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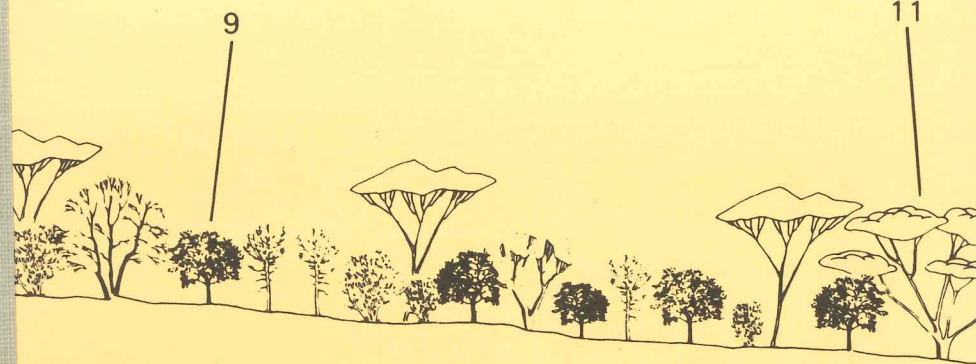
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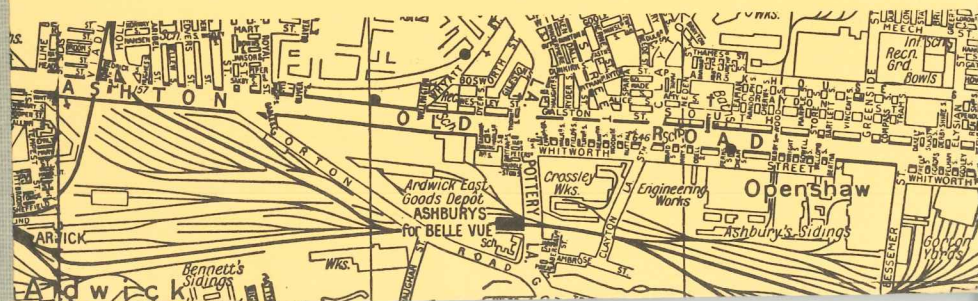


SOCIETY AND NATURE:

Socialist perspectives on the relationship between human and physical geography

Edited and Introduced by

The London Group of The Union of Socialist Geographers



What is the USG?

The Union of Socialist Geographers was originally formed in the early seventies by geographers in North America and a group was eventually established in the U.K. in 1978. However, by that time most committed socialist geographers were already active in organisations such as the Conference of Socialist Economists and had little time to promote a British USG. After some initial discussion it was decided that the British Isles USG Group should act solely as an umbrella organisation for socialists working or studying in the field of geography, providing a contact network through occasional meetings, newsletters and a session at the annual conference of the Institute of British Geographers. Recently, even this function, formerly coordinated by a group of members based in London, has been hit by a lack of labour power. At present the USG in Britain is looking for new blood to take over this coordinating role and make use of the existing membership resources of the organisation to promote a socialist viewpoint within geography. If there is anyone interested the USG can still be contacted c/o Room, S417, Department of Geography, London Houghton Street, London WC2 2AE

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More copies of this booklet are available from the same address. Cheque with order please.

The London Group, USG apologise to the authors for the long delay in publishing this booklet.

January 1983

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Preface

The immediate background to this booklet was a conference at the London School of Economics, held in March 1981, at which all the following papers were presented. However, the conference and the papers, and indeed the debate within the Union of Socialist Geographers which led up to them, are all part of a much wider discussion taking place within the discipline of geography. It is against this wider context that this collection should be seen.

The intention of holding the conference was to present socialist perspectives on the physical/human divide within geography and to attract physical geographers into a debate which has long been dominated by those with a social science background. Although the conference did serve to highlight the divide between natural and social science, it also pointed to several avenues of fruitful concurrence. And even if the conference and this booklet reveal more problems than solutions in the society and nature debate, it does show the value of disagreements aired in constructive debate. However the conference and subsequent discussion have also raised disagreements and problems in socialist theory and practice. For this reason some members of the London USG have written an introduction to this booklet which explains some of these areas of debate. Similarly, further reading has been suggested to encourage investigation of Marxist and socialist concepts and ideas.

INTRODUCTION

Does it worry you that in geography undergraduate courses there is a wide combination of study areas, encompassing geomorphology, social geography, biogeography, economic geography, and yet by the final year you end up being either a 'physical' or a 'human' geographer? Why is it that lecturers are basically 'geomorphologists', 'social geographers' and so on, seemingly isolated from one another and in many ways akin to geology or sociology as they are to something called geography?

Despite geography's claim to be the subject which integrates the study of the physical processes of the earth's surface with the analysis of the human and social systems which clothe it, these two areas of study remain largely distinct. They reflect rather than overcome the broader division between the natural sciences on the one hand and the humanities and social sciences on the other.

Graduates still emerge from their universities and colleges as specialists in one branch or the other: ne'er or rarely do the twain meet. In some universities the guardians of each branch are actually separated on different floors or even in different buildings. The mental separation is maintained on many levels. In jesting mutual antipathy, over coffee, maps or stereoscopes, the banter continues as to who are the *real* geographers. The division is enshrined in the specialist Study Groups of the IBG (Institute of British Geographers), and in the publication of separate series called 'Progress in Human Geography' and 'Progress in Physical Geography'.

In short, the great care that is taken in organising syllabuses to provide students, initially at least, with some basic training in both sides of the discipline, is soon undone. Physical geographers continue to regard social systems as an intrusion upon (or at best peripheral to) their work. And on the human side, where the object of study is these social systems, geographers are loath to consider physical phenomena since they appear to be largely irrelevant. The branches of geography end up reflecting the apparent separation of humankind and its social systems from the physical world of nature. Geography grinds on with its sorry list of attempts to find a paradigm in which humankind and nature can be effectively interrelated.

The four papers in this pamphlet confront this problem from various viewpoints and within different socialist perspectives. The first three are by authors who conventionally would be considered physical geographers, and who argue for a closer relationship between human and physical geography. The fourth is by Sayer, a 'human geographer', who argues instead that a separation is more honest and fruitful providing it is based on a proper understanding of the distinct objectives of the physical and human branches of geography.

Two papers (Bradley and Richards) examine problems which traditionally are treated by physical geographers in isolation from social systems. They show the serious shortcomings of an approach which pretends there is a scientifically objective physical geography which supposedly hands over its research results for policy decisions to be made within the social system. Bradley discusses soil science and the drought problem in a part of Mauritania, in the Sahel zone of West Africa. He demonstrates the importance of integrating physical geography research with a close understanding of the social system and agricultural practices of the local Soninke people. Richards assesses the hydrological problems of part of California, and argues that disruption of local water tables is intimately linked with problems in the social organisation of the region. Any solution to hydrology crises must be dealt with by changes in the social system.

The third paper by David Pepper looks at geographical education, outlines a course syllabus which attempts to integrate physical and human geography more closely and discusses the problems encountered in its implementation. Finally, Andrew Sayer approaches the issues from a more theoretical angle and argues that there is, in fact, some rationale in the separation of human and physical geography as he feels we cannot use the same methods to study both natural and social phenomena.

Thus three of the four papers stress the value and potential of integrating human and physical geography more closely, while the last argues against the idea. Also, Richards provides examples of why it might be valuable to integrate, while Pepper describes problems encountered in trying to do so and reasons why it cannot always be done.

This variety of subjects, points of view and speakers led to a good deal of discussion both at the conference and within the London USG

group. We have tried to represent some of the ideas that were raised in this discussion in this introduction. Inevitably in the process of group writing and editing, some ideas and views will have been left out. We trust that those points which we have omitted will be raised again in further debate.

The rest of this introduction has been organised into three sections. In places we have gone beyond the immediate concerns of the papers and looked at the avenues for further debate that they have highlighted. The first of the sections deals with possibly the most central issue of the conference, and that is the issue of why socialist methods of analysis appear to us to provide a way out of the physical/human geography split. In particular we point to how materialist approaches, the basis of Marxist theory, are already successfully used in natural and physical sciences.

Our second section deals with education. As most geographical work is carried out in educational establishments we discuss some of the influences that fashion our education system and which to a certain extent, create and help to perpetuate the split between human and physical geography.

The third and final section is concerned with change and the struggle for socialism. We are not presenting a programme for action. Rather we try to describe briefly the basic dilemma of all seeking to bring about a socialist society: should we be trying to change capitalist society's institutions from within or is it necessary to replace them? This may seem to be somewhat removed from the main concern of the conference. Indeed it is an issue which is often put to one side precisely because it does seem remote. However, if the aim of the conference was to consider one of the basic faults of geography, it was also about changing and improving peoples lives, and we would argue that it is essential to understand properly the implications of the strategy of change one is adopting. To put it crudely, should it be reform or revolution? And if reform is chosen as the appropriate or only possible strategy in a given situation, what are its limitations?

Materialism in Natural and Social Science

What makes socialist geography so different? How does it provide a way out of the physical/human geography split? Isn't it just another passing fad, the latest bandwagon? It might appear from reading some

of these papers that they are simply arguing for a more holistic approach, for a deeper recognition of the interaction between human and natural phenomena. Pepper in fact argues for a reintegration of physical and human geography in the final year of the degree, with no necessary intention of producing a socialist perspective amongst students. Likewise Bradley and Richards argue for a much closer understanding of the relationship between nature and human/economic systems. Yet in their work there is a desire to adopt a more *materialist* and *dialectical* approach to geography and geographical education. Such an approach offers important benefits in the explanation of the relationship between humans and nature.

In fact, materialism has demonstrated its most powerful analytical and explanatory capabilities and has been accepted in the natural sciences. For instance, in developing and initiating the theory of evolution, Darwin had to establish the material basis for the way in which different species emerge, in opposition to the idealist notions and concepts arising from the religious framework of thought. In a similar way, Galileo had to resist the power of the Church and the ruling class to establish the materialist basis for an understanding of the motion of the Solar System.

In Galileo's time, the Universe was considered to have been created by God, in the form of a series of crystal spheres circling around and centred on the earth, and to which the various stars, planets and the Sun were fixed. Such a view was consonant with the feudal and religious hierarchy, for whom it was important that God's creation of 'man' within such a universe placed humans at its centre, and structured them into a natural hierarchy. The peasants, aristocrats and clergy were thus naturally placed in a system in which rewards would be granted in heaven to the lower orders provided they remained hard-working, obedient, faithful and in their place during their time on earth.

Of course the developments of a more materialist analysis, and the emergence of capitalism as a very different socio-economic system, have enabled such a position to be opposed and transcended. In his time, Galileo narrowly escaped the Inquisition's torture and death. In capitalist society, the problem is not religious idealism but the notion of science and technology being 'neutral' and value-free. The impact of such ideas on divided geography is important. Despite its

technological appearance of materialism and objectivity, modern science is still capable of being anti-materialist in other ways. For instance, modern 'scientific' Western medicine has until only recently held other systems of medicine up to ridicule because they appeared to be anti-materialist. Acupuncture, for example, was regarded as unscientific mumbo-jumbo because doctors were refusing to accept that a phenomena which did not fit their own materialist explanation could have a materialist basis at all. Others, who accepted that it might work, believed it to be a result of hypnotism rather than needle manipulation; even though Western medicine has no materialist explanation for hypnotism, it was preferable to accepting the 'idealist' notions of a foreign culture. Now, with much more work being done on the human body's own complex biochemistry of hormones and their relation to the nervous system, acupuncture is more acceptable, and its materialist basis is beginning to be understood.

Physical geography is certainly founded on a natural science materialist base. However, as Bradley illustrates, it is still susceptible to idealist errors similar to those of medicine with acupuncture. But it is with the thorny question of the relationship between nature and human systems that materialism could be of tremendous value and yet is frequently eschewed. Perhaps this is because if materialism were to be accepted as useful in understanding this nature-society relationship, then it becomes difficult to avoid using it throughout human geography. To do this, however, is politically unacceptable to many because materialism applied to social systems (i.e. historical materialism) is usually known as Marxism.

Apart from such political opposition to materialism and its application to social systems, there are other constraints on the development of materialism in natural sciences (including 'physical geography'), and particularly in the analysis of the human-nature relationship. There continues to be a strong attachment to the scientific method that presupposes a neutral, value-free and objective science. Such a presupposition is in itself idealist and thus antagonistic to a materialist philosophy. This idea of a value-free objective science fits easily into the disciplinary boundaries that divide the world — the object of study — into neat parcels of knowledge.

