The influence of human geography on physical geography
by Ian Douglas

As virtually all physical geographers have studied some human geography and in many countries contribute to teaching with human geographers, much influence of human geography on physical geography may be expected. However, the two kinds of geography have grown in differing ways. The scope and concerns of present-day physical geography are as old as the subject itself. The present scope of human geography on the other hand is largely a product of the twentieth century, much of it having been clarified and set in the context of social and behavioural science since 1950. While physical geography reflects the scientific concern to understand and explain the nature and properties of matter and the universe, human geography reflects the burgeoning of the social sciences and the need to understand the variety of living conditions, human activity and land use around the world and within nations as the product of the working of social, political and economic systems.

The broad goals and content of physical geography are little changed from a hundred years ago (see Table 1). The task of physical geography in discovering the dynamics and evolution of the surface of the earth was stressed by Elisée Reclus in 1877:

Physical geography, in confining itself to the present epoch, merely describes the earth as it is existing before our eyes. Its aim is not so ambitious that of geology, which tries to recount the history of our planet during the long succession of ages; but still, it is geography which collects and classes the facts; she it is that discovers the laws both of the formation and the destruction of strata (Reclus, 1877:39).
The emphasis on law formulation is apposite today. Although the technology used by physical geographers is vastly different from that of 100 years ago, many of their methods have remained essentially the same. For example, Reclus had figures for rates of denudation by major rivers based on river flow measurements and water quality determinations. Indeed, Briggs and Smithson (1985) may be exaggerating a little in suggesting that the questions asked by physical geographers are changing:

<table>
<thead>
<tr>
<th>W.M. Davis (1902)</th>
<th>D. Briggs and P. Smithson (1985)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary physical geography</td>
<td>Fundamentals of physical geography</td>
</tr>
<tr>
<td>The earth as a globe</td>
<td>The global energy system</td>
</tr>
<tr>
<td>The atmosphere</td>
<td>Energy balance of the atmosphere</td>
</tr>
<tr>
<td>Temperature</td>
<td>Heat and moisture in the atmosphere</td>
</tr>
<tr>
<td>Circulation of the atmosphere</td>
<td>The atmosphere in motion</td>
</tr>
<tr>
<td>Planetary winds</td>
<td>Weather-forming systems</td>
</tr>
<tr>
<td>Rainfall</td>
<td>Climates of the world</td>
</tr>
<tr>
<td>The ocean</td>
<td>Micro and local climates; climatic change</td>
</tr>
<tr>
<td>Waves, currents, tides</td>
<td>The global water balance</td>
</tr>
<tr>
<td>Life in the Ocean</td>
<td>Precipitation; evapotranspiration</td>
</tr>
<tr>
<td>The lands</td>
<td>Runoff and storage</td>
</tr>
<tr>
<td>Hypsometry</td>
<td>Oceans and their circulation</td>
</tr>
<tr>
<td>The wasting of the lands</td>
<td>Landscape form and process</td>
</tr>
<tr>
<td>Plains and plateaus</td>
<td>The formation of rocks; earthbuilding</td>
</tr>
<tr>
<td>Coastal and inland plains</td>
<td>Weathering; erosion and deposition</td>
</tr>
<tr>
<td>Plateaus, dissected plateau mesas</td>
<td>Hillslopes; streams</td>
</tr>
<tr>
<td>Mountains</td>
<td>Glacial and periglacial system</td>
</tr>
<tr>
<td>Lofty mountains, landslides</td>
<td>Aeolian system</td>
</tr>
<tr>
<td>Worn down mountains, old mountain ridges</td>
<td>Lacustrine, coastal and marine systems</td>
</tr>
<tr>
<td>Volcanoes</td>
<td>Ecosystems; soil formation</td>
</tr>
<tr>
<td>River and valleys</td>
<td>Development of the vegetation layer</td>
</tr>
<tr>
<td>Work of rivers, valley</td>
<td>Biogeochemical cycling</td>
</tr>
<tr>
<td>Deserts and glaciers</td>
<td>World ecosystems</td>
</tr>
<tr>
<td>Shore lines</td>
<td>Man and the ecosystem</td>
</tr>
<tr>
<td>The distribution of plants, animals and man</td>
<td></td>
</tr>
</tbody>
</table>

Table 1  Major contents of two physical geography texts
The basic aim of physical geography has always been to understand how the world works... in the last 20 years or so physical geographers have begun to adopt different approaches and to ask different questions. Increasingly emphasis has been placed on monitoring and understanding processes and in predicting change in the physical world (Briggs and Smithson, 1985:6).

While the ability to predict, to monitor and to observe have all improved, the questions – ‘How does it work?’, ‘How did it come to be the way it is?’ and ‘How

