

**DEVELOPING SIXTH FORM
STUDENTS UNDERSTANDING OF
THE RELATIONSHIPS BETWEEN
ENVIRONMENT AND DEVELOPMENT
ISSUES**

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ABSTRACT

The focus of the research for this thesis is the development of critical pedagogy for a greater understanding of environment/development issues among sixth form A Level geography students. The thesis first considers the concept of sustainable development which can provide a framework for supporting the close integration of environment and development issues. Caution is necessary, however, given the various interests it serves and resulting contradictions inherent in proposed radical change within traditional economic, social and political structures. Within this context student perceptions of environment/development issues were investigated using phenomenography as a methodology. However, a critique of the methodology was necessary, given contradictions in accepting *multiple* realities of phenomena based on conceptualisation through experience while also seeking a *limited* number of categories of description of phenomena. Out of the action research undertaken, a curriculum module based on critical pedagogy (influenced by critical theory) was developed to encourage critical thinking by students on a case study example of an environment/development issue. The research shows that the students could perceive environment/development issues as complex inter-related phenomena, but only to a limited extent did it enable them to be confident in challenging systems which perpetuate or exacerbate some of the problems related to the issues.

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INTRODUCTION

THE RESEARCH CONTEXT

Concern for environment and development issues in both the rich and poor world has been given a high profile in recent years, particularly through the media, large charity events, consumer organisation, businesses and schools. Young people have a heightened awareness of many issues. However, the particular relationships that exist between improving people's lives and the effects on the environment are not always explicitly addressed. Environmental problems often occur as a result of a particular approach to development, decided upon by particular groups in society who have the power to make decisions.

"The challenge is not to seek to protect the environment from man, but to alter the global economy in which our appetites pressure on the outer limits of resources. This can only be done by altering the entitlements of the poor in the South so that environmental discourse becomes a development discourse."
(Redclift in Johnston 1989, p. 196)

The broad aim of this research is to explore the ways in which A level geography students make sense of environment/development issues within the A level geography curriculum and to develop more effective teaching strategies to enable them to achieve a greater awareness/understanding of the complexity of the

relationship between environment and development in the context of their geographical education.

Below are the questions which set the agenda for the research.

RESEARCH QUESTIONS

1. What contribution has the concept sustainable development made to our understanding of environment and development issues?
2. In what ways do students make sense of the environment and development as concepts used in geographical enquiry?
3. Do students perceive a relationship between environment and development issues?
4. To what extent can students explore conflicting interests, attitudes and values towards environment and development issues, evaluate attempts to solve the problems, identify constraints on possible solutions and seek strategies to overcome them?
5. How can teaching strategies and resources be developed to enable students to explore environment and development issues in a more integrated manner?

The research is set in the context of the debate

about 'sustainable development'- a concept integrating environment and development issues - defined by the Brundtland report 'Our Common Future' (WCED, 1989). The research sets out to explore the critique of the concept and it's relative importance given the high profile of education for sustainable development in Agenda 21 of the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. (UNCED, 1992 ch.36.3)

"Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues... It is also critical for effective participation in decision-making."

Chapter 1 explores the critique of the concept and its contribution to our understanding of environment/development issues as in the first research question above.

Chapter 2 also seeks to explore the extent to which sustainable development has influenced the understanding of environment/development issues in relation to education, in particular the ways in which it has influenced curricula and the development of teaching about the relationship between the environment and development. This is put in the context of the development of geography as an academic discipline and in the context of educational academic writing about environmental education, in terms of it being seen by some as an agent of social change and the contribution of critical theory in realising this aim. In this sense the Chapter addresses some elements of

the 4th research question above. In order to enable students to consider and ultimately contribute to working towards a 'better world' they need to develop the skills to effectively debate and communicate. Critical theory as a tradition of social and political thought, has contributed to the promotion of a language of discursive political democracy, demanding not only a consciousness raising of issues but also the articulation and evaluation of various views and value systems underpinning the way society works.

Students will then be empowered to challenge existing social and political structures that result in environment and development problems. A discursive, critical and highly interactive form of education is therefore a prerequisite to the development of solutions to articulate a plurality of future scenarios, probable, possible and preferred.

Chapter 3 describes and discusses the methodology adopted to investigate the second research question. This research methodology is qualitative, since the focus will be on 16-19 year old geography A Level students and their perception and understanding of environment and development relationships. The methodology will involve phenomenography which

"...is a research method for mapping the qualitatively different ways in which people experience, conceptualise, perceive and understand various aspects of phenomena in the world around them." (Marton, 1986b p 31)

Environment and development are concepts or phenomena which students will be describing and their experiences and conceptualizations will be elicited from taped conversations. The data will then be analysed by sorting the understandings into conceptual categories of their statements. Chapter 4 deals with the data collection, analysis, conclusions and a critique of the methodology used.

Chapter 3 also outlines and justifies action research as the methodology to investigate research questions three to five. Chapters 5, 6 and 7 present the planning, implementation, analysis and evaluation stages of the action research spirals used to focus on the development of effective teaching strategies and resources to facilitate students to test out and reconstruct their understandings and perceptions of environment and development issues as elicited through the phenomenographical research. This is set in the context of the sixth form 16-19 Project A Level geography course. It takes a predominantly student centred approach. The teaching and learning content involves a module of work on changing agricultural systems in Yemen. It was developed specifically as part of the research, using a variety of strategies and teaching techniques to address research questions three, four and five and set in the context of the concept of sustainability and the development of environmental education for sustainability.

In the wider context of geographical education the research aims to contribute to the development of resources and strategies for teaching and learning for sustainability given the international importance placed in this area of education.

1. SUSTAINABLE DEVELOPMENT

The Concept

Sustainable development has been described as

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
(Our common future WCED 1987 p 43)

Implicit in this concept is the relationship between development - meeting the needs and improving the quality of life for human kind - and the resource base on which that development depends, i.e. the environment. Sustainable development should result in the

"amelioration of the quality of life and minimise the degradation or destruction of the bases of production" (Gallopín, 1989 page 394).
et al

Brundtland identifies some of the dimensions of sustainability

"first it requires the elimination of poverty and deprivation. Second it requires the conservation and enhancement of the resources base which alone can ensure that the elimination of the poverty is permanent. Third it requires a broadening of the concept of development so that it covers not only economic growth but also social and cultural development. Fourth and most important, it requires the unification of economics and ecology and decision making at all levels."
(Brundtland, 1986 in Pearce et al 1989 p 174)
(WCED)

The term sustainable development has been used widely in a variety of contexts as a jargon phrase by politicians, international institutions, non-governmental organisations and the media since Our Common Future was published. It also provided a rationale for the framework of negotiations at the United Nations conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. Environment and development aspects of a number of issues were discussed on an integrated basis. Although the concept embraces both environment and development issues there has been a powerful critique of the concept (as defined by the Brundtland Report, Our Common Future) and contradictions have been examined. Hence, there have been many interpretations of sustainable development in the literature to support a variety of values, attitudes and beliefs which are essentially rooted in the various ideological stances adopted in addressing environment and development issues as distinct areas of study. The aim of this chapter is to explore these ideological stances and the context in which sustainable development has emerged as an 'integrating concept (about environment and development issues) and to go some way towards a conclusion as to whether it is actually a theoretical concept or as Adams (1990, p.3) suggests merely

"...rhetorical flags under which ships of very different kinds can sail."

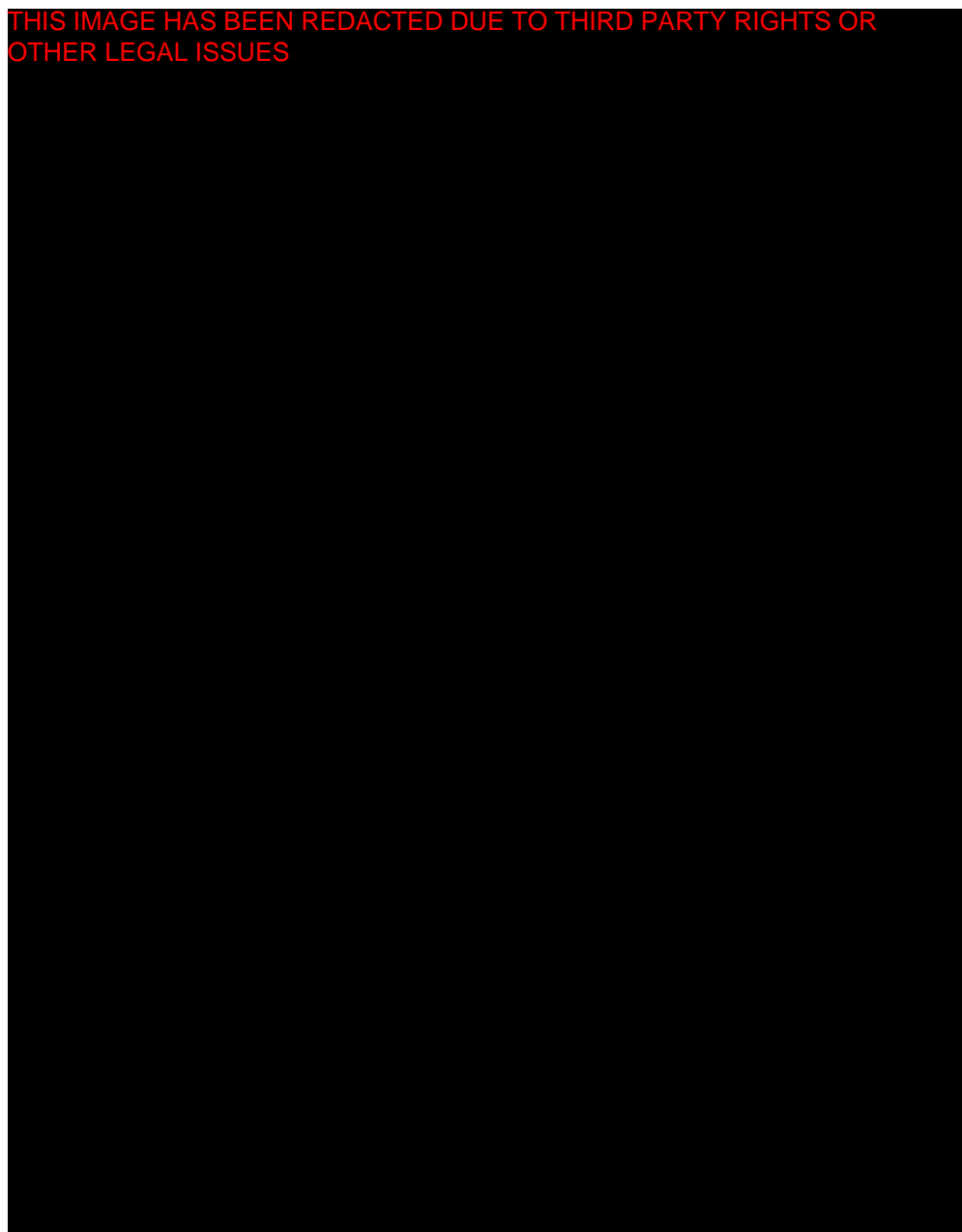
Sustainable development as a concept needs to be examined in relation to the development and classification of environmental thinking and also that of development theory