In geography, conflicts between the two sides of the discipline arise from the conception of two distinct sets of phenomena: each set is

studied by one branch of geography, those of the natural world by physical geography, and human/social systems by human geography. Natural phenomena are seen as being separate from, or *outside* of the social organisation of society, to be studied by chemistry, astronomy etc, as well as physical geography. On the other hand, social, economic and human phenomena are viewed as objects of study for sociologists, economists and human geographers.

Of the papers presented here, Andrew Sayer's is interesting for supporting such a separation of sciences for natural and human phenomena, a position which requires a human geography distinct from physical geography. He states that 'society cannot exist apart from nature, for we are simultaneously social and animal beings; but nature has existed for rather a long time without human society'. In this abstract sense of separate phenomena this is true. But does it adequately demonstrate the need for a separation? For what we are concerned with is not natural phenomena *per se*, but **knowledge of** natural phenomena (and social and human systems.) No matter how long nature or the universe have existed, knowledge of it can only be gained through the existence of **societies**, by the way in which humans consciously make use of nature and engage in the more specific practices of trying to understand it. Knowledge of nature is **acquired** through production (agriculture, handicrafts, industry etc) and research practices; in other words, it is gained in ways which are guided by and constrained by the social forms of the society concerned. In most cases these are societies divided on class and other lines. Furthermore, knowledge of nature is directly influenced by the ability to gather information and data about natural phenomena. Thus technological knowledge is also a powerful constraint, one which is also closely linked to social structures. Without the necessary radio telescopes it is not possible to develop and test materialist theories of the universe, or relativity theory. We need to know the **social** conditions which influence the way in which research is done and how technology is developed to collect data.

Thus while a separation of the 'natural' and the 'human' is possible in an abstract sense, the fact that humans exist as conscious, social animals means that nature is 'known' only through societies and their different forms. There is no inherent quality in nature that enables nature to be understood independently of human societies. The

production of knowledge of nature by humans is a social process governed not by the existence of an objective nature, but by means of socially constructed concepts and categories of analysis. These not only affect the method by which nature is interpreted, but also determine what natural phenomena become known about, i.e. what parts of nature are deemed worthy of study, and conversely what is left out, or excluded as 'supernatural' or 'paranormal'.

Education Policy

There are many ways in which such social constructs of nature arise, but in this introduction we discuss some areas that are raised by the conference papers. The first, and perhaps the most obvious, is through the **education system**. At its crudest, such social constraints in education affect the way in which research is directed, funds allocated and priorities determined. On deeper levels, we need to understand how in a class-divided society like ours, the education system can be dominated by the ruling class in order that the capitalist system is reproduced and perpetuated.

Every society requires an education system of some form. It is a means by which it can teach its new members the skills and customs necessary for their smooth assimilation into society and ensure its reproduction. All people are the products of such a system and inevitably it conditions our approach to knowledge, research and teaching. The ability to resist and break away from these influences depends on our awareness of them and our skill at analysing and criticising their effects. In a class society it is the ruling class which exerts the strongest control over education policy and generally it will direct it to suit its own interests rather than those of the exploited classes which make up the mass of the population.

The existence of fundamental biases in the British education system, such as those based on class, sex and racism have already been well documented. But it is worth stressing again the strong emphasis our bourgeois dominated class society places on the development of individualism and competition. While the encouragement of individual thought and action might appear to be against the interests of a centralised and class controlled state, given the opportunities it provides for critiques of the state. But such critiques as do emerge in Britain are strictly limited in their power by the influence of competitiveness. Individual critiques are prevented from being fused

into a unified and strong opposition because personal success is paramount. Moreover, with limited opportunities for personal success, competition between individuals is fierce. This pattern of behaviour extends upwards through the institutional hierarchy of society. Individuals are encouraged to support the interests of the institution they belong to in its competition with other institutions; their well-being as individuals is tied to the success of their institution. In essence this is a policy of divide and rule, since without organised opposition, the ruling class is able to draw on the criticisms voiced by individuals to reorganize and strengthen its own position and thereby defuse opposition.

A parallel for this encouragement of, yet strict control over, individualism is provided by firms which employ graduates with new and often critical ideas of the way the firm operates. If the senior management is astute they will use such criticisms to strengthen the company and their own position within it. At the same time they control the careers and prospects of the new employees and the progressively more limited promotion opportunities ensure that those interested in moving up compete amongst themselves rather than operate in unison to challenge the senior management's position.

In capitalist society there is a continuous conflict between the degree of individualism the state can encourage and the degree of control it should exert, depending on the prevailing circumstances and the strength of its own position. Any changes in this balance are reflected in education policy. David Pepper's article outlines two possible approaches to education policy.

The first, which Pepper calls the 'Boyson' model after the Thatcher Government's recent Minister for Higher Education, aims at creating people who will conform well, accepting bourgeois customs and attitudes with little criticism. It is a policy for dealing with a crisis, based on short term economic priorities and efficiency criteria and it is intended to produce quickly a more productive and less critical labour force. Criticism is considered risky and inefficient and is therefore discouraged.

The second, 'Berlin' model (after Isaiah Berlin) attempts to stimulate critical scrutiny of the values and assumptions of older generations. While this certainly has a progressive side to it, the policy can also turn criticism to the ruling class' own advantage. British governments

which tolerate the teaching of critical social science in universities and polytechnics understand that, kept within certain limits, the criticisms that emerge can actually be used in forms of social control. Such 'repressive tolerance' acts as a safety valve, defusing opposition and even enabling the ruling class to strengthen its position.

But it is clear that such a model, whether in geography or wider education, is likely to produce more free-thinking individuals who may be more aware of collective solutions to social or scientific problems. The 'Boyson' model is more repressive and less inclined to permitting a critique of society or even more fruitful approaches to science. It is designed for crisis.

In times of crisis, economic or otherwise, it is all the more important that education is carefully directed and controlled in the interests of the ruling class. With the structure of society at risk it is necessary to reduce pressures within it, hence the current move to a Boyson policy model. At the same time, when funds are restricted teachers, researchers and students are more careful of how critical their work is, fearing that their budgets may be cut. It is this which makes academic tenure for lecturers and unrestricted access to higher education such crucial elements in any attempt to increase the critical nature of the education system. In the present crisis in Britain where both these elements are threatened by cuts, there is continuing evidence of a trend towards a more conforming and less critical education system. It is often the critical courses and research work that are the most severely affected by the cuts. The SSRC has undergone reorganisation to ensure greater central control over work funded. There has been the closure of the Centre for Environmental Studies. At Cambridge, the research group on economic growth, highly critical of government policy, was severely cut by the SSRC. The restriction of university and polytechnic places, and the swing to the view that education should be self-financing with full cost fees, also have class implications. They tend to favour those who have both money and a social background familiar with higher education.

In order to fight such controls over education the first step is to be conscious of their existence and pervasiveness. Equally we must recognise the impossibility of value-free knowledge and objectivity in any branch of learning, including both physical and human geography. In addition we should support alternative ways of working that combat

pressures to be competitive and individualistic. There is a real value in cooperative and group work. It stimulates individual thought and questioning, which in turn feeds back into the group so that it moves forward as a whole. Every individual contributes different things to group work, but the total result will be more than the sum of each individual's contribution. But as we know only too well from our own experience, it is not easy to pursue such a course of action with the education background with which we are all imbued.

A fuller understanding of how to fight capitalist control over education must, however, be accompanied by a discussion of our general means to resist and oppose capitalism: the strategic issue of 'reform or revolution'.

Strategies for change – reform or resolution?

This split between reformist and revolutionary socialism is another dichotomy which is of concern to the socialist geographer. The distinction itself is contentious, and has a history of often vitriolic debate, but it is an important and generally recognised divide in the socialist tradition. The debate revolves around the question of political strategy for the achievement of a socialist society. Unfortunately, any attempt at rigid definition of revolutionary socialism as distinct from reformist socialism would not win one hundred per cent agreement from socialists of either persuasion. The two positions are, in any case, not static or rigidly divided. A rough sketch can be drawn as follows: a reformist socialist strategy would aim to fight for socialism through reform of the capitalist system, by working within and changing existing political institutions such as parliament and government; a revolutionary socialist strategy would be based on the view that existing institutions and structures are controlled by, or on behalf of, the capitalist class and thus act as a barrier to the achievement of socialism.

Socialism can be achieved only by working outside those institutions and with progressive movements of the working-class and other oppressed groups in conflict with bourgeois class interests. Such struggle builds up political and class awareness which it is suggested will eventually lead to a revolutionary situation. (The overthrow of the reformist socialist Allende government by the military in Chile is often cited by revolutionary socialists, to illustrate the unwillingness of the bourgeoisie to willingly give up power.)

Obviously these statements are simplifications and highly characterised. Socialist strategies at any particular time may embody aspects of both or neither! There is also an assumption that socialists, both reformist and revolutionary, share a common definition of socialism and it is simply a question of different paths to a shared vision of the future. This is not necessarily the case, although throughout this introduction it is assumed that socialists do share a broad philosophy and methodology which accepts the value of historical and dialectical materialism. But even a common philosophy and methodology may still produce different analyses and strategies.

Distinctions are further blurred by supposedly socialist political stances where power (personal, party or parliamentary) becomes the aim. Equally the distinction between reformist and revolutionary socialism is not necessarily revealed by the labels tagged on to political parties and personalities. The history of the British Labour Party or the Soviet Communist Party could be cited as examples of supposedly socialist parties, labelled reformist and revolutionary respectively, carrying out anti-working-class policies when in power.

But both reformist and revolutionary socialists must live and operate in a world dominated by capitalist social relations; where production is for exchange-value and profit rather than use-value and need; workers have no control over capital and must sell their labour to live; and politics consists not only of class struggle between labour and capital but also struggle within classes and between nation states. Under such conditions of continuing and overlapping struggles, socialist strategy, reformist or revolutionary, can be compromised or diverted to the extent that it may no longer be accurately described as socialist. The emergence of social democracy in the West, and Soviet-style communism in the East out of the reformist and revolutionary tendencies of the Second International in the early twentieth century, could be considered as examples of this process.¹

However, the split between reformist and revolutionary socialists is real and has its origins in the mid-nineteenth century. It has often rested upon differing analyses of the nature of capitalism, its flexibility and stability, and whether socialism is even a possibility. The reformists in the Second International, such as Eduard Bernstein and more recently Anthony Crosland, who predicted increasing capitalist stability and no inevitable breakdown, advocated a reformed

capitalism as an end in itself. Such a view is 'social democracy' rather than socialism and is the theoretical basis of the strategies of the many social democratic governments and parties in post-war Europe. This distinction between social democracy and reformist socialism is possibly more important than that between revolutionary and reformist socialism. Social democratic strategy is anti-Marxist and does not have socialism as an aim. Yet, because it approaches capitalism's problems on a reformist basis it has in the past shared many characteristics and political platforms with reformist socialists.

During the years of booming capitalism in the fifties and sixties, the distinctions between socialist reformist, and social-democratic reformist blurred, while those between reformist socialism and revolutionary socialism were crystal clear. In Britain the former coalesced in the Labour Party, while the latter grew relatively isolated and fragmented under the shadow of Stalinism and Soviet communism. However as the capitalist crisis has deepened in the last decade the opposite process appears to be taking place. Distinctions between reformist and revolutionary socialists blur. Revolutionaries join the Labour Party as its grassroots drift further left; the Communist Party of Great Britain takes the 'Parliamentary Road to Socialism'; and the social democratic reformists have crystallised out of the Labour Party and formed the Social Democratic Party. Thus, movements in socialist strategy are partly related to changing conditions in capitalist society.

While capitalism is booming, concessions to reformism such as free delivery health and welfare services can be made and the appearance may even be given of a movement towards some form of socialist society. Of course, such gains are not entirely due to economic conditions as political and working-class pressure can also force concessions. However, as capitalism moves into crisis, reforms can no longer be paid for, and class struggle is intensified with attempts to reduce wages and workers living standards. At this time, reformist and revolutionary socialist strategies are more likely to overlap in the fight against such attacks on the working-class and in other progressive campaigns, for example the anti-nuclear and anti-fascist movements. But such apparent unity does not overcome fundamental disagreements between reformist and revolutionary socialists since problems inevitably arise in deciding what are progressive actions.

This, of course, brings the argument full circle, back to the question of political strategy for the achievement of a socialist society.

So where does this leave socialism and geography? We believe there is a clear distinction to be made between socialism and social democracy: we reject the idea that the problems capitalism creates for ordinary people can be resolved by reforming capitalism itself. Despite differences over reform and revolution there is sufficient basis for a common approach to science and philosophy. In geography, such a common approach promotes critical discussion and political action with a view to changing the prevailing bourgeois domination. The papers here form part of this discussion, and we hope indicate some of the ways socialist geography can develop, in particular in using materialism and dialectics to reconstitute a relationship between physical and human geography.