Table 2 The content of human geography at 1900 and 1980

<table>
<thead>
<tr>
<th>Human geography at the 7th International Geographical Congress, Berlin (1899)</th>
<th>Types of human geography given by Haggett (1979)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population statistical maps</td>
<td>Economic</td>
</tr>
<tr>
<td>Settlement geography</td>
<td>Urban</td>
</tr>
<tr>
<td>Isopleth mapping of population density</td>
<td>Population</td>
</tr>
<tr>
<td>Distribution of industry in different climatic zones</td>
<td>Cultural</td>
</tr>
<tr>
<td>Statistical mapping of social phenomena</td>
<td>Behavioural</td>
</tr>
<tr>
<td>The production and consumption of tea</td>
<td>Historical</td>
</tr>
<tr>
<td>Development in arid zones</td>
<td>Spatial interaction</td>
</tr>
<tr>
<td>Political geography of colonization</td>
<td>Location theory</td>
</tr>
<tr>
<td>Ethnology relation of geographical to physical race traits</td>
<td></td>
</tr>
<tr>
<td>Origin and distribution of Indo-German people</td>
<td></td>
</tr>
<tr>
<td>Historical geography</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Racial geography</td>
<td>Geography and behaviour</td>
</tr>
<tr>
<td>Human geography and spatial distribution</td>
<td>Modelling economic behaviour</td>
</tr>
<tr>
<td>Historical geography</td>
<td>People and space</td>
</tr>
<tr>
<td>Metropolitan England</td>
<td>Models of men</td>
</tr>
<tr>
<td>Industrial England</td>
<td>Environmental information</td>
</tr>
<tr>
<td>Scotland</td>
<td>Decision making</td>
</tr>
<tr>
<td>Ireland</td>
<td>Image and behaviour</td>
</tr>
<tr>
<td>Strategic geography</td>
<td>Consumer behaviour</td>
</tr>
<tr>
<td>Economic geography</td>
<td>Urban housing</td>
</tr>
<tr>
<td>Imperial Britain</td>
<td>Industrial location</td>
</tr>
<tr>
<td></td>
<td>Adaption to hazards</td>
</tr>
<tr>
<td></td>
<td>Leisure and recreation</td>
</tr>
<tr>
<td></td>
<td>Stress and pathology</td>
</tr>
<tr>
<td></td>
<td>Migration and residential mobility</td>
</tr>
<tr>
<td></td>
<td>Voting behaviour</td>
</tr>
<tr>
<td></td>
<td>Humanistic approaches</td>
</tr>
</tbody>
</table>
will it change in the future?' - are still being directed at a similar list of topics to those described by Davis in 1902 (Table 1).

Human geography on the other hand has changed substantially in scope, aims and methodology (see Table 2). While 80-100 years ago it was primarily concerned with the distribution of population, settlement and industry and the elucidation of the 'geographical factor' (Herbertson, 1910) in the location of human activity, today it is as much concerned with how the global economic and national political systems help to explain why people are doing the things they do, where they do. Both new research questions and new research methods are involved. So great has been the change, that post-1960's human geography was called the 'New Geography' (Claval 1972; 1977). While Clozier (1949) saw the basic task of human geography as the explanation of population distribution and density, and secondly the study of the landscape features of settlements, economic activity and ways of life, Claval (1977) finds human geography now embracing ecological concepts, social and economic forces and the psychological aspects of behaviour.

While human geography has positivist, humanist and structuralist epistemologies, the general epistemology of physical geography is a broad scientific method with sometimes more precise positivist procedures. In this scientific method, the aim has been to seek verification, to achieve a greater probability that suggested evolutionary models are correct, and to develop better means of predicting future environmental changes. While research design and experimentation in physical geography are frequently discussed, there is little debate over the overall purpose, aims and general philosophy of physical geographers. In this respect, Haines-Young and Petch (1986) suggest that physical geography lacks well-established bases for scientific argument.

Human geography has been part of the ferment of critical ideas in the social sciences, becoming caught up in ideological debates which have increased the breadth and diversity of the subject and have led its practitioners to ask fundamental questions about why and how they should pursue their research. Despite geological discussions of uniformitarianism, catastrophism and plate tectonics, physical geography has sought to shed new light on old problems, to understand climatic and environmental change in greater detail and to develop predictive techniques applicable in environmental management, engineering and planning. So great have the technical advances and opportunities to measure, monitor and model become in physical geography, that a spate of new investigations and new fashions in research, such as the geomorphic bandwaggons described by Jennings (1973), has emerged leaving little time and little incentive for the philosophical debate over aims and objectives which has prevailed in human geography.

The divergence of approach, subject matter and level of philosophical debate reduces the need, opportunity and benefit for human geography to influence physical geography. If there is a bath full of ideas and philosophical debate in human geography, physical geography has only been wetted by a few splashes and
spills over the edge of the bath. Nevertheless, five distinct levels of influence related to the organization of geography, the use of historical approaches, attention to ecological relationships and philosophical spill-overs may be identified. These influences may be termed the teaching and educational links, the historical dimension, the common concern with certain problems, the attraction to an integrated body of techniques or models and the influence on the general formulation of research questions.

I Teaching and educational influences

Although many have argued, like Gould (1973), that in educational terms physical geography is a separate subject, most of which is totally irrelevant to human spatial organization, courses at secondary and tertiary level continue to link the two fields under the umbrella of geography. At the secondary level, links between people and the environment are explored through resource management systems, especially water resources and river basin development schemes systems, (Tweedie, 1975). Such approaches have led many physical geographers to look at the environmental consequences of water resource policies and related management. Some of the attention to the downstream consequences of reservoir construction, salt build-up in valley floors, and the impacts of channelization, urban construction and mining stems from teaching situations and need to demonstrate the links between political, socioeconomic systems and ecosystems.

The residual teaching legacy of regional geography leads some physical geographers to concentrate on specific environments, such as the Mediterranean, to enhance both classroom and field teaching. However, in tertiary education, the most important influence is at the broad philosophical level as departments discuss curricula and decide whether to encourage specialization or diversity, and whether or not final examination candidates should be able to discuss the modes of enquiry and research methods currently used in geography.

