Technical methods

- *Mathematical*
- *Econometrics*
- *Experimental*
- *National accounting*

Fields and subfields

- *Behavioral*
- *Cultural*
- *Evolutionary*
- *Growth*

Development

History

International

Economic systems

Monetary and Financial economics

Public and Welfare economics

Health

Education

Welfare

Population

Labour

Personnel

Managerial

Computational

Business

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The economy: concept and history

Portal icon Business and economics portal

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Economists such as Paul Krugman and Jeffrey Sachs have also analyzed many traits related to economic geography. Krugman has gone so far as to call his application of spatial thinking to international trade theory the "new economic geography", which directly competes with an approach within the discipline of geography that is also called "new economic geography".[2] The name geographical economics has been suggested as an alternative.[3[

Approaches to study

As the economic geography is a very broad discipline with economic geographers using many different methodologies in the study of economic phenomena in the world some distinct approaches to study have evolved over time:

Theoretical economic Geography focuses on building theories about spatial arrangement and distribution of economic activities.

Regional economic geography examines the economic conditions of particular regions or countries of the world. It deals with economic regionalization, and local economic development as well.

Historical economic geography examines history and the development of spatial economic structure. Using historical data it examines how the centers of population and economic activity shift, what patterns of regional specialization and localization evolved over time and what factors explain these changes.

Critical economic geography is approach from the point of view of contemporary critical geography and its philosophy.

Behavioral economic geography which examines the cognitive processes underlying spatial reasoning, locational decision making, and behavior of firms[4] and individuals.

...

Economic geography is a branch of anthropo-geography that focuses on regional systems of human economic activity. An alternative description of different approaches to the study of human economic activity can be organized around spatiotemporal analysis, analysis of production/consumption of economic items, and analysis of economic flow. Spatiotemporal systems of analysis include economic activities of region, mixed social spaces, and development. Alternatively, analysis can focus on production, exchange, distribution and consumption of items of economic activity. Allowing parameters of space-time and item to vary, a geographer may also examine material flow, commodity flow, population flow and information flow from different parts of the economic activity system. Through analysis of flow and production, industrial areas, rural and urban residential areas, transportation site, commercial service facilities and finance and other economic centers are linked together in an economic activity system.

Branches

Thematically, economic geography can be divided into these subdisciplines:

Geography of Agriculture

Geography of Industry

Geography of International Trade

Geography of Resources

Geography of Transport and Communication

and others

However, their areas of study may overlap with other geographical sciences or may be considered on their own.

History of economic geography

The history of economic geography was influenced by many theories arising, mainly, from economics and geographical sciences.

First traces of the study of spatial aspects of economic activities can be found in seven Chinese maps of the State of Qin dating to the 4th century BC. Ancient writings can be attributed to the Greek geographer Strabo's Geographika compiled almost 2000 years ago. As the science of cartography developed, geographers illuminated many aspects used today in the field; maps created by different European powers described the resources likely to be found in American, African, and Asian territories. The earliest travel journals included descriptions of the native peoples, the climate, the landscape, and the productivity of various locations. These early accounts encouraged the development of transcontinental trade patterns and ushered in the era of mercantilism.

The second world war to the popularization of geographical knowledge plays a significant positive effect. The post-war world economic recovery and development, promote the development of economic geography.

During the period known in geography as environmental determinism notable (though later much criticized) influence came from Ellsworth Huntington and his theory of climatic determinism.

Valuable contributions came from location theorists such as Johann Heinrich von Thünen or Alfred Weber. Other influential theories were Walter Christaller's Central place theory, the theory of core and periphery.

Fred K. Schaefer's article Exceptionalism in geography: A Methodological Examination published in American journal Annals (Association of American Geographers) and his critique of regionalism had a big impact on economic geography. The article became a rallying point for the younger generation of economic geographers who were intent on reinventing the discipline as a science. Quantitative methods became prevailing in research. Well-known economic geographers of this period are William Garrison, Brian Berry, Waldo Tobler, Peter Haggett, William Bunge and others.

Contemporary economic geographers tend to specialize in areas such as location theory and spatial analysis (with the help of geographic information systems), market research, geography of transportation, land or real estate price evaluation, regional and global development, planning, Internet geography, innovation, social networks and others

Geomarketing

Geomarketing is the integration of geographical intelligence into various aspects of marketing, including sales and distribution. Geomarketing research is the use of geographic parameters in marketing research methodology, including from sampling, data collection, analysis, and presentation. Geomarketing Services related to routing, territorial planning, and site selection where the location is the key factor for such disciplines.

The core base of Geomarketing is the digital map; it can either make or break the concept. Equally important, though, is the association of data with these maps using some place-based component.[1[

In marketing, geo (also called marketing geography or geomarketing) is a discipline within marketing analysis which uses geolocation (geographic information) in the process of planning and implementation of marketing activities.[2] It can be used in any aspect of the marketing mix – the product, price, promotion, or place (geo targeting). Market segments can also correlate with location, and this can be useful in targeted marketing. The methodology geomarketing is successfully applied in the financial sector through identifying ATMs traffic generators and creating hotspots maps based on geographical parameters integrated with customer behavior.[3[

Geomarketing has a direct impact on the development of modern trade and the reorganization of retail types. Site selection becomes automated and based on scientific procedures that saves both time and money. Geomarketing uses key facts, a good base map, proper data layers, reliable consumer profiling, and proper success/fail criteria.

GPS tracking and GSM localization can be used to obtain the actual position of the travelling customer.

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Geo marketing software

Geolocation software is used to display data that can be linked to a geographic region or area. It can be used to:

Recommend nearby social events.[2[

Determine where the customers are (on country, city, street or user level.(

Determine who the customer is (on organisation or user level), or make a guess on it based on earlier encounters by tracking IP address,[4] credit card information, VOIP address, etc.

Visualize any data in a geographic context by linking it to a digital map.

Locate a web client's computer on a digital map.

Calculate summary information for specific areas.

Select customers within specific areas.

Select customers with a certain radius of a point.

Using micro-geographic segmentation select customers similar to a specific type in the rest of the country.

Some of the software used includes MapInfo, ArcGIS (ESRI), RegioGraph (GfK), assorted open source like Mapwindow, DIVA (which while normally used for bio-diversity creates very visually pleasing density maps), GRASS (which works in Linux and Windows environments) GeoEdge (tracking local ads and pages). Several other software are available. Indeed Google Earth provides an excellent set of images that are always useful.

Some Applications for Geo

Different content by choice

A typical example for different web content by location is the FedEx website at FedEx.com where users have the choice to select their country location first and are then presented with different site or article content depending on their selection.

Automated different content

With automated different content in internet marketing and geomarketing the delivery of different content based on the geographical geolocation and other personal information is automated.

Other applications

Solve problems regarding location of a new retail outlet

Map consumer demand trends to best distribute products and advertising. This links with trade zone management.

Scope digital advertising towards individual consumers.

Research consumer shopping patterns and observe traffic within shopping centers and between retail outlets. It also helps in visualisation of market research findings and help improve the overall planning ability of organisations.

Improve customer cooperation.

Transportation geography

From Wikipedia, the free encyclopedia

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Spatial interaction in Dhaka

Transportation Geography, also Transport Geography, is the branch of geography that investigates spatial interactions; letting them be of people, freight, and information. It can consider humans and their use of vehicles, or other modes of traveling. And how markets are serviced by flows of finished goods and raw materials. It is a branch of Economic geography.

“ The ideal transport mode would be instantaneous, free, have an unlimited capacity and always be available. It would render space obsolete. This is obviously not the case. Space is a constraint for the construction of transport networks. Transportation appears to be an economic activity different from others. It trades space with time and thus money” (translated from [Merlin, 1992.([

Geography and transportation intersect in terms of movement of people, goods, and information. Over time, accessibility has increased and led to a greater reliance on mobility. This trend can be traced back to the industrial revolution, although it has significantly accelerated in the second half of the twentieth-century, for various reasons. Today, societies rely on transport systems to support a wide variety of activities. These activities include commuting, supplying energy needs, distributing goods, and acquiring personal wants. Developing sufficient transport networks has been a continuous challenge to meet growing economic development, mobility needs, and ultimately to participate in the global economy.

Transport and urban geography are closely intertwined, with the concept of ribbon development closely aligned to urban and transport studies. As humans increasingly seek to travel the world, the relationship transport and urban areas have often become obscured.

Transportation geography measures the result of human activity between and within locations. It focuses on items such as travel time, routes undertaken, modes of transport, resource use, and sustainability of transport types on the natural environment. Other sections consider topography, safety aspects of vehicle use, and energy use within an individual's or group's journey.

The purpose of transportation is to overcome space, which is shaped by both human and physical constraints, such as distance, political boundaries, time, and topographies. The specific purpose of transportation is to fulfill a demand for mobility, since it can only exist if it moves something, whether it is people or goods. Any kind of movement must consider its geographical setting, and then choose an available form of transport based on cost, availability, and space.

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Transportation modes

In terms of transport modes, the primary forms are air, rail, road, and water. Each one has its own cost associated with speed of movement, as a result of friction and place of origin and destination. For moving large amounts of goods, ships are generally used. Maritime shipping is able to carry more at a cheaper price around the world. For moving people who prefer to minimize travel time, and maximize comfort and convenience, air and road are the most common modes in usage. A railroad is often used to transport goods in areas away from water.

" Transportation modes are an essential component of transport systems since they are the means by which mobility is supported. Geographers consider a wide range of modes that may be grouped into three broad categories based on the medium they exploit: land, water and air. Each mode has its own requirements and features, and is adapted to serve the specific demands of freight and passenger traffic. This gives rise to marked differences in the ways the modes are deployed and used in different parts of the world. Recently, there is a trend towards integrating the modes through intermodality and linking the modes ever more closely into production and distribution activities. At the same time; however, passenger and freight activity is becoming increasingly separated across most modes." [1]

Health geography

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Hepatitis A prevalence worldwide, 2005.

Health geography is the application of geographical information, perspectives, and methods to the study of health, disease, and health care.

Adopting a socio-ecological rather than the bio-medical model, health geography adopts a more holistic approach, emphasizing treatment of the whole person and not just components of the system. Under this model, new illnesses (e.g., mental ill health) are recognised, and other types of medicine (e.g., complementary or alternative medicine) are combined with traditional medicine.

This alternative methodological approach means that medical geography is broadened to incorporate philosophies such as structuration, structuralism, social interactionism, feminism, et cetera. Thus the field of health geography was born.

History of health geography

A classic piece of research in health geography was done in 1854 as a cholera outbreak gripped a neighborhood in London. Death tolls rang around the clock and the people feared that they were being infected by vapors coming from the ground. John Snow thought that if he could locate the source of the disease, it could be contained. He drew maps showing the homes of people who had died of cholera and the locations of water pumps. He found that one pump, the public pump on Broad Street, was central to most of the victims. He figured that infected water from the pump was the culprit. He instructed the authorities to remove the handle to the pump, making it unusable. After that the number of new cholera cases decreased.

Areas of study

Health geography can provide a spatial understanding of a population's health, the distribution of disease in an area, and the environment's effect on health and disease. It deals also with accessibility to health care and spatial distribution of health care providers. The field is considered a subdiscipline of human geography, however, it requires an understanding of other fields such as epidemiology, climatology.

Geography of Health Care Provision

Although health care is a public good, it is not equally available to all individuals. The geography of health care provision has much to do with this. Demand for public services is continuously distributed across space, broadly in accordance with the distribution of population, but these services are only provided at discrete locations. Inevitably therefore, there will be inequalities of access in terms of the practicality of using services, transport costs, travel times and so on. Geographical or 'locational' factors (e.g. physical proximity, travel time) are not the only aspects

which influence access to health care. Other types (or dimensions) of accessibility to health care except for geographical (or spatial) are social, financial and functional. Social accessibility to health care depends on race (like separate hospitals for white and black people), age, sex and other social characteristics of individuals, important here is also relationship between patient and the doctor. Financial depends upon the price of a particular health care and functional reflects the amount and structure of provided services. This can vary among different countries or regions of the world. Access to health care is influenced also by factors such as opening times and waiting lists that play an important part in determining whether individuals or population sub-groups can access health care – this type of accessibility is termed 'effective accessibility.'

The location of health care facilities depends largely on the nature of the health care system in operation, and will be heavily influenced by historical factors due to the heavy investment costs in facilities such as hospitals and surgeries. Simple distance will be mediated by organisational factors such as the existence of a referral system by which patients are directed towards particular parts of the hospital sector by their GP. Access to primary care is therefore a very significant component of access to the whole system. In a 'planned' health care system, we would expect the distribution of facilities to fairly closely match the distribution of demand. By contrast, a market-oriented system might mirror the locational patterns that we find in other business sectors, such as retail location. We may attempt to measure either potential accessibility or revealed accessibility, but we should note that there is a well-established pattern of utilisation increasing with access, i.e. people who have easier access to health care use it more often.