Terry Cannon
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for the London USG Group
July 1982

Note

1. The Second International was a socialist organisation which succeeded the International Workingmen's Association (IWA) set up by Marx and Engels. The Second International eventually split, the revolutionaries leaving to form the Third International. The Second International is mainly a paper organisation, and includes the Labour Party, the French Socialist Party and various Social Democratic Parties.

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Bringing Physical and Human Geographers Together: Why is it so difficult?

David Pepper — Oxford Polytechnic

Introduction

The debate on whether there is, or should be, unity between physical and human geography is long-standing. Traditionally, it has been joined by those who argue in terms of subject matter and method. On both counts there are grounds for believing that the two parts of the discipline have now grown away from each other so much that they cannot be usefully re-united. For instance, if spatial analysis is to be taken as the paradigm, then there are grave objections to the inclusion of geomorphology in the discipline, because of the essentially non-spatial nature of the statistical techniques which modern process geomorphology has used and of many of the problems that it has attempted to solve (Chorley, 1967). There is also a fundamental objection to the apparently unifying framework of systems approaches. Chorley, again, (1973) is but one of many who have pointed to the unsatisfactory aspects of attempting to impose such a framework, taken from a physical and biological context, on to human societies.

If one tries to use the broad "man — land" tradition (Pattison, 1964) as a unifying theme, then it is true that one can examine environmental issues in terms of physical and human geographers each making their contribution. But there is a suspicion that the physical geographer is being cast in an essentially subordinate and unsatisfying intellectual role in the partnership. They are so often mere inventorists — mappers of soils, vegetation, slopes or other physical resources — performing an indispensable service in the manner of Ian McHarg (1969) but not thereby guaranteed to have (or want?) an influential voice in decision making.

There is always the possibility that the two strands of the discipline may be united by a common method — preferably a uniquely "geographical" method not shared by other disciplines. This, however,

is not found to be so. And even though scientific method underlies virtually all aspects of physical geography and extends into spatial analysis in human geography, or behavioural or even “welfare” geography, what has been called the more “humanistic” branch of the discipline is by no means committed to it. In any case, it seems unsound to attempt to base the unity of a discipline on method alone.

Since the majority of those who debate the issue of unity in geography are professional educators it is also appropriate to examine this issue in an educational context, and not to confine it to questions of subject matter or method. One should, perhaps, ask questions about the educational processes and values which apply to courses in physical as opposed to human geography. Are the processes similar or are they radically different; do they contribute equally to the education of students, or does one have more value than another? To answer these questions, of course, one must first define what one most seeks in education, and I attempt to do this below. The definition is rather personal, and it is presented in a specific institutional context. But from it some general principles might be obtainable.

Two views of education

Two very distinct and opposing views of education come to mind when questions such as “what is the purpose of education?” are asked. (These views probably have technical names but since, like so many of my colleagues who teach, I lack any formal training in the subject of education, I use my own shorthand to refer to them). The *Boyson School* seems substantially to be the prevailing wisdom in the minds of the British public, and it is also deeply entrenched in our higher educational institutions. Dr Rhodes Boyson, recently the Government’s junior minister in charge of higher education, enunciates it frequently. It holds that education should essentially help people to earn a living, either through straight vocational training, or through skills and attitudes imparted in “non-vocational” subjects (the availability and popularity of the latter — many of which are derided as “soft options” — should be substantially reduced if possible). Education must also inculcate attitudes which value and appreciate the importance of the process of “wealth creation” and property ownership. It should be geared much more than at present to the needs of industry and commerce and should contribute to the pool of

skills necessary for economic revival. From all this it can be inferred that education thus conceived will not encourage the turning of critical and reflective thought to questions about the very premises underlying the prevailing socio-economic order — rather it will seek to support and strengthen the political *status quo*. In the rhetoric of the Boyson view, education must serve the “national interest” which, if it is defined at all, appears to coincide closely with the interests of the major contributors to the funds of the political party of which Boyson is a member.

The counter view, called here the *Berlin School*, is derived from Isaiah Berlin’s statement that in order for society to progress socially, “parricide” is essential.¹ By this is meant an essentially critical and questioning scrutiny of the values and assumptions of the older generation, which have become, in Galbraith’s terms “the conventional wisdom”. This scrutiny is to take place with a view to rejection of such “wisdom” and the system that supports it, if it is seen to be no longer appropriate or perhaps based on unacceptable premises. For the scrutiny to be rigorous, it follows that the vested interests of those who promulgate the “wisdom” must also be examined. In this process, total “parricide” need not be inevitable. But the educational implication is that a sound decision for retention or rejection of the conventional wisdom *first* requires uninhibited development of the critical faculty, and, since questions of the future of the whole *society* are at stake, a narrowly specialised education may not suffice if parricide is to have the desired effect. Henry David Thoreau (1974, 18-19) put it rather more simply and memorably.

It appears as if men had deliberately chosen the common mode of living because they preferred it to any other. Yet they honestly think there is no choice left. But alert and healthy natures remember that the sun rose clear. It is never too late to give up our prejudices. No way of thinking or doing, however, ancient, can be trusted with proof. What everybody echoes, or in silence passes by as true today may turn out to be false tomorrow, mere smoke of opinion . . . What old people say that you cannot do you try and find that you can . . . Practically the old have no very important advice to give to the young, their own experiences have been so partial and their lives have been such miserable failures.

Clearly, in the Berlin — derived view, the function of education is to stimulate an “alert and healthy nature”.

My own predilection for the Berlin school partly reflects my participation in the Polytechnic sector of British Higher Education (H.E.) Here it seems very appropriate to accept Johnston's (1977) and Knos' (1977) propositions that geographical education should be part of a broad pattern of study which should be aimed at “education for citizenship” (In a progressive sense, not necessarily supportive of the *status quo*). For reasons which they discuss, it is not so desirable for most Polytechnic geography departments to be intent on producing single Honours geography specialists in the same way that university departments may be. But perhaps there are also compelling reasons for all sectors of geographical HE to consider the wisdom of adopting more positively the Berlin — derived view of education. These reasons become apparent from Harvey's (1974) very persuasive analysis of the position of post-war geography in British HE. He argued that the discipline, particularly in the 1960s, was heavily influenced by notions of being “useful” to the ruling elite, and was substantially dedicated to the production of a technically efficient bureaucracy whose purpose was to preserve and enhance the aims of vested interest groups in the market economy, to manage cyclical crises in that economy, and to *contain and defuse discontent*. In this respect, therefore, he characterised and rejected a geography which embraced what I now describe as the Boyson philosophy.

Since, and partly as a result of, the writing of Harvey's striking critique, the position which he describes in geography has altered. To put it simply, an education which encourages specialisation in physical geography and related sciences still tends to support the Boyson concept. But one that involves concentration on human geography (especially humanistic geography) and related social studies and humanities, can (though it need not) produce in students an effect more akin to that implied by the Berlin School.² If this is the case, then here, in educational terms, lies another powerful reason why geography in the 1980s cannot be a unified discipline.

An attempt to bring geographers together

A case study which supports the above view is the course on “Man-Environment Attitudes”, which is taught to third-year geography

students at Oxford Polytechnic. This course discusses and examines arguments and attitudes encountered in current debates about the man-environment relationship, and it attempts to trace their historical, philosophical and political roots. It brings together students who, having started from a common first year of physical and human geography, have subsequently specialised in one or other branches of the subject. Usually the physical geographers in this joint Honours degree have combined their study of geography with sciences like biology and geology, or with maths and computer studies; while human geographers have combined with a range of humanities or social sciences or languages or education.

They join, in Man-Environment Attitudes, to examine subject matter which reflects a common traditional, geographical, concern. So, underlying this course — and indeed the whole degree field in geography at Oxford — is an assumption that it is possible to unify the discipline around the man-environment paradigm. In the rubric for the field, which was designed in the early 1970s, geography was defined as “the study of spatial patterns on the earth's surface as expressed in the visible landscape — man's experience of and behaviour in his environment is a prime factor in shaping this landscape” (Cosgrove and Pepper, 1976).

The course aims, which reflect the Berlin perspective, are described to students at the commencement in the following way:

To give an historical perspective to the current environmental debate: to stimulate interest in the philosophical background to this debate: to show the relationship between the debate and geography: to encourage critical examination of students' values and the values of Western society: to encourage critical and reflective attitudes to course material and broader educational processes in the Polytechnic: to facilitate a form of learning in which (a) students communicate with and help each other (b) students attach importance to ideas and opinions as well as 'facts' (c) students enjoy reading and enquiry (d) students improve their standard of writing and speaking.

Limitations on success

The reactions to the course over the past five years have been highly variable. At best, students have written and argued cogently and with insight; they have read voraciously; performed well in written examinations and have claimed that the course has touched them personally, changing substantially their outlook on life. The majority of those who have reacted thus have been human geography specialists. At worst, students have been unable to form and express ideas clearly; they have not read widely; they have performed indifferently in examinations; and they have not really understood or been stimulated by the course. The majority of students in this category have been physical geographers who have combined with science, and their struggles have sometimes been communicated to more junior colleagues who have, despite advice to the contrary, commonly modified their programmes so as to avoid doing the course altogether.

These adverse reactions have sometimes been articulated as complaints about the unfamiliarity of the course's subject matter and doubts about its value — although it displays a bias towards material which is very relevant to scientists such as: the modern environmental movement; some principles of ecology; the "scientific revolution", rationalism and the Enlightenment; the philosophy of science and positivism; environmental determinism; Darwin and social Darwinism; Malthus, the limits to growth, and notions of environmental capacity; technocrats and technocracy, as reflected in current environmental issues; the social functions of science, and science as ideology (see Figure 1).

It is, of course, the last two which cause particular confusion amongst physical geographers/scientists, as does the attempt to understand why Marxists are so critical of the ecology movement.³ This discomfort extends from the subject matter to elements of the teaching approach and methods.⁴ These attempt to stimulate critical thought and discussion *between students* in the belief that students might learn far more of value from each other than they will from a tutor — another Thoreauesque philosophy:

Tuition, for instance, is an important item in the term's bill while for the far more valuable education which he gets by associating with the

most cultivated on his contemporaries, no charge is made. (Thoreau 1974, 46)

Sometimes the effect of such an approach is to generate panic in the ranks of physical geographers, because it casts them in a different role to that of the traditional student/tutor relationship which they are used to — where the former is a receiver of knowledge (chiefly information) while the latter is its disseminator. Instead, the philosophy of this course holds that tutors are there as *facilitators* — i.e. to help the students in their *own* attempts to become *self-motivated* and *self-educated*.

Figure 1 'Man-Environment Attitudes' —
Some Subject Matter

** modern environmental movement	x romanticism
** some principles of ecology	
** scientific revolution – the enlightenment, rationalism	x social functions of science
** philosophy of science	x science as ideology
** determinism	x phenomenology and existentialism
** Darwin	- social Darwinism
** Malthus and the limits to growth	x Marxism and Marxist critiques of environmentalists
** nuclear power issues and the technocracy	x anarcho-communism and Kropotkin etc.
geographer's contribution to the environmental debate	
** affinity with science students' background and interests	
x less affinity	

To be more specific, the ethos and credibility of the course is sometimes undermined because of the difficulties which physical geographers and scientists in particular have in accepting propositions like the following:

That argued beliefs and opinions constitute as a valid a subject matter as "facts"; that the divorcing of facts from values in Western philosophy, education and thought generally is a recent phenomenon (see Skolimowski 1975); that empirically-derived knowledge may not be the only valid form of knowledge; that approaches to knowledge embodied by philosophies other than positivism could be as valid as positivism itself; that scientific knowledge is not objective and that science is not a monolithic structure composed of inviolable truths but reflects the ideologies of those who use it; that materialist interpretations of history may be more valid than what Sandbach (1980) calls "functionalist" interpretations; that, indeed, any other interpretations of history may be more valid than social Darwinist interpretations; that there are other conceptions of progress apart from those intimately allied with science technology and materialism.

The Roots of the Problem

I trace the inabilities, inflexibilities and general lack of confidence which I have identified in many physical geographers to the very nature of the education which they have received in their branch of geography and in the allied science subjects. This "education" has been geared principally and excessively to producing geomorphological, climatological, biological or geological technicians, in a process which places heavy emphasis on fact gathering and rote learning. The presentation of "facts" is done in standardized ways which do not expand the boundaries of the students' abilities to communicate verbally or in writing with tutors or colleagues. In fact, it is not an exaggeration to assert that final-year physical geographers and other scientists are frequently semi-literate. Furthermore, the process which has led to this state of affairs is frequently elitist because it encourages these students to disparage subjects (or branches of a subject like geography) where the nature of knowledge and wisdom is not always so clearly identifiable with the steady accumulation of, and familiarity with, facts — where perhaps questions of value and even feeling are legitimate currency. Thus, in

the view of the physical geographer, more physical geography is better education; other occupations are either a waste of time or they are peripheral to the main task of life. The encouragement of such sentiments negates those parts of the goal of liberal education which relate to the encouragement of breadth of interest and curiosity about the world.