In the 1960s, when quantitative techniques and systems analysis were considered applicable in all branches of geography, several major texts on the nature of geographical enquiry appeared, the most significant being Harvey’s work on explanation in geography (1969). Subsequent philosophical debate and greater social awareness among human geographers led to a vigorous debate and many new statements on the nature and purpose of human geography (e.g. Harvey, 1973; Peet, 1977; Gregory, 1978; and Johnston, 1979). This wealth of reading on the nature of human geography left physical geographers without a countervailing literature to support their part of teaching and examining in the nature and methods of geography. Although Chorley and others produced prescriptions of what physical geography might be and provided scholarly accounts of the origins of geomorphology (Chorley and Kennedy, 1971; Chorley, Dunn and Beckinsale, 1964), specifically student-oriented works on the nature of physical geography did not appear until the mid-1980s. Gregory’s The nature of
physical geography (1985), designed as a direct complement to Johnston's Geography and geographers (1979), deliberately tries to meet the needs of undergraduates. The more deeply worked analysis of scientific explanation in physical geography (Haines-Young and Petch, 1986) also derives from the stimulus of a more rigorous analysis of the philosophy and methods of human geography. However, such works seem destined to help undergraduate and graduate students rather than to prompt a wide reassessment of the overall aims and purpose of physical geography. Unlike human geographers, physical geographers seem content to pursue advances in their individual specialisms and to develop firmer links with cognate disciplines in the physical, earth and life sciences.

II The historical dimension

Physical and historical geographers share a common concern for the evolution of the landscape, suing the same data sources to understand vegetation history (e.g. Watts's (1966) study of Barbados) and landform evolution (e.g. coastal changes). In 1967 a conference on early maps as historical evidence included two papers by geomorphologists using maps to reconstruct coastal change (De Boer, 1969; Carr, 1969). De Boer uses the techniques of the historical geographer to establish the hanging nature of Spurn, Humberside, noting how medieval chronicles described a spit with a narrow neck and a wider head on which the thirteenth century port of Ravenser Odd was situated. These medieval sources helped to confirm De Boer's suggestion (1964) that Spurn point has undergone a cyclical evolution, the last complete cycle of development running from about 1600 or 1610 to about 1850 when artificial intervention checked further developments. The earlier evidence suggests a cycle ending in the sixteenth century, soon after 1560. Carr (1969) follows the development of Orford Ness, Suffolk, from reference to the construction of Orford Castle in 1165 in the Pipe Rolls of 1165-68 to the mid-twentieth-century hydrographic charts. Cartographic evidence is sometimes contradictory and often limited by its small scale, accuracy and dependence on other derived sources. The way earth scientists view historical sources with healthy circumspection is emphasized by Hooke and Kain (1982) who also demonstrate how useful the historical geographer's knowledge of documentary, cartographic and statistical sources is to physical geographers. These authors stress the need to examine the past both for interpreting the present environment and for predicting the effects of natural processes.

Possibly the best demonstration of the influence of historical geography on physical geography comes from the discussions on the Norfolk Broads. These shallow, lowland lakes appear to be related to flooding of coastal and riverine swampland. Careful study of over 2000 boreholes across the Broads by geomorphologist J.N. Jennings and palaeobotanist J.M. Lambert, indicated that the Broads had vertical sides in places and sometimes an overall rectangular form
with steep-sided islands, peninsulas and ridges of solid peat within the broads (Lambert et al., 1960, 1965). An historical geographer, C.T. Smith, used medieval records such as the accounts of Norwich Cathedral Priory and the register of St Benet's Abbey to derive data for a calculation that there was a turf cutting industry from the twelfth to the fifteenth century large and active enough to have emptied the great basins of the Broads.

Analysis of the historical record can contribute to the analysis of global climatic fluctuations. The dramatic changes in the equatorial-tropical southeastern Pacific atmospheric and oceanic circulations associated with the El Nino phenomenon produce storms along the Chilean coast and appear to be associated with drought in northeastern Brazil. A detailed listing of shipwrecks along the Chilean coast since 1540 and a 429 year record of rainy and dry years compiled by the Oficina Meteorologia de Chile show that shipwrecks were most frequent in rainy years with severe winter storms. Several of these stormy winters coincide with summers of copious rains prompted by the El Nino phenomenon along the Peruvian coast (Cavides, 1985). Although such work indicates that climatic anomalies in South America are conspicuously related in time with climatic crises of a global scale, climatologists express the same concerns about the reliability of the historical record as other physical geographers.

More generally, historical geographers concerned with land development in marginal areas have felt pressed to investigate the interaction between land use and geomorphic processes. Thus Delano-Smith's historical geography of the western Mediterranean (1979) devotes a chapter to erosion in the hills and another to siltation on the coasts, developing arguments on the impact of agriculture from physical principles and using historical sources to illustrate how land degradation occurred. While the mutual influence of archaeology and physical geography, especially pedology and geomorphology, on each other is clear, as both are using correlative deposits to reconstruct the past, there has been less influence of cultural historical geography on those fields. However, faced with the broad range of questions on physiographic evolution and past climates asked of a geographer by scholars in a wide range of historical and archaeological disciplines, Brice (1978), a cultural geographer, skilfully edited a collection of essays providing a new synthesis of the environmental history of the Near East. The 22 specialists who contribute to the discussions of areas from Greece to the Punjab and Soviet deserts include archaeologists, botanists, climatologist, geologists, historians and pedologists, whose opinions differ as to the importance of human or natural influences on land degradation. However, it was the cultural geographer's concern for the historical environmental context of human activity that brought together this major review of environmental change.

III Problems of common concern

The interrelationship between people and their environment, long considered the
core of geography, remains the common ground for human and physical geographers. People’s ability to assess, manage, conserve and use resources wisely depends equally on their understanding of the physical, chemical and biotic character of the resource and their adaptation and manipulation of the social, economic and cultural attitudes, controls and restrictions affecting their decisions and actions.

The ‘natural hazards’ approach to people and environment is often taken to illustrate this common ground of physical and human geography. Four broad approaches to hazards are adopted by geographers: (a) the view of hazards as the result of the natural and inevitable operation of internal physical processes ranging from the geological to the climatological; (b) in terms of the impact of people on a neutral nature; (c) as the consequence of the deprived, or poor, being forced to live in hazardous areas; and (d) through the concept of nature being transformed through productive labour in a historical process which also changes people and society.