Historical geography

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A 1740 map of Paris.

Historical geography is the study of the human, physical, fictional, theoretical, and "real" geographies of the past. Historical geography studies a wide variety of issues and topics. A common theme is the study of the geographies of the past and how a place or region changes through time. Many historical geographers study geographical patterns through time, including how people have interacted with their environment, and created the cultural landscape.

Historical geography seeks to determine how cultural features of various societies across the planet emerged and evolved, by understanding their interaction with their local environment and surroundings.

In its early days, Historical geography was difficult to define as a subject. A textbook from the 1950s cites a previous definition as an 'unsound attempt by geographers to explain history' [1] . Its author, J. B. Mitchell, came down firmly on the side of geography: 'the historical geographer is a geographer first last and all the time' By 1975 the first number of the Journal of Historical Geography [2] had widened the discipline to a broader church: 'the writngs of scholars of any disciplinary provenance who have something to say about matters of geographical interst relating to past time.'

For some in the United States, the term historical geography has a more specialized meaning: the name given by Carl Ortwin Sauer of the University of California, Berkeley to his program of reorganizing cultural geography (some say all geography) along regional lines, beginning in the first decades of the 20th century. To Sauer, a landscape and the cultures in it could only be understood if all of its influences through history were taken into account: physical, cultural, economic, political, environmental. Sauer stressed regional specialization as the only means of gaining sufficient expertise on regions of the world. Sauer's philosophy was the principal shaper of

American geographic thought in the mid-20th century. Regional specialists remain in academic geography departments to this day. But some geographers feel that it harmed the discipline; that too much effort was spent on data collection and classification, and too little on analysis and explanation. Studies became more and more area-specific as later geographers struggled to find places to make names for themselves. These factors may have led in turn to the 1950s crisis in geography, which raised serious questions about geography as an academic discipline in the United States.

This sub-branch of human geography is closely related to history and environmental history. At many colleges it is a field of study in Historical studies

Time geography

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Time geography or time-space geography traces its roots back to the Swedish geographer Torsten Hägerstrand who stressed the temporal factor in spatial human activities. The time-space path, devised by Hägerstrand, shows the movement of an individual in the spatial-temporal environment with the constraints placed on the individual by these two factors. Three categories of constraints were identified by Hägerstrand[1:[

Time geography is that branch of human science which deals with the study of temporal factor on spatial human activities with constraints like authority, capability and coupling.

Authority - limits of accessibility to some places or domains placed on individuals by owners or authorities

Capability - limitations on the movement of individuals, based on their nature. For example, movement is restricted by biological factors, such as the need for food, drink, and sleep

Coupling - restraint of an individual, anchoring him or her to a location while interacting with other individuals to complete a task

The methods associated with time geography have been criticized by a number of postmodern and feminist geographers [2].

Political geography

Political geography is the field of human geography that is concerned with the study of both the spatially uneven outcomes of political processes and the ways in which political processes are themselves affected by spatial structures. Conventionally political geography adopts a three-scale structure for the purposes of analysis with the study of the state at the centre, above this is the study of international relations (or geopolitics), and below it is the study of localities. The primary concerns of the sub-discipline can be summarised as the inter-relationships between people, state, and territory.

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History

The origins of political geography lie in the origins of human geography itself and the early practitioners were concerned mainly with the military and political consequences of the relationships between physical geography, state territories, and state power. In particular there was a close association with regional geography, with its focus on the unique characteristics of regions, and environmental determinism with its emphasis on the influence of the physical environment on human activities. This association found expression in the work of the German geographer Friedrich Ratzel who, in 1897 in his book Politische Geographie, developed the concept of Lebensraum (living space) which explicitly linked the cultural growth of a nation with territorial expansion, and which was later used to provide academic legitimation for the imperialist expansion of the German Third Reich in the 1930s.

The British geographer Halford Mackinder was also heavily influenced by environmental determinism and in developing his concept of the 'geopolitical pivot of history' or heartland (first developed in 1904) he argued that the era of sea power was coming to an end and that land based powers were in the ascendant, and, in particular, that whoever controlled the heartland of 'Euro-Asia' would control the world. This theory involved concepts diametrically opposed to the ideas of Alfred Thayer Mahan about the significance of sea power in world conflict. The heartland theory hypothesized the possibility of a huge empire being created which didn't need to use coastal or transoceanic transport to supply its military industrial complex, and that this empire could not be defeated by the rest of the world allied against it. This perspective proved influential throughout the period of the Cold War, underpinning military thinking about the creation of buffer states between East and West in central Europe.

The heartland theory depicted a world divided into a Heartland (Eastern Europe/Western Russia); World Island (Eurasia and Africa); Peripheral Islands (British Isles, Japan, Indonesia and Australia) and New World (The Americas). Mackinder claimed that whoever controlled the Heartland would have control of the world. He used this warning to politically influence events such as the Treaty of Versailles, where buffer states were created between the USSR and Germany, to prevent either of them controlling the Heartland. At the same time, Ratzel was creating a theory of states based around the concepts of Lebensraum and Social Darwinism. He argued that states were analogous to 'organisms' that needed sufficient room in which to live. Both of these writers created the idea of a political and geographical science, with an objective view of the world. Pre-World War II political geography was concerned largely with these issues of global power struggles and influencing state policy, and the above theories were taken on board by German geopoliticians (see Geopolitik) such as Karl Haushofer who - perhaps inadvertently - greatly influenced Nazi political theory. A form of politics legitimated by 'scientific' theories such as a 'neutral' requirement for state expansion was very influential at this time.

The close association with environmental determinism and the freezing of political boundaries during the Cold War led to a considerable decline in the importance of political geography which was described by Brian Berry in 1968 as 'a moribund backwater'. Although in other areas of human geography a number of new approaches were invigorating research, including quantitative spatial science, behavioural studies, and structural Marxism, these were largely ignored by political geographers whose main point of reference continued to be the regional approach. As a result much political geography of this period was descriptive with little attempt to produce generalisations from the data collected. It was not until 1976 that Richard Muir could argue that political geography might not be a dead duck but could in fact be a phoenix.

Areas of Study

The Brandenburg Gate of the Berlin Wall in 1961.

From the late-1970s onwards, political geography has undergone a renaissance, and could fairly be described as one of the most dynamic of the sub-disciplines today. The revival was underpinned by the launch of the journal Political Geography Quarterly (and its expansion to bi-monthly production as Political Geography). In part this growth has been associated with the adoption by political geographers of the approaches taken up earlier in other areas of human geography, for example, Ron J. Johnston's (1979) work on electoral geography relied heavily on the adoption of quantitative spatial science, Robert Sack's

(1986) work on territoriality was based on the behavioural approach, and Peter Taylor's (e.g. 2007) work on World Systems Theory owes much to developments within structural Marxism. However the recent growth in the vitality and importance of the sub-discipline is also related to changes in the world as a result of the end of the Cold War, including the emergence of a new world order (which as yet is only poorly defined), and the development of new research agendas, such as the more recent focus on social movements and political struggles going beyond the study of nationalism with its explicit territorial basis. Recently, too, there has been increasing interest in the geography of green politics (see, for example, David Pepper's (1996) work), including the geopolitics of environmental protest, and in the capacity of our existing state apparatus and wider political institutions to address contemporary and future environmental problems competently.

Political geography has extended the scope of traditional political science approaches by acknowledging that the exercise of power is not restricted to states and bureaucracies, but is part of everyday life. This has resulted in the concerns of political geography increasingly overlapping with those of other human geography sub-disciplines such as economic geography, and, particularly, with those of social and cultural geography in relation to the study of the politics of place (see, for example, the books by David Harvey (1996) and Joe Painter (1995)). Although contemporary political geography maintains many of its traditional concerns (see below) the multi-disciplinary expansion into related areas is part of a general process within human geography which involves the blurring of boundaries between formerly discrete areas of study, and through which the discipline as a whole is enriched.

In particular, then, modern political geography often considers:

How and why states are organized into regional groupings, both formally (e.g. the European Union) and informally (e.g. the Third World(

The relationship between states and former colonies, and how these are propagated over time, for example through neo-colonialism

The relationship between a government and its people

The relationships between states including international trades and treaties

The functions, demarcations and policing of boundaries

How imagined geographies have political implications

The influence of political power on geographical space

The study of election results (electoral geography(

Critical Political Geography

) See also: Critical geopolitics(

Critical political geography is mainly concerned with the criticism of traditional political geographies vis-a-vis modern trends. As with much of the move towards 'Critical geographies', the arguments have drawn largely from postmodern, post structural and postcolonial theories. Examples include:

Feminist geography, which argues for recognition of the power relations as patriarchal and attempts to theorise alternative conceptions of identity and identity politics. Alongside related concerns such as Queer theory and Youth studies

Postcolonial theories which recognise the Imperialistic, universalising nature of much political geography, especially in Development geography

Electoral geography

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This article is written like a personal reflection or essay rather than an encyclopedic description of the subject. (July 2008(

This article may contain original research. (August 2010(

Part of the Politics series

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Electoral Geography is the analysis of the methods, behavior, and results of elections in the context of geographic space and using geographical techniques. Specifically, it is an examination of the dual interaction whereby geographical traits of a territory affects political decisions and geographical structure of the election system affects electoral results. The purpose of this analysis is to identify and understand driving factors and the electoral characteristics of territories in a broad and integrative manner.[1[

Elections serve as the central political expression and exercise of power within democratic states,[2] and conducting elections in democracies requires the translation of the political decisions of the distributed voting public into resulting "seat" representation of the various constituencies, except in the cases of Israel and the Netherlands which each have only a single constituency.[3] [4] It is philosophically accepted that in a democracy, each vote is equally valid amongst all other votes and thus each eligible voter casts only one equally valued vote.[5] However, disproportionality and bias towards specific voting groups arise in the construction of artificial constituency boundaries in that political parties and policies are unevenly and inaccurately represented in the aggregate results amongst the electoral regions when compared to the popular vote.[6[

Electoral Constituencies

Main article: Electoral district

The territorial unit with boundary distinctions in representative elections is commonly termed the constituency, district, or precinct, and serves as both a region for the tabulation and study of the electoral result. These boundaries are defined in various methods, which are unique to each state, and can cause alterations or skewing of aggregate vote results and by extension the true decision of the electorate.

Election Mechanics

Electoral geographers require the knowledge of the local and statewide laws and procedures for conducting elections, though it has been claimed that it is not within their purview to attempt to correct any observed flaws.[7] The details of voting or the parameters of the election in various states or in constituencies within the state are critical factors, which affect the levels of participation and can characterize the outcome. The mechanics of an election are fully described through identifying the pattern of constituencies, franchise qualifications and changes, and the method of the election. The patterning of constituencies is related to the spatial orientation and drawing of boundaries as detailed previously. The franchise qualifications define the eligible voter bloc, the electorate, and thus determine the range of relevant, critical issues, which apply to those who vote in an election, and alterations in enfranchisement can greatly alter the nature of the electorate and the outcome of the election.[8] The methods of election are critical to analyzing the results, as it is impossible to adequately assess the proportionality of representation or validity of an electoral outcome without understanding how votes are cast and counted. For example, single-vote, winner take all systems can greatly disenfranchise minority voters as their selection is ultimately irrelevant in a two-party dominant system.[9] However, in systems which employ proportional voting or ranked voting techniques, the extreme minorities receive greater opportunity for representation.

Electoral Distortion and Bias

Regardless of the means by which boundaries are drawn, including by non-partisan or independent governmental associations, bias in electoral

regions can always be observed. The United Kingdom serves as an example as the constituencies are established by a non-partisan commission and yet bias toward Labour has been observed in general elections since 1979.[10[

Gerrymandering

Main article: Gerrymandering

Gerrymandering is a selective drawing of constituency boundaries in order to alter the results of an election.[11] The popular or numerical election results within a constituency, precinct, or electoral district can be distorted by the act of gerrymandering. Common alterations to election results caused by gerrymandering are:

Splitting or dilution of the concentrations of votes for one party so as to make that party the minority in a large portion of the constituencies in conjunction

Concentrating the votes of one party into a selected few constituencies such that many of their votes are 'wasted', while creating many constituencies with only slight majorities in favor of the other party

Placing two or more incumbents of one party within a single revised constituency, thus removing control of seats for that party

Creating "winner takes all" multi-member districts with one party in the majority

Malapportionment

Main article: Malapportionment

Malapportionment is unequal and disproportionate representation electoral systems with multiple constituencies. It is a violation of the democratic principle of "one person, one vote" in that constituency boundaries enclose populations of various size, which means that the votes of people in regions of lower population have greater representation per vote than those in regions with a higher population.[12] The effect of malapportionment is observed when equivalent percentages of the total vote results in different numbers of seats for each party due to one party having greater control in smaller constituencies and another in larger constituencies.[13[

Geographic Context

The spatial distribution and variation of the voting populace in conjunction with the demographic characteristics and delineation of voting regions provide a geographic context for the analysis of elections. Along with purely physical characteristics, distribution of economic resources, lines of communication, governmental and party platforms, and gender, ethnic, or class groups creates an interwoven fabric of people and opinion, which is accounted for in electoral analysis.[14] A population settles for various social, economic, and cultural reasons which create a defined contour of both population density and related political opinion.[15] However, this contour is not a static condition and changes in electoral results must be considered with respect to the change in the type of people and not just the change in their chosen politics. The distribution of politics has been attributed to various factors, one of which is described as a convergence of external stimuli.[16] These stimuli can come in the form of state-supplied information, local cultural norms, religious affiliations, economic opportunity, and media presentation of issues. The degree of effect for each particular stimulus is then a result of the susceptibility of a particular geography. For example, policy dealing with the governmental treatment of an urban population would have greater importance to those in a territory with an urban densities and a far smaller importance in a sparser region.[17] A state or its political organizations has some power to affect these stimuli and are therefore considered as a contributing factor in the changes of election outcomes.