One fears that with the physical geographer, study time which is not spent in doing geomorphology or geology, etc, (preferably in hours of so-called "practicals"), is regarded as ill-spent. To put it another way, time is devoted to how to get more (factual) knowledge but not to a consideration of what to do with this once it is gained. Schumacher (1973) characterised this as a preoccupation with the *know how* rather than *know what* — both in reality being necessary for true wisdom. The philosophical roots of such a problem lie in the nature of positivism and an excessive and exclusive exposure to this philosophy, and in debates about facts versus values. They are highlighted by Skolimowski (1978):

Now the influence of the present quantity ridden society, and the present quantity ridden education — one is a mirror image of the other — is so pervasive that we are positively discouraged from exercising our judgement, and are prompted to make decisions "on the basis of facts" — "facts are not judgemental, facts do not judge", — we are told.

But there is a huge fallacy in this proposition. For in a subtle way facts do judge; facts are judgemental: to obey facts is to obey the theory and the world view which these facts serve, exemplify and articulate . . .

The atomistic and analytical way is one in which almost of necessity the trivial, the facile, the obvious and the physical dominate. The ultimate texture of life requires an approach which posits a variety of depth, which assumes that there are things which defy easy analysis . . . and which also acknowledges that these are the things which ultimately matter . . .

The language of present philosophy, its concepts and its criteria of validity are such that of necessity it must rule matters concerning spirituality as invalid or incoherent.

Conclusion

The effects of a physical geography/scientific education may be detrimental to any attempt to mount a course such as the one described, in which physical and human geographers are to study together topics that might traditionally be recognised as of common concern. Although many human geographers also receive what amounts to an essentially “quantity ridden” and positivistic education, it seems that there may be less of a tendency on this side of the discipline to dismiss as invalid all forms of, and approaches to, knowledge which is not cast in this rigid mould. Indeed, there has been in recent years the emergence of an antidote to the purely scientific and “value-free” approach, in the forms of humanistic and radical geography (e.g. Relph 1970, 1976, Peet 1978, Bunge 1973). Such emerging schools would appear unlikely to accept Moss’ (1979) contention that questions of group values (which are cultural and historical) can be treated, not in terms of perception, but “in terms of indeterminacy” and that, therefore, “using stochastic processes we can take care of indeterminacy without studying actual perceptions and place our study on the more secure methodological foundation provided by the analogy of the methods of biological science . . . It is suggested, therefore, that many problems which at present are considered to be problems of perception can be reduced to problems of indeterminacy and become more tractable in consequence”.

To make a course like Man-Environment Attitudes more “successful” (in the sense that it would touch fundamentally more people, especially those on the physical side of geography) one could advocate changes in the positioning, nature and form of the course itself. Additionally and more fundamentally, rather radical changes seem to be needed in the educational context of the course. Teachers of physical geography and science should perhaps be prepared to sacrifice some of what they might see as “depth”, “academic rigour”, “expertise”, “coverage” or other similar clichés, in favour of introducing students to different materials and new thought modes. (At present I meet final-year geomorphology and geology students who have never heard of Hutton and Playfair, let alone of Kuhn — can this be regarded as satisfactory, even within the context of a narrow science education?)

One cannot be optimistic that such contextual changes will occur. Indeed the thrust in education appears to be in a reverse direction.

For what I have judged to be deficiencies in a physical geography/science education would be regarded as strengths by the Boyson school, which advocates strongly an extension of science education while it derides and seeks to “rationalise” or otherwise limit arts, humanities and social studies courses. To have students and their tutors reduced to the rank of puzzle solvers within the scientific paradigm (Kuhn 1962) is safe, and reinforcing to the vested interests in society. It accords with the Boyson view and it also defuses discontent (a long — accepted aspect of the ‘usefulness’ of science — see Thackray 1974). To have them examine and question the nature of the paradigm itself, as in Berlin, is dangerous and threatening to the *status quo*. While these two forces pull on either side of the discipline of geography, then the prospects for a united discipline in educational terms are low indeed.

Notes

1. A statement made in the course of describing the nature and purpose of philosophy, in the introductory programme of BBC2’s ‘Men of Ideas’ series.
2. It could be asserted that I am here suggested too simple a model, in which a physical geography education leads to an attitude in students of support for the socio-economic status quo, while a human geography education leads to the reverse. Such a simplification fails to recognise that human geography need not always be more ‘progressive’ (in the sense implied here), and that physical geography can indeed be progressive. I should stress that this paper was written with a view to stimulating discussion rather than providing a totally balanced review of the scope and nature of modern physical and human geography. Indeed I cannot provide such a balance since my training is in physical geography and I have an incomplete picture of developments in human geography over the last two decades. Nonetheless, the model here proposed is certainly descriptive of *tendencies* I have perceived among students trained in physical or human (especially humanistic and radical) geography in my own institution.
3. It would be unwise to attempt to summarise in such a short space the nature of Marxists’ very important criticisms of the ecology movement — particularly since superficially the two schools of

thought have much in common. (They both, for example, see the demise of capitalism as inevitable and they both imply that there is a need for major socio-economic reform). However, papers in *Antipode* 10 (2), 1978, give a flavour of these criticisms. They include the notions that the ecology movement is; (i) neo-Malthusian, and that it is therefore deterministic, fatalistic and guilty of using science to promote bourgeois ideology; (ii) ahistoric in its perspective and therefore superficial and reactionary because it calls for changes in *attitudes* and ideas about the man-nature relationship without any real recognition of the fact that current attitudes, and the environmental degradation which stems from them, are inherent in the capitalist mode of production i.e. in the material base of society.

4. The teaching methods and techniques include lectures (recorded), tutor-led large group seminars, student-led small group seminars, no-tutor sessions, poster sessions, film and video presentations, group student projects, self-marked essays, one-to-one tutorials, team teaching and student debates.

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Underdevelopment and Physical Geography: bias and relevance in the Sahel.

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Introduction

Most 'socialist' geographers are social and economic geographers, people concerned with the allocation of resources, and access to them. Their impact has not only been on the subject matter of research and the interpretation of its findings, but also on the methodology and assumptions underlying such research. Western scientific method has been increasingly questioned, and a social science in which values play such an important role demanded. Although alternative methodologies have been accepted into the mainstream of social science, those who study the physical world have an acute dilemma. The combination of socialism and physical geography is not easy or obvious. Indeed the idea of a Marxist geomorphologist invokes the image of the fundamentalist Christian scientist, whose only road to sanity is to accept a schizophrenic cleavage between faith and positivism. Only by complete separation of the two can any semblance of order in either pursuit be maintained. Yet the geomorphologist need not suffer the consequences of such a conflict. Though it is hard to see how investigations of meander geometry need be, or can possibly be, modified by socialist precepts, there exist nevertheless situations and research programmes in which conventional scientific procedures may well be unsuitable.

It is especially in applied studies in physical geography that the issue of inappropriate routes to explanation are raised, as are problems of bias, and assumptions of an ethnic or social nature. In this respect physical geography is no different from social or economic geography, being concerned with resource management and allocation. If early work by geographers of the housing market can be criticised for its lack of attention to issues of power and control, and over-emphasis on planning rationality, then the same can be said for water-resource work and atmospheric pollution studies. As soon as the domain of

environmental science comes to include a human dimension, then it acquires value, and it is exposed to charges of irrelevance, conservatism and the like. In my own experience, this is nowhere more evident than in the field of development studies, and the position of environmental studies within it.

The Sahelian Drought (1968-1973)

Evidence of the importance of appropriate environmental research is provided by a consideration of the literature which emerged from Sahelian drought and desertification studies. Three main lines of enquiry pervade this literature:-

Firstly there is a considerable body of research which focusses almost exclusively on the *analysis of precipitation statistics*. The goal of such studies is to describe the drought and explain its manifestations in terms of physical processes. They lie in the domain of pure science, and are judged accordingly. However, there is a minority of researchers who attempt to bridge the gap between physical drought studies and those concerned with improving the lot of people who suffer its consequences. Bergeron's suggestions of cloud seeding and massive irrigation (Bergeron, 1970) are revealing examples of solutions which attempt to defeat the environment by technology, with little regard to the dynamics of peasant societies in the zone.

A second group of researchers devotes its energies to the broader problem of *desertification*. Their concern lies with the manifestations of environmental deterioration (erosion by wind and water, devegetation, increased runoff, and so on), and its apparent cause. Although the initial impetus is directed towards the physical aspects of desertification, there is often a rapid progression towards a study of the role of human. In making this change, most researchers introduce the spectre of environmental abuse, and by implication, irrational resource management on the part of the peasant and pastoralist:-

This expansion of deserts along their edges is due only to human action; to the permanent and increasing pressure of man and his animals on fragile and unstable ecosystems and to misuse of natural resources through careless management (or lack of management). see Glantz (1977) p.28

... 'false deserts' having been gradually desertized by man during centuries of frantic misuse.
ibid, p.30 quoting Emberger (1957)

These, and other statements carry the implication that peasants and herders have wilfully chosen to misuse their environment. This hidden issue of choice is reminiscent of early housing studies (see Gray, 1975), and it is a short step from such a view to the belief that the Sahelian people are the cause of their own downfall. These comments are undoubtedly oversimplifications, but there is nevertheless a constant allusion to such themes in much of this research. Furthermore, if judged by official publications of international agencies, the press, and the institutions of government, it is the irrationality of the pastoralist and peasant that becomes the focus of the executive's attention. And one assumes it is to the executives of government that applied researchers are ultimately addressing their work.

The third line of research adopts an *historical, political-economic perspective*, and seeks to explain present conditions as the inevitable consequence of colonialism and neo-colonialism, in which the capacity of the people to manage their environment is constantly eroded (see Baker, 1973; Swift, 1973; Raynaut, 1976, 1977; and others). It seems to me that these studies, lying within a socialist framework, provide the best explanation of current events and have succeeded where desertification research by physical geographers has not.

In a slightly different context Blaikie has argued that soil erosion research will only lead to sensible counter measures if it is founded on the political-economic and social system within which it occurs. The causes and processes of soil erosion may be seen to lie within the realm of physical systems by orthodox physical geographers, but in Blaikie's view its roots can only be found in the forces which limit the flexibility of the cultivator. Traditional 'conservationist' practices cannot be maintained in the face of land expropriation, loss of bargaining power, and integration into a commercialized economy. Peasants must either exploit their dwindling resources or starve. There is no question of choice in the matter. In this respect, what is true for Nepal is equally true for the Sahel.

So far I have attempted to put into context the dilemma of environmental research within development studies. I have indicated

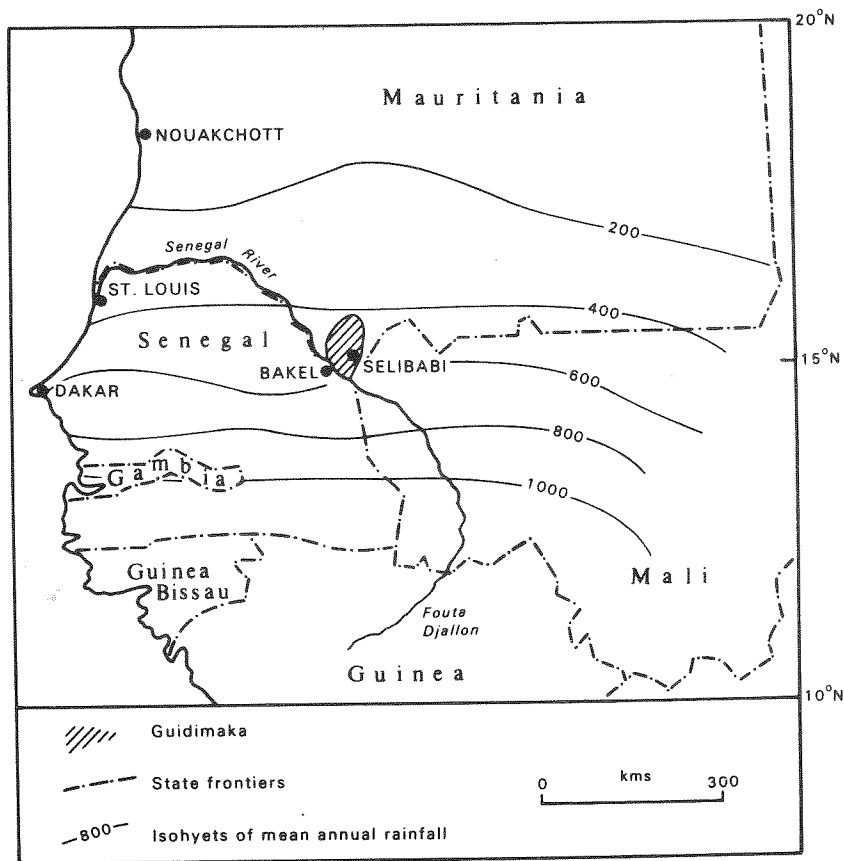
that potentially unfortunate results may emerge from research based on established scientific methods which purport to be objective, 'neutral', and passive in the face of humans' interaction with the environment. Nevertheless, development research, particularly when concerned with agriculture, does require the services of environmental experts. The need for environmental research is not questioned. What is at issue is the type of research which is most appropriate and relevant. A useful illustration of the search for more suitable and effective methods of investigation is provided by War on Want's approach to agricultural development in the Senegal valley. (See map)

The Senegal Valley

The War on Want Development project in the Guidimaka¹ area of Mauritanian is founded on stabilising and securing traditional dryland cultivation rather than transforming it into a substantially new system. From an initial diagnosis offered by a multidisciplinary team (comprising an environmental scientist, a social anthropologist and an agronomist) it has moved on to a progressive introduction of simple technical changes whose cumulative effects are constantly monitored from the perspective of environmental response, agronomic success and social reaction. The approach has been holistic: the three specialists do not work independently on separate investigations which should somehow be complementary, but work consistently on joint programmes which are planned collectively and aim towards a commonly-conceived goal.