Although physical geographers have generally analysed hazards from standpoints (a) and (b), they have gradually come to see the cause of natural hazards as the process of interaction between people seeking a livelihood by the use of the earth and the natural processes of the biosphere. Hazards are seen as negative resources, a function of the culture and technology in any human society (Burton, 1985). Human geographers place most of their emphasis on the culture, politics and economics of groups affected by hazards for although exposure to the environment is universal, the consequences of this exposure in the prevailing economic systems are far from uniform (Smith and O’Keefe, 1980). The interchange between physical and human geographers in the hazards field is great enough for it to be difficult to distinguish the affiliation of the geographers contributing to a symposium on hazards in Australia (Heathcote and Thom, 1979). Geomorphologists have gone beyond flood plain delimitation to develop techniques of costing the effects of floods using stage-damage curves. Historical geographers discuss soil erosion, land degradation and drought alongside pedologists and geomorphologists.

While geographers have made a distinguished contribution to the study of hazards, partly as a result of fertile human/physical interchanges and partly as a consequence of the individual leadership of Gilbert White, Ian Burton and R.W. Kates, they have had less impact on the people/environment area generally. Brookfield (1984) comments that up to the 1960s, geography departments were the only worldwide network notionally devoted to integrating the work of natural and social scientists, and ‘by and large they made a pretty poor job.’ When geography departments become divided, either formally or de facto, into physical and human sections, the environmental movement of the late 1960s had already begun to spawn a new set of integrating organizations in the Environmental Studies Centres and Institutes of the 1970s. Many of the best geographers in these fields, such as Brookfield, Burton and Kates found a new realm for their people/environment concerns in the work of the UNESCO Man and the Biosphere.
Programme (MAB) initiated in 1971. Such human and physical geographers have transcended the conventional structure of geography to exert their influence at a transdisciplinary level. Their work has influenced some physical geographical research on drought and its ecological impacts, on desertification, forest regeneration and the urban environment.

Resource evaluation was hailed in the 1960s as a great opportunity for inherently geographical teams, comprising geomorphologists, biogeographers, pedologists and economic or social geographers, to contribute to the assessment of land potential. Promoted in thinly populated areas such as tropical Australia, many of the early land resource surveys ignored the existing human populations and their use of the land completely. Critiques of these methods, often from human geographers, gradually led to a more culturally based approach by physical geographers so that by 1970 the land resource surveys of the New Guinea highlands examined population and existing land use. The surveyors often found that the land types they recognized were also identified by indigenous subsistence cultivators (McAlpine, 1970). Such investigations show clearly that in the Goroka, the Mount Hagen area at least, agricultural production by non-indigenous people occurs almost wholly on the lands classified in the highest capability classes.

Physical geographers now incorporate land resource surveys into broader schemes of landscape ecological surveys and land capability assessment (Vink, 1983). More attention is paid to the changing relationship between people and the land, often as a consequence of the operation of the economic system. Moss (1968; 1969) argues that the essentially physiographic land resource surveys offer too static a view or approach, viewing people/land relationships as functioning systems (Young, 1976).

Just as human societies may be considered in terms of their vulnerability to hazards, poverty or unemployment, so may land be considered vulnerable to all kinds of environmental degradation from direct human action or its indirect consequences. To cope with this vulnerability, general ecological models, linking environmental characteristics, societal needs, social activities and the dynamics of the natural development, have been used in ecological planning and land use allocation – especially in the Netherlands (Vink, 1983). Such concern by physical geographers reflects the common interest in environmental management shared with, among others, human geographers. Great stimulus to this exchange of ideas has been given by the growth of the environmental impact assessment business. Ecological concepts have a broader impact, being a major part of Claval's view (1977) of human geography in terms of human dependence on the natural world for food, clothing and shelter. Extending this ecological interpretation into an ecology of disease is a relatively small step that has encouraged climatologists to investigate links between unusual weather and mortality, between air pollution and bronchitis and photochemical smog and traffic accidents (e.g. Chandler, 1976). Contributions from medical geographers emphasize the social factors in disease distributions, so tempering the provisional associations with physical
factors established by climatologists. Better understanding of environmental factors, both social and physical, in disease is gained when the various geographers influence each other and investigate the actual movements of individual sufferers through residential and health care delivery systems.

The urban environment has attracted the attention of physical geographers, perhaps as an indirect result of the growth of urban geography and the increasing sophistication of human geographical research on cities. While physical geographers recognize the need to relate the consequences of changes to natural processes to concepts of inequality of suffering and distribution of direct and indirect costs, human geographers have been slow to assess the decision making and behavioural responses to urban, physical, environmental changes – a theme which looms large in Cooke’s account of Los Angeles (1984). Instead, human geographers tend to accuse physical geographers of interpreting the human population as no more than an element of the biological system and of falling into the trap of middle-class conformity in their suggestions for environmental improvement. If this is the case, than the influence of human geography on physical geography is not strong enough. The two approaches to urban areas seem to take divergent paths, making the opportunities for collaboration difficult.

If collaboration and mutual influence is difficult in the complex, urban environment, might it be easier in terms of rural problems where there is a close association of economic activity with soil and weather conditions? A comparison of two texts from the same publisher on soil erosion, one in a series on applied geography (Morgan, 1979) and the other in a geographically oriented series on development studies (Blaikie, 1985), shows a virtually complete divorce in the physical erosion appraisal and erosion potential assessment of the former and the socioeconomic causation approach of the latter. Although Morgan emphasizes that the ultimate success of conservation schemes depends on how well the measures are implemented, especially the willingness of farmers and others to adopt the techniques required, his main argument is that by developing a hierarchical system of erosion survey, applied physical geographers can supplement and make more effective the work of the conservation engineer.