Physical Contour

Electoral geography considers the way in which the physical characteristics of a territory directly affect the population and thus the election decision

of these people.[18] The geographic location and associated natural factors are directly related to the potential in a specific region for political development[19] and have an additional relationship with the electoral processes and policy decisions of the region.[20] The study of electoral results has been shown to identify the regions of specific politics and the relative cohesion amongst these similar regions.[21] Regions which share large numbers of physical or demographic characteristics, or both as these two factors are related,[22] will demonstrate significant similarities in voting participation and patterns of outcome.

Economics, Communications, and Infrastructure

The economic development within a given region is also related to the development of its politics and the issues which are important to the electorate. A state with disproportionate economic development will necessarily come under pressure from the poorer constituencies to take action to redistribute wealth and level the economic prosperity, which will be observable in the electoral results.[23] The range and availability of communication and issue awareness can affect perception of issues and skew rational decision making. If a populace is generally unaware of the implications of policy decisions they are less able to make informed decisions and are more readily manipulated by candidate or party claims and marketing techniques, which can make analysis difficult as no predictable rationale may exist for voting outcomes.

Culture, Demographics, and Political Parties

Background information detailing the established political parties, issues being contested in an election, and the mechanics of the election process also help to contextualize and understanding contributing factors in each individual election. Over time these factors may be changed as parties are formed or disbanded and policy issues are brought to vote or become obsolete, which can explain the shifting appearance of the electoral result over a period of time. The governmental and party platforms serve as categories into which voters are forced to classify themselves[24] even though it is likely that no one party platform accurately captures the entirety of the opinions held by a voter.[25] This makes consideration of the party platform or recent party activities critical in understanding the changes or stability of electoral results over space and time. Gender, ethnic, and class disparity can cause voting that is related to shared background qualities and experience as opposed to political opinions.[26] This means that candidates from a particular area or common ethnicity can receive votes from the citizens of that area irrespective of their party affiliations or national because of their shared experience and mutual acquaintance. This has been referred to as the "friends and neighbors effect".[27[

Determinism

Main article: Geographic determinism

There is a distinction amongst geographers between considering the effect of geography to be fully deterministic and merely having only a partial effect amongst other effects. Deterministic electoral geography would result in predictable results regardless of candidate or proposed policy as the sum of physical geographic traits would entirely control voting decisions. This interpretation has been widely rejected by geographers.[28] Instead, it is more fully accepted that geography plays some role in conjunction with other cultural and interpersonal effects. The "neighborhood effect" is an observed altering of electoral results due to the tendency of people who are spatially close to vote similarly because of daily interactions.[29] Arguments against determinism also rely on observed anomalies in voting results. An example arises in comparing results of presidential elections in the United States to the expectation of favoring Democrat or Republican candidates in urban or rural locations respectively or the expectations for preference on the county scale based on racial composition with minority groups favoring the Democrat party.[30] The results indicate that anomalies occur in distinct voting areas where the Republican or Democrat candidate won counties that had opposite characteristics of their traditionally carried counties. These anomalies are attributed to the historical, economic, and cultural geographies which serve to override the territory traits that were used to predict the electoral results.[31] In this way voters are motivated by factors outside their geography to vote in a way that is unexpected

and often even contrary to their individual interests.

Electoral Mapping

The spatial variations of support for particular policies are routinely mapped in order to pictorially represent the electoral geography of a territory, which can allow for the recognition of patterns of location.[32] Ron Johnston[33] considers the entire process and outcome of the election through the examining lens of territory maps. He claims that electoral results are the outcome of superimposing the map of cultural, economic, religious, and demographic characteristics with the determined map of electoral districts and applying the issues on the ballot. The selection of mapping paradigms using color, patterning, brightness or darkness effects is employed in order to visually detail aspects and characteristics of interest in elections, such as voter participation, intensity of support, population density, and constituency boundaries which may not easily be noticed by considering words and numbers.[34] An example of a mapping paradigm is observed in United States elections in recent history, wherein results in favor of Democrat candidates are marked by coloring the constituency blue and using red for results in favor of Republican candidates.[35] This has been used to a wide degree and is thus readily acknowledged by United States citizens in the media and academic display of election results. However, the variations in electoral results over a territory or place cannot be directly equated to the land areas represented by mapping as the voting populace is the subject of interest and study in electoral geography and not the particular territory they live on during a given election. Human movement is an ongoing progress, which consistently redefines the distributions of policy preference and thus the associated election decisions.[36] Thus the passage of time must be incorporated in electoral analysis through the duality of Electoral geography also deals with the alterations of election results in a given place over an extended time interval encompassing many elections. This effect can be mapped using various techniques which help to show changing opinions and changing populations in the constituencies of the state over a time interval.[37] Electoral geography relies upon detailed and accurate mapping techniques with appropriate contextualization and background knowledge in order to successfully visualize and analyze the results of an election.

World Electoral Geographies

Canada

Main article: Canadian political culture

See also: regions of Canada

Canadian electoral geography is typified by a high degree of political regionalism, with most disputes interpreted as conflicts between provinces or regions. Notably, class consciousness is quite low in Canada as compared to the former mother country, Britain.

Because of the disparity in the population size of the various provinces, their importance in electoral geography varies substantially. As well some provinces are small enough and similar enough to their neighbours that they vote similarly, while others are large enough to have considerable internal divisions. The smaller Atlantic Provinces might be considered as unit, but Ontario might be subdivided between the urban, suburban, rural, and remote regions, or between north, south, east, and west, or into more specific regions like the Golden Horseshoe or the Greater Toronto Area.

In federal politics, a winning coalition must various sub-regions, identified not only by place but by ideology. A winning coalition might include Western social conservatives, suburban Ontario moderates, and Quebec soft nationalists (Brian Mulroney, 1984, 1988), or Ontario moderates, Quebec federalists, and most of Atlantic Canada (Jean Chretien, 1993, 1997, 2000), or most of the West and Atlantic Canada, plus rural and suburban Ontario (Stephen Harper, 2011.(

When the main parties are not seen to serve the interest of a particular region, protest parties or movements often emerge. This has included several Quebec nationalist parties, parties arising from the phenomenon called Western alienation, and the

Maritime Rights Movement. Partly for this reason, Canada has typically had a multi-party system for much of its history rather than the two-party system that is typical of first past the post elections. This has in turn led to several minority governments in Canada.

Regionalism in Canada is such that is also notable within provinces on the stage of provincial elections. There is considerable distinction between the politics of Montreal and those of the Saguenay or the Gaspe, and likewise between the Lower Mainland and the BC Interior.

United Kingdom

In the present United Kingdom, electoral geography is studied extensively and has been compared to the method in the United States of elections and regionalization, by employing UK methods of class cleavage, where the Conservative Party tends to be favoured by the white-collar class and the Labour Party by the UK's working class.[38] Comparing the methods of sectionalism in the UK and the US places emphasis on location; instead of basing support for a party by class, the US does so by location. In the UK, some areas are more heavily populated than others, giving differences in population relating to the geography of each individual voting district.

In the UK, to extinguish regional identity, England was divided into nine regions.[39] It was thought[40] that people who congregate seem to vote alike, rather than voting on one's own opinions. This is what is known as the "neighborhood effect".[41] Even with nine distinct regions, the voting patterns are seemingly disproportionally divided between the two dominant parties. This forces researchers to question what causes regional differences in voting outcomes.

The voting method in the UK differs from that of the United States. To produce an outcome, "all voting takes place in the context of a particular electoral system. There has to be some agreed way of aggregating votes to produce a result. Votes indicate individuals' preferences and in the public elections these have to be translated into seats by some formula".[42] This formulaic approach ends in an outcome giving a translated number of seats for each party in Parliament.

England is not alone in selecting its electoral system. "… A cross-national study found seventy different systems in twenty-seven democracies."[43] When choosing which system a government will use, great consideration has to be made. A serious question arises during this process; What should this election be designed to achieve? General answers have been:

To enable the representation of voters' opinion in rough proportion to their strength in the electorate

To allow for the representation of geographically defined areas

To decisively confer power on a team of leaders or a party".

Voter awareness in terms of the reasoning, motivation, and methods of an election are critical for shoring up public support for the legitimacy of elections and elected officials.

Russia

Main article: Electoral geography of Russia

The electoral geography of Russia is marked by the obvious territorial cleavages between North and South, urban and rural territories, etc. One phenomenon of territorial cleavages in electoral preferences in Russia is known as the "red belt" (compact located regions with high support for the Communist Party.(

In the first democratic elections in the history of contemporary Russia it was noticed that liberal

and democratic politicians had much higher support in the northern regions, whereas the south of Russia appeared more conservative.

Both capitals in Russia - Moscow and the "northern capital" Saint Petersburg - significantly differ in electoral results from the rest of the country. Only in these cities is there strong electoral support of liberal and democratic politicians. Support for United Russia is less than in other regions.

United States

Main article: Electoral geography of the United States

The electoral geography of the United States is a description of regional political differences, which in recent years has been popularized by the red and blue paradigm to pictorially represent Republican and Democrat Election results. The presence of a two-dominant party system creates a great potential for disenfranchisement of minority voters and their opinions. Qualities of "northeasterliness", "westerliness", and "southerliness", which constitute the expectations for Democrat, Republican, and volatile Republican voting results, have been used in order to understand and define the political landscape.[44] However, culturally driven anomalies in this general expectation have been observed.

Debate has been common in recent elections in regards to the election of the President of the United States via the electoral college. The debate stems from the fact that the electoral college is a malapportioned body.,[45][46] and thus provides for a scenario whereby a candidate may win the election via the electoral college without carry a plurality of the popular vote.[4

Geopolitics

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Geopolitics, from Greek Γη (earth) and Πολιτική (politics), refers broadly to the relationship between politics and territory whether on local or international scale. It comprises the practice of analysing, proscribing, forecasting, and the using of political power over a given territory. Specifically, it is a method of foreign policy analysis, which seeks to understand, explain and predict international political behaviour primarily in terms of geographical variables. Those geographical variables generally refer to: geographic location of the country or countries in question, size of the countries involved, climate of the region the countries are in, topography of the region, demography, natural resources and technological development.[1] Traditionally, the term has applied primarily to the impact of geography on politics, but its usage has evolved over the past century to encompass wider connotations.

Geopolitics traditionally indicates the links between political power and geographic space. In concrete terms it is often seen as a body of thought examining strategic prescriptions based on the relative importance of land power and sea power in world history. The geopolitical tradition had some consistent concerns with regards to geopolitical correlates of power in world politics, the identification of international core areas, and the relationships between naval and terrestrial capabilities.[2[

Academically, the study of geopolitics involves the analysis of geography, history and social science with reference to spatial politics and patterns at various scales. It is multidisciplinary in its scope, and includes all aspects of the social sciences with particular emphasis on political geography, international relations, the territorial aspects of political science and international law.[3] Also, the study of geopolitics includes the study of the ensemble of relations between the interests of international political actors, interests focused to an area, space, geographical element or ways, relations which create a geopolitical system.[4]

Strategic geography(

Strategic geography is concerned with the control of, or access to, spatial areas that have an impact on the security and prosperity of nations. Spatial areas that concern strategic geography change with human needs and development. This field is a subset of human geography, itself a subset of the more general study of geography. It is also related to geostrategy.

Strategic geography is that branch of science,which deals with the study of spatial areas that have an impact on the security and prosperity of a nation.

Military geography

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A landing in Egypt.