As a result of this approach, which was established at the outset, standard environmental research methodologies were quickly seen to be inadequate. Immediately after the drought it was simple to assume that one of the major problems facing the Soninke societies of the Guidimaka was water shortage. This would inevitably have led to the arrival of hydrologists in the region, with an eventual emphasis on irrigation techniques based on the waters of the Senegal valley. The predisposition to assume that environmental constraints are invariably the principal limitation to increased food production in the Sahel is discussed elsewhere (Bradley, 1980a). In our efforts this approach was eschewed at the beginning. The arrival of highly trained hydrologists with their commitment to irrigation and agricultural transformation was resisted. I shall refer further to the irrigation issue and its implications for physical geographers below.

A second methodological consideration was the role of soil studies. A survey of the soils of the region was available to the research team, but its usefulness was limited by its insufficiency in local detail (it spanned a much broader area than the project zone), and by its orientation towards a type of development which War on Want wished to avoid. Again I shall expand on this point later.



I have selected irrigation studies and soil survey in order to demonstrate two points. The first concerns the 'non-passive' or 'non-neutral' role of technically-sophisticated and science-based research (both in its methodology and its content); and the second concerns a reorientation of both approach and substance in the conduct of applied environmental research.

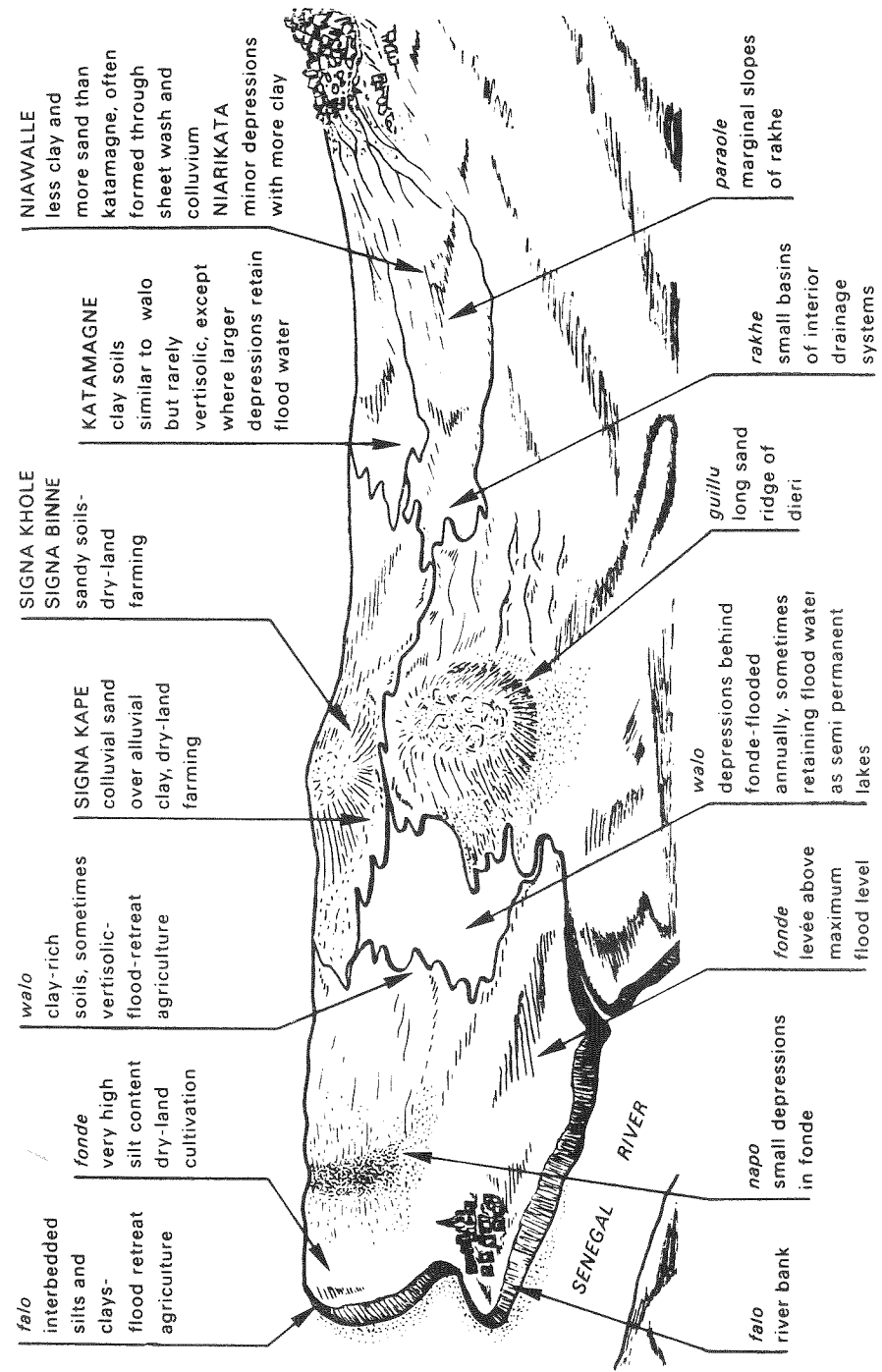
Irrigation Studies

Hydrological research and irrigation planning serve to illustrate the bias that can be inbuilt in 'scientific' environmental research. In this instance, the focus is on irrigation in the Senegal valley, although I am confident that there is a wider implication.

Traditionally the peoples of the Senegal valley practice a dual farming economy, in which the cultivation of flood-retreat crops during the dry season is of fundamental importance. As the waters of the Senegal rise at the end of the rainy season, interior basins lying behind the riverside levées flood with sediment-rich water. As these waters evaporate during the ensuing dry season, they deposit their suspended load and provide a fertile and moist soil for the cultivation of sorghum, the staple food of the people in the lower valley (where the rains are generally insufficiently reliable to provide guaranteed dryland production). However, the aspirations of the state government and the urban populations are divorced from this local subsistence practice, for since the beginning of the French colonial era, a preference for rice has emerged. The ensuing demand for imported rice has caused severe balance of payments problems for Senegal in particular. As an umbrella over these two elements, of peasant reality, and state design, is the international concern over the future of the Sahel and its problems of water supply. In this three-cornered contest, the international and national ambitions are most easily combined, and thus we see the emergence of a development strategy designed to harness the Senegal river for irrigation. From the international perspective such a strategy mitigates the effect of drought, while from the national viewpoint, irrigation for paddy rice solves the problems of balance of payments and urban food supply. Further details of the evolution and economics of this irrigation programme are given elsewhere (Bradley, 1980b). On the ground, the peasants' valuation of the flood-regime of the Senegal river and the sedimentary basins which sustain their sorghum production is ignored. As a replacement, the irrigation programme offers a growing number of irrigated plots in

the order of 40 ha in size. These are located on the levées themselves rather than in the sedimentary basins which lie behind them, and are designed for paddy rice cultivation. The organisational and maintenance costs of these intensively-managed plots are high, and the peasants soon fall into debt. They are obliged to commit scarce capital; and because of labour competition at key periods, they are forced to abandon both dry-land and flood-retreat cultivation. As a result, they no longer grow sufficient sorghum for their needs. They have entered the commercial market under unfavourable terms of exchange. They do not control the rice supply, nor do they have any influence over the provision of sorghum. The scale of transformation required of the traditional economy is considerable. In the evolution of the Senegal river programme we can see history repeating itself, for it bears an uncanny resemblance to the programme of the Office de Niger in the middle Niger delta.²

It is certainly true that state and international interest groups are instrumental in fostering the evolution of such a programme, but the position and role of the environmental research worker is not disconnected from the end product. By the standards of the West African peasant, foreign experts are overwhelmingly biased towards high technology research, with its complex sampling and instrumentation procedures, and its concern with evaporation estimation, discharge regimes, soil moisture and water tables. With the training and Western background of these scientists it is not surprising that they are biased towards technocratic solutions. The very logistics of their operations immediately divorce them from peasant reality. Their solutions might as well be copied directly from other corners of the world. In the Senegal valley, the option of securing and improving sorghum production was never considered. Even if it could have been within their terms of reference, irrigation specialists would almost certainly have dismissed it as a possibility, for their experience and training was intimately associated with the use of high technology pumping equipment. Their premise was the use of floating diesel pumps, and thus their research was directed to no more than least-cost location. Their approach would seem to have lacked any awareness of the potential social consequences of their intervention. In short, the breadth of their research was constricted by a lack of recognition of the social dimension of agriculture. However, by



Sketch diagram illustrating the major soil and land systems of Guidimaka

approaching the situation from a different perspective, one which acknowledged the holistic nature of the agricultural system, even one which was willing to ask the peasant what was wrong (rather than automatically assuming water shortage), different phenomena may have been examined, and with different techniques. Again the improvement of the existing flood-retreat practices, and concentration on the sedimentary basins rather than the levées, spring to mind.

Thus, if the physical scientists are prepared to consider the broader context of their research, and to become aware of the political, social and economic forces which define agriculture, then they are in a position to modify the approach, and to seek solutions which run counter to the unfortunate history of so many development projects.

Soil Survey

The second issue concerns the nature of soil survey as preliminary research. It is generally considered an essential prerequisite to the formulation of agricultural development schemes. Once again such a basic survey seems innocent enough. Soil is justifiably seen as a key resource for agriculture, and this view in no way denies the importance of social and economic factors. However, a close examination of the practice of soil survey in these situations leads to a less optimistic assessment of their neutrality. The following features are common to a greater or lesser extent in soil survey.

An examination of soil forming factors (climate, geology, topography, etc.) invariably precedes the survey.

Sampling systems are based on a prior definition of 'land systems'

'Typical' sites are selected for the preparation of soil pits with a view to full profile description. Supplementary evidence is derived from augering.

In the context of West Africa, classificatory schemes are commonly based on the concept of profile development and are concerned with pedogenesis. An attempt is made to assign all soils studied to categories within this system.³

Laboratory analyses also emphasise those elements which relate weathering sequences and states as a key to classification (for example ORSTOM practice is to define the mobility of iron in the profile)

Laboratory analyses are emphasise those elements which relate strongly to chemical fertilizer application (phosphorous is a typical example, even though its measurement as an available nutrient to crops is notoriously difficult, and rarely correlates with crop performance)

Mapping of the resultant soil units

As a consequence of these practices (which together became acceptable as a standard 'package'⁴ in temperate latitudes) the following conclusions tend to emerge:-

Because of the emphasis on soil-forming factors, the acceptance of land systems as the starting point, and the genetic basis of the classificatory scheme, the area of survey invariably extends beyond the spatial confines of existing peasant agriculture. It is therefore concerned as much with the potential use of currently non-cultivated land as with changes in existing soil use. It therefore implies change; new, transformed agriculture, and as a result tends to deny any appreciation or awareness of the validity of existing systems. In effect it dismisses them as irrelevant.