since it is a term used uniformly by adherents of many forms of environment/development ideologies. There is a dialectic between O'Riordan's technocentrist and ecocentrist views of environmentalism in the debate over sustainable development which is mirrored by a dialectic between radical and liberal/conservative approaches to development. O'Riordan (1981a) provides a framework of environmentalism (fig. 1, p 20) from the almost laissez faire optimism of the cornucopia technocrats to a new legislative order of economic adjustment to guarantee a minimum level of environmental quality, to the more radical ecocentrist approaches. These include self reliant communities using soft technology to minimise human activity in the environment, recognising the intrinsically interconnected web of relations between people and environments. Economic growth should be directed to providing for basic needs of the poorest and the deep ecologists recognise the rights of nature before humankind. These are also some of the underlying principles of 'ecodevelopment' discussed later in the chapter.

Modernisation views of development reflect those of the technocentrists and include the continuing globalisation of economies locked into world market systems and the continuing capital accumulation of capitalist societies, driven by increasing consumption patterns in the North paid for by exploitation in the South. Capital generated will eradicate poverty and restore damaged environments through the process of 'trickle down'. At the other extreme there

are calls for a new world order giving members of all communities a democratic voice in self determination and the power to challenge the existing political and economic structures so that societies have a fair share of resources at first hand rather than waiting for 'trickle down'.

Figure 1



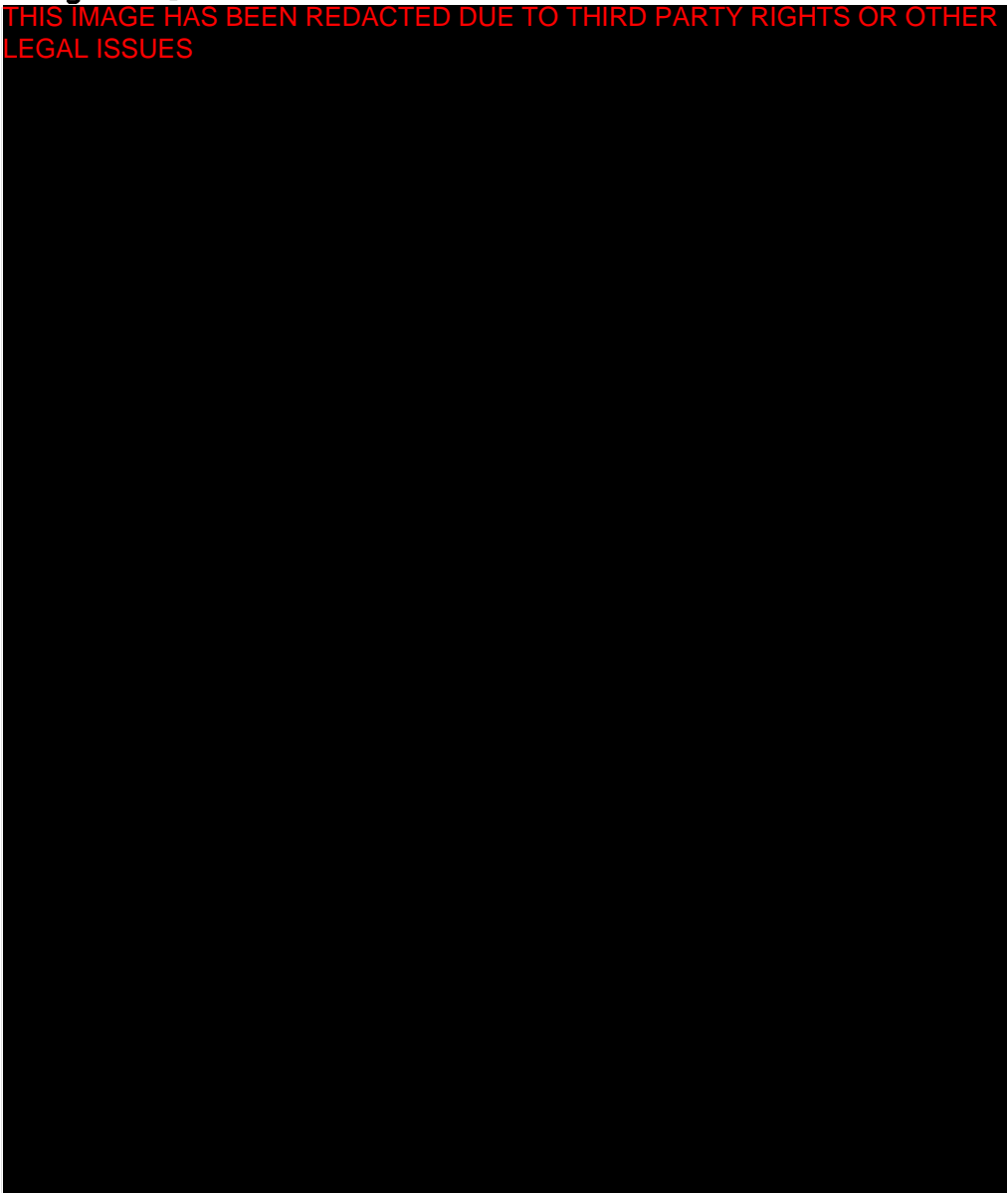
Source: O'Riordan 1981a p 376

Sustainable Growth or Sustainable Development

As a result of the differing perspectives above, sustainable development has been interpreted and criticised from a variety of standpoints, giving rise to a distinction between 'sustainable growth' and 'sustainable development' as discussed by Huckle (1991). As figure 2 (page 22) illustrates, sustainable growth is essentially reformist, modifying the economic system, monitoring and protecting the environment through increased energy efficiency and legislative control in order to protect the ecological conditions of production and ensure capital accumulation. This capital accumulation or economic growth is seen as essential for financing the technology and legislation initiatives to more effectively and 'efficiently' manage our resource base. It is also used by extreme 'technocentrists' or those Vidal (1995) describes as 'contrarians' to justify supplying the demands of an ever increasing world population and the amelioration of poverty in the world. Sustainable development is fundamentally technocratic (referring back to O'Riordan's classification of environmentalism) and politically expedient. Development will be achieved through a shallow green approach by 'reactive' policy to fix environmental 'problems', minimising conflicts inherent in the exploitation of the environment and to change the parameters of our resource base through biotechnology for example. It does not challenge the status quo, the dominant paradigm of economic growth. Technology is considered

Figure 2

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Source: Huckle 1991, p.47

essential for

"...achieving green growth whereby the quality of life is sustained by the rich and improved for the poor...green growth will not be achieved without a growing role for environmental policy."
(Pezzey, 1989, pp 22-23)

This 'green growth' is economic growth tempered and generated by having environmental considerations in terms of resource utilisation in the generation of capital. Sustainable development on the other hand is essentially radical, recognising a need to fundamentally change social and economic systems to ensure

"...intergenerational equity and democracy"
(Huckle, 1993, p 58)

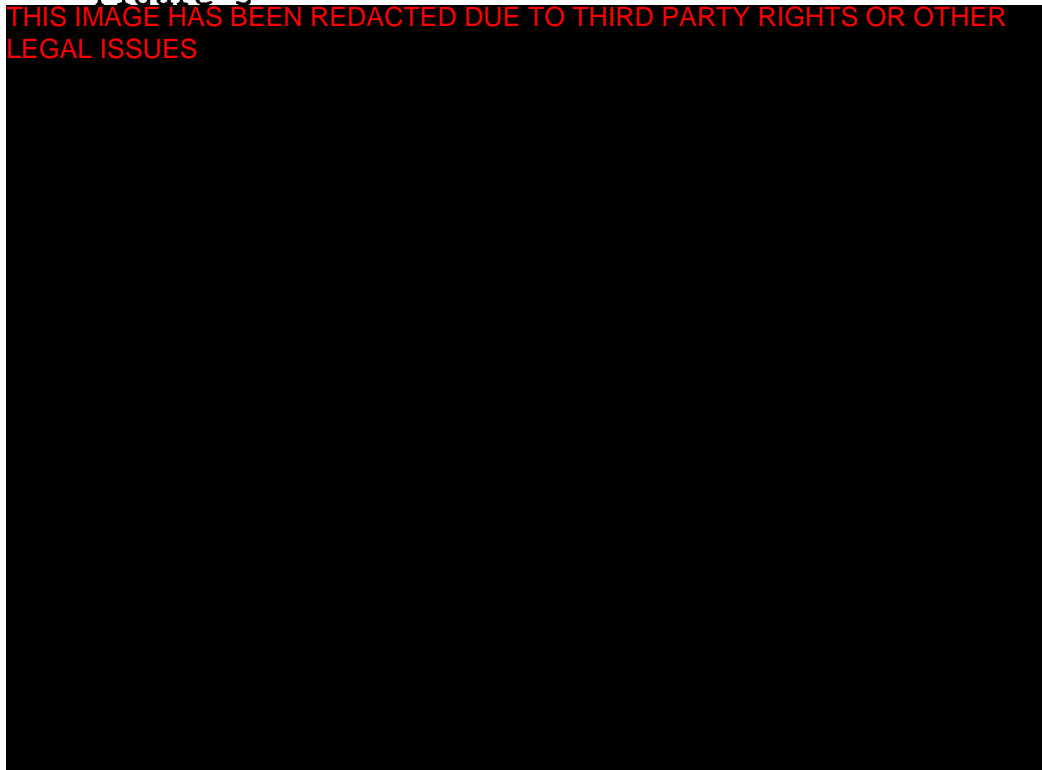
It is ironic that while it has been a premise of sustainable development to steer away from dualisms such as that dividing environment and development issues (and instead view issues in a holistic, integrated manner), dualisms still dominate the way in which the concept has been interpreted by creating a distinction between sustainable growth and development. This distinction, however, does highlight the point that although there is no disagreement over the broad notion of sustainable development as

"...a kind of development that provides real improvement in the quality of human life and at the same time conserves the vitality and diversity of the Earth..."
(IUCN WWF UNEP, 1991 p 8)

there are very differing views as to how it can be achieved.