Military geography is a sub-field of geography that is used by, not only the military, but also academics and politicians to understand the geopolitical sphere through the militaristic lens. Following the Second World War, Military Geography has become the "application of geographic tools, information, and techniques to solve military problems in peacetime or war."[citation needed] To accomplish these ends, military geographers must consider diverse geographical topics from geopolitics to the physical locations' influences on military operations and from the cultural to the economic impacts of a military presence. Military Geography is the most thought-of tool for geopolitical control imposed upon territory.

Without the framework that the military geographer provides, a commander's decision-making process is cluttered with multiple inputs from environmental analysts, cultural analysts, and many others.[citation needed] Without the military geographer to put all of the components together, a unit might know of the terrain, but not the drainage system below the surface. In that scenario, the unit would be at a disadvantage if the enemy would have chosen that drainage system as a point to ambush the unit as it passed through the area. The complexities of the battlefield are multiplied tenfold when military operations are to take place within the boundaries of areas of urban development.[citation needed[

" If a general desired to be a successful actor in the great drama of war, his first duty is to study carefully the theater of operations so that he may see clearly the relative advantages and disadvantages it presents for himself and his enemies

Population geography

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Population geography is a division of human geography. It is the study of the ways in which spatial variations in the distribution, composition, migration, and growth of populations are related to the nature of places. Population geography involves demography in a geographical perspective. It focuses on the characteristics of population distributions that change in a spatial context. Examples can be shown through population density maps. A few types of maps that show the spatial layout of population are choropleth, isoline, and dot maps. Population geography studies:

Demographic phenomena (natality, mortality, growth rates, etc.) through both space and time

Increase or decrease in population numbers

The movements and mobility of populations

Occupational Structure

The way in which places in turn react to population phenomena e.g. immigration

Research topics of other geographic sub-disciplines, such as settlement geography, have also a population-geographic dimension:

Grouping of people in settlements

The way from the geographical character of places e.g. settlement patterns

Settlement geography

Settlement geography is a branch of geography that investigates the earth's surface's part settled by humans. According to the United nations' Vancouver Declaration on Human Settlements (1976), "human settlements means the totality of the human community – whether city, town or village – with all the social, material, organizational, spiritual and cultural elements that sustain it."

Classification

Traditionally, it belongs to cultural geography and is divided into the geography of urban settlements and rural settlements. Thereby, settlements are mostly seen as elements of the cultural landscape. Apart from Australia, Europe and India, the term is actually rarely used in English-speaking geography. One of the last English books on settlement geography was published by Cambridge University Press in the 90s. [1] However, it is a traditional and actual branch in many other countries (e.g. German Siedlungsgeographie, French Geographie de l'habitat, Italian Geografia insediativa, Polish Geografia osadnictwa.(

Actuality

Due to processes of urban sprawl such as counter urbanization,[2] periurbanisation or postsuburbanisation the existing dichotomy between the urban and the rural is losing importance, especially in industrialized countries and newly industrialized countries. Hence, an integrative geography of settlements that considers the urban and the rural settlements as a continuum[3] is regaining the importance lost during the 20th century. Further it is used in prehistoric,[4] historic[5] and present-focusing [6] [7] [8] geographic research.

Definitions

Referring to Stone (1965), settlement geography is

the description and analysis of the distribution of buildings by which people attach themselves to the land. Further, that the geography of settling designate the action of erecting buildings in order to occupy an area temporarily or permanently. It should be understood that buildings are one tangible expression of man-land relationships and that specification of this focus assumes study may be at any scale from quite general to most specific; there is no restriction to large-scale study of individual building plans or architectural details. Buildings are simply one representation of the process of people living in an area they are a mappable division of the landscape to which attention needs direction.[9[

With respect to the latter definition Jordan (1966) emphasizes, that settlement geography not exclusively investigates the distributions, but even more the structures, processes and interactions between settlements and its environment (such as soil, geomorphology, economy or society), which produce them. [10] More recently, the study of settlement has evolved into the interaction of humans with the physical and ecological world. [11[

In sum, settlement geography describes and explains the settlements' location, substance, form and structure, as well as the functions and processes that produced them over time (Genesis[disambiguation needed], from Greek γέννησις, "origin, birth" or historical development). As an applied science, it projects future settlement development and contributes to the sustainable development of human-environmental systems.

Urban geography

This article is written like a personal reflection or essay rather than an encyclopedic description of the subject. Please help improve it by rewriting it in an encyclopedic style. (December 2007(

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New York City, one of the largest urban areas in the world

Urban geography is the study of areas which have a high concentration of buildings and infrastructure. These are areas where the majority of economic activities are in the secondary sector and tertiary sectors. They often have a high population density.

Urban geography is that branch of science, which deals with the study of urban areas, in terms of concentration, infrastructure, economy, and environmental impacts.

It can be considered a sub-discipline of the larger field of human geography with overlaps of content with that of Cultural Geography. It can often overlap with other fields of study such as anthropology and urban sociology. Urban geographers seek to understand how factors interact over space, what function they serve and their interrelationships. Urban geographers also look at the development of settlements. Therefore, it involves planning city expansion and improvements. Urban geography, then, attempts to account for the human and environmental impacts of the change. Urban geography focuses on the city in the context of space throughout countries and continents.

Urban geography forms the theoretical basis for a number of professions including urban planning, site selection, real estate development, crime pattern analysis and logistical analysis.

Areas of study

There are essentially two approaches to urban geography. The study of problems relating to the spatial distribution of cities themselves and the complex patterns of movement, flows and linkages that bind them in space. Studies in this category are concerned with the city system. Secondly there is the study of patterns of distribution and interaction within cities, essentially the study of their inner structure. Studies in this category are concerned with the city as a system. A succinct way to define urban geography that recognizes the link between these two approaches within the subject is then, that "urban geography is the study of cities as systems within a system of cities."[this quote needs a citation[

Cities as centers of manufacturing and services

Cities differ in their economic makeup, their social and demographic characteristics and the roles they play within the city system. These differences can be traced back to regional variations in the local resources on which growth was based during the early development of the urban pattern and in part the subsequent shifts in the competitive advantage of regions brought about by changing locational forces affecting regional specialization within the framework of the market economy. Recognition of different city types necessitates their classification, and it is to this important aspect of urban geography that we now turn. Emphasis is on functional town classification and the basic underlying dimensions of the city system.

The purpose of classifying cities is twofold. On the one hand, it is undertaken to search reality for hypotheses. In this context, the recognition of different types of cities on the basis of, for example, their functional specialization may enable the identification of spatial regularities in the distribution and structure of urban functions and the formulation of hypotheses about the resulting patterns. On the other hand, classification is undertaken to structure reality in order to test specific hypotheses that have already been formulated. For example, to test the hypotheses that cities with a diversified economy grow at a faster rate then those with a more specialized economic base, cities must first be classified so that diversified and specialized cities can be differentiated.

The simplest way to classify cities is to identify the distinctive role they play in the city system. There are three distinct roles. 1. Central places functioning primarily as service centers for local hinterlands. 2. Transportation cities performing break-of-bulk and allied functions for larger regions. 3. Specialized-function cities are dominated by one activity such as mining, manufacturing or recreation and serving national and international markets. The composition of a

cities labor force has traditionally been regarded as the best indicator of functional specialization, and different city types have been most frequently identified from the analysis of employment profiles. Specialization in a given activity is said to exist when employment in it exceeds some critical level.

The relationship between the city system and the development of manufacturing has become very apparent. The rapid growth and spread of cities within the heartland-hinterland framework after 1870 was conditioned to a large extent by industrial developments and that the decentralization of population within the urban system in recent years is related in large part to the movement of employment in manufacturing away from the traditional industrial centers. Manufacturing is found in nearly all cities, but its importance is measured by the proportion of total earnings received by the inhabitants of an urban area. When 25 percent or more of the total earnings in an urban region are derived from manufacturing, that urban areas is arbitrarily designated as a manufacturing center.

The location of manufacturing is affected by myriad economic and non-economic factors, such as the nature of the material inputs, the factors of production, the market and transportation costs. Other important influences include agglomeration and external economies, public policy and personal preferences. Although it is difficult to evaluate precisely the effect of the market on the location of manufacturing activities, two considerations are involved: the nature of and demand for the product and transportation costs.

Urban area

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) Redirected from Urban areas(

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"Built-up area" redirects here. For use of the term in the United Kingdom Highway Code, see Built-up area (Highway Code.(

"Urban zone" redirects here. For other uses, see Urban zone (disambiguation.(

"Urban region" redirects here. For an area in Catalonia, Spain, see Àmbit metropolità de Barcelona.

"Urbanized area" redirects here. For use of the term in relation to the United States Census, see List of United States urban areas.

Greater Tokyo Area, the world's most populous urban area, with about 35 million people.

Urban areas with at least one million inhabitants in 2006. In 1800, 3% of the world's population lived in cities, a figure that had risen to 47% by the end of the twentieth century.

World map showing percent of population living in an urban environment.

An urban area is characterized by higher population density and vast human features in comparison to areas surrounding it. Urban areas may be cities, towns or conurbations, but the term is not commonly extended to rural settlements such as villages and hamlets.

Urban areas are created and further developed by the process of urbanization. Measuring the extent of an urban area helps in analyzing population density and urban sprawl, and in determining urban and rural populations.[citation needed[

Unlike an urban area, a metropolitan area includes not only the urban area, but also satellite cities plus intervening rural land that is socio-economically connected to the urban core city, typically by employment ties through commuting, with the urban core city being the primary labor market. In fact, urbanized areas agglomerate and grow as the core population/economic activity center within a larger metropolitan area or envelope.

In the US, Metropolitan areas tend to be defined using counties or county sized political units as building blocks of much larger, albeit more condensed population units. Counties tend to be

stable political boundaries; economists prefer to work with economic and social statistics based on metropolitan areas. Urbanized areas are a more relevant statistic for determining per capita land usage and densities.[citation needed[

Definitions

Urbanization and condominium buildings in Porto Alegre

Definitions vary somewhat between nations. European countries define urbanized areas on the basis of urban-type land use, not allowing any gaps of typically more than 200 m, and use satellite imagery instead of census blocks to determine the boundaries of the urban area. In less developed countries, in addition to land use and density requirements, a requirement that a large majority of the population, typically 75%, is not engaged in agriculture and/or fishing is sometimes used.

Australia

In Australia, urban areas are referred to as "urban centres" and are defined as population clusters of 1000 or more people, with a density of at least 200/km2.[1[

Canada

Main article: List of the 100 largest population centres in Canada

According to Statistics Canada, an urban area in Canada is an area with a population of at least 1,000 people where the density is no fewer than 400 persons per square km2.[2] If two or more urban areas are within 2 km (1.2 mi) of each other by road, they are merged into a single urban area, provided they do not cross census metropolitan area or census agglomeration boundaries.[3[

In the Canada 2011 Census, Statistics Canada redesignated urban areas with the new term "population centre";[4] the new term was chosen in order to better reflect the fact that urban vs. rural is not a strict division, but rather a continuum within which several distinct settlement patterns may exist. For example, a community may fit a strictly statistical definition of an urban area, but may not be commonly thought of as "urban" because it has a smaller population, or functions socially and economically as a suburb of another urban area rather than as a self-contained urban entity, or is geographically remote from other urban communities. Accordingly, the new definition set out three distinct types of population centres: small (population 1,000 to 29,999), medium (population 30,000 to 99,999) and large (population 100,000 or greater).[4] Despite the change in terminology, however, the demographic definition of a population centre remains unchanged from that of an urban area: a population of at least 1,000 people where the density is no fewer than 400 persons per square km2.

China

In China, an urban area is an urban district, city and town with a population density higher than 1,500/km2. As for urban districts with a population density lower than that number, only the population that lives in streets, town sites, and adjacent villages is counted as urban population.[5[

France

In France, an urban area is a zone (aire urbaine) encompassing an area of built-up growth (called an "urban unit" (unité urbaine)[6] - close in definition to the North American urban area) and its commuter belt (couronne périurbaine). Although the official INSEE translation of aire urbaine is "urban area",[7] most North Americans would find the same as being similar in definition to their metropolitan area.

India

For the Census of India 2011, the definition of urban area is as follows:

All places with a municipality, corporation, cantonment board or notified town area committee, etc.

All other places which satisfied the following criteria:

A minimum population of 5,000;

At least 75% of the male main working population engaged in non-agricultural pursuits; and

A density of population of at least 400 persons per sq. km.

Source: A PDF file named '1. Data Highlight' accessed on 11 April 2012 from Census of India, 2011[8[

Japan

In Japan urbanized areas are defined as contiguous areas of densely inhabited districts (DIDs) using census enumeration districts as units with a density requirement of 4,000 inhabitants per square kilometre (10,000 /sq mi.(

New Zealand

Statistics New Zealand defines New Zealand urban areas for statistical purposes as a settlement with a population of a thousand people or more.