Blaikie (1985), on the other hand, discusses soil erosion in terms of the land management system from the farmers upwards. He sees environmental degradation as a result of underdevelopment (of poverty, inequality and exploitation), a symptom of underdevelopment and a cause of underdevelopment (contributing to a failure to produce, invest and improve productivity). Blaikie’s emphasis is on the social system that produces soil erosion stressing that, in steeplands on the margins of semi-acid regions, there is often a set of problems of long, historical standing interwoven with external, political, economic relations which intimately affect pressure on the land and soil erosion. Thus in Lesotho, the rate of soil erosion is intimately tied up with the volume of remittances and population movement caused by the Republic of South Africa’s recruitment policies for mineworkers.

Both studies of soil erosion are excellent in their own contexts. Their scales and
emphasis differ. The failure to achieve a total understanding of soil erosion, involving behavioural, social, economic, political, biotic and physical elements within the present compartmentalized structure of geographical research, arises from the weak influence of human geography on physical geography and from differing peer group expectations. The practitioners in each subject have been subconsciously, sociologically conditioned to write to an expected pattern and level of analysis acceptable either to social scientists or to earth scientists, engineers and agriculturalists.

Progress towards total understanding has been made by workers in the ecological paradigm of human geography. Outstanding are the village-level studies by Brookfield (1973) and his colleagues. Brookfield has long argued the need to understand people's perceptions of their own environment and the complex roles plants and animal play in culture and society (Brookfield, 1964). Among the detailed contributions to physical geography stemming from his own investigations, is an analysis of rainfall in Papua New Guinea (Brookfield and Hart, 1965).

The subtle nature of the interaction between people and ecosystems is a major theme in studies of tropical, rural communities. For example, the Enga people in the highlands of New Guinea generally are aware of the environmental and demographic constraints on their adaptation to their surroundings and they perceive that many of their agricultural practices are in direct response to these (Waddell, 1972). Kiduru (i.e., frost or hail) and a variety of soil conditions (moisture, depth and fertility) are recognized as specific environmental constraints. Their gardens are located to minimize these constraints with, at 2200–2800 m altitude, sites in the forest or at the interface between the forest and grassland being most favoured to avoid frost. Close investigation of the way these Enga people use their time and their land led also to a greater understanding of severe frosts in these tropical highlands.

Some tropical physical geographers now acknowledge the importance of the physiographic lore and understanding possessed by traditional cultivators. Folk traditions about past volcanic eruptions can be linked to information from tephra deposits to develop a more complete geomorphic history. Patterns of the use of fire to clear land or of deliberate preservation of trees for food supplies help to explain vegetation distribution. From the deliberate encouragement of hillside erosion to promote accumulation of sediment in terraced valley floors to the widespread clearance of forests by modern machinery, the impact of human activity on biogeography, geomorphology, soils and climate is so pervasive that any help human geographers can provide in explaining when, why and how such changes occur contributes significantly to understanding the magnitude and impact of earth surface processes. Many opportunities for a constructive influence of human geography on physical geography still exist here. In some ways, economic historians and archaeologists have done more than human geographers on these themes.
IV Attraction to an integrated body of techniques or models

During the 1960s, physical geographers, largely following the lead of Strahler (1952) and human geographers, with Garrison (1956, 1960) in the vanguard, spent over a decade working together applying well-established statistical methods from the biological, psychological and medical sciences to geographical problems. Many techniques were equally applicable to spatial distributions in the earth and social sciences. Trend surface analysis could be applied to areal distributions of topographic, rainfall, income or production data to provide general trends and identify prominent residuals or deviations from the trend (Chorley and Haggett, 1965; Unwin, 1975; D.M. Smith, 1975). Network analysis could be applied to both drainage and transportation systems (Haggett and Chorley, 1969) while point patterns of karst depressions and factory locations could be described using a double Poisson model or Bose-Einstein statistics (Thomas and Reeve, 1976; Thomas, 1977). The growing attention to spatial statistics was seen as a focal point for common endeavours between human and physical geographers who, for a period, had great interaction in developing or applying new software, research designs and teaching packages in quantitative methods. To some extent this work continues through organizations like the Quantitative Methods Study Group of the Institute of British Geographers which publishes a series of booklets (CATMOG) on quantitative methods, many of which are widely applicable throughout geography (e.g. Silk, 1981; Daultry, 1976). Spatial data sets continue to pull human and physical geographers together in the development of geographical information systems where the integration of environmental and socioeconomic attributes of parcels of land or specific areas is required by land agencies (e.g. Walker and Cocks, 1983; 1984). Combination of remotely sensed digital data and areally based census data into a common information system will continue to require the mutual interaction of physical and human geographers. The statistical analysis of geographical data has been only the first stage of the deepening of the understanding of geographical phenomena. Further advances are made by mathematical analysis (Wilson, 1973), especially in terms of systems analysis. All five roles of systems analysis are relevant in geography: the straightforward help in analysis of complexity; the focusing on the interdependence of the elements of the system; the evaluation of the most appropriate analysis methods for particular types of system; the development of a general systems theory and the practical role in planning or problem solving (Wilson, 1980).

Systems theory was seen as both a restatement of traditional organizing concepts in geography and as a new contribution emphasizing interaction, interrelationships and the dynamic nature of both physical and economic phenomena (Borchert, 1968). An ad hoc committee on geography of the US National Academy of Sciences – National Research Council (Ackerman, 1965) considered the overriding problem of geography to be the understanding of the ‘vast system on the earth comprising man and the natural environment’. Human
geographers and physical geographers discussed together many close analogies between river and central-place systems (Woldenberg and Berry, 1967).