Fien and Trainer (1993b) have drawn up a continuum between sustainable growth and sustainable development (fig.3 below) which broadly corresponds with O'Riordans views of environmentalism (fig.1 p 20).

Figure 3



Source: Fien & Trainer 1993b p. 34

It shows the dominant social paradigm of unfettered economic growth deemed essential for sustainable development against the 'new' environmental paradigm which doesn't place an emphasis on growth. It requires considerations of social, economic and environmental goals in balance (fig.4 p 25) so that none are considered to the exclusion of another.

Figure 4

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Source: Fien & Trainer 1993b p. 35

However, there is an argument that growth is not compatible with sustainable development at all, since it demands continued consumer consumption at rates which are ecologically unsustainable, primarily by the 'rich world'. Four fifths of the world's income rests in the 'North' which also has only one third of the world's population. The North consumes 70% of the world's energy, 75% of the world's metals and 85% of the world's wood, a large proportion of these resources coming from the South. The argument that economic growth can alleviate poverty and supply the growing developing world population in this context seems impossible when the very economic growth generated in the North is dependent on exploiting the people and environments of the South. 'Green growth' is also

considered uneconomic because

"...If the ecosphere were fully priced not free,
such consumption patterns could not continue."
(UNDP, 1994, p.18)

This fundamental contradiction, part of the radical critique of sustainable development is discussed below.

The Critique of Sustainable Development

Porritt (1992) warns of the dangers of too readily accepting sustainable development as a principle to be applied to policy making, in that it is often espoused on a superficial level without addressing major issues of the world's structural political economy. As with other radical theorists Porritt identifies the contradictions within the concept of sustainable development, seeing it as a term interpreted to justify "sustaining the patently unsustainable" (1992) in terms of economic growth and consumerism exploiting the natural resource base. This resource base is under threat, given that

"...a three percent per annum growth rate actual means a doubling of production and consumption in just 25 years." (Porritt, 1992, p 39)

Fien and Trainer (1993b) also question how we can continue economic growth, solve problems of global poverty and prevent environmental degradation when present levels of resource use are unsustainable. The World Commission on Environment and Development's (WCED) Brundtland Report 'Our Common Future', has been criticized for not addressing this issue explicitly and relying heavily on technocentric

means of managing the earth's resources. It has a utilitarian argument and a tempered neo-malthusian deterministic message of the environmental system setting limits on human action and suggests that a growing world economy can organise and manage sustainable development. Critics have also identified a tendency for WCED to interpret manifestations of poverty as major causes of environmental degradation, failing to recognise poverty as symptoms of northern policies and patterns of growth and does not examine the social and political changes necessary to meet conservation goals.

"The environment cannot be the starting point from which to derive a coherent prescription for global reform; nor is it a mere technical problem soluble by scientific means alone; it is a function of the prior transnational system of domination and subordination of empowerment and disempowerment." (Graff, 1992, p 557)

Our Common Future (WCED 1987) has been described as an

"unsustainable fiction, riddled with structuralist assumptions emphasising order, linear development and control." (Gough 1991 p39).

Meadows (1992), although criticizing Brundtland for failing to recognise the underlying political economy does not, however, consider a 'no growth' policy to development. Instead development should be qualitative and material growth used as a 'considered tool'. This perhaps indicates a 'growth with equity' approach (fig.3) rather than a truly sustainable development approach. This view of economic growth is also an inherent and necessary component of what the United Nations Development Programme (UNDP) 1994 calls

'Sustainable Human Development'. They argue that there need not be any tension between economic growth and environmental protection and regeneration. It is the character and consumption of that growth which is important. Growth is seen as a means not an end to protecting the life opportunities of future generations.

Redclift views the environment within the perspective of the political economy, relating environmental change to superstructural factors such as ideology and policy at various levels of complexity and suggests that environmental issues are socially constructed under capitalism. The process of capital accumulation cannot be achieved without the exploitation and marginalisation not only of the workforce and conditions of production (from a Marxist perspective) but also of the environment in policy making. In other words the hegemony of a value system based on consumption to stimulate production and capital accumulation has led to a crisis of reproduction and a crisis of sustainability.

The conditions of production , the environment on which we depend has been neglected from economic planning and as a dwindling resource base threatens future capital accumulation. The UNDP Human Development Report (1994) also recognises this crisis of sustainability. It states that future generations will be left with economic debts ('postponed' debts from the present) which will "mortgage sustainability" (UNDP, 1994, p.18) as will the ecological and social debts generated by the exploitation of the

resource base and people in order to achieve short term economic growth.

"Current consumption cannot be financed for long by incurring economic debts that others must repay...and it means that resources must be used in ways that do not create ecological debts by over exploiting the carrying capacity and productive capacity of the earth." (UNDP, 1994, p.18).

To try and avoid this crisis sustainability has been taken on board by market welfare liberals as 'green consumerism' and 'commodity fetishes' to once again legitimate a system of production and consumption. Structural relationships between North and South are also tied within this political economy, supporting the development of underdevelopment in the South and continuing the exploitation of the environment for human consumption in the North through unfair trade (Multi-national companies control 70% of world trade), inappropriate aid and developing world debt (\$ 1 trillion in the 1990s).

The modernisation theory to development, which is embedded in the prevailing political economy between North and South, can, however, claim that development can be sustainable, taking into account the accumulation of capital for development projects. Capital will trickle down to those in need and provide funding for technological development to fix environmental problems. These values regard the environment in utilitarian terms and technology as enabling the shifting of the frontiers of sustainability (finding new resources or new ways of adapting/using resources to supply an increasing demand) rather than

seeing the resource base as an absolute Malthusian entity (limited in its carrying capacity, the environment as a finite collection of resources).

"The government espouses the concept of sustainable economic development. Stable prosperity can be achieved throughout the world, provided the environment is nurtured and safeguarded."
(Thatcher 1988 in Pearce et al 1989 pp 182-183)

This "technological optimism" (Meadows 1992, p. 154) gives rise to a narrow definition of sustainable development, which

"...requires maximising the net benefits of economic development subject to maintaining the services and quality of natural resources."
(Barbier, 1989 in Pearce et al 1989, p.174).

The South itself does not necessarily recognise that economic growth, a conserved resource base and social equity are mutually exclusive.

"Environmental problems cannot be dealt with separately; they must be linked to the development process by which the environmental interests are in line with the imperatives of economic growth and development. The right to develop for the developing countries must be fully recognised."
(Beijing Declaration of the Group of Southern Industrial Countries in Sachs, 1992, p.27)

One must consider, however, from a radical perspective that those who attended the Group of Southern Industrialised Countries have most to gain, belonging to the elite who are already locked in and benefit from the rewards of the political economy before a small percentage of economic growth trickles down to enhance the lives of the majority of poor people.

In contrast to the above approach are the advocates of the "bottom up, periphery inward development paradigm" (Stohr 1981) who call for development from grassroots based on basic needs, self reliance, an emphasis on community capabilities and appropriate technology. This also draws on Schumacher's 'Small is Beautiful' ideas. Without depending on the world economy, communities can break from structural dependence and the processes of capital accumulation. These ideas have also been developed by the ecodevelopment movement whose advocates regard an alternative approach as essentially political and deal with the 'power' variable.

"Naive statements on needs, participation and environmental compatibility are espoused in many papers... but whose needs are going to be met and whose are not; who will participate and who not; and which lobbies, international groups and economic and political entities will be hurt by environmental compatibility?" (Favar and Glaeser, 1971 in Redclift, 1987, p 34) ^{quote}

Ecodevelopment is an approach to environmentalism in which basic needs, self reliance and ecological sustainability all need to be considered since development will not be sustainable unless poor people are involved in meeting their aspirations. This also relates to the deep ecology movement, whose ideas have been classified by O'Riordan (1981a) as deep green. They advocate a neopopulist approach of the decentralisation of society into small units where the

"...distinction between humans and nature can begin to dissolve..." (Simmons, 1992, p 14)

giving greater intrinsic value to nature rather than instrumental or utilitarian value. Power must be located within those communities requiring greatest need. An example of this is the organisation of 'groupement villageois' in Burkino Faso, West Africa. These are primarily womens' groups addressing their key development needs through collective action to change their conditions. Twenty five villages close to Garango are helped by the Association Dakupa based in Garango. They are representative of a world wide movement over the last five years which has seen an explosion of indigenous development groups in the developing world. The villages around Garango gain access to support from Western charities which they can direct and use according to their own decisions - grassroots society and democracy.. In the village of Sabtenga the 'groupement' has decided how to distribute and use a \$1000 loan from a french agency, Afrique Verte to be prepaid with 10% interest within 10 months - credit they could never get from a bank. However, Redclift does not believe that the poorest can effectively be given priority at a local level while the

"...effects of international development systematically marginalises them...the political aspects of development can only be achieved through political changes at the local, national and international level." (Redclift, 1987, p 36)

The United Nations Conference on Environment and Development (UNCED) and Sustainable Development

Many of the contradictions and difficulties expressed about the concept sustainable development are also reflected in the nature of the UNCED in Rio de Janeiro (The Earth Summit, June 1992) and its outcomes. UNCED was to begin a process of institutional reform to challenge and extend a framework of law to embrace common global rights with respect to natural resources. It covered almost every conceivable issue related to sustainable development. It established a Commission on Sustainable Development to monitor the performance of governments and international institutions to live up to the precepts of sustainable development as defined in Agenda 21 which should reflect

"... a global awareness and political commitment at the highest level of development and environmental co-operation"
(preamble to Agenda 21, 1992 in Holmberg^{etal}, 1993 p 35)

Agenda 21 addresses the environment and development aspects of each issue, dealt with on an integrated basis. It also focuses on the idea of participation, incorporating 'bottom up' principles of development. It argues that the transition to sustainable development can only be effective if it

"gradually evolves as a result of the participation process that engages different social groups in open discussion on the merits of

various trade-offs in reconciling environment and development objectives." ^{et al}
(Ch.37, Agenda 21, 1992, in Holmberg, 1993, p 12)

However, UNCED can be critically evaluated against the critique of sustainable development already discussed. Firstly it has institutionalised further collaboration among sets of transnational northern and southern elites who have the power to reinforce the northern global hegemony. Johnston (1989, in Huckle 1991 p 43) recognises that these

"...institutions capable of change are controlled by a powerful minority with strong interests in the status quo."