Norway

Statistics Norway defines urban areas ("tettsteder") similarly to the other Nordic countries. Unlike in Denmark and Sweden, the distance between each building has to be of less than 50 m, although exceptions are made due to parks, industrial areas, rivers, and similar. Groups of houses less than 400 m from the main body of an urban area are included in the urban area.[9[

Philippines

With an estimated population of 16.3 M. Metro Manila is the most populous metropolitan area in the Philippines and the 11th in the world. However, the greater urban area is the 5th largest in the world with a population of 20,654,307 people (2010 estimate).[10] Including Metro Manila, the Philippines has twelve metropolitan areas as defined by the National Economic and Development Authority (NEDA). Metro Angeles, Metro Bacolod, Metro Baguio, Metro Batangas, Metro Cagayan de Oro, Metro Cebu, Metro Dagupan, Metro Davao, Metro Iloilo-Guimaras, Metro Naga, Metro Olongapo.

Poland

In Poland, official "urban" population figures simply refer to those localities which have the status of towns (miasta). The "rural" population is that of all areas outside the boundaries of these towns. This distinction may give a misleading impression in some cases, since some localities with only village status may have acquired larger and denser populations than many smaller towns.[11[

Russia

In Russia, only the population residing in cities/towns and urban-type settlements is considered to be "urban". The city/town/urban-settlement designation means usually that the majority of the population is employed in areas other than agriculture, but the exact definitions vary from one federal subject to another.

Sweden

Urban areas in Sweden (tätorter) are statistically defined localities, totally independent of the administrative subdivision of the country. There are 1956 such localities in Sweden, with a population ranging from 200 to 1,372,000 inhabitants.[12[

United Kingdom

Main article: List of urban areas in the United Kingdom

The United Kingdom's Office for National Statistics has produced census results from urban areas since 1951, since 1981 based upon the extent of irreversible urban development indicated on Ordnance Survey maps. The definition is an extent of at least 20 ha and at least 1,500 census residents. Separate areas are linked if less than 200 m (220 yd) apart. Included are transportation features.[13] The UK has five Urban Areas with a population over a million and a further sixty nine with a population over one hundred thousand.

United States

New York City, the most populous urban area in the United States

Main article: United States urban area

In the United States there are two categories of urban area. The term urbanized area denotes an urban area of 50,000 or more people. Urban areas under 50,000 people are called urban clusters. Urbanized areas were first delineated in the United States in the 1950 census, while urban clusters were added in the 2000 census. There are 1,371

The U.S. Census Bureau defines an urban area as: "Core census block groups or blocks that have a population density of at least 1,000 people per square mile (386 per square kilometer) and surrounding census blocks that have an overall density of at least 500 people per square mile (193 per square kilometer".(

The concept of Urbanized Areas as defined by the U.S. Census Bureau is often used as a more accurate gauge of the size of a city, since in different cities and states the lines between city borders and the urbanized area of that city are often not the same. For example, the city of Greenville, South Carolina has a city population under 60,000 and an urbanized area population of over 300,000, while Greensboro, North Carolina has a city population over 200,000 and an urbanized area population of around 270,000 — meaning that Greenville is actually "larger" for some intents and purposes, but not for others, such as taxation, local elections, etc.

The largest urban area in the United States is that of New York City, with its city proper population exceeding 8 million and its metropolitan area population almost 19 million. The next five largest urban areas in the U.S. are those of Los Angeles, Chicago, Washington D.C. and Philadelphia and Boston.[14] About 82 percent of the population of the United States lives within the boundaries of urbanized area as of December, 2010.[15] Combined, these areas occupy about 2 percent of the United States. The majority of urbanized area residents are suburbanites; core central city residents make up about 30 percent of the urbanized area population (about 60 out of 210 million).[citation needed[

In the U.S. Department of Agriculture's natural resources inventory, urban areas are officially known as developed areas or urban and built-up areas. Such areas include cities, ethnic villages, other built-up areas of more than 10 ac (4 ha), industrial sites, railroad yards, cemeteries, airports, golf courses, shooting ranges, institutional and public administration sites, and similar areas. The 1997 national resources inventory placed over 98,000,000 ac (40,000,000 ha) in this category, an increase of 25,000,000 ac (10,000,000 ha) since 1982.[16[

Rural area

*۸۳percent of the United States' inhabitants live in suburban and urban areas,[1] but cities occupy only 10 percent of the country. Rural areas occupy the remaining 90 percent.[2] The U.S. Census Bureau, the USDA's Economic Research Service, and the Office of Management and Budget (OMB) have come together to help define rural areas.;United States Census Bureau:The Census Bureau definitions (new to the 2000 census), which are based on population density, defines rural areas as all territory outside of Census Bureau-defined urbanized areas and urban clusters.:*An urbanized area consists of a central surrounding areas whose population ("urban nucleus") is greater than 50,000. They may or may not contain individual cities with 50,000 or more; rather, they must have a core with a population density generally exceeding 1,000 persons per square mile; and may contain adjoining territory with at least 500 persons per square mile (other towns outside of an urbanized area whose population exceeds 2,500).:*Thus, rural areas comprise open country and settlements with fewer than 2,500 residents; areas designated as rural can have population densities as high as 999 per square mile or as low as 1 person per square mile.[3];USDA:* The USDA's Office of Rural Development may define rural by various population thresholds. The 2002 farm bill (P.L. 107-171, Sec. 6020) defined rural and rural area as any area other than (1) a city or town that has a population of greater than 50,000 inhabitants, and (2) the urbanized areas contiguous and adjacent to such a city or town.:* The rural-urban continuum codes, urban influence code, and rural county typology codes developed by USDA's Economic Research Service (ERS) allow researchers to break out the standard metropolitan and non-metropolitan areas into smaller residential groups.[3] For example, a metropolitan county is one that contains an urbanized area, or one that has a twenty-five percent commuter rate to an urbanized area regardless of population.;OMB: Under the Core Based Statistical Areas used by the OMB,::* a*

metropolitan county, or Metropolitan Statistical Area, consists of (1) central counties with one or more urbanized areas (as defined by the Census Bureau) and (2) outlying counties that are economically tied to the core counties as measured by worker commuting data (i.e. if 25% of workers living there commute to the core counties, or if 25% of the employment in the county consists of workers coming from the central counties).:: Non-metro counties are outside the boundaries of metro areas and are further subdivided into Micropolitan Statistical Areas centered on urban clusters of 10,000-50,000 residents, and all remaining non-core counties.[3][4[*

Canada

In Canada, the Organisation for Economic Co-operation and Development defines a "predominantly rural region" as having more than 50% of the population living in rural communities where a "rural community" has a population density less than 150 persons per square kilometer. In Canada, the census division has been used to represent "regions" and census consolidated sub-divisions have been used to represent "communities". Intermediate regions have 15 to 49 percent of their population living in a rural community. Predominantly urban regions have less than 15 percent of their population living in a rural community. Predominantly rural regions are classified as rural metro-adjacent, rural non-metro-adjacent and rural northern, following Ehrensaft and Beeman (1992). Rural metro-adjacent regions are predominantly rural census divisions which are adjacent to metropolitan centres while rural non-metro-adjacent regions are those predominantly rural census divisions which are not adjacent to metropolitan centres. Rural northern regions are predominantly rural census divisions that are found either entirely or mostly above the following lines of parallel in each province: Newfoundland and Labrador, 50th; Quebec and Ontario, 54th; Manitoba, 53rd; Saskatchewan, Alberta and British Columbia, 54th. As well, rural northern regions encompass all of the Yukon, Northwest Territories and Nunavut.

Statistics Canada defines rural for their population counts. This definition has changed over time (see Appendix A in du Plessis et al., 2002). Typically, it has referred to the population living outside settlements of 1,000 or more inhabitants. The current definition states that census rural is the population outside settlements with 1,000 or more population with a population density of 400 or more inhabitants per square kilometer (Statistics Canada, 2007.(

Europe

Germany

The country is divided into 402 administrative districts; these consist of 295 rural districts, and 107 urban districts Germany is among the largest agricultural producers in the European Union. More than half of Germany's territory - almost 19 million hectares – is used for farming, and are located in the rural areas. German farmers and their work constitute a distinctive feature of its landscapes, so are considered as an integral part of life in rural areas. They are important because there is hardly any other economic sector in which tradition and progress are so closely linked. Almost every tenth gainfully employed person in Germany has work linked directly or indirectly with the agricultural, forest and fisheries sectors; approximately a fifth of them are employed in primary production. This is why rural areas are considered as important as urban areas, and all efforts are made to develop them equally. The implication is that, unlike in some other European countries, where rural areas are known for being backward when compared to urban areas, in Germany, the trend is changing. Due to the country's policy of equal living conditions, this is not the case in Germany. Rural areas receive nearly equivalent attention as the urban areas do. Also, through a special approach to rural development, usually referred to as Village Renewal, the challenges of rural Germany are taken care of.[5[

Rural schools

National Center for Education Statistics (NCES) revised its definition of rural schools in 2006 after working with the Census Bureau to create a new locale classification system to capitalize on improved geocoding technology and the 2000 Office of Management and Budget (OMB) definitions of metro areas that rely less on population size and county boundaries than proximity of an address to an urbanized area. The new classification system has four major local categories — city, suburban, town, and rural — each of which is subdivided into three subcategories. Cities and suburbs are subdivided into the categories small, midsize, or large; towns

and rural areas are

subdivided by their proximity to an urbanized area into the categories fringe, distant, or remote. These twelve categories are based on several key concepts that Census uses to define an area's urbanicity: principal city, urbanized area, and urban cluster. Rural areas are designated by census as those areas that do not lie inside an urbanized area or urban cluster. NCES has classified all schools into one of these twelve categories based on schools' actual addresses and their corresponding coordinates of latitude and longitude. Not only does this mean that the location of any school can be identified precisely, but also that distance measures can be used to identify town and rural subtypes.

Rural health

Rural health definitions can be different for establishing under-served areas or health care accessibility in rural areas of the United States. According to the handbook, Definitions of Rural: A Handbook for Health Policy Makers and Researchers, "Residents of metropolitan counties are generally thought to have easy access to the relatively concentrated health services of the county's central areas. However, some metropolitan counties are so large that they contain small towns and rural, sparsely populated areas that are isolated from these central clusters and their corresponding health services by physical barriers." To address this type of rural area, "Harold Goldsmith, Dena Puskin, and Dianne Stiles (1992) described a methodology to identify small towns and rural areas within large metropolitan counties (LMCs) that were isolated from central areas by distance or other physical features." This became the Goldsmith Modification definition of rural. "Bhoomeet rural education The Goldsmith Modification has been useful for expanding the eligibility for federal programs that assist rural populations—to include the isolated rural populations of large metropolitan counties".

United Kingdom

In Britain, "rural" is defined[6] by the government Department for Environment, Food and Rural Affairs (DEFRA), using population data from the latest census, such as the United Kingdom Census 2001. These definitions have various grades, but the upper point is any local government area with less than 26% of its population living in a market town ("market town" being defined as any settlement which has permission to hold a street market). The British countryside, especially in the south of England, is perceived as under threat, and a number of measures including green belts are used to protect it.

Rural health

An NHS patient is defined as rural if they live more than 5 km (3.1 mi) from either a doctor or a dispensing chemist. This is important for defining whether the patient is expected to collect their own medicines. While doctors' surgeries in towns will not have a dispensing chemist instead expecting patients to use a high-street chemist to purchase their prescription medicines, in rural village surgeries, an NHS dispensary will be built into the same building.

Population density

Population density (people per km2) map of the world in 1994 (detailed.(

Population density (people per km2) map of the world in 1994.

Population density (in agriculture standing stock and standing crop) is a measurement of population per unit area or unit volume. It is frequently applied to living organisms, and particularly to humans. It is a key geographic term.[1[

Biological population densities

Population density is population divided by total land area or water volume, as appropriate.[1[

Low densities may cause an extinction vortex and lead to further reduced fertility. This is called the Allee effect after the scientist who identified it. Examples of the causes in low population densities include:[2[

- *Increased problems with locating sexual mates*
- *Increased inbreeding*

Different species have different expected densities. R-selected species commonly have high population densities, while K-selected species may have lower densities.[3] Low densities may be associated with specialized mate location adaptations such as

specialized pollinators, as found in the orchid family (Orchidaceae.(

Human population density

Monaco in South Europe, currently holds the record for being the most densely populated nation in the world.

Mongolia is the least densely populated country in the world.

A population cartogram uses areas rather than colors to represent population density.

Main article: List of sovereign states and dependent territories by population density

For humans, population density is the number of people per unit of area usually per square kilometer or mile (which may include or exclude cultivated or potentially productive area). Commonly this may be calculated for a county, city, country, another territory, or the entire world.