In the section on agronomic implications which habitually follows the description of the soils, emphasis is placed on the soil as the determinant, for which the most appropriate crops are selected. Thus in the Guidimaka survey, rice and cotton were frequently mentioned as suitable crops, despite their virtual absence from the existing agricultural system. Once more the implication is that a complete transformation is necessary. It is not what the peasants want that is at issue, but what the soil can grow.

Despite its evident 'applied' nature, the approach and methodology of such soil surveys is largely academic, in the tradition of West European science. The emphasis on classification, and in particular on the need to develop a standard, universally applicable system does not stem from local agricultural needs. It is a manifestation of the constraints of orthodoxy, and has little functional value in the context under review.

It can be seen therefore that traditional soil survey techniques are predisposed towards types of agricultural development which do not accept the validity of existing agricultural systems. By extension, they

support agricultural transformations, and it is no accident that these tend to incorporate technocratic packages and integration into an externally controlled cash economy. The soil surveyor, in conducting his 'objective' environmental research, is not neutral.

In the case of War on Want, such an approach would have been incompatible with its stated aims of working within the existing agricultural system of the Soninke in an attempt to stabilise and improve dryland farming without major change. Nevertheless it was essential that the project team gained useable information concerning the peasants' soil resources. In hindsight it has been extremely difficult to break out of the conventional orthodoxy, and to a certain extent our early efforts involved the collection of much irrelevant information, and the emergence of technical options which flew in the face of peasant reality. However, by a process of successive approximation over the last five years there has evolved a new methodology which in this particular context seems to be appropriate. We make no claims for a breakthrough in this. In themselves the techniques of investigation which we currently employ are neither original nor exciting, but they do constitute an effective method of gaining essential information. This information provides the basis for planning, is relevant to peasant opportunities, and is cost-effective.

The major characteristics of our current approach to soil research are as follows:-

It does not stop with the initial survey. Throughout the duration of the project soil investigations continue, both in accumulating (by specialisation and concentration) additional 'basic' information, and by monitoring the effects of the technical changes introduced by the project.

It is flexible in its operation, responding to the needs of the executive field team, and the requests of the peasants.

As a consequence it has no pre-determined areal sampling strategy. It is almost exclusively confined to fields which are currently used, or which form part of a rotation system. Non-agricultural land is rarely sampled.

There is no intention to classify soils according to an international system. Throughout, the peasant system of land and soil classification is used.

As full profile description is largely irrelevant, samples are collected from near the soil surface where the greater proportion of crop roots are found.

As a result of initial chemical analyses which followed orthodox practice, it became apparent that the precision required was much less than is normally considered desirable, and that a small number of physical and chemical measurements would provide all the necessary information. Current analytical practice concentrates on organic matter, texture, and pH. These three variables, by correlation, carry sufficient information about nitrogen, bases, and exchange capacity, without the need to measure them directly.

Only after five years in the field are measurements of infiltration capacity, bulk density, and soil-moisture being conducted, and then only as a response to specific monitoring needs associated with a new technical introduction: animal-drawn ploughs.

Field sampling and measurement are always conducted in the presence of local farmers. The validity and purpose of the techniques are discussed and the farmer is invited to offer assessment of the soil's qualities and problems. In this way the vast knowledge of the peasants is tapped.

Day-to-day activities, and medium-term planning of soils research, are anticipated and co-ordinated by the group as a unit. Regular meetings ensure that further investigations are concordant with the objectives of the programme overall, and geared to the resolution of problems as they occur.

As a result of the approach outlined above, our knowledge of peasant agriculture has improved and enabled us to suggest technical changes which do not conflict with current practice, are egalitarian in their effects, and are within the means of the peasant to adopt. We have realised that fertility is not seen as a problem, although its importance is recognised. The rationale of the Soninke soil classification is primarily based on clay content, and is subtle enough to distinguish between single and double lattice clays. Organic matter is not considered important unless added in massive quantities by manuring. Structural and textural constraints are of overwhelming importance. Whilst these observations give an indication of the local perception of soil value, they do not in themselves indicate any sure way of

improving production. Their value lies in the manner in which it enables us to plan in a context which takes social and economic factors into account. Soil resources are evaluated as part of a complex pattern of constraints and opportunities rather than a distinct and independent variable.

Conclusion

My comments in this paper are concerned only with applied physical geography research. In particular they relate to environmental research in the context of agricultural development in the Third World.

With that proviso, research can lead to development plans which are less elitist if it acknowledges the primacy of the social basis of agricultural production.

It is incumbent on the physical geographer to gain an awareness of the social, political and economic dimension to agricultural systems. Although the more recent practice of convening multi-disciplinary research teams which include anthropologists, sociologists and economists is a positive step, these latter specialists cannot act as surrogates for self-awareness by physical geographers.

If physical geographers are prepared to change their approach in this way, an awareness of the bias of conventional wisdom is gained, and corrective measures can be sought.

Such an awareness may well mean that the programmes of international agencies such as *FAO*, *UNESCO*, *World Bank*, *USAID*, etc. are seen to be elitist, exploitative and anti-social in their planning strategies. At best they frequently address the wrong problems.

As a result alternative approaches can be examined. In the examples used, rejection of conventional methodologies of hydrological and soils research is indicated. In the latter case a different orientation has evolved which is compatible with the egalitarian objectives of the development programme.

Notes

1. See Bradley, Raynaut and Torrealba (1977) for a full account of the project.

2. See de Wilde (1967) for a lengthy examination of the problems of the Niger delta scheme.
3. The classificatory system employed in the pre-existing survey of Guidimaka soils (Audry, 1961) followed ORSTOM (Office de la Recherche Scientifique et Technique Outre-mer) practice. It is dominated by the concept of soil evolution as manifest in profile differentiation and horizon definition.
4. It could be argued that a 'package' as described is no more than terms of reference to which a soil scientist has to respond. However, it is almost inevitable that soil scientists themselves will be instrumental in drawing up terms of reference, for the subject matter is too technical for the non-specialist to make a contribution.

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Notes on Geography and the Relationship Between People and Nature

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Marxists in geography have now contributed a number of papers on a materialist conception of people and nature e.g. Burgess (1977), Dunford (1980), Sayer (1979). In these notes I will not rehearse these ideas at length, but instead raise what I think are some key issues, including some criticisms of socialist theory and practice, and some implications for divisions of academic labour such as that between physical and human geography.

The political significance of the question

It is often assumed that discussions of materialism and the relationship between people and nature must be purely academic and of no relevance to practice, especially political practice. Against this, I believe that problems in understanding these subjects underlie many political controversies. Confusions of the effects of 'nature' and 'society' are a particularly dangerous source of mystification and a common legitimation for political repression. As Timpanaro says in a widely-quoted passage

For too long the ruling classes have attributed to 'Nature' . . . the iniquities and sufferings for which the organisation of society is responsible. (1975, 17)

Here it is a class system that is legitimised, but similar kinds of mis-attribution provide a prop for sexism and racism. Wherever there is a problem of explaining the differences between races, men and women, old and young people, the sane and the insane, the intelligent and the unintelligent, or developed and underdeveloped regions, we can be

sure that underneath lurks the problem of correctly identifying the respective effects of nature and society.

Despite the fact that geographers have often claimed a special interest in the relationship between people and nature, they have a record of propagating dangerous myths on this subject.

This type of misidentification is at its most crude and obvious in environmental determinism, but the fact that it is more subtle and concealed in modern geography should make us more, rather than less, vigilant. For example, in quantitative, positivist geography, the misidentification is not made directly through a commitment to a particular (erroneous) general theory of what nature and society are and how they are related, such as that of environmental determinism. Instead it arises from a commitment to a theory of knowledge and methodology according to which *any* phenomenon, social or natural, is to be explained by showing it to be an instance of a universal (natural) law. As a result we have difficulty in distinguishing between what *has* to be the case as a universal law of nature, and what *happens* to be the case as a local and *changeable* fact about society. I will have more to say about this confusion later, but it's interesting also to note that similar effects can arise in research in the humanistic or phenomenological school, which is *hostile* to positivism. This school seeks to disclose the content of people's consciousness, especially their ideas and feelings about their environment. It generally places a methodological prohibition upon criticism (and sometimes explanation) of people's consciousness: we simply have to understand it as it is. As a result, and for different reasons from those of positivism, this approach tends to take the relation between people and nature for granted and as fixed. In both these contrasting cases, methodological and philosophical assumptions give rise to the conservative implication, that whatever is must be.

Key components of the marxist conception

On the subject of marxist conceptions of people and nature, I want to make just two key points — one fairly well-established, one more contentious — which will allow me to go on to make some points about method and some criticisms of socialist views.

Any major system of thought is structured in certain ways which make it difficult to conceptualise some things and easy to conceptualise

others. *Practice* is a central concept in marxism; it has implications for how we understand interactions between people and nature and between people and other people. Yet from outside marxism it is generally difficult to conceptualise. The difficulty derives from the existence of a fundamental dualism which has an important structuring effect upon much of non-marxist western thought — that of 'mind and body', implying a clear split between the realm of ideas and the realm of matter. Whole systems of more specific concepts are polarised by this dualism. An illuminating cognate term for practice used by Marx in the *Theses on Feuerbach* (in Arthur, 1974) is 'sensuous human activity'. Marx's argument could be interpreted as follows: once this dualism is accepted we inevitably oscillate between a materialism which can understand 'sensuous human activity' only in its physical aspect and an idealism which can understand only its mental, ideational aspect, torn out of its material, practical context.

This dualism might be illustrated in geography by the co-existence of ecosystem and humanist approaches. The ecosystem approach gives human beings a merely biological status as top carnivore. True, human artifacts such as cities can be included in ecosystems but what is lost is any recognition of forms of social relationship between people and of what these signify *to* people. The approach lacks the concepts which enable us to think of these things. In its attempt at unifying physical and human geography, it only manages to deal with the latter by reducing it to *matter*, i.e. it only provides a physical geography of the human world. On the other hand, humanist approaches, with their focus upon perception and consciousness, tend to lack any serious recognition of how people materially transform the world. (See, for example, Stoddart 1967 and Ley and Samuels 1979, respectively.)

Practice involves physical movement and transformation but it is *simultaneously* informed by ideas, and these in turn are developed partly in a feedback-like process of monitoring the results. The most widely — sometimes the only — form of practice acknowledged in marxism is work, or as older marxists call it, labour. In paying so little attention to labour, geographers have characteristically missed the most active and transformative relationship between people and nature. It is not simply that people change their natural surroundings through labour, but that the changes that result from labour react back upon human life in new ways. The cultivation of land through

labour gives us a new material context which limits us in some ways (e.g. by being incompatible with other land uses) and also provides new resources and means of labour which can be used in subsequent labour. The new labour is consequently of a different kind, and so therefore, to some degree, are society and the results upon the environment. In other words, whether largely intentionally or unintentionally, change of nature is also change of society, or self-change.

Obvious though this may all seem, it is remarkable how many major schools of thought in geography have managed to deny or overlook it. Environmental determinism reduced the process to a one-way conditioning process in which environment (pre-) determined human geography, locking people into an animal-like fixed relationship with nature which made historical change unintelligible. Possibilism was a weak and incomplete reaction to this; the environment only set limits and human geographies had some degree of freedom, but what enabled them to move in particular ways within this range was not really taken beyond payment of lip-service to the notions of perception and culture. We have already seen how humanist geography couldn't get beyond the model of people merely perceiving and reflecting upon nature. (However, in its favour, it must be said that it at least tried to examine what perception and consciousness involved instead of relegating these concepts to the sole role of inserting some 'slack' between people and nature, which is effectively what happened in possibilism). As regards 'spatial analysis': its downgrading of the effects of environment are well known and epitomised in its isotropic plains. But in addition, practice and change were understood as a process of mere movement of atom-like individuals (particularly in the concepts of spatial interaction and social physics). Apart from moving around, the atoms didn't actually transform anything or become transformed.¹

This is not to say that none of these types of geography could ever refer even obliquely to labour: rather it is that their concepts block the recognition of the wider significance of labour for the relationship between people and nature. Fortunately this is now well-established in marxist work in geography.

The second and more contentious point is that practice cannot be wholly reduced to labour, and yet many marxists assume that it can.

At worst, people are reduced to one of their powers — labour power, the capacity to work, and even then only paid work tends to be noticed. (Feminists have counteracted this latter kind of tunnel vision and demonstrated the importance of reproductive, unpaid work, but this still retains the reduction of practice to work.)