As a result reform was extremely unlikely, every principle being agreed to the lowest common denominator to satisfy a variety of interest groups within a group of powerful elites.

While environment and development aspects to a number of issues were addressed, once again the structural nature of the global political economy was not tackled. Calls for a New International Economic Order (NIEO) from the South were still not given a platform for debate. There was

"little scientific let alone political consensus...on the relationship between environmental degradation and the state of the international economic environment."
(Holmberg, 1993, p 7).
^{et al}

The prevailing economic policy paradigm of the free market was used to investigate how best to carry out economic

protection and equity of opportunity, through improved institutional frameworks and management - a technocentric, reformist approach. There is no conflict recognised between profit and records of environmental excellence. This is in contrast to the radical criticism of the sustainable growth paradigm already discussed whereby it is argued that

"Today's patterns of production and consumption, besides not being sustainable are the principal cause of the threat facing the global ecosystem, and that the northern states therefore have to accept substantial blame for environmental degradation in the poorer countries." (Havel, 1992, p 20)

Indeed Rajiv Gandhi has suggested the idea of a Planet Protection Fund of an official 0.1% of GNP

"...not as a measure of charity but more as a measure of the payments that the rich ought to be making for their existing consumption"
(Centre for Science and Environment, 1992, p 275)

Given the fact that most countries in the North fail to meet the UN suggested 0.7% of GNP for development aid, Gandhi's idea is unlikely to be seen as a realistic solution and perhaps will only fuel the sustainable growth argument in order to pay for such a fund.

By 1995 UNCED in its recommendations through Agenda 21 has suggested that all governments should have 'mutually productive dialogues' (Holmberg^{et al}, 1993, p 19) with non-governmental organisations (NGOs) and that they should be partners in the process of change. It is in part due to the

rise and success of environmental and development NGOs that UNCED took place. During the 1980s the influence of environmental groups in particular was built on the success of their 'watchdog' function. They drew attention to environmental degradation and political and institutional inaction. They have been central to continuing environmental concern. However, Porritt (1988) considers in some respects that the green movement is in danger of being compromised, encouraged as it is to take active roles as policy members on regulatory and advisory committees. There is a tension developing between responding quickly to opportunities for influence and retaining the independence to keep pushing the agenda forward.

The variety of environmental groups also reflects a variety of ideological stances from the essentially private interests of NIMBYs (Not In My Back Yard) and the public interest environmental groups' technocentric/ecocentric tendencies. These tendencies have supported alternative subcultures from green consumerism (the technological response to threatened resources by the production and consumption of environmentally friendly products) to a deep green biorights alternative. Most environmental groups claims Porritt, pursue reformist policies and

"...only Friends of the Earth have argued that growth is ecologically impossible. The vast majority of environmental groups have been co-opted by the growthist obsessions of our industrial culture." (Porritt, 1988, p 22)

With a co-opted NGO movement it will be very difficult for

UNCED to progress much beyond a shallow green approach to dealing with strategies to achieve sustainable development in the context of radical theorists arguments.

UNCED is also largely unfinanced. It has failed to encourage the 0.7% of GNP target for aid and the newly created Global Environment Facility (GEF) administered by UNDP, UNEP and the World Bank is considered inadequate. The World Bank integrated environmental considerations into development policy making in 1987 and a presidency for 'environmentally sustainable development' was created. Despite acknowledging the three main objectives of sustainable development, economic social and ecological, (as in Fien and Trainer 1993b) and the multifaceted, integrated nature of relevant issues, it continues to espouse the view that

"...the positive aspects between growth and environment need to be aggressively exploited."
(World Bank, 1993)

The World Bank has a questionable record in environment and development projects. The failure rate of projects funded is around 37%. Technocratic solutions override ecocentric values and considerations in that

"Human and environmental concerns have been subordinated to engineering and construction demands."
(Morse in Chatterjee, 1992, p 21)

Although investments in environmental projects have quadrupled from \$404 million to \$1.6 billion during 1992, the money, it is alleged has gone to existing projects to make them look acceptably 'green'. They (the World Bank)

"...merely greenwash the environmental and social destruction of the old."
(Chatterjee, 1992, p 21)

Sustainable development is unlikely to be realised for many if the mechanisms through which change will take place continue to be part of the existing dominant political and economic order of global capital and global institutional decision making.

Participatory democracy is also called for in sustainable development. Empowerment given to people to take control of their own development is strongly endorsed by UNCED. UNCED is, however, unclear on how this can come about given that the thrust of responsibility for implementing recommendations lies with governments whose aims are primarily short term political expediency and maintaining the status quo of control and decision making. UNCED recommends that

"...governments should support a community driven approach to sustainability that would...enable communities to gain sustained access to resources needed by the poor to overcome their poverty."
(Ch.3, Agenda 21 in Holmberg, 1993, p 13)

et al

If it is assumed that grass roots movements should be encouraged to shape environmental decisions, what are the mechanisms by which it should happen and how far are governments prepared to let these groups challenge political decisions? There has been a proliferation of NGOs in the South but it is an ever demanding struggle to fight against national governments and international

institutions. The Kalparvriksh, an environment action group is working with and on behalf of the Bhils people of the Narmada valley in India. The people are faced with the threat of the Narmada Dam project, funded largely by the World Bank. It is to be a series of 30 large dams and hundreds of smaller ones, flooding 120 miles of forest and farmland in the state of Gujarat. Community campaigns with the help of NGOs did result in the World Bank pulling out of financially backing the project in November 1992 but should such attempts to achieve sustainable development by people be such a struggle? Decision making should be a democratic process involving the representation of all groups affected from the grassroots to international bodies in the first instance.

"Democratisation of the world order at all levels is...necessary if communities are to realise sustainable development." (Huckle, 1991, p 51).

Unless societies are reshaped and power is distributed more evenly the mass action of campaigns such as those over the Narmada Dam will remain marginal. There has to be participatory democracy in environment and development decision making at the outset of any proposed project. This does, however involve a nation state abandoning some of its sovereignty. This should be not only to multilateral and international forms of government capable of securing ecological and collective security, but also dispersing that sovereignty within the nation to recognise a diversity of values and a range of knowledge systems crucial for effective planning for sustainable development. It should

be the case that

"sustainable development ceases to be the quest for unlimited growth tempered by economic care - as advocated by the Brundtland Commission - but becomes the quest for environmental and economic justice at the local level."
(Harding, 1992, p 25)

There needs to be change from above to allow substantial change from below to begin to realise the long term aims of sustainable development in the short term.

"Society can only be reconstructed from below if there has to be coordination and planning from above." (Huckle, 1991, p 50).

UNCED assumed a consensual co-operative North/South dialogue, however the geopolitical reality of differing interests albeit within a broadly sustainable growth ideology results in a stumbling block to realising sustainable development. There was no real communicative rationality, no discursive dialogue that could transform the dominant ideology towards a new paradigm of values associated with sustainable development as opposed to sustainable growth. UNCED was essentially a conference of organisations and governments based firmly within the dominant political economy excluding any other interest groups. The NGOs were not represented at the negotiations and ran their own parallel Global Forum. As a result, UNCED as with other national and international attempts to achieve sustainable development, may only

"...secure the interests of future generations

of the rich across the world but it will care little whether the present generations of the poor can even be assured of a bare survival." (Centre for Science and Environment, 1992, p 264)

Conclusion: Sustainable Development - Beyond Our Reach?

Sustainability will be seen as an idealist future as long as the contradictions inherent in the concept of sustainable development as a result of its critique remain unresolved. Differing views tackle the concept by either putting an emphasis on the environment itself as a resource base to be nurtured, protected, repaired and extended to facilitate development or by putting the focus in the political economy addressing development issues of empowerment and democratic participation. The former seeks to address the symptomatic environmental problems of economic development whereas the latter seeks to identify the causal relationships giving rise to environmental problems and change the structural nature of society. However, sustainable development can provide a framework for supporting the close integration of environment and development issues in this latter context, accepting that underlying environmental problems are economic and social problems, functions of a particular form and process of development. Adams (1990) suggests that degraded environments are not an unfortunate byproduct of the development process but an inherent part of the process itself. We can no longer see environmental and development issues as dichotomous areas of study.

"Environmental problems are usually development problems in disguise and in turn create economic and development burdens." (Holmberg, 1991, p 6)

Too often development issues have been hidden behind the high profile that is accorded to the description of and limits to growth warnings of environmental 'problems', without addressing the complex causal factors.

"The challenge is not to seek to protect the environment from man but to alter the global economy in which our appetites pressure on the outer limits of resources. This can only be done by altering the entitlements of the poor in the South so that environmental discourse becomes a development discourse."
(Redclift in Johnston, 1989, p 196).

Therefore, in searching for a strategy for sustainable development it is fundamental that the root causes of environmental problems are established and tackled rather than 'reactive' planning to merely address the symptoms.

"We have to disaggregate the socio-ecological system into a set of relevant subsystems and their linkages."
(Gallopín, 1989, p 384)

Simmons (1992, p 13) points out that

"...we use language to load the problem away from the human component onto the natural"

in our use of the phrase 'environmental problems'. It is

"...as if the environment was somehow behaving in an awkward or even bad fashion and exhibiting problems like a recalcitrant child."
(Simmons, 1992, p13).

It is perhaps more appropriate that we think of environmental problems as

"...a set of human problems which have an environmental delivery route."
(Simmons, 1992, p 13).

The problems ultimately delivered through the environment then result in knock on problems for society in terms of a diminished resource base resulting in further impoverishment and inequity. Concerns must focus

"...primarily on the set of human actions that impinge on the natural ecological effects generated in nature and impinging on the social system." (Gallopín, 1989, p 387).

From the search in this chapter for the meaning of the term sustainable development, three conceptual understandings can be identified in terms of how the term is used. The first is as a theoretical concept It has a theoretical basis as a concept in terms of structurally relating environment and development problems through cause/effect and cyclical relationships. It provides a theoretical context in which to explore the nature of the relationships and the causes and effects of human actions on the environment and communities. Second is a consideration of the term as a set of goals, shared and conflicting (depending on the ideology of their proponents) about for example, the amelioration of quality of life, political democracy, the conservation and regeneration of environment all in the context of inter and intra-generational equity. Thirdly and finally sustainable development is understood and proposed as a strategy or a

process for achieving the above aims. This is perhaps the most contentious and problematic area of understanding about the concept in terms of it's applicability to reality and the realisation of sustainability as a set of defined goals. The two dominant processes of change that are espoused are economic growth (more specifically green growth) and participatory democracy. The two are mutually exclusive under the present world economic and political order since much economic growth is dependent on disenfranchising communities of power over their right to a fair share of global resources.