The world's population is 7 billion,[4] and Earth's total area (including land and water) is 510 million square kilometers (197 million square miles).[5] Therefore the worldwide human population density is 6.8 billion ÷ 510 million = 13.3 per km2 (34.5 per sq. mile). If only the Earth's land area of 150 million km2 (58 million sq. miles) is taken into account, then human population density increases to 45.3 per km2 (117.2 per sq. mile). This calculation includes all continental and island land area, including Antarctica. If Antarctica is also excluded, then population density rises to 50 people per km2 (129.28 per sq. mile).[1] Considering that over half of the Earth's land mass consists of areas inhospitable to human inhabitation, such as deserts and high mountains, and that population tends to cluster around seaports and fresh water sources, this number by itself does not give any meaningful measurement of human population density.

Several of the most densely populated territories in the world are city-states, microstates, or dependencies.[6][7] These territories share a relatively small area and a high urbanization level, with an economically specialized city population drawing also on rural resources outside the area, illustrating the difference between high population density and overpopulation.

Cities with high population densities are, by some, considered to be overpopulated, though the extent to which this is the case depends on factors like quality of housing and infrastructure and access to resources.[8] Most of the most densely populated cities are in southern and eastern Asia, though Cairo and Lagos in Africa also fall into this category.[9[

City population is, however, heavily dependent on the definition of "urban area" used: densities are often higher for the central municipality itself, than when more recently developed and administratively separate suburban communities are included, as in the concepts of agglomeration or metropolitan area, the latter including sometimes neighboring cities. For instance, Milwaukee has a greater population density when just the inner city is measured, and not the surrounding suburbs as well.[10[

As a comparison, based on a world population of seven billion, the world's inhabitants would, as a loose crowd taking up ten square feet (one square metre) per person (Jacobs Method), would occupy a space roughly the size of Fiji's land area.

Spatial analysis

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Map by Dr. John Snow of London, showing clusters of cholera cases in the 1854 Broad Street cholera outbreak. This was one of the first uses of map-based spatial analysis.

Spatial analysis or spatial statistics includes any of the formal techniques which study entities using their topological, geometric, or geographic properties. The phrase properly refers to a variety of techniques, many still in their early

development, using different analytic approaches and applied in fields as diverse as astronomy, with its studies of the placement of galaxies in the cosmos, to chip fabrication engineering, with its use of 'place and route' algorithms to build complex wiring structures. The phrase is often used in a more restricted sense to describe techniques applied to structures at the human scale, most notably in the analysis of geographic data. The phrase is even sometimes used to refer to a specific technique in a single area of research, for example, to describe geostatistics.

Complex issues arise in spatial analysis, many of which are neither clearly defined nor completely resolved, but form the basis for current research. The most fundamental of these is the problem of defining the spatial location of the entities being studied. For example, a study on human health could describe the spatial position of humans with a point placed where they live, or with a point located where they work, or by using a line to describe their weekly trips; each choice has dramatic effects on the techniques which can be used for the analysis and on the conclusions which can be obtained. Other issues in spatial analysis include the limitations of mathematical knowledge, the assumptions required by existing statistical techniques, and problems in computer based calculations.

Classification of the techniques of spatial analysis is difficult because of the large number of different fields of research involved, the different fundamental approaches which can be chosen, and the many forms the data can take.

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Spatial analysis can perhaps be considered to have arisen with the early attempts at cartography and surveying but many fields have contributed to its rise in modern form. Biology contributed through botanical studies of global plant distributions and local plant locations, ethological studies of animal movement, landscape ecological studies of vegetation blocks, ecological studies of spatial population dynamics, and the study of biogeography. Epidemiology contributed with early work on disease mapping, notably [Dr. Snow's work] mapping an outbreak of cholera, with research on mapping the spread of disease and with locational studies for health care delivery. Statistics has contributed greatly through work in spatial statistics. Economics has contributed notably through spatial econometrics. Geographic information system is currently a major contributor due to the importance of geographic software in the modern analytic toolbox. Remote sensing has contributed extensively in morphometric and clustering analysis. Computer science has contributed extensively through the study of algorithms, notably in computational geometry. Mathematics continues to provide the fundamental tools for analysis and to reveal the complexity of the spatial realm, for example, with recent work on fractals and scale invariance. Scientific modelling provides a useful framework for new approaches.

Fundamental issues in spatial analysis

Spatial analysis confronts many fundamental issues in the definition of its objects of study, in the construction of the analytic operations to be used, in the use of computers for analysis, in the limitations and particularities of the analyses which are known, and in the presentation of analytic results. Many of these issues are active subjects of modern research.

Common errors often arise in spatial analysis, some due to the mathematics of space, some due to the particular ways data are presented spatially, some due to the tools which are available. Census data, because it protects individual privacy by aggregating data into local units, raises a number of statistical issues. The fractal nature of coastline makes precise measurements of its length difficult if not impossible. A computer software fitting straight lines to the curve of a coastline, can easily calculate the lengths of the lines which it defines. However these straight lines may have no inherent meaning in the real world, as was shown for the coastline of Britain.

These problems represent one of the greatest dangers in spatial analysis because of the inherent power of maps as media of presentation. When results are presented as maps, the presentation combines the spatial data which is generally very accurate with analytic results which may be grossly inaccurate. Some of these issues are discussed at length in the book How to Lie with Maps.[1[

Spatial characterization

Spread of bubonic plague in medieval Europe. The colors indicate the spatial distribution of plague outbreaks over time. Possibly due to the limitations of printing or for a host of other reasons, the cartographer selected a discrete number of colors to characterize (and simplify) reality.

The definition of the spatial presence of an entity constrains the possible analysis which can be applied to that entity and influences the final conclusions that can be reached. While this property is fundamentally true of all analysis, it is particularly important in spatial analysis because the tools to define and study entities favor specific characterizations of the entities being studied. Statistical techniques favor the spatial definition of objects as points because there are very few statistical techniques which operate directly on line, area, or volume elements. Computer tools favor the spatial definition of objects as homogeneous and separate elements because of the limited number of database elements and computational structures available, and the ease with which these primitive structures can be created.

Spatial dependency or auto-correlation

Spatial dependency is the co-variation of properties within geographic space: characteristics at proximal locations appear to be correlated, either positively or negatively. Spatial dependency leads to the spatial autocorrelation problem in statistics since, like temporal autocorrelation, this violates standard statistical techniques that assume independence among observations. For example, regression analyses that do not compensate for spatial dependency can have unstable parameter estimates and yield unreliable significance tests. Spatial regression models (see below) capture these relationships and do not suffer from these weaknesses. It is also appropriate to view spatial dependency as a source of information rather than something to be corrected.[2[

Locational effects also manifest as spatial heterogeneity, or the apparent variation in a process with respect to location in geographic space. Unless a space is uniform and boundless, every location will have some degree of uniqueness relative to the other locations. This affects the spatial dependency relations and therefore the spatial process. Spatial heterogeneity means that overall parameters estimated for the entire system may not adequately describe the process at any given location.

Scaling

Spatial measurement scale is a persistent issue in spatial analysis; more detail is available at the modifiable areal unit problem (MAUP) topic entry. Landscape ecologists developed a series of scale invariant metrics for aspects of ecology that are fractal in nature.[citation needed] In more general terms, no scale independent method of analysis is widely agreed upon for spatial statistics.

Sampling

Spatial sampling involves determining a limited number of locations in geographic space for faithfully measuring phenomena that are subject to dependency and heterogeneity.[citation needed] Dependency suggests that since one location can predict the value of another location, we do not need observations in both places. But heterogeneity suggests that this relation can change across space, and therefore we cannot trust an observed degree of dependency beyond a region that may be small. Basic spatial sampling schemes include random, clustered and systematic. These basic schemes can be applied at multiple levels in a designated spatial hierarchy (e.g., urban area, city, neighborhood). It is also possible to exploit ancillary data, for example, using property values as a guide in a spatial sampling scheme to measure educational attainment and income. Spatial models such as autocorrelation statistics, regression and interpolation (see below) can also dictate sample design.[citation needed[

Common errors in spatial analysis

The fundamental issues in spatial analysis lead to numerous problems in analysis including bias, distortion and outright errors in the conclusions reached. These issues are often interlinked but various attempts have been made to separate out particular issues from each other.[citation needed[

Length

In a paper by Benoit Mandelbrot on the coastline of Britain it was shown that it is inherently nonsensical to discuss certain spatial concepts despite an inherent presumption of the validity of the concept. Lengths in ecology depend directly on the scale at which they are measured and experienced. So while surveyors commonly measure the length of a river, this length only has meaning in the context of the relevance of the measuring technique to the question under study.

Britain measured using a long yardstick

The locational fallacy refers to error due to the particular spatial characterization chosen for the elements of study, in particular choice of placement for the spatial presence of the element.

Spatial characterizations may be simplistic or even wrong. Studies of humans often reduce the spatial existence of humans to a single point, for instance their home address. This can easily lead to poor analysis, for example, when considering disease transmission which can happen at work or at school and therefore far from the home.

The spatial characterization may implicitly limit the subject of study. For example, the spatial analysis of crime data has recently become popular but these studies can only describe the particular kinds of crime which can be described spatially. This leads to many maps of assault but not to any maps of embezzlement with political consequences in the conceptualization of crime and the design of policies to address the issue.

Atomic fallacy

This describes errors due to treating elements as separate 'atoms' outside of their spatial context.[citation needed[

Ecological fallacy

The ecological fallacy describes errors due to performing analyses on aggregate data when trying to reach conclusions on the individual units.[citation needed] Errors occur in part from spatial aggregation. For example a pixel represents the average surface temperatures within an area. Ecological fallacy would be to assume that all points within the area have the same temperature. This topic is closely related to the modifiable areal unit problem.

Solutions to the fundamental issues

Geographic space

Manhattan distance versus Euclidean distance: The red, blue, and yellow lines have the same length (12) in both Euclidean and taxicab geometry. In Euclidean geometry, the green line has length $6\times\sqrt{2} \approx 8.48$, and is the unique shortest path. In taxicab geometry, the green line's length is still 12, making it no shorter than any other path shown.

A mathematical space exists whenever we have a set of observations and quantitative measures of their attributes. For example, we can represent individuals' income or years of education within a coordinate system where the location of each individual can be specified with respect to both dimensions. The distances between individuals within this space is a quantitative measure of their differences with respect to income and education. However, in spatial analysis we are concerned with specific types of mathematical spaces, namely, geographic space. In geographic space, the observations correspond to locations in a spatial measurement framework that captures their proximity in the real world. The locations in a spatial measurement framework often represent locations on the surface of the Earth, but this is not strictly necessary. A spatial measurement framework can also capture proximity with respect to, say, interstellar space or within a biological entity such as a liver. The fundamental tenet is Tobler's First Law of Geography: if the interrelation between entities increases with proximity in the real world, then representation in geographic space and assessment using spatial analysis techniques are appropriate.

The Euclidean distance between locations often represents their proximity, although this is only one possibility. There are an infinite number of distances in addition to Euclidean that can support quantitative analysis. For example, "Manhattan" (or "Taxicab") distances where movement is restricted to paths parallel to the axes can be more meaningful than Euclidean distances in urban settings. In addition to distances, other geographic relationships such as connectivity (e.g., the existence or degree of shared borders) and direction can also influence the relationships among entities. It is also possible to compute minimal cost paths across a cost surface; for example, this can represent proximity among locations when travel must occur across rugged terrain.

Types of spatial analysis

Spatial data comes in many varieties and it is not easy to arrive at a system of classification that is simultaneously exclusive, exhaustive, imaginative, and satisfying. -- G. Upton & B. Fingelton[3[

Spatial data analysis

Urban and Regional Studies deal with large tables of spatial data obtained from censuses and surveys. It is necessary to simplify the huge amount of detailed information in order to extract the main trends. Multivariate analysis (or Factor_analysis Factor analysis, FA) allows a change of variables, transforming the many variables of the census, usually correlated between themselves, into fewer independent « Factors » or « Principal Compents » which are, actually, the eigenvectors of the data correlation matrix weighted by the inverse of their eigenvalues. This change of variables has two main advantages : 1- since information is concentrated on the first new factors, it is possible to keep only a few of them while losing only a small amount of information ; mapping them produces fewer and more significant maps ; 2- the factors, actually the eigenvectors, are orthogonal by construction, i.e. not correlated. In most cases, the dominant factor (with the largest eigenvalue) is the Social Component, separating richs and poors in the city. Since factors are not-correlated, other smaller processes than social status, which would have remained hidden otherwise, appear on the second, third, ... factors.