Initially, common methods were used to model such systems, in terms of the growth of spatial structure (T.R. Smith, 1976) or of diffusion processes (Wilson and Kirkby, 1975). Gradually, more specific techniques developed for particular sets of problems were employed, such as Q-analysis, the algebraic Language of Structure, introduced to human geography by Gould (Gaspar and Gould, 1981; Beaumont and Gatrell, 1982). The enthusiastic influence of human and physical geographers on each other in the application of quantitative techniques has declined with the development of larger, more complex models of specific systems and the evolution of statistical and mathematical procedures more closely adapted either to the earth or to the social sciences.

V The formulation of research questions

The questions researchers ask are not necessarily related to the development of theory or the search for explanations, but reflect the prevailing fashions and opportunities of the time. Given the closer associations with neighbouring disciplines and the decline of concern about whether the problems, or methods or ideas that geographers use and pursue are geography or not, a growing difference in the types of questions that physical and human geographers ask is to be expected. The geographer's traditional primary concern, explaining how the landscape came to be the way it is, has been largely replaced with a desire to understand the processes producing those changes in both human and physical geography. These questions about process have devolved into measurement and monitoring in physical geography, and behavioural and humanistic perception and marxist and structuralist investigations in human geography. While access to information technology has speeded up the kind of quantitative geography envisaged by Galton and others in the nineteenth century, it has only slightly affected the fundamental questions asked by geographers. The biggest changes have been spurred on by the expansion of social science and the search for understanding of how societal and environmental management decisions are made. When Hägerstrand (1973) argued for a new kind of political geography which identified the decision making groups, he pointed the way to the flowering of behavioural geography and the development of the structuralist interpretations.

Two broad social movements also affected geography in the late 1960s and early 1970s, the environmental movement and the participatory reforms after the student protests of 1968. The environmental movement awakened many physical geographers, especially biogeographers, to their opportunities as students of the impact of people on the atmosphere, hydrosphere, lithosphere and biosphere. The participatory reforms were partial responses to an increasingly radical view of social science which had a major influence on human geography.
Physical geographers generally have avoided the area of social responsibility in science, despite their proximity to welfare and radical, social change-oriented human geographers in their workplaces. One of the rare attempts to persuade geomorphologists to look at the social implications of their work was a session on environmental resources and the third world at the 1983 Edinburgh annual conference of the Institute of British Geographers. While the human geographers present were well aware of previous debates within the social sciences and found most of the points raised familiar, the geomorphologists had much to discuss. Some foresaw emergence of a radical geomorphology (Dwyer, 1983).

A deeper radical perspective of the relationships between human and physical geography stemmed from the growth of materialistic and marxist analysis among human geographers (London Group of the Union of Socialist Geographers, 1981). Although the discussion by the London Group was clearly prompted by developments in human geography, the three physical geographers involved argued for a closer relationship between human and physical geography, but the human geographer suggested that separation would be more honest and fruitful providing it was based on a proper understanding of the distinct objectives of the physical and human branches of geography (Sayer, 1981). In 1986, another forum found two physical geographers again arguing for a closer relationship, with human geographers stressing contrasts and differing epistemologies (Graham, 1986).

Some physical geographers have become increasingly critical, through their association with human geographers and other social scientists, of the view that there is a scientifically objective physical geography which supposedly hands over its results for decision making within the social system. For Bradley (1981) 'it is incumbent on the physical geographer to gain an awareness of the social, political and economic dimension to agricultural systems.' However, Sayer (1981) thinks that while 'social scientists, including marxists, often underestimate the importance of the natural world, there is nevertheless a rationale to the de facto divorce between natural and social science and between physical and human geography.' Such comments reflect the dismaying situation in which those (probably relatively few) physical geographers who have been influenced by reading the more socially aware human geography, find themselves. Having endeavoured to write a physical geography that is more socially relevant and that sees the inequity of the consequences of people-induced environmental change, their work is then played down, rejected or ignored by human geographers who argue that the study of social forces, gatekeepers, political movements and gender-related phenomena is more important in improving the well-being of people.

What then drives the social awareness of a whole range of physical geographers who have for decades been concerned with the social consequences of environmental degradation and the possibilities of environmental management to improve standards of living? Dresch's clear awareness (1982) that colonial land policies in Morocco led to increasing concentration of the native Berber people on the most readily eroded hill, and Tricart's continued concern for how social
structures affect agricultural systems that fail to provide the best yields and best patterns of land conservation (1962a, b; 1984), stem from the same awareness of the class struggle that inspires younger geographers like Sayer. Yet those two doyens of geomorphology have had a more direct influence on human well-being than all but a handful of human geographers. Dresch encouraged and taught Moroccan independence activists before the second world war, while Tricart has advised many Latin American governments and has trained and taught many third world graduate students and research collaborators.

Bruneau (1981) feels it important to combine the analysis of humanized landscapes of the ecological kind, with a global social analysis based on marxism, in order to understand people in their environment in the fullest sense of the term. Starting from the land evaluation and terrain analysis approaches adopted by physical geographers, Bruneau examined the operation of the rural system through a detailed statistical survey of all households in ten villages in northern Thailand. He followed this by an analysis of those models of production which had successively had dominant and subordinate roles in this social formation and the spatial systems associated with them. His view of a total dynamic of the landscape, capable of being portrayed cartographically at different periods, has much to attract all geographers.

Despite much attention to matters related to environmental quality, resources and pollution (e.g. Harvey, 1974), contributors to the radical geography debate address few remarks to physical geographers, merely being frequently critical of positivist science. If there has been an influence of radical human geography on physical geography, it has been in encouraging a more questioning attitude to the social relevance of physiographic science. However, other opportunities and constraints also arose from the mid-1970s onwards. Opportunities for consultancy work grew while government funds for higher education and research contracted. Physical geographers had to decide whether to take whatever research funds are available or to obey their social consciences and concentrate on work that will improve the lot of the poor and deprived. Not all contract work promotes social justice and human well-being, but it can reward the individual researcher. The social awareness shown by some physical geographers may stem from the influence of radical human geography, but it is ultimately the consequence of growing public and scientific concern for human well-being and the condition of the environment.