What is lost in this kind of reduction are those aspects of practice which involve communication and 'symbolic interaction'. The difference between these and work is that they cannot be understood simply as a transformation of nature but must necessarily involve the sharing of meaning among people. As we have argued, work is informed by ideas but these do not necessarily have to be understood by others for the work to be successful, even though the workers of course acquire their ideas through communication with others. Social actions are different. They involve either verbal communication or tacit symbolic interaction. For such actions as using money or voting, the success of the action depends in part upon its meaning being understood in a certain way by others. Selling things is an activity which involves both work and communication, and it cannot be reduced wholly to either of these aspects. Social actions are therefore intrinsically-meaningful or concept-dependent.² (A refusal of the claim as 'idealist' does not constitute an argument!)

A really crucial implication of this is that there must be a fundamental difference in method between natural and social science. The latter must not only causally explain actions, it must also interpret and evaluate their intrinsic meaning. A geography of, say, new towns would both have to explain how they were financed, planned and built and how they function, and understand the meaning of the ideologies of new towns. A historical geography of religious artefacts in India would need to be very careful in its interpretation of religion, as western concepts would probably be inapplicable. These two examples make the methodological point look almost too obvious, because they involve concepts in society which are either new or alien to us. But what is important is that we recognise that this understanding of the intrinsic meaning of actions and institutions is a condition of the possibility of doing *any* social science, no matter how familiar the object. We don't even notice that a study of some aspect of say, British society, pre-supposes that we already have an understanding of the intrinsic meaning of its objects. Because we get this

understanding from everyday practice we cease to be aware of it, but therein lies the danger, for we fail to question whether our understanding is correct. Unless we problematise the meaning of social objects we fail to go beyond the received informal 'theories' of commonsense. There is no equivalent of this in natural science: although we have to know what *we* mean by rocks and rivers, we don't have to know what they mean because they don't mean anything!: atoms, rivers, livers, lungs and trees don't relate to one-another on the basis of any understanding.

Once again, this probably seems like a kind of academic nit-picking at first, but it has major implications for politics and for the relationship between physical and human geography. Let us take the political implications of blurring this distinction between natural and social sciences. If we see ourselves as natural scientists of society (and Marx himself leaned in this direction — cf. Preface to the First Edition of *Capital* and the Postface to the Second Edition), we might be able to explain causally, say, why people demonstrate and how demonstrations can be controlled. We needn't understand the meaning of the demonstrators' grievances, we needn't *listen* to what they're demonstrating *about*: we need only respond physically, with water cannon, plastic bullets or whatever. Or, to take another example, we can easily causally explain how the spatial mobility of blacks and coloureds in South Africa is physically restricted, but if we fail to ask why this is done by examining the meaning of apartheid, then the political issue is transformed into a mere technical problem. Spatial science and systems theory made exactly this kind of translation of politically-contestable grievances and practices into mere nature-like facts of physical behaviour.

Behavioural geography erected this mistake of reducing action to intrinsically-meaningless physical behaviour into a methodological principle. Certainly, consciousness is shaped by the material conditions in which people live, but that consciousness must still be understood in terms of its content, its meaning; it must not be merely collapsed back into the material conditions so that it effectively disappears (cf. Sartre, 1962). The tragedy of versions of marxism which try to mimic the natural sciences and hence devalue materialism into behaviourism is that they support the degeneration of socialism from an emancipatory order into a repressive one. If marxists are

going to oppose positivism and reification in geography, they should make sure they are not merely reproducing it themselves in a different form.

Some marxists, usually of a different, more Hegelian leaning, resist this distinction between nature and society on the grounds that they must be seen as an indivisible whole and understood through a unified method. However, wholes can be internally differentiated and unity should not be confused with uniformity. Nature and society can certainly be seen as a whole, but it must be remembered that the relation is asymmetric; society cannot exist apart from nature, for we are simultaneously social and animal beings, but nature has existed for rather a long time without human society. Naive predilections for uniform, undifferentiated wholes and methods do not provide a basis for opposing positivism, for such predilections are very close to those of positivism itself.

Attributing to society what is due to nature

Marxists have rightly attacked the dangerous tendency to attribute to nature what is due to society, but as some recent work by Soper (1978) and Williams (1978) shows, they have often fallen prey to a reverse kind of reduction.

Raymond Williams notes that when faced with the familiar statement that "it's only human nature to do such-and-such", the knee-jerk response of marxists is to say that "human nature is socially-determined!" Many, including myself, have parroted that as a slogan rather than an argument, without thinking through its limitations. Do we really mean that human nature has *no other* determinants than social ones? Marx wrote in the sixth thesis on Feuerbach that the "human essence . . . is the ensemble of social relations" and Kate Soper rightly questions this, for surely it is not *wholly reducible* to this. While it is true that our biological powers (e.g. reproductive powers) are *always* mediated by social forms (e.g. sexual morality) this does not mean that the former are reducible to or wholly determined by the latter, and yet this is precisely what some marxists have concluded (e.g. Schmidt, 1974). If the social order affects or works upon us in some way, it must have some *material* out of which to fashion us, as social beings; i.e. it is always a mediation of 'natural' processes.

It might be thought that this sort of reductionism would at least get us

away from pessimistic beliefs that we can't change things because they are a part of a natural order. Unfortunately, this kind of belief (social voluntarism) is more likely to backfire in repressive ways. Having dismissed biological and other natural determinants we easily fall prey to them, either by being unaware of them or by imagining that a 'triumphalism' of limitless expansion and development of the productive forces is possible, an incredible 'conquest of nature' in which, as Trotsky and others imagined, whole mountain ranges could be moved (Williams, 1978). Such beliefs can easily be used to license a repression of social needs in the course of the 'forced march to accumulation'. Such fears are not too far-fetched; as the marxist East German dissident Rudolf Bahro shows, cavalier assumptions about dominating nature have been among the forces impeding the development of socialism in the DDR. This is perhaps one reason why he has joined the ecology party now that he is in West Germany (Bahro, 1978).

The point of these criticisms then, is simply that a materialism worthy of the name should beware of belittling nature or dissolving the natural into the social.

On the question of whether there are grounds for divorce between human and physical geography

This question could be taken to presuppose that whether unified or split, geography can justifiably be considered a distinct discipline. I have little confidence in such an assumption. So my arguments in favour of divorce concern the possibility of disciplinary divisions in general and separate natural and social disciplines in particular, and leave open the question of whether any kind of geography is justified.

The first point is unlikely to be contentious and concerns the pros and cons of an academic division of labour. This specialisation is of course simultaneously an uneven development of consciousness, and makes it hard for us to become 'well-rounded people', to use an old-fashioned expression. But although I accept the desire to prevent our consciousness from being restricted, I don't see how we could eliminate specialisation without serious loss. So the question has to be 'what *kind* of division of knowledge is least damaging?'

To answer this, I shall use ontological criteria; that is, I shall suggest that the divisions should be appropriate to the way the world is

actually structured and differentiated. In an approximate way (and one which is always subject to revision as knowledge develops), many disciplines are concerned with distinct strata of the world. Each stratum is constituted by objects of lower strata, but is not reducible to them. Water is constituted by hydrogen and oxygen, but water's properties are not reducible to those of its constituents. It has what realist philosophers call *emergent powers* (Bhaskar, 1975). Similarly, the biological is constituted by the chemical and physical but is not wholly reducible to the latter. Individual people are constituted by all of these, but they have emergent powers; our capacity to think is not reducible to some capacity to think possessed by each of the cells that compose us. In turn, social structures, such as the landlord-tenant relation, cannot exist except where they are (re)produced by people and yet individuals cannot form them on their own, and so social structures are not reducible to individuals and cannot be understood as such.

Within this stratified reality, higher strata can react back upon lower ones, even though they are constituted by them; for example, we can interfere in our own physical, chemical and biological make — up, but only according to nature's laws. We are influenced by the physical geography of where we live, and can alter this context. But then we are also affected by the laws of physics, chemistry and biology: there is no special, unique tie between social science, including human geography, and physical geography.

Now although there are these kinds of constitutive and interactive relationships between different strata, the fact of emergent powers means that we don't have to work back through all the successive constitutive strata in order to understand objects in any specific stratum. We can know a great deal about society without having to go back into biology, and we can know a great deal about the effects of water on human life without having to understand the properties of hydrogen and oxygen, because of the irreducible nature of society and water.

By the same token, in human geography, we can take account of certain features of physical geography without necessarily having to go back into physical explanations of the latter. For example, we may indeed be interested in the causes of flooding and this will often include 'social' as well as 'natural' events. But although floods may be

the effect of social actions this does not make floods social. It is true that physical geographers may study human artefacts, such as erosion processes on coal tips, but there is nothing special about this; biologists may study the contents of our stomachs; and chemists, the content of industrial effluent, but this doesn't make any of them social scientists. They are studying the *effects* in terms of physical results, at the level of non-social strata, of social actions. Understanding the social character of the actions which caused the floods, pollution or coal tips might be of interest but would not be essential for understanding the latter: sulphur dioxide from a socialist factory is no different from sulphur dioxide from I.C.I.

To sum up: while I think 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. Arguing that just because physical and social processes interact, the disciplines which study them should marry, is no more sensible than saying that because kinship relations involve biological reproduction we should enforce a kinship relation between anthropologists and biologists.

Notes

1. This particular selective 'way of seeing' also stems from spatial science's preoccupation with quantitative analysis. Quantitative forms of description require an atomistic view of the world in which change is understood as the result of mere movement of essentially unchanging basic particles. Quantification is difficult to reconcile with the idea of change as qualitative transformation of entities, and it is this concept of change which is implicit in most kinds of labour. (cf. Georgescu-Roegen, 1971; Harré, 1972, ch. 4; Sayer, 1978).
2. The extent to which this is a concession to the claims of humanist geographers is discussed in Sayer, 1979.

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Dialectics, Nature and Physical Geography

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Introduction

The division of geography into “human” and “physical” spheres persists in spite of the subject’s pretence that it integrates “society” and “Nature”. This failing stems from the lack of any cohesive conceptual framework which can encompass the interaction of nature and society. A dialectical materialist approach provides a theoretical framework with which to achieve this overview.

There is insufficient space here for a detailed description of the dialectical method. Therefore this paper must be confined to a consideration of basic principles, together with some examples of their operation in the fields of human and physical geography. Recent contributions to the application of dialectics in geography have confined themselves largely to social processes and critiques of present methods in human geography (Day and Tivers, 1979; Day, 1979; Massey, 1978). These contributions however, ignore the potential of dialectical materialism as a means for breaking down traditional categories of scientific inquiry, and producing new formulations which challenge present “value-free” and ahistorical approaches to science.

As Engels (1936) pointed out, “the old rigid antitheses” of traditional science are dispensed with by dialectics, which “grasps things and their images, ideas, essentially in their inter-connection, in their sequence, their movement, their birth and death”. In opposition to idealistic and mechanistic views, “*the world is not to be comprehended as a complex of ready-made things but as a complex of processes*”, in which fixed forms are revealed as mere abstractions. Thus categories such as “Man” and “Nature” must be replaced by a consideration of the mediation of natural processes by social

processes and vice versa. Thus Anderson (1980) states

“In its dialectical conception, Man (and Woman) is part of “Nature” but is capable of consciously transforming it through productive labour. In this historical process of transforming external “Nature” and increasing his control over it, Man transformed his own human nature and social organisation.”

If this dialectic is ignored, then “Man” and “Nature” simply exist as separate groups of “ready-made things”, and the division of branches of inquiry persists. This is equally evident in the geographical treatment of space. Space is either seen as a mechanistic “universal natural datum” by physical geographers, or as “putty in the hands of man, society or culture” in the idealistic view of most human geographers (Burgess, 1976). Both of these views are opposed to the dialectical conception of space as the material product of historical processes, which comes much closer to characterising the concrete role of space in both nature and society (Castells, 1977).

Connections between natural and social processes

Present approaches to society, environment and space produce contradictions between the appearance and reality of geographical problems which can only be resolved through study of their inter-connection. Perhaps this is best illustrated by reference to a specific example.

California is a socially defined area which includes a very diverse set of environmental problems, and as in many other areas, the distribution of natural resources is poorly related to social needs. Throughout the history of the state, the distribution of water resources has been a major problem — either too much, or too little, in the wrong place, at the wrong time. Such problems are commonplace as far as geographers are concerned, but rarely are the connections between their human and physical aspects or their historical content fully explored. The following analysis attempts to put some of the physical problems in a human context, and vice versa.

To put it simply, central and southern California constitute a water deficient area. The concept of water deficiency must itself be a social one: an excess of water demand over supply. Thus decisions over

water distribution are value-laden, as they become a question of which demands to satisfy first. Although hydrologists are engaged in assessing water resources and water demand, rarely are they concerned with the social ramifications of the original problem or their solutions. As is typical of this bourgeois conception of value-free science, such ramifications are left to planners and politicians, thus depriving the problem of its social, physical and historical content.