Sustainable Development cannot amount to a strategy or even represent a new paradigm when the interpretations of it are based in what Redclift (1987, p.20) calls different "environmental rationalities".

"Different perceptions of the environment are neither more or less rational. They merely reflect the way we look at the world...(there is a) clash of plural rationalities, each using impeccable logic to derive different conclusions from different premises." (Thompson in Redclift, 1987, p. 201).

Thompson argues, however, that in recognising these contrasting rationalities and their underlying values we are taking a better step towards decision making.

Redclift (1987), however, argues that the different rationalities are closely related to economic and political realities. Therefore, better decision making depends on the degree of power held by different groups regardless of open debate and dialogue. Sustainable development cannot therefore succeed as a strategy when democratic decision-making does not extend beyond debate.

Hence, this recognition of multiple environmental rationalities may not help in democratic decision making unless power is redistributed to enable the poorest members of global society to alter the mechanisms by which they are disenfranchised from their share of global resources and their role in strategies developed to attain the goals identified by the Brundtland definition of sustainable development. Even if sustainable development is being achieved, there is no guarantee that the empowerment is itself sustainable, such is the case of Burkino Faso. From 1983-1987 Thomas Sankara led a revolution decentralising power to rural areas, reducing dependence on foreign 'aid', empowering women and initiating environmental protection measures to halt desertification and the advance of the

Sahara. He had the support of the population and achieved considerable success in realising goals of self reliance, economic independence, helping the poorest and protecting the environment also goals of sustainable development from one perspective. However, in 1987 he was assassinated and Compaoré assumed the presidency. Since then Burkino Faso has pursued westernisation in terms of development, in the process doubling the country's debt and accepting IMF loans and structural adjustment on the condition of continuing the implementation of free market policies. The greatest increase in per capita GDP predates these policies. In 1994 at the insistence of Paris and the West the CFA franc was devalued causing widespread hardship amongst the poor. Burkino Faso's traditionally strong cattle industry has been destroyed by the European Union dumping off its beef mountain as aid. Power is increasingly concentrated with allegations of corruption and nepotism. What processes there were working towards sustainability in Burkino Faso during the time of Sankara have disappeared.

"Development ought to be what communities do to themselves. In practice, however, it is what is done to them by states, their bankers and expert agents in the name of modernity, national integration and economic growth...." (Adams, 1990, p.199)

The example of Burkino Faso (New Internationalist 1995) reflects the concerns of Redclift and others in that concentrated economic and political power jeopardise the realisation of sustainability and prohibit sustainable development as a process from occurring.

Sustainable development is a concept eclectic in nature which can be used to represent an assortment of paradigms on environment and development. The very nature of its inherent contradictions provides a forum to challenge our attitudes towards and assumptions about development in achieving an improvement in peoples lives and the state of our environment. Sustainable development provides an

"...environmental rationale through which the claims of development to improve the quality of life can be challenged and tested."
(Redclift, 1987, p 33)

In response to Adams' quote at the beginning of this chapter (page 18) sustainable development is a theoretical concept as discussed above and can also be used to identify those flags under which ships of very different kinds can sail. The strength of the term lies in the use to consider in which direction those ships are sailing and why, which will reach their destination and by which method. Of course the answer depends on which ship you yourself are sailing in. It is these questions the educational action research of this thesis hopes to encourage geography students to reflect on . The term is best used as a tool for critical reflection about environment/development issues rather than a universally accepted and agreed concept.

It contains the broad tenets by which we should reflect on our actions, after all,

"It makes better sense to reshape ourselves to fit a finite planet than to attempt to reshape the planet to fit our infinite wants."
(Orr quoted in Stirling, 1993, p 81 in Fien 1993)

2. EDUCATION FOR SUSTAINABLE DEVELOPMENT

"Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues (...). Both formal and non formal education are indispensable to changing people's attitudes so that they have the capacity to assess their sustainable and development concerns. It is also critical for achieving environmental and ethical awareness, values and attitudes, skills and behaviour consistent with sustainable development and for effective participation in decision making. To be effective, environment and development education should deal with the dynamics of both the physical/biological and socio-economic environment and human development and should be integrated into all disciplines."
(Ch.36.3 Agenda 21, UNCED, 1992)

Within Agenda 21, education for sustainable development is accorded a very high profile. Under section IV (Means of Implementation), chapter 36 focuses on reorientating education towards sustainable development. However, the recommendations have been brought to attention before. The first inter-governmental co-operation on environmental education took place at the 1972 United Nations Conference on the Environment in Stockholm. It recommended a programme for interdisciplinary environmental education and initiated the United Nations Environment Programme (UNEP). As a result of the Belgrade International Workshop in 1975, the Belgrade Charter (UNESCO-UNEP 1976) sought to integrate ecological sustainability and social justice. International developments in environmental education were

based on this charter and related to the global movement for a New International Economic Order (NIEO).

"Inequality between the poor and the rich among nations and within nations is growing and there is evidence of increasing deterioration of the physical environment...it is within this context that the foundations must be laid for a worldwide environmental education programme that will make it possible to develop new knowledge and skills, values and attitudes, in a drive towards a better quality of environment and indeed towards a higher quality of life for the present and future generations living within that environment."
(UNESCO-UNEP 1976:1-2)

The World Conservation Strategy (IUCN, UNEP, WWF 1980) also recognised the role of environmental education, as did the World Commission on Environment and Development in its report, Our Common Future in 1987. The UNESCO inter-governmental conference in Tbilisi in 1977 put forward recommendations to establish programmes of action for environmental education at the national level. This eventually led to the Resolution of Council of Ministers of Education of the European Community May 1988, which suggested European governments put these recommendations into practice. 1991 saw the publication of Caring for the Earth: A Strategy for Sustainable Living, which emphasised the importance of the role of education in moving towards a more sustainable society.

"Sustainable living must be the new pattern for all levels; individuals, communities, nations and the world. To adopt the new pattern will require a significant change in the attitudes and practises of many people. We will need to ensure that education programmes reflect the importance of an ethic for living sustainably."
(IUCN, UNEP, WWF 1991,p.5).

In the same year the Council of Europe reiterated the importance it attached to environmental education as

"...one of the best ways of restoring a balance between the individual and nature and guaranteeing a rational and reasonable management of planetary resources in the context of sustainable development." (UNESCO/UNEP, Connect 1992 XVII no 1 March p 4)

UNCED in 1992 again recognised the pivotal role of environmental education with a series of recommendations for governments.

"Governments should strive to update or prepare strategies aimed at integrating environment and development as a cross cutting issue into education at all levels within the next three years (1992-5)." (UNCED 1992 ch.36.5(a))

UNCED also recommended that co-ordinating bodies be established to strengthen centres of excellence in research and education and

"...to strengthen information exchange...to promote environment and development education and public awareness." (UNCED, 1992 ch.36.5a)

Despite the various international commitments to environmental education and education for sustainable development there does seem to be a gap between declarations and conference reports and practical implementation. This is particularly the case when one considers the implicit critical approach that any analysis of the causes and interrelationships between environment/development problems necessitates. Williams in Fien, 1993 p.34) suggests that

"...the espousal and advocacy of a holistic critical education approach to teaching about environment and development within the school curriculum has become a controversial political issue. The consequence of this has been to play it safe; environmental studies or environmental science, being the acceptable substitutes or alternatives, bury the problems within legitimate subjects."

This problem is illustrated by the introduction of environmental education into the UK National Curriculum in 1990. First of all it was included as a separate attainment target within the geography curriculum rather than integrated throughout. The Interim Whole Curriculum committee (IWCC) that was set up under the auspices of the National Curriculum Council (NCC) to ensure a broad and balanced curriculum, established a cross curricular theme environmental education.

The non statutory nature of the document and overload of content in the core and foundation subjects resulted in a limited integration of environment/development education within the school curriculum. The National Curriculum Guidance 7 gives limited examples of topics to cover. The document emphasises a concern for aesthetic values towards the environment which in turn it is assumed will lead to

individuals changing their behaviour which will then solve environmental problems. It does not recognise the wider societal and institutional processes which contribute towards an understanding of environment/development issues. It fails to address differing /alternative value systems contributing to current perceptions and utilisation of the environment. The document reflects a 'pale green' approach to education for sustainable development with a reformist and technocentric bias which aims to highlight awareness of environmental problems with no mention of related and integrative development issues. At present there is also national initiative for integrating education for sustainability in Post 16 geography curricula.

Stirling (1993) considers that education for sustainable development should be delivered through a holistic paradigm not only integrating environment and development issues but also in terms of wider educational aims. This involves moving towards an integration of intrinsic and instrumental educational values to achieve learning not only for the child but for the 'wider society' At present a reductionist view of education is dominant based on principles of scientific rationality and simple cause-effect dualisms. Stirling suggests that education is changing through the emergence of a holistic paradigm integrating ideas and developing an education closer to the reality of an interdependent world rather than the fragmentation of knowledge and ideas (fig. 5, p.53).

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A large black rectangular redaction box covering the entire area where Figure 5 would be located.

Stirling suggests a 'P' model to environmental education (fig. 6 below). Of central concern is the opportunity to question and analyse patterns and value positions of environmental/development issues so that students can

"...further the cause of social justice, to achieve environmental protection, to be tolerant towards social, political and religious systems which differ from their own, ensuring that commonly accepted humanistic values and human rights are upheld and work for international peace and solidarity in an interdependent world."
(Stirling, 1993 p.3)

Figure 6

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A large black rectangular redaction box covering the entire area where Figure 6 would be located.

Source: Stirling 1993, p. 92

This form of education should facilitate a paradigm shift from a technocentric approach to dealing with environment/development issues to an ecocentric approach encouraging 'deep green' management strategies geared to retaining global stability. Stirling advocates a move towards a radical approach to learning and a pedagogical framework that is socially critical. The role of critical theory has been influential in the development of this approach.