Despite a greater central control of the teaching of geography in France than in English-speaking countries, the influence of human geography on physical geography is no stronger there. On the one hand, the distinguished climatologist, Péguy, argues that climatology should be part of the general culture, understood and appreciated by everyone because of its essential involvement with virtually all human activity from agriculture and architecture to history and psychology (Péguy and Marchand, 1982). On the other hand, Brunet (1982) sees a technical sophistication and flowering of physical geography, but the only link with human geography is in terms of the integrated ecological approach in which land
management is seen in terms of both physical and social conditions. The strength of the latter view, eloquently argued by Tricart (1976; 1978; 1984), is greatest in terms of rural development. Geographers employed by ORSTOM have taken the approach to rural land in the tropics advocated by Moss (1969) further than their British counterparts. Studies of land degradation, the forest-savanna interface and the effects of drought all involve detailed examination of terrain, ecological and social conditions (Blanc-Pamard and Peltre, 1984). Nevertheless such work, often combining the efforts of climatologists, geomorphologists and rural geographers is seen as a multidisciplinary effort (Chambrezy et al., 1984) rather than an approach based on a single discipline.

These examples merely indicate a concern for relevance among physical geographers and a general prompting of them by human geographers in the direction of research that is useful and that takes account of who wins and who loses. As the philosophies of the social sciences have grown and flowered, the unnnurtured, bypassed theoretical and philosophical development of physical geography has remained almost dormant, only occasionally fertilized by some drift and fallout from human geography.

VI Social system or ecosystem: inseparable or forever separated?

As portrayed here, there is some common ground between human geography and physical geography in what has been regarded as the people/environment tradition of geography. This, however, is only one of the four traditions of geography described by Pattison (1964). The others have led to divergence between human and physical geography as spatial and behavioural analysis and links with the earth sciences have expanded. Such a divergence may be the main explanation of the weak influence of human geography on physical geography.

Haggett (1981) notes that the emergence of geography from the earth sciences in many countries and the continuing links of human geography with physical geography has caused acute problems of philosophical orientation for human geographers. One approach has been towards a separate human geography closely linked to the social sciences, the other to emphasize the special value of the close links with physical geography. After the discussions of methodological unity in the 1960s and the shared enthusiasm for the new opportunities provided by the adoption of statistical techniques and the availability of computers, human geographers have tended to look more closely towards other social sciences and away from physical geography.

Gregory (1978) sees links between disciplines as necessary and fragmentation of inquiry between one subject and another as a handicap; 'not only are the physical and human worlds necessarily conjoined in social practice, they are also dialectically related within the totality of knowledge'. Such a view would see scholars working together towards a common goal of understanding people and their world. The social organization of scholarship into compartments or
departments mitigates against this with many scholars feeling most comfortable and least threatened in a labelled cocoon, be it human geography, physical geography, cytogenetics or eygptology. Where the great scholars stride out of the compartments and transcend department segregation, the great insights and advances are achieved. Perhaps the question should not be how has or does human geography influence physical geography, but how can I, as an individual scholar and world citizen, contribute more effectively to some worthwhile goal of enquiry or applied research?

Nevertheless, there is a particular aspect of geography that may have had an overwhelming influence on the attitudes of human geographers towards physical geography; the role of the environment in human affairs. The geographical factor, the influence of nature on people, looms large in the writings of W.M. Davis and his contemporaries (1902).

Any field of human endeavour is a reflection of its practitioners' attitudes and actions. Progress can be accelerated or restrained by dominant individuals or elites. Geography's emergence was prompted by the struggles of individuals to establish movements to promote Chairs in Geography at the major universities and then by the advocacy of geography as an essential part of the school curriculum. The scholars who came to geography had varied backgrounds. In Britain they frequently had degrees in geology or history. Strikingly, over the first half of the twentieth century, many who began in geology became physical geographers first and later made contributions to human geography. Outstanding are Griffith Taylor (Powell, 1978, 1979) and Dudley Stamp both of whom made significant contributions to geology before their great work for geography. Jovan Cvijic is known for his Das Karstphanomen (1983) to geomorphologists, but human geographers respect his work on the human geography of the Balkan Peninsula (1902–1909) and Balkan ethnic groups and their migrations (1918–24), which played a dominant role in the allocation of Macedonia to Yugoslavia at the 1919 peace conference. Accepted as an impartial, most distinguished geographer, Cvijic probably had more influence on the delineation of the Yugoslav state than any other person (Taylor, 1985).

In view of the increasing concern of many physical geographers with the way their studies involve people and their actions (e.g. Goudie, 1986; Gregory and Walling, 1979), it might be thought that there is a continuing tendency for physical geographers or earth scientists to move towards human geography. Perhaps scholars, attracted to study the surface of the earth and the processes operating upon it, tend to want to comment on the impact of people on those processes and landforms. Others have been more concerned about the effects of processes and landforms on human activity and this may be why many human geographers resolutely turn away from physical geography. Just as the media and late twentieth century popular science still see geography in terms of the visible features and characteristics of the environment, so there is a residual fear among social scientists, including some human geographers, that more than the most cursory attention to physical phenomena may put them at risk of environmental
determinism. This fear may be reinforced by the knowledge that Ellsworth Huntington’s early work in geology and geomorphology, partly under the tutelage of W.M. Davis, paved the way for his interpretation of the relationship between climate and societies (Freeman, 1967). Concern about statements such as:

‘The people of high latitudes are, on the whole, more intellectual than those of low latitudes’ (Huntington, 1945: 376).

and

‘The stormy part of western Europe seems to be the most favoured of all regions for climatic efficiency in our stage of civilization. The northeastern United States from southern New England to the Great Lakes and beyond probably stands second’ (Huntington, 1945: 393).

leads to a heavy insistence that human geography must be integrated with the other social sciences. Such a turning away from physical geography has inevitably left gaps in human endeavour which have been filled by other arrangements, especially those of the biologists who extended ecology into the geographical arenas of population, resources, environment and urban ecology. Some of today’s best geographers are in those arenas, but the majority of physical and human geographers are not.