The history of water development in California, from the earliest wells to the present massive capital investment in water transfer projects, is a history of natural and social contradictions. The uncertainty of surface water supplies led to the early exploitation of ground-water sources, as farmers attempted to increase the yields of their land by irrigation. Use of groundwater soon outstripped its replenishment by surface recharge, lowering water tables and water pressures in the aquifers. The weight of overlying rocks thus caused compaction of the water-bearing sediments, which eventually led to land subsidence at the surface. In the Central Valley, intensive groundwater use led to subsidence of up to 8.53m in sixty years (Lofgren 1963). This in turn caused widespread disruption of surface water supplies and flooding of subsided areas, and decreased the amount of water storage available in the sediments as compaction increased. Thus a dialectical relationship can be seen to exist in which the development of the forces of production has caused a change in the environment, which in turn has had an effect on the forces of production.

Land subsidence can be halted, and in some cases partially reversed by pumping water back into the aquifers (Lofgren and Klausing, 1969). Such remedial measures present only temporary solutions, however, as they essentially depend on the reduction of future water use. This was forcefully brought home during a severe drought in 1976-77, when rainfalls as low as 30% of normal caused renewed pressure on water resources. In areas where subsidence had previously been halted, such as the San Joaquin Valley, increased groundwater pumping led to resumed subsidence (Lofgren, 1977). In addition, forest fires were especially severe, with fire damage amounting to \$250m. Water levels in reservoirs fell, and with them the output of hydroelectricity which led to people being put out of work (Matthai, 1979). It has been suggested that the effects of such droughts could be alleviated by cutting water consumption but as Johnston, (1978) has noted, this would provide a powerful argument for further development in water

deficient areas, thus reducing the flexibility of response to future droughts. Failure to find long-term solutions to such problems often lies in the form of social response to natural hazards, which often follows a cycle of the form "Drought — Awareness — Concern — Panic — Rain — Apathy" (Foehner, 1977). Thus the problem is divorced from its historical context, which becomes lost to the planning process.

Social response to such hazards is made even less flexible by the historical development of water resources in California. Irrigation now uses more water than all other uses combined, for the simple reason that this is the most profitable use available. At the turn of the century, there was a vast amount of speculation in tracts of arid land in the expectation of the profits which would accrue to landowners from public provision of irrigation water. Irrigation has been estimated to have increased land values in such areas by up to 750% (Taylor, 1971). As the ability of any single landowner to irrigate land far removed from water supplies is limited, these profits accrued from the provision of water by the state. In an attempt to stop large private landowners appropriating all of the expected profits, and to try and plough some of the money back into the public sector, Congress passed the National Reclamation Act of 1902, also known as the "160 acre law" (Taylor, 1971). This attempted to limit the size of holding for which the state would provide irrigation water to 160 acres per landowner. This far-sighted piece of legislation was intended to return unused land to state ownership, and to protect the interests of small farmers. In fact it was frustrated in both of these aims by a flagrant disregard for the spirit and the letter of the law by large landowners and state officials. It is estimated that the state subsidy accruing to a 120,000 acre tract is as much as \$200m per annum, and this helped to hasten the growth of large-scale capital intensive agriculture (Taylor, 1971).

Thus the distribution of public water resources may help direct the process of private capital accumulation. More importantly, this exposes a prime contradiction of capitalism — the appropriation of the fruits of socialised production by private capital. This fact was evident even at the time the 160 acre law was passed. In 1902, Theodore Roosevelt, speaking in support of the law said "I wish to secure this country against ever seeing a time when the 'Have-nots' shall rise against the 'Haves'."

Areas afflicted with drought often encounter the opposite extreme — too much rain in too short a time. In spring 1969, rainfalls of up to 43cm in 48 hours created devastating floods in parts of California. These caused the loss of 92 lives and \$62m worth of damage. The scale of the devastation is directly attributable to the rapid growth of urban areas during this century. A slightly larger flood in 1914 caused \$10m worth of damage, but no loss of life (Biggar, 1959). This shows that quantitative change in human activity may lead to qualitative change in its relationship to nature. Thus an ahistorical view of nature as a constant in social development is unrealistic. Because class divisions often express themselves as spatial ones, the effects of nature may also be class-specific. In Los Angeles, the 1969 floods caused most damage in middle class suburbs developed on alluvial fans, where unconsolidated sediments became mud-slides, causing far more damage than water alone (Scott, 1971). In contrast, in New Orleans, flood water is sometimes diverted into the black ghettos, where property values are low, to protect more expensive white areas. The use of property values as an indication of potential damage in “value-free” cost-benefit analyses may effectively discriminate against the poorer sections of society.

In California, perhaps because of the loss of life, and perhaps because of the nature of the areas affected, response to the flooding hazard has been relatively swift. Flood defences are improved to protect against the last big flood to occur, often regardless of the likelihood of a bigger one occurring later. The apparently contradictory result of such an approach is that there is a direct relationship between the amount spent on flood protection and the amount of subsequent flood damage (Costa, 1978). This is partly explained by the fact that a “protected” area is subsequently regarded as safe, and thus development may occur on a larger scale than before, increasing the amount of damage if the defences fail later. Furthermore, protection of one area may simply pass on a larger flood hazard to areas downstream. Dividing such problems into “physical” and “human” aspects therefore denies the dialectical relationship between natural and social processes which determines the social response to environmental problems.

There are other options available to protect lives and property against flooding. Perhaps the most desirable of these is land-use zoning, which simply designates a flood prone area as a non-development area. As

might be expected, however, this solution is rarely adopted, thanks to pressure exerted by development capital. Industrialists and speculators will tend to favour cheap, flat land on floodplains and in estuarine areas, even if the environmental hazards are greater. In California, cities are discouraged from designating non-development areas within their boundaries for the simple reason that this would deplete their already shrinking local tax base. Thus it can be seen that socially defined space may be in conflict with the physical environment.

The inability of present planning and research methodologies to reconcile social and environmental problems is costly both in human and financial terms. Problems with water resources are just some of the more pressing examples in California. The wider picture is far more depressing — earthquake hazard, for example, far less predictable, and far more destructive, must also be considered. The scale of the problem as a whole can be judged from the estimate of the California Division of Mines and Geology (1973) that in the 30 years up to the year 2000, total financial losses from geologic hazards (floods, earthquakes, subsidence, etc.) will be in the region of \$55,324m.

By splitting such problems into categories, geographers are in danger of falsely abstracting from the complex of interpenetrating social and natural processes. “Natural” hazards are only hazardous in social terms, and their effects and scope can be socially mediated. Ignorance of the dynamic and historical aspects of the relationship between society and nature not only leads to mis-interpretation of the contradictions in the relationship, but also fails to uncover the common ground of human and physical geography.

Dialectics and Space

The adoption of a unified geographical approach to society and nature is also hampered by present geographical concepts of space. As noted in the introduction, physical geographers tend to adopt a mechanistic view of space, while human geographers adopt an idealistic view (Burgess, 1976). This typifies the way in which many physical geographers divorce natural processes from their social context, while human geographers exhibit a widespread disregard for the effects of nature on society. This separation of social and natural process distorts their dialectical relationship, and produces problems in the geographical treatment of space.

The rise of civilisation, the nation state, and more recently, capitalism, have increasingly led to the separation of society from space or place. With the state came the territorial definition of society, in which "the inhabitants became a mere political appendage of the territory" (Engels, 1972). The rift between society and place was widened under capitalism, as the concentration of the means of production separated work from the home. The subsequent transformation of land into private, and later state capital has created a series of spatial relations which geographers have consistently failed to deal with (Sack, 1980).

The refusal of geographers to adopt a materialist, historical view of space underlies the poor performance of most land-use models. The theories of Von Thunen, Alonso and the Chicago School all assume that value depends on nearness to the centre, and are rent based. If the development process is considered, however, it can be seen that over time, the relations of the land market and space will be affected by state intervention. Such a historical perspective is obviously important in the speculation in irrigable land in California, or in potential office and industrial sites in Britain.

Further contradictions in the geographic treatment of space are evident at the level of the nation state. Discrete territorial boundaries rarely co-incide with physical ones, causing disputes over the control and use of resources. The present pollution problem in the Rhine, for example, is most acute in the Netherlands, which receives the accumulated waste poured into the river downstream in Switzerland, France and West Germany. Each regards their stretch of river as their own personal dustbin, and co-operation to solve the problem is slow in coming. Artificial territorial agglomerations created by colonialism have led to present conflicts which can only be understood as a historical effect of the colonisation process. Even within Europe, various nationalist movements can be seen as the result of the territorial definition of space, and its separation from its original social context. Conflicts over resources inevitably sharpen this territorial definition. Recent disputes over oil resources in the Mediterranean between Malta and Libya, and the battle for control of the Shatt el Arab waterway are not simply a product of present spatial relations but also a product of history. Human geographers tend to ignore the alienating effects of boundaries by treating them as concrete, while physical geographers ignore their social effects by not recognising their existence.

Spatial dialectics have been used in human geography, for instance in tracing the development of regionalism. As Massey (1978) points out, "the nature of capital's response to spatial unevenness is itself a product of the interaction between the existing characteristics of spatial differentiation and the requirements at any time of the dominant process of production". However, this ignores the fact that capital does not present a unified front to the environment. The struggle for resources will often reveal clashes of interest between different forms of capital accumulation. For example, the extensive development of land drainage in Britain over the past 50 years has been stimulated by agricultural capital in order to increase crop yields (Hill, 1976). In the process, however, river discharges have risen, threatening the use of floodplains for industrial and residential use, and thus the interests of development capital. In addition, this has posed a threat to wetland areas, which in the past have acted as wildlife refuges and have filtered out much of the nitrogen derived from artificial fertilisers. If the degradation of wetlands leads to increased nitrogen levels in rivers (which will also be stimulated by the conversion of drained land to arable use), then present problems of eutrophication in lakes may be exacerbated. The disciplinary boundaries are abstracted from such complexes of processes and spatial relations and only serve to conceal their true relations.

Dialectics and Geography

Most of the concepts of dialectics are already familiar to physical and natural scientists, but they have not been placed in a materialist framework (Greaves, 1977). Thus the adoption of dialectical materialism by geographers does not necessarily imply a drastic revision of methods. It would, however, involve radical change in theory and in the stance of geography to society, which would then involve a reappraisal of method. For example General Systems Theory incorporated the idea of quantitative changes leading to qualitative change (thresholds), an idea also enshrined in Catastrophe Theory (Day and Tivers, 1979). The major problem with these approaches, as with present process-based studies in geomorphology, is the lack of a socio-economic and historical perspective. Where a historical perspective is

involved, it has often been misplaced. Models of landscape evolution, in common with some models of social evolution, borrow their ideas from Darwin. However, many paleontologists are now questioning Darwin's original concept of evolution through slow progressive change, suggesting rather that evolution proceeds by a series of rapid speciation events in small populations of organisms (Stanley, 1978). This is so close to the dialectical model of change that the exhibition of these ideas at the Natural History Museum in London prompted a letter to the "Sunday Times" which suggested that Marxist dogma had become official museum policy.

This might seem to be a vindication of Engel's belief that there is an inherent dialectic in nature, the existence of which has been hotly debated in recent years (e.g. Thompson, 1975; Rayner, 1977). This argument is of little relevance to the use of dialectics in geography, however. Given that Man's relationship to nature is defined primarily in social terms, then the dialectical processes which manifestly operate in society require that a dialectical approach be taken to environmental problems. In addition, a compatible materialist conception of space must be adopted.

The advantages of such an approach are manifold. On the academic level, new areas of research would be created, and the discipline formed into a more cohesive whole. More importantly, both human and physical geographers would become more aware of their social responsibility, and the need to become involved in, rather than divorced from, the planning process. This also implies that the application of geographic knowledge to the relationship between nature and society would be based on concrete social considerations, rather than abstract physical ones.

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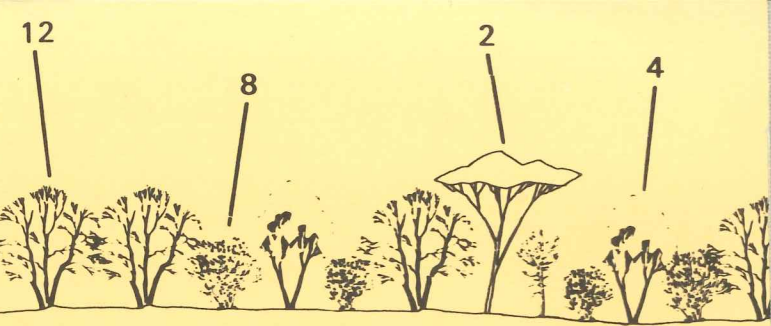
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