The Influence of Critical Theory on Education for Sustainability

Critical Theory is a tradition of social and political thought which addresses the connection between human agency and social structures - how do people act given the social structures of power and influence that govern our lives. The central concern is the historicity of social action. It aims to identify past and present social patterns, causal relationships and change (drawing on Marx's historical materialism) in order to help develop effective strategies for change in the future. In terms of sustainable development this relates to the recognition of the causal relationships between environment and development issues and the economic and political structures which have to date prevented significant moves towards sustainable development. If we can critically evaluate the wider structures and dynamics in society and learn the ways in which decisions can be influenced then there is a greater

chance that sustainable development can be achieved.

Habermas looked at the interests that influence society and explain social structures. These interests are served by differing forms of knowledge or ways of studying knowledge. The technical interest in the context of the forces of production (from a Marxist perspective) relies on empirical-analytic knowledge to deal with a world of objects. This can be related to the technocentric approach to environmental/development problems applying scientific rationality, developing technical fixes for problems, new ways of exploiting existing resources and developing new resources. The practical interest (in terms of the relations of production from the Marxist perspective) is served by the 'historical-hermeneutic' sciences dealing with the interpretation of people's interactions. In terms of education for sustainable development this interpretive form of knowledge is important in identifying the reasons underlying human actions/decisions. A third emancipatory interest is supported by 'critical' science. This necessitates a critique of ideology in terms of the structures and mechanisms by which society functions and an investigation of the ways in which social change in the past has come about.

It is argued by Huckle (1993) and other critical theorists that in order to create a 'better world' it is necessary for students to be able to recognise structures in society and the interests which they serve to be able to challenge the

legitimacy of institutions from a sustainable development perspective.

"Education is not a solution to our environmental predicament but appropriate forms of education informed by critical theory can assist the political struggle to adopt more sustainable forms of development." (Huckle, 1991 p 58)

Critical theory promotes a language of discursive political democracy which demands a consciousness raising of issues and an articulation of various views, beliefs and value systems underpinning the way in which society works. Education for sustainable development must create a politically aware and active society to empower people to effectively take part in change leading to a sustainable society. The recognition of conflicting interests, differing and alternative policies for change is evident in Porter's model of political literacy which is outlined in figure 7.

If environmental education is to be an agent of social change rather than the social reproduction of industrial affluent consumer society, then students must be encouraged to deconstruct meanings that dominate our culture and in particular the various narratives concerning environmental issues in the light of O'Riordans distinctions of environmental thought. Students need to be able to identify and challenge underlying interests of all positions in society. They need to explore alternatives to the positions they themselves hold. They need to investigate the importance of social interest and incorporate ecological

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source: Fien and Gerber, 1988

sustainability, social justice and democracy as criteria for evaluating environmental/development projects. They must also adopt a reflective scepticism towards their own ideas and actions and those of others.

Critical theory incorporates a structuralist dimension to education for sustainability and is based on a realist approach to education in terms of recognising structures in society independent of our power to experience and access them rather than the notion that there is no other reality than that we perceive as a mental construct. The view that

"We cannot know the world as it is, only the one presented to us through our senses and mediated by our experiences..." (Kant, in Pepper, 1986 p 8)
quoted

should then be taken one step further to look at the way our perceptions are a function of what White (in Pepper) calls our 'cultural filter'. This is in effect determined by the values underpinning the structure and functioning of different societies. We selectively perceive the 'real' world.

"We live lives based on selected fictions. Our view of reality is conditioned by our position in space and time - not by our personalities as we like to think." (Durrell, 1963 in Gough, 1991 p 31)

The challenge for education as mentioned above is to enable students to critically look at their own perceptions and explore the cultural filter through which they develop those perspectives. Students must look at values and how they are

transmitted through the cultural filter, reflect on the structures and ideological forces that influence their lives and on democratic alternatives. However, the hegemony of scientific rationality continues as illustrated by Mortimer's criticism of the childrens' programme Captain Planet.

"Captain Planet encourages children to think about these issues ideologically rather than rationally or scientifically." (Mortimer in Young, 1992)

UNCED calls for participatory democracy. Critical theory therefore has a crucial role in contributing to the development of a highly discursive, critical and interactive form of education to enable students to become politically articulate. Education for sustainability

"...involves fostering the attitudes and practising the skills needed for active participation in the political process. Such attitudes and skills are empowering and vital if students are to become subjects rather than objects in their own history."
(Grieg 1987 p 36)

So, in developing education programmes for sustainable development it would seem that

"...the task is more complex than putting environmental content into existing curricula."
(Simpson in Fien, 1993 p.28).

So what is education for sustainability?

Education for sustainable living is defined by the IUCN Commission on Education and Communication 1993 as a process which:

"...develops human capacity and creativity to participate in determining the future, encourage technical progress as well as fostering the cultural conditions favouring social and economic change to improve the quality of life and more equitable growth while living within the carrying capacity of supporting ecosystems to maintain life indefinitely." (IUCN, 1993 p. 6)

The question is to what extent can education actually lead to change? It is argued in the light of critical theory that

"...those involved in environmental and development education need to activate the socially critical or reconstructionist tradition in education and promote approaches to curriculum planning and pedagogy that can help integrate social justice and ecological sustainability into a vision and mission of personal and social change." (Fien, 1993 p.9)

This view encourages a mode of education along deep green, ecocentric lines. This is illustrated by Stirling (1993 p.90) in fig. 8 below. There must be a movement towards a pedagogy which develops the ability of students to assess values and attitudes of others and their own, and to develop political awareness and the skills with which they can actively take part in challenging the world around them.

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Source:

Stirling 1993, p. 90

Huckle (1994 p 1-2) outlines some criticisms of the technocentric approach to education for sustainability. The knowledge content is heavily descriptive and as Stirling also suggests in figure 8 instrumental, focusing on the needs of the economy. It resists change in that any environmental problems can be solved within the existing social structures and relations by technocratic and bureaucratic means. The technocratic approach also tends to separate the natural and social environments drawing attention away from the social construction of environments and environmental issues. It also fails to explain social conflicts over the use of nature, a depoliticised approach to learning. The approach also fails to focus on the ways in which students make sense of their environment and discounts

radical social alternatives and the means whereby they might be realised.

In contrast Huckle (1991, 1994) suggests that education for sustainable living should include the following components.

- A knowledge of the natural environment and its potential for human use
- An understanding of the role of appropriate technology in sustainable development
- A sense of history of the impact of changing formations on the natural world
- An awareness of class conflict and social movements.
- Political literacy
- An awareness of alternative social and environmental futures and how they might be realised.
- An understanding of ideology and consumerism to be able to interpret beliefs and values
- Involvement in real issues
- Tentativeness and optimism to create awareness of uncertainties in our knowledge and not to overwhelm pupils with the worlds problems.

Underpinning the above components are the following integrating aims: that any study of the environment is firmly within a societal and political framework which reveals interactions between people and their environments; that there is an explicit acknowledgement of power relations

and that the limitations of managerial and technocratic approaches to environmental protection are acknowledged and alternatives proposed which will contribute to improved social justice, democracy and sustainability both today in the short term and the long term future. In short the politics of environment and development issues and their integration is central to any pedagogy addressing education for sustainability.

"Environmental education aims to empower people so that they can become agents of social change and sustainable development. It enables them to reflect and act on the structures and mechanisms which shape the social use of nature in ways which prefigure a future democratic and sustainable society. Such education draws heavily on critical knowledge of the environment and education, and can termed *education for sustainability*."
(Huckle, 1993 p 62)

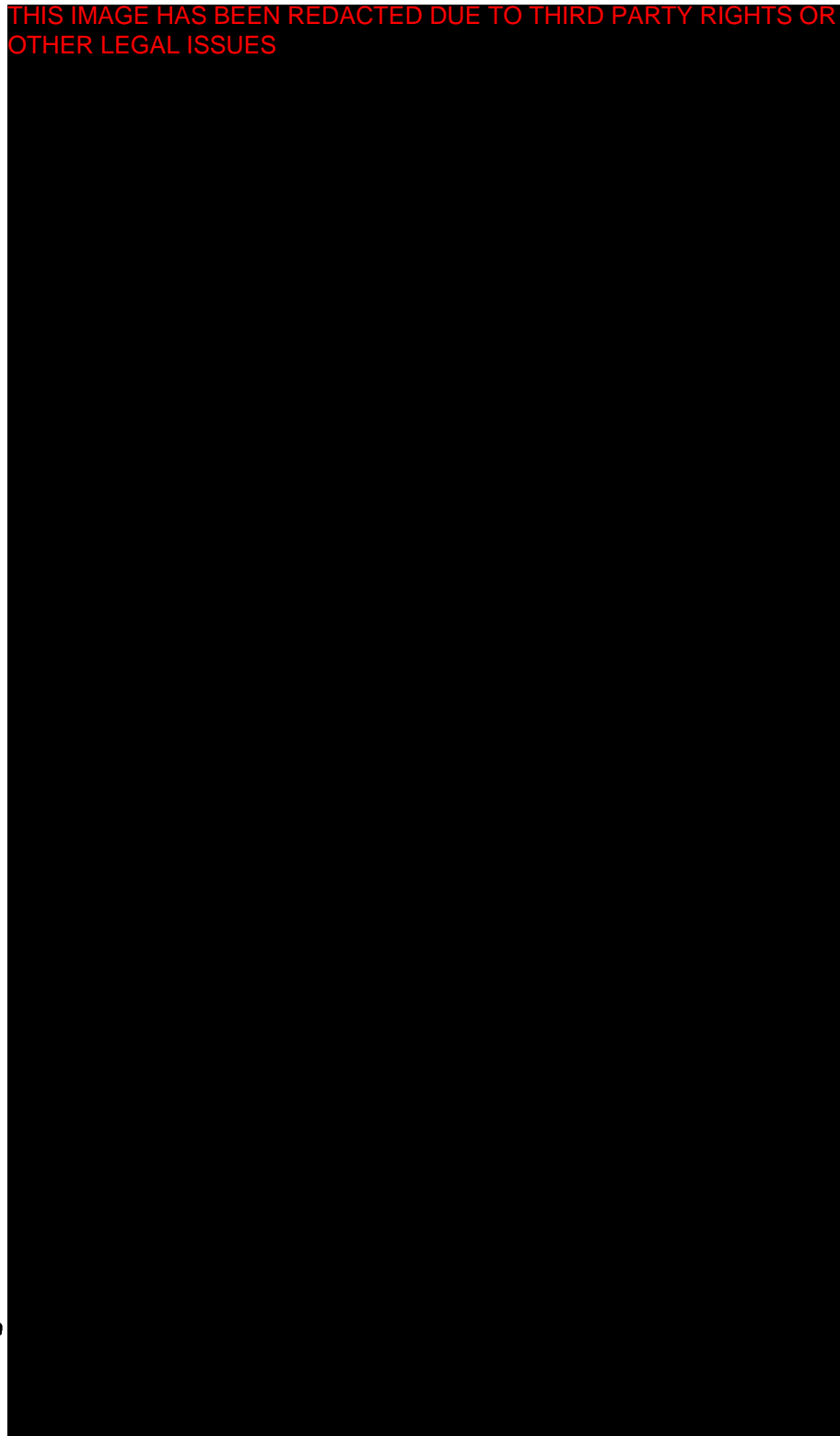
Geography and Education for Sustainability

Although it is only since 1990 that environmental education was formally integrated into the National Curriculum as a non-statutory cross-curricular theme and as an attainment target in the geography national curriculum, it has, to a certain extent long been a focus in geography education and in the development of the geography curriculum.