There is still a great, ever-changing world of transient, ephemeral, quasi-static and virtually permanent phenomena of all descriptions and all levels of interdependence out there waiting to be explored and comprehended. Exploration today is best considered in human, anthropological terms of long contact, not only to begin to see a little of how the local people understand the world from their situation, but also to begin to comprehend the dynamics of the biological and physical world. The ghastly unreliability of the impressions mid-nineteenth-century explorers brought back of the Australian interior still lurks in geographical writing. Today it is as much the fault of blinkered, narrow and selective approaches of misinterpretation of physical phenomena or people. The small influence of human geography on physical geography may be contributing to this lurking unreliability. The situation found in those environmental impact assessment requirements which consider just one proposed development at a time without looking at total, cumulative environmental change is inherent in modern geography. Perfectly good geomorphology may ignore wildlife, people and history. Highly satisfactory retail location may neglect vehicle exhaust emissions, frequency of inversions and cold air drainage. A little more influence of human and physical geography on each other would not only do all geography a lot of good, but further our efforts to make the world a better place in which to live.

Many intensely geographical problems remain inadequately explained. The failure to achieve a total understanding of soil erosion, involving the whole range of physical, biological and human factors has already been mentioned. Similar comments might be made about the relationships between disease, health and environment. Relatively simple statements about exposure to environmental contaminants and ill health are frequently made, but where is the detailed explanation of the links between social conditions, access to housing and welfare,
place of residence, traffic, industry, air flow and pollutant emissions?

As the great industrial cities of Europe and North America find their nineteenth-century infrastructure of hospitals, schools, bridges, aqueducts, reservoirs and sewers are requiring replacement, adjustment to changed environmental, social and economic conditions is required. The problem is not simply one of industrial change, housing allocation, derelict land reclamation or water resource management. In financing the replacement of these worn out structures and engineering works, choices have to be made and priorities established. Health and safety factors, as well as political opportunism, intervene in the allocations, but geographers ought to be analysing the various alternative replacement strategies, examining how cleaning the rivers, modernizing the hospitals, rebuilding the bridges and preventing dam failure can each be set in an order of priorities. Much more attention to assessing the advantages and disadvantages of alternative futures would be possible if physical and human geographers set out to study urban problems together.

Tourism has attracted a few geographers as a promising field of study, but few have tried to set out the economic value of a physical feature, such as a beach, and to link the sequence of geomorphological change, that all too often accompanies the economic development of the coastling, to the investment required to sustain the tourist industry. Competition between differing demands on coastal resources is well illustrated by the problems of beach management on the Belgian coast (Douglas, 1971), but can be equally well shown in a north-south context at many tropical beaches such as Batu Ferringhi, Pulau Penang, Malaysia. Here the growth of hotel and the associated settlements has led to so much turbidity and organic pollution that the basic attraction, the clear, blue waters of the Indian Ocean against a white sand beach, is now a repulsive muddy stew, about as attractive as the beaches of the Mersey Estuary. Why are such things still allowed to happen? Some geographers know that informal settlements often follow new investment in tourist projects. Some geographers understand the problems of inadequate drainage in rapidly expanding low-latitude urban areas. Some geographers know how sediment is dispersed and redistributed along shorelines. Why don't they get it together?

Less obvious, but probably more serious in the long run, are the environmental consequences of chemical transfers, be they waste disposal, pesticides use or application of fertilizers. Movement of nitrates in chalk aquifers to points of water abstraction may take months, years or decades, depending on hydrological conditions. Policies of urban expansion, release of land for housing, increased cereal yields or intensive vegetable production may all lead to release of nitrate to groundwater. Each such policy closes off some alternative future options, leads to possible future problems and has unwanted side effects on other people. Although some future problems have to be expected, it is neither appropriate for some geographers to argue for complete environmental protection, nor appropriate for others to assume that if social justice is achieved the environmental problems can all be fixed by technological solutions. The tremendous potential
for a geographical earthwatch, an inventory of social and environmental change and an analysis of global alternatives, has been virtually taken out of the hands of geographers. However, they still have an opportunity to do this at a national and regional level if they are prepared to argue about the difficult questions and to work together to seek answers. Geographers should be excited that so many things are still too difficult for simple economic or engineering solutions, that there is an energy crisis, that forests are being cleared, that estuaries are silting, that soils are degrading, that crops are failing; for all these things need their attention and there is so much important work to do.

School of Geography, University of Manchester, UK

Acknowledgements

I thank Arthur Conacher, Peter Dicken, Maureen Douglas, Ron Johnston, David Lea and Jim Walmsley for their suggestions and the University of Manchester for a period of study leave which gave me the chance to discuss ideas with Australian colleagues.

VII References


**Chorley, R.J., Dunn, A.J. and Beckinsale, R.P.** 1964: *The history of the study of landforms or the development of geomorphology*, Volume 1. London: Methuen.


**Davis, W.M.** 1902: *Elementary physical geography*. Boston: Ginn.


The influence of human geography on physical geography


Society.


**Sayer, A.** 1983: Notes on geography and the relationship between people and nature.


London: Longman.