Factor analysis depends on measuring distances between observations : the choice of a significant metric is crucial. The Euclidean metric (Principal Component Analysis), the Chi-Square distance (Correspondence Analysis) or the Generalized Mahalanobis distance (Discriminant Analysis) are among the more widely used.[4] More complicated models, using communalities or rotations have been proposed.[5[

Using multivariate methods in spatial analysis began really in the 1950s (although some examples go back to the beginning of the century) and culminated in the 1970s, with the increasing power and accessibility of computers. Already in 1948, in a seminal publication, two sociologists, Bell and

Shevky,[6] had shown that most city populations in the USA and in the world could be represented with three independent factors : 1- the « socio-economic status » opposing rich and poor districts and distributed in sectors running along highways from the city center, 2- the « life cycle », i.e. the age structure of households, distributed in concentric circles, and 3- « race and ethnicity », identifying patches of migrants located within the city. In 1961, in a groundbreaking study, British geographers used FA to classify British towns.[7] Brian J Berry, at the University of Chicago, and his students made a wide use of the method,[8] applying it to most important cities in the world and exhibiting common social structures.[9] The use of Factor Analysis in Geography, made so easy by modern computers, has been very wide but not always very wise.[10[

Since the vectors extracted are determined by the data matrix, it is not possible to compare factors obtained from different censuses. A solution consists in fusing together several census matrices in a unique table which, then, may be analyzed. This, however, assumes that the definition of the variables has not changed over time and produces very large tables, difficult to manage. A better solution, proposed by psychometricians,[11] groups the data in a « cubic matrix », with three entries (for instance, locations, variables, time periods). A Three-Way Factor Analysis produces then three groups of factors related by a small cubic « core matrix ».[12] This method, which exhibits data evolution over time, has not been widely used in geography.[13] In Los Angeles,[14] however, it has exhibited the role, traditionally ignored, of Downtown as an organizing center for the whole city during several decades.

Spatial autocorrelation

Spatial autocorrelation statistics measure and analyze the degree of dependency among observations in a geographic space. Classic spatial autocorrelation statistics include Moran's I and Geary's C and Getis'G. These require measuring a spatial weights matrix that reflects the intensity of the geographic relationship between observations in a neighborhood, e.g., the distances between neighbors, the lengths of shared border, or whether they fall into a specified directional class such as "west". Classic spatial autocorrelation statistics compare the spatial weights to the covariance relationship at pairs of locations. Spatial autocorrelation that is more positive than expected from random indicate the clustering of similar values across geographic space, while significant negative spatial autocorrelation indicates that neighboring values are more dissimilar than expected by chance, suggesting a spatial pattern similar to a chess board.

Spatial autocorrelation statistics such as Moran's I and Geary's C are global in the sense that they estimate the overall degree of spatial autocorrelation for a dataset. The possibility of spatial heterogeneity suggests that the estimated degree of autocorrelation may vary significantly across geographic space. Local spatial autocorrelation statistics provide estimates disaggregated to the level of the spatial analysis units, allowing assessment of the dependency relationships across space. G statistics compare neighborhoods to a global average and identify local regions of strong autocorrelation. Local versions of the I and C statistics are also available.

Spatial interpolation

Spatial interpolation methods estimate the variables at unobserved locations in geographic space based on the values at observed locations. Basic methods include inverse distance weighting: this attenuates the variable with decreasing proximity from the observed location. Kriging is a more sophisticated method that interpolates across space according to a spatial lag relationship that has both systematic and random components. This can accommodate a wide range of spatial relationships for the hidden values between observed locations. Kriging provides optimal estimates given the hypothesized lag relationship, and error estimates can be mapped to determine if spatial patterns exist.

Spatial regression

Spatial regression methods capture spatial dependency in regression analysis, avoiding statistical problems such as unstable parameters

and unreliable significance tests, as well as providing information on spatial relationships among the variables involved. Depending on the specific technique, spatial dependency can enter the regression model as relationships between the independent variables and the dependent, between the dependent variables and a spatial lag of itself, or in the error terms. Geographically weighted regression (GWR) is a local version of spatial regression that generates parameters disaggregated by the spatial units of analysis.[15] This allows assessment of the spatial heterogeneity in the estimated relationships between the independent and dependent variables. The use of Markov Chain Monte Carlo (MCMC) methods can allow the estimation of complex functions, such as Poisson-Gamma-CAR, Poisson-lognormal-SAR, or Overdispersed logit models.

Spatial interaction

Spatial interaction or "gravity models" estimate the flow of people, material or information between locations in geographic space. Factors can include origin propulsive variables such as the number of commuters in residential areas, destination attractiveness variables such as the amount of office space in employment areas, and proximity relationships between the locations measured in terms such as driving distance or travel time. In addition, the topological, or connective, relationships between areas must be identified, particularly considering the often conflicting relationship between distance and topology; for example, two spatially close neighborhoods may not display any significant interaction if they are separated by a highway. After specifying the functional forms of these relationships, the analyst can estimate model parameters using observed flow data and standard estimation techniques such as ordinary least squares or maximum likelihood. Competing destinations versions of spatial interaction models include the proximity among the destinations (or origins) in addition to the origin-destination proximity; this captures the effects of destination (origin) clustering on flows. Computational methods such as artificial neural networks can also estimate spatial interaction relationships among locations and can handle noisy and qualitative data.

Simulation and modeling

Spatial interaction models are aggregate and top-down: they specify an overall governing relationship for flow between locations. This characteristic is also shared by urban models such as those based on mathematical programming, flows among economic sectors, or bid-rent theory. An alternative modeling perspective is to represent the system at the highest possible level of disaggregation and study the bottom-up emergence of complex patterns and relationships from behavior and interactions at the individual level.[citation needed[

Complex adaptive systems theory as applied to spatial analysis suggests that simple interactions among proximal entities can lead to intricate, persistent and functional spatial entities at aggregate levels. Two fundamentally spatial simulation methods are cellular automata and agent-based modeling. Cellular automata modeling imposes a fixed spatial framework such as grid cells and specifies rules that dictate the state of a cell based on the states of its neighboring cells. As time progresses, spatial patterns emerge as cells change states based on their neighbors; this alters the conditions for future time periods. For example, cells can represent locations in an urban area and their states can be different types of land use. Patterns that can emerge from the simple interactions of local land uses include office districts and urban sprawl. Agent-based modeling uses software entities (agents) that have purposeful behavior (goals) and can react, interact and modify their environment while seeking their objectives. Unlike the cells in cellular automata, agents can be mobile with respect to space. For example, one could model traffic flow and dynamics using agents representing individual vehicles that try to minimize travel time between specified origins and destinations. While pursuing minimal travel times, the agents must avoid collisions with other vehicles also seeking to minimize their travel times. Cellular automata and agent-based modeling are complementary modeling strategies. They can be integrated into a common geographic automata system where some agents are fixed while others are mobile.

Multiple-Point Geostatistics (MPS(

Spatial analysis of a conceptual geological model is the main purpose of any MPS algorithm. The method analyzes the spatial statistics of the geological model, called the training image, and generates realizations of the phenomena that honor those input multiple-point statistics.

One of the recent technique to accomplish this task is the pattern-based method of Honarkhah.[16] In this method, a distance-based approach is employed to analyze the patterns in the training image. This allows the reproduction of the multiple-point statistics, and the complex geometrical features of the given image. The final generated realizations of this, so called random field, can be used to quantify spatial uncertainty.

In the recent method, Tahmasebi et al.[17] used a cross-correlation function to better spatial pattern reproduction and they presented the CCSIM algorithm. This method is able to quantify the spatial connectivity, variability and uncertainty. Furthermore, the method is not sensitive to any type of data and is able to simulate both categorical and continuous scenarios.

Geographic information science and spatial analysis

Geographic information systems (GIS) and the underlying geographic information science that advances these technologies have a strong influence on spatial analysis. The increasing ability to capture and handle geographic data means that spatial analysis is occurring within increasingly data-rich environments. Geographic data capture systems include remotely sensed imagery, environmental monitoring systems such as intelligent transportation systems, and location-aware technologies such as mobile devices that can report location in near-real time. GIS provide platforms for managing these data, computing spatial relationships such as distance, connectivity and directional relationships between spatial units, and visualizing both the raw data and spatial analytic results within a cartographic context.

This flow map of Napoleon's ill-fated march on Moscow is an early and celebrated example of geovisualization. It shows the army's direction as it traveled, the places the troops passed through, the size of the army as troops died from hunger and wounds, and the freezing temperatures they experienced.

Content

Spatial location: Transfer positioning information of space objects with the help of space coordinate system. Projection transformation theory is the foundation of spatial object representation.

Spatial distribution: the similar spatial object groups positioning information, including distribution, trends, contrast etc..

Spatial form: the geometric shape of the spatial objects

Spatial space: the space objects 'approaching degree

Spatial relationship: relationship between spatial objects,including topological, orientation, similarity, etc..

Geovisualization (GVis) combines scientific visualization with digital cartography to support the exploration and analysis of geographic data and information, including the results of spatial analysis or simulation. GVis leverages the human orientation towards visual information processing in the exploration, analysis and communication of geographic data and information. In contrast with traditional cartography, GVis is typically three or four-dimensional (the latter including time) and user-interactive.

Geographic knowledge discovery (GKD) is the human-centered process of applying efficient computational tools for exploring massive spatial databases. GKD includes geographic data mining, but also encompasses related activities such as data selection, data cleaning and pre-processing, and interpretation of results. GVis can also serve a central role in the GKD process. GKD is based on the premise that massive databases contain

interesting (valid, novel, useful and understandable) patterns that standard analytical techniques cannot find. GKD can serve as a hypothesis-generating process for spatial analysis, producing tentative patterns and relationships that should be confirmed using spatial analytical techniques.

Spatial Decision Support Systems (sDSS) take existing spatial data and use a variety of mathematical models to make projections into the future. This allows urban and regional planners to test intervention decisions prior to implementation.[citation needed[

Psychogeography

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Psychogeography, a subfield of geography, was defined in 1955 by Guy Debord as "the study of the precise laws and specific effects of the geographical environment, consciously organized or not, on the emotions and behavior of individuals."[1] Another definition is "a whole toy box full of playful, inventive strategies for exploring cities...just about anything that takes pedestrians off their predictable paths and jolts them into a new awareness of the urban landscape."[2[

Psychogeography was originally developed by the avant-garde movement Lettrist International in the journal Potlach. The originator of what became known as unitary urbanism, psychogeography, and the dérive was Ivan Chtcheglov, in his highly influential 1953 essay "Formulaire pour un urbanisme nouveau" ("Formulary for a New Urbanism").[3] The Lettrists' reimagining of the city has its precursors in aspects of Dadism and Surrealism. The idea of urban wandering relates to the older concept of the flâneur, theorized by Charles Baudelaire. Following Chtcheglov's exclusion from the Lettrists in 1954, Guy Debord and others worked to clarify the concept of unitary urbanism, in a bid to demand a revolutionary approach to architecture. At a conference in Coscio de Arroscia, Italy in 1956, the Lettrists joined the International Movement for an Imaginist Bauhaus to set a proper definition for the idea announced by Gil J. Wolman "Unitary Urbanism - the synthesis of art and technology that we call for — must be constructed according to certain new values of life, values which now need to be distinguished and disseminated."[4] It demanded the rejection of functional, Euclidean values in architecture, as well as the separation between art and its surroundings. The implication of combining these two negations is that by creating abstraction, one creates art, which, in turn, creates a point of distinction that unitary urbanism insists must be nullified. This confusion is also fundamental to the execution of unitary urbanism as it corrupts one's ability to identify where "function" ends and "play" (the "ludic") begins, resulting in what the Lettrist International and Situationist International believed to be a utopia where one was constantly exploring, free of determining factors.[citation needed[

In "Formulary for a New Urbanism," Chtcheglov had written "Architecture is the simplest means of articulating time and space, of modulating reality, of engendering dreams".[5] Similarly, the Situationists found contemporary architecture both physically and ideologically restrictive, combining with outside cultural influence, effectively creating an undertow, and forcing oneself into a certain system of interaction with their environment:

"[C]ities have a psychogeographical relief, with constant currents, fixed points and vortexes which strongly discourage entry into or exit from certain zones".[6[

The Situationists' response was to create designs of new urbanized space, promising better opportunities for experimenting through mundane expression. Their intentions remained completely as abstractions. Guy Debord's truest intention was to unify two different factors of "ambiance" that, he felt, determined the values of the urban landscape: the soft ambiance – light, sound, time, the association of ideas – with the hard, the actual physical constructions. Debord's vision was a combination of the two realms of opposing ambiance, where the play of the soft ambiance was actively considered in the rendering of the hard. The new space creates a possibility for activity not formerly determined by one besides the individual.[citation needed[

However, the Situationist International may have been tongue-in-cheek about some parts of psychogeography. "This apparently serious term 'psychogeography,'" writes Debord biographer Vincent Kaufman, "comprises an art of conversation and drunkenness, and everything leads us to believe that Debord excelled at both."[7[