Geography has developed as a school curriculum subject through a number of paradigm shifts which have filtered down from academic geography. The diverse nature of the subject encompassing elements from other disciplines has often led to a crisis of its status. However, geography has maintained a high profile particularly in recent years with the attention given to environmental issues. How geographers have tackled environment and development issues, however, is subject to the prevailing geographical paradigm and also reflects the evolution of environmentalism suggested by O'Riordan (fig. 9 p 65). This is a linear model of change and development, but it should be noted that in society today there is an eclecticism in our attitudes and approaches towards environmental and development issues, reflecting the variety of ideas and attitudes outlined by O'Riordan.

If we take sustainable development and the idea of the integration of environment and development issues then geographers have a particular contribution to make in terms

Figure 9



Source: O'Riordan (1990, p. 144). In Stirling 1993, p. 86

of education for sustainability. The characteristics of geographical thinking enables geographers to synthesise information from a variety of sources. It is exactly this approach that is required to address the social, economic, political and environmental aspects of environmental and development issues. This was recognised by Walker (1976 p 478)

"The holism of geography, long seen as it's achilles heel is now what our earth demands of the species on whatever scale we choose to manage it."

It is ironic that the 'environment' should be placed in a separate attainment target within the geography national curriculum when Walker has suggested that it is the holistic nature of geography which will enable students to develop the skills with which to study the complex and integrative nature of environmental issues.

The development of school geography and the role of environmental education within it is a reflection of the paradigm shifts which represent the ways in which geographers have made sense of the world and the ways in which students are encouraged to study geographical phenomena. The Council for Environmental Education (1990) suggest that environmental education is an approach to learning, not a separate part or separate curriculum area. The approach that is taken is symptomatic of the wider paradigm shifts in geographical thought.

Geography has been neither a purely natural science or a purely social science. It's intellectual origins as a distinctive field of study predate such a separation. Going back to classical Greece, people were viewed as an integral part of nature. With the establishment of the subject as a university discipline in the late nineteenth century, courses were split between human and physical geography. Despite this split, remaining today to a certain extent, there have been developments in geographical thought which focus on the environment and the integration of the human and natural world, developments which have influenced the ways in which we view the relationship and study geographical phenomena.

From the beginning of the twentieth century the use of the concept human ecology was developed as an application of ecological concepts to the study of the relations between people and their physical environment. This was more specifically the study of the place of people in the natural environment of specific areas. It was thus linked to regional geography and the search for underlying principles applied to the region. Some geographers, however, at the time were more concerned with the development of an idiographic approach - the unique and particular characteristics of geographical phenomena.

Environmental determinism prevailed in the 1920s. This was a view that the environment controls the course of human action, failing to recognise social construction of most

environments. Human ecology was revived in the 1960s and subject to rigorous systems analysis, a consequence of the 'quantitative revolution' and positivist approaches to geographical inquiry. This approach provided a series of complicated connections between human and physical systems.

Hagerstrand in the early 1970s developed an extension of the possibilities of the systems approach to human ecology through his 'time geography' also described as 'space time ecology'. From this perspective space and time were seen as 'resources with a limited 'carrying capacity'. Changes to the space and time components threaten to restructure pre-existing relations. This can be related to the neo-malthusian limits to growth warnings in ecological carrying capacity terms and can also be related in part to the nature of deep green environmentalism and the characteristics of the radical approaches to sustainable development which call for changes to the structures of society. These changes are seen as a positive development for sustainable living but perhaps threatening social relations in terms of power.

Despite the long established interest in the relationship between people and their environments in some form or other, few geographers seized the opportunities to develop this area further at the time of the rise of modern environmentalism (late 1960s and early 1970s). Most geographers were immersed in the 'new' geography applying

positivist philosophy to their subject. Scientific rationalities of empirical inquiry dominated.

Although the 'new' geography was to be challenged, the scientific rationality espoused, is today still revered in technocratic approaches to environmental problems. The challenges to the 'new' geography came from the humanist and radical geographers of the 1970s and 1980s. Human agency is central to humanistic geography. It emphasises the role of people as individuals and as companies, corporations and states. It is also defined in terms of power. Humanistic geographers also focused on the personal and cultural meaning of the landscape, exploring attitudes and values from a subjective perspective. The role of agency in determining geographical phenomena led to the debate about the relationships between structures and agency - Gidden's structuration theory - that social structures are both the medium and outcome of human agency. Hence in relation to environmentalism, the environment is not only the space in which humans act, but also the outcome of human actions. Our surroundings are a product of our (individual and collective/societal) actions.

Radical geographers also took on board the nature of the structures of society in determining the relationships between society and the natural environment. Neo-Marxism and historical materialism were expounded as crucial to an understanding of society-nature relations. Pepper (1984), Johnston (1989) and Redclift (1987) all explored

environmentalism from this perspective.

Humanist geography is based on interpretive or hermeneutic science investigating environmental meanings. The location of these meanings and the interests they serve within the wider society are the focus for radical geography and critical science. An integration of these two traditions in geographical thought is highly relevant to education for sustainability.

The above elements in geographical thinking have only been applied to school geography in a limited way in relation to environment and development education. The inclusion of attainment target five in the geography national curriculum (1991) represents education for environmental management and control rather than education for sustainability. There is no national initiative for integrating education for sustainability Post 16, although environment education is embedded in the particular framework of ideas and is a part of the philosophy behind the specific 16-19 Geography A level Project syllabus.

Although the focus of this research is on 16-19 A level geography students, it is useful to explore the geography national curriculum as a comparative exercise to the 16-19 Geography A level Project especially to assess the type of education for sustainability pupils might experience and the ideas they might bring to the next stage of their geographical education.

Environmental geography in the National Curriculum

The place of environmental education in the geography national curriculum is explored below. It has already been suggested (page 59) that Attainment Target 5 'Environmental Geography' (DES, 1991, fig. 10 p 72) is limited in its ability to provide a curriculum for sustainability. It is not until level 10 that pupils are expected to come across the concept of sustainable development. This should be the focus of the whole attainment target since education for sustainability is more an approach to education rather than a curriculum element taught in isolation. The revised draft geography national curriculum (SCAA 1994) goes a little further towards a better framework for integrating education for sustainability.

There is evidence that the 1991 document emphasises a management/technical fix approach to the environment from a technocentric viewpoint. Level 7 includes an analysis of the technological developments on the exploitation of natural environments and their management. Level 8 focuses on the pressure of growing populations on resources rather than considering the present consumption patterns of richer societies. The areas of highest growth populations are not the largest consumers of resources.

There is only one reference to conflicting interests in level 6 and this is restricted to areas of great scenic attraction. This focuses on the preservation of

environments rather than the careful conservation of resource management for the benefit of wider society and all interest groups in the near and distant future. This emphasis on preservation is also apparent in level 4b.

While there is potential in some of the statements of attainments to be included in an education for sustainability, there is not the explicit inclusion of the concept throughout the attainment target. For example 6c could be used to illustrate the shortcomings of a management approach in technocentrist terms of environmentalism. This is a valid form of analysis only if alternative ways of living as part of our environments area suggested and evaluated. In doing this we are implicitly incorporating level 10 within the attainment target as a whole.

Level 2b and 8b can be interpreted in a sustainable development framework in terms of the importance of pupils being able to recognise and explain that people create and change environments.

Huckle has put forward an alternative to attainment target 5 (fig.11 p 76). It provides a challenging framework which can be used to study a range of environment/development issues from a sustainable development perspective. The command words have more carefully been chosen in order that pupils at any level can have the opportunity to show understanding at higher levels. For example the use of

Figure 11

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'talk about' enables greater flexibility for assessment of this attainment target. Pupils could talk about the way in which people create environments (level 2) and also in the same exercise would not be restricted from being able to

show some awareness of the reasons for social actions and the interests served (level 4). The attainment target is a framework of underlying principles of sustainable development which could be incorporated into themes such as water, energy, urban environments, transport systems, agriculture and others. Education for sustainability can therefore be more easily incorporated into the geography national curriculum with more ease than the existing AT5.

The revised draft geography national curriculum (SCAA, 1994) provides a better framework for the inclusion of environmental education and in particular the concept of sustainability. Sustainable development has been taken out of the level 10 statements of attainment and included within section 13 'Managing environments and sustainable development' (fig.12 below).

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Figure 12

source: SCAA, 1994, p 10

This provides the opportunity for sustainable development to become an integral part of the school geography curriculum for all and not just a concept for those pupils at level 10. There is an attempt to link environmental issues with development

"...investigating environmental issues and how they are addressed to allow development on a sustainable basis..." (SCAA, 1994 p 10)

The statement, however, only looks forward at how 'good' environmental management can contribute towards 'development'. There is no explicit attempt to look at the causes of environmental problems and that these can result from particular paths to development. This is included in Huckle's alternative level 5 descriptions. Pupils should be able to

"...distinguish between sustainable and non-sustainable forms of development..."
(Huckle 1994 p 12)

The revised national curriculum level descriptions (fig.13 p 79) do recognise the different approaches to tackling environmental issues but they do not address the relationship between environment and development issues. It is here that Huckle's alternative level descriptions provide greater clarification for the teacher on the context in which the issues and concepts can be studied. For example the national curriculum level 7 description includes the statement that pupils

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FIGURE 13

"...make comparisons between different approaches to environmental management." (SCAA, 1994 p 13)

Huckle's level 7 statement puts this in the context of reformist/radical alternatives to managing environments in that pupils should be able to

"...recognise the value and limitations of reformist measures designed to alleviate environmental problems and suggest more radical alternatives." (Huckle 1994 p 12).