Eventually, Debord and Asger Jorn resigned themselves to the fate of "urban relativity". Debord readily admits in his film A Critique of Separation (1961), "The sectors of a city…are decipherable, but the personal meaning they have for us is incommunicable, as is the secrecy of private life in general, regarding which we possess nothing but pitiful documents". Despite the ambiguity of the theory, Debord committed himself firmly to its practical basis in reality, even as he later confesses, "none of this is very clear. It is a completely typical drunken monologue…with its vain phrases that do not await response and its overbearing explanations. And its silences." <A Critique of Separation (1961). Complete Cinematic Works (AK Press, 2003, Trans. Knabb. K<

Before settling on the impossibility of true psychogeography, Debord made another film, On the Passage of a Few Persons Through a Rather Brief Unity of Time (1959), the title of which suggests its own subject matter. The film's narrated content concerns itself with the evolution of a generally passive group of unnamed people into a fully aware, anarchistic assemblage, and might be perceived as a biography of the situationists themselves. Among the rants which construct the film (regarding art, ignorance, consumerism, militarism) is a desperate call for psychogeographic action:

“ When freedom is practiced in a closed circle, it fades into a dream, becomes a mere image of itself. The ambiance of play is by nature unstable. At any moment, "ordinary life" may prevail once again. The geographical limitation of play is even more striking than its temporal limitation. Every game takes place within the boundaries of its own spatial domain.[citation needed [”

Moments later, Debord elaborates on the important goals of unitary urbanism in contemporary society:

“

The atmosphere of a few places gave us a few intimations of the future powers of an architecture that it would be necessary to create in order to provide the setting for less mediocre games.[citation needed[

”

Quoting Marx, Debord says:

“ People can see nothing around them that is not their own image; everything speaks to them of themselves. Their very landscape is animated. Obstacles were everywhere. And they were all interrelated, maintaining a unified reign of poverty.[citation needed [”

While a reading of the texts included in the journal Internationale Situationniste may lead to an

understanding of

psychogeography as dictated by Guy Debord, a more comprehensive elucidation of the term would come from research into those who have put its techniques into a more developed practise. While Debord's influence in bringing Chtchglov's text to an international audience is undoubted, his ability to practise the 'praxis' of unitary urbanism has been placed into question by almost all of the subsequent protagonists of the Formulary's directives. Debord was indeed a notorious drunk (see his Panegyrique, Gallimard 1995), and his assertions regarding the veracity of the affects of the psychogeographical process (derive, constructed situation) must be questioned by this personal weakness. The researches undertaken by WNLA, AAA and the London Psychogeographical Association during the 1990's support the contention of Asger Jorn and the Scandinavian Situationniste (Drakagygett 1962 - 1998) that the psychogeographical is a concept only known through practise of its techniques. Without undertaking the programme expounded by Chtchglov, and the resultant submission to the urban unknown, comprehension of the Formulary is not possible. As Debord himself suggested, an understanding of the 'beautiful language' of situationist urbanism necessitates its practice.

By definition, psychogeography combines subjective and objective knowledge and studies. Debord struggled to stipulate the finer points of this theoretical paradox, ultimately producing "Theory of the Dérive" in 1958, a document which essentially serves as an instruction manual for the psychogeographic procedure, executed through the act of dérive ("drift.("

“ In a dérive one or more persons during a certain period drop their usual motives for movement and action, their relations, their work and leisure activities, and let themselves be drawn by the attractions of the terrain and the encounters they find there… But the dérive includes both this letting go and its necessary contradiction: the domination of psychogeographical variations by the knowledge and calculation of their possibilities.[6 [”

In the SI's 6th issue, Raoul Vaneigem writes in a manifesto of unitary urbanism, "All space is occupied by the enemy. We are living under a permanent curfew. Not just the cops – the geometry".[8] Dérive, as a previously conceptualized tactic in the French military, was "a calculated action determined by the absence of a greater locus", and "a maneuver within the enemy's field of vision".[9] To the SI, whose interest was inhabiting space, the dérive brought appeal in this sense of taking the "fight" to the streets and truly indulging in a determined operation. The dérive was a course of preparation, reconnaissance, a means of shaping situationist psychology among urban explorers for the eventuality of the situationist city.

Contemporary psychogeography

Since the 1990's, as situationist theory became popular in artistic and academic circles, avant-garde, neoist and revolutionary groups emerged, developing psychogeographical praxis in various ways. Influenced primarily through the re-emergence of the London Psychogeographical Association and the foundation of The Workshop for Non-Linear Architecture, these groups have assisted in the development of a contemporary psychogeography.

Between 1992 and 1996 The Workshop for Non-Linear Architecture undertook an extensive programme of practical research into classic (situationist) psychogeography in both Glasgow and London. The discoveries made during this period, documented in the group's journal Viscosity, expanded the terrain of the psychogeographic into that of urban design and architectural performance.

The journal Transgressions: A Journal of Urban Exploration (which appears to have ceased publication sometime in 2000) collated and developed a number of post-avant-garde revolutionary psychogeographical themes. The journal also contributed to the use and development of psychogeographical maps[10] which have, since 2000 been used in political actions, drifts and projections, distributed as flyers.

Since 2003 in the United States, separate events known as Provflux and Psy-Geo-conflux have been dedicated to action-based participatory experiments, under the academic umbrella of psychogeography.

Psychogeography also become a device used in performance art and literature. In Britain in particular, psychogeography has become a recognised descriptive term used in discussion of successful writers such as Iain Sinclair and Peter Ackroyd and the documentaries of filmmaker Patrick Keiller. The popularity of Sinclair drew the term into greater public use in the United Kingdom. Though Sinclair makes infrequent use of the jargon associated with the Situationists, he has certainly popularized the term by producing a large body of work based on pedestrian exploration of the urban and suburban landscape. Sinclair and similar thinkers draw on a longstanding British literary tradition of the exploration of urban landscapes, predating the Situationists, found in the work of writers like William Blake, Arthur Machen, and Thomas de Quincey. The nature and history of London were a central focus of these writers, utilising romantic, gothic, and occult ideas to describe and transform the city. Sinclair drew on this tradition combined with his own explorations as a way of criticising modern developments of urban space in such key texts as Lights Out for the Territory. Peter Ackroyd's bestselling London: A Biography was partially based on similar sources. Merlin Coverley gives equal prominence to this literary tradition alongside Situationism in his book Psychogeography (2006), not only recognising that the situationist origins of psychogeography are sometimes forgotten, but that via certain writers like Edgar Allan Poe, Daniel Defoe and Charles Baudelaire they had a shared tradition. Psychogeography, as a term and a concept, now reaches more British eyes than ever before, as novelist Will Self had a column of that name which started out in the British Airways Inflight magazine and then appeared weekly in the Saturday magazine of The Independent newspaper until October 2008.

The concepts and themes seen in popular comics writers such as Alan Moore in works like From Hell are also now seen as significant works of psychogeography. Other key figures in this version of the idea are Walter Benjamin, J. G. Ballard, and Nicholas Hawksmoor. Part of this development saw increasing use of ideas and terminology by some psychogeographers from Fortean and occult areas like earth mysteries, ley lines, and chaos magic, a course pioneered by Sinclair. A core element in virtually all these developments remains a dissatisfaction with the nature and design of the modern environment and a desire to make the everyday world more interesting.

After a few years of practicing, the psychogeography group that gravitates around the Urban Squares Initiative and Aleksandar Janicijevic,[11][12] the initiator of, and main figure in organizing and leading this group, came up with the working definition of this procedure as: "The subjective analysis–mental reaction, to neighbourhood behaviours related to geographic location. A chronological process based on the order of appearance of observed topics, with the time delayed inclusion of other relevant instances".[13] Bill Humber [Executive Director, Revitalization Institute, Toronto, Canada],[14][15] a participant in a few of our walks, described our intentions in his article about psychogeography like this: "In discovering a small world we discover the whole world."

Environment and Planning

The Environment and Planning journals are four academic journals. They are described as "interdisciplinary", though they have a highly spatial focus, meaning that they are of most interest to human geographers. The journals are also of interest to the scholars of economics, sociology, political science, urban planning, architecture, ecology and cultural studies.

The four journals are:

Environment and Planning A: The original Environment and Planning journal, launched in 1969. It focuses on urban and regional issues.[1[

Environment and Planning B: Planning and Design: Introduced in 1974 to provide a focus on methodological urban issues, focusing again on the built environment, planning and policy.[2[

Environment and Planning C: Government and Policy: Established in 1983, it again aims to focus on policy issues, but a on a wider scale. It has particular focus on the interventions of civil society agents such as NGOs in policy-making.[3[

Environment and Planning D: Society and Space: Launched as Society and Space in 1979 and joined the Environment and Planning series in 1983. Initially devoted to human geography, the journal is now broadening its scope and welcomes submissions from geography, cultural studies, economics, anthropology, sociology, politics, international relations, literary studies, architecture, planning, history, women's studies, art history, and philosophy.[4[

In the 2001 Research Assessment Exercise in the United Kingdom, the highest number of submissions from geographers were articles from Environment and Planning A, with Environment and Planning D fourth in the list.[5]

Geography of food

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The Geography of Food is a field of human geography that is concerned with the production, consumption and supply chains of food.

Spatial variations in food production and consumption practices have been noted for thousands of years. In fact, Plato commented on the destructive nature of agriculture when he referred to the soil erosion from the mountainsides surrounding Athens (3) (p. 61). The study of food has not been confined to a single discipline, and has received attention from a huge range of diverse sources.

Modern geographers initially focused on food as an economic activity, especially in terms of agricultural geography. It was not until recently that geographers have turned their attention to food in a wider sense: "The emergence of an agro-food geography that seeks to examine issues along the food chain or within systems of food provision derives, in part, from the strengthening of political economy approaches in the 1980s" (Winter 2004.(

Overlapping areas of study

Because food is a bridge between the natural and the social world, it has received attention from both the physical sciences and the social sciences. Some of the earliest numerical data about food production come from bureaucratic sources linked to the ancient civilizations of Ancient Egypt and the Roman Empire (3). Traders have also been influential in documenting food networks. Early Indian mapped the location of trading posts associated with food production nodes.

Thomas Malthus famously stated that food output could only expand arithmetically (in proportion with the extension of farmland) while population could increase geometrically, leading to a 'population bomb' or a Malthusian catastrophe. His theory was also given a spatial element when he predicted the Irish potato famine (though there was enough non-potato based food produced in Ireland at the time the potato crop failed, the British, who controlled Ireland, sold the food abroad.(

Since the industrial revolution, the study of food has been increasingly formalized, often taking an explicit spatial dimension. Food featured greatly in economics, experimental agriculture, political economy and travel literature. It was still not studied from an explicitly geographical perspective though until the 20th century.

Food Production

Food production was the first element of food to receive extensive attention from geographers.

Green Revolution

Food Consumption

The huge variation in diet and consumption practices on global and regional scales became the focus of geographers and economists with the vastly expanding population and widely publicized famines of the 1960s. Differences in the caloric intake of food and the composition of diet was estimated and mapped for many countries from the 1960s onward.

DCs consume more food than LDCs in the past years. However, in recent years, LDCs have been increasing their food consumption. Besides, DCs have been reported to have a food consumption level greater than satisfactory level ever since 1960s while the LDCs' food consumption has been below this level even until the first decade of 21st century.

There are many factors contributing to this difference. And these factors are categorized into two main areas—food availability and food accessibility.

Since the farmers in DCs are able to produce more food with the application of proper agricultural system as well as the usages of machinery and modern irrigation, there is more than enough food available for the farmers in DCs. In contrast, such high level of food production is absent in LDCs which leads to food insufficiency in LDCs.

However, globalization allows international trading of food and LDCs have benefited from this progress in the world as they are able to purchase food from various sources with international aid.

Moreover, advances in agrotechnology has also increased food production in LDCs

. Integrated geography

Integrated geography, integrative geography or human-environmental geography is the branch of geography that describes and explains the spatial aspects of interactions between humans and the natural world. It requires an understanding of the dynamics of geology, meteorology, hydrology, biogeography, ecology, and geomorphology, as well as the ways in which human societies conceptualize the environment (cultural geography). To a certain degree it may be seen as a successor of physical anthropogeography (Physische Anthropogeographie)—a term coined by the Vienna Geographer Albrecht Penck in 1924—and geographical cultural or human ecology (Harlan H. Barrows 1923.(

The links between cultural and physical geography were once more readily apparent than they are today. As human experience of the world is increasingly mediated by technology, the relationships have often become obscured. Thereby, integrated geography represents a critically important set of analytical tools for assessing the impact of human presence on the environment by measuring the result of human activity on natural landforms and cycles. It hence is considered the third branch of geography, as compared to physical and human geography.[citation needed[