This statement, however, also includes an evaluation of the different approaches which is included in level 10 in the national curriculum level descriptions.

"Pupils assess the relative merits of different ways in which environmental issues are tackled." (SCAA, 1994 p 13)

The revised draft geography national curriculum provides a better framework for tackling environmental issues in school geography. It allows for greater integration of the issues into the curriculum rather than a separate attainment target and does provide an opportunity for pupils to critically evaluate different approaches to environmental management although this is not explicitly defined. Huckle's alternative descriptions are still useful in giving the issues a social, political and economic context particularly in considering the causes and impacts of approaches to development/environment issues.

Since the research was written amendments have been made to the draft proposals for geography in the national curriculum (1994). The requirements of the programme of study in the new 'Geography in the National Curriculum

published in 1995 (London:HMSO) in relation to sustainable development have changed as have the references to environmental education in the level descriptions.

16-19 ALevel Geography and Education for Sustainability

Since the focus of the research is A Level students perceptions and understandings of sustainable development some consideration needs to be given to the potential of the London Examinations A Level 16-19 Project syllabus (1994) as a vehicle for education for sustainability. The syllabus is based on the Schools Council 16-19 Project's Curriculum Framework which adopts an approach to geography based on examination of the questions, problems and issues which arise from the interactions of people with their varied environments. The emphasis is on enquiry based learning. The framework of the syllabus is characterised by:

- emphasis on the understanding of concepts and principles;
- emphasis on understanding the inter-relationships between people and their varied environments;
- study of the issues, questions and problems which arise from these inter-relationships;
- appreciation of the special contribution made by geography to the understanding and possible solution of the problems, resolution of the issues and answering of the questions;
- using geographical study as a medium through which

skills, abilities and techniques are developed;
-adoption of an enquiry approach to learning;
-opportunity to consider the significance of values
in environmental decisions, and for students to
clarify and develop their own values through
values-based enquiry.

There is a very strong people environment emphasis to this syllabus. People are seen very much as components of natural systems and as constructing and changing their environments. There is also an element of long term approaches and effects of human activity in modifying environments. The language of the syllabus allows interpretation in terms of sustainable development eg.

'...modifications to landforms and to natural processes may result in adverse consequences for the future use of natural environments.'

'...management of ecosystems represents people's attempts to effect change ...which will be beneficial and constructive rather than destructive to their environments; for successful management it is necessary to understand the workings of the ecosystems and the likely causes and effects.'

The above extracts from the syllabus allow for studying long term goals and concerns which is a dominant theme in sustainable development.

Political decisions, conflict and a focus on consumerism are also evident in the syllabus:

'...the decision to exploit an energy resource depends on the physical character and availability of the resource, technological capabilities and the way in which society appraises its demands for energy.'

'...decisions are commonly made in response to political pressures, and may result in conflict between individual, groups and nations.'

'...decision-making in urban areas frequently reflects the distribution of power and wealth in society; this has implications for spatial justice.'

'...economic and social policies, decided at national and international level, are having an increasingly significant impact on agricultural systems, and so on the people whose lives depend on them.'

The 16-19 A Level geography syllabus provides ample scope for developing curriculum units with education for sustainability as the main approach given the content of the syllabus and the approach to people/environment relationships. It also emphasises an enquiry approach to learning, given an example of the 'route to enquiry' which facilitates both teacher in the preparation and presentation of materials and student in developing an

informed critical evaluation of an issue in order to develop decision making skills. This route to enquiry encourages critical evaluation of an issue through the use of key questions such as what? where? who? which interests are served? why? which solutions? with what impacts? (short term, long term, positive, negative, economic, political, environmental, social) what do others think? what do I think? It is perhaps this emphasis on students engaging themselves in enquiry through the structure of the route to enquiry and the development of their decision making capacities that will best prepare them for an emancipatory and participatory role in a society working towards sustainable development.

CONCLUSION

This chapter has taken the reader through the series of international conferences and discussions which have included debate on the importance of environmental education, the debate by academic educationalists about education for sustainability and the contribution of geography to this debate both from an academic geographical perspective and through examples of school geography.

Education for sustainability which can and has been used interchangeably with environmental education is neither more specific in definition or conceptually more fixed in definition. Indeed many characteristics of education for sustainability can be found in the literature of

conferences supporting 'environmental education' going back to Stockholm and Belgrade referred to earlier in the chapter, whichever phrase is used, both espouse a consideration of a particular ethic, attitudes and values which support sustainable development, a consideration of future generations within the context of the relationship between natural resources and human demand. Educationalist academics also outline similar aims and desired outcomes of education for sustainability in considerable detail. The holistic nature of environmental education and specific knowledge areas and skills which students should understand/acquire are outlined by Stirling and Huckle - that values, attitudes influencing the interest of various groups and the students themselves are centrally important as is critically evaluating environment/development issues to effectively participate politically in society to challenge the status quo and work towards achieving sustainable development. Environmental education by them is seen to be an agent of social change. This has also been influenced by academic geographers and the contribution of the humanist and radical traditions, particularly the role of human agency in determining geographical/environmental issues/phenomena.

There has been much written about the nature of environment/development issues, sustainable development and the aims of environmental education within this context and what should be achieved by education. However, what is lacking is a pedagogic element - the 'science' of teaching-

the methodologies and ideas which enable the knowledge, understandings, skills, attitudes and values to be achieved and developed by students. It is the lack of this element which results in the limited practical application of the calls for environmental education to be integrated into school curricula. The British National Curriculum goes only part of the way in terms of including some of the knowledge areas and concepts about education for sustainability but does not go further in facilitating teachers and students to realise the aims. The council for Environmental Education (CEE) suggests that environmental education is an 'approach' to learning but little more is said about the nature of this approach.

Stirling (1993, p.90) suggest that pedagogy from an ecocentric environmental perspective should be critical, participative and experimental rather than the pedagogy of the technocentric perspective of 'traditional' learning styles but goes no further in articulating the nature of the pedagogy. Even Huckle's alternative national curriculum for the geography attainment target 5 described earlier, gives little or no pedagogical advice or direction. However, the 16-19 A level Geography Project does present the potential for a pedagogy for education for sustainability as already described in this chapter. It is ideas for classroom teaching and student learning within the context of it's enquiry approach to learning that this research seeks to develop, creating practical opportunities for realising the aims of education in

achieving sustainable development.

3. RESEARCH METHODOLOGY

The methodology adopted is set in the context of qualitative research. Since the focus is on 16-19 year old student's perceptions and understandings of environment and development relationships, the methodology will include a phenomenographical approach. This approach will be used within critical/action research since another aim is to develop geographical teaching material and strategies to encourage education for sustainability, improve students' understanding of this concept and it's applications for sustainable living.

Phenomenography

Phenomenography is a research method which seeks to explore patterns in the conceptualisation of meanings and experiences of individuals. It is

"...a research method for mapping the qualitatively different ways in which people experience, conceptualise, perceive and understand various aspects of phenomena in the world around them." (Marton, 1986b p 31).

The first step using the research methodology is to elicit the meanings that individuals attach to a particular phenomenon as it is experienced or appears to that individual. This is an experiential approach or

constitutes a 'second order' perspective. The interpretation of the phenomenon is located between the individual and the phenomenon itself with a focus on conceptual understanding from the student's perspective.

Although the meanings are specific to the phenomenon they are not specific to context. Hence the same meanings can be elicited in a number of different settings about the same phenomenon. Thus the analysis of students' conceptions of a phenomenon can be used by educationalists to establish learning outcomes, perhaps in relation to learning approaches, the extent to which students can apply knowledge and in curriculum design to facilitate the ability of students to identify themselves different meanings of reality by different interest groups. This can be applied to different perspectives on environmentalism and sustainable development.

The data collection for this method of research involves taped semi-structured interviews or participant observation in order to record the respondents comments and discussion of a phenomenon. Once the data has been collected, the discussion or comments are transcribed before analysis.

The aim of analysis is to determine the distinctive characteristics of the data by sorting the comments into conceptual categories or a limited number of understandings of the particular phenomenon. This is done

by selecting comments that relate to the phenomenon and marking them. The comments are then grouped according to the different meanings implicit in the quotes. These are grouped according to similarity, difference and complementarity. The criteria for each grouping is carefully clarified. The number of categories is gradually reduced until it is defined in terms of its 'core' meaning. The resulting understandings are referred to as categories of description representing several frames of reference to the phenomenon. These categories of description have been decontextualised so that they can be applied more generally. This methodology is not idiographic.

The categories constitute what is called the 'outcome space' and can be defined structurally diagrammatically. The categories can be ordered sequentially or in a hierarchical way according to increasing levels of complexity of conceptual understanding. The outcome space of phenomenographic research shows some similarities to 'concept maps' generated by a constructivist approach to understanding childrens' thinking undertaken by Ghaye and Robinson (1989). They were concerned with the nature of knowledge and cognitive structures and the cognitive processes associated with the construction of meanings of geographical phenomena by children. Cognitive structures refer

"...to the way children, under certain situational and task related influences organise and reconstruct knowledge structures (curriculum topics)."

(Ghaye and Robinson, 1989, p.117).

Ghaye's research (1984) aimed to establish the notion of a 'geographical mind scape' which refers to

"the idiosyncratic, continuously dynamic configuration of cognitions, values and perceptions, derived from person-task-situation interactions.." (Ghaye, 1984, p.16).

Concepts within a knowledge structure (or content/structure of a lesson) were given to children who were then asked to arrange them on a piece of paper and link them together writing on each line the reasons for the relationship between them. The children select and order concepts and build their own structures of understanding. They are reconstructing their own experience of topics taught in class. The main characteristics of the child's cognitive structure is represented by the concept map. The use of the concept map is a technique that enables children to establish and build relationships between concepts in a way that makes sense to them. It is a way of externalising the child's understanding of how concepts given to them are connected. For the research,

"The meaning of each concept is derived partly through an understanding of its intrinsic qualities and also through an appreciation of the meaning relations which hold between it and other concepts represented on the 'map'." (Ghaye, 1984, p.512).

The complexity of the maps represents the interplay between the connectedness of the teacher's knowledge structure, and the way in which the child has stored, organised and reconstructed meaning. An example from Ghaye (1984) compares the teacher's content structure for a lesson shown in fig.13b (p 93) and the pupils concept map shown in fig.13a (p 93). This approach is very similar to the ideas underlying the methodology of phenomenography and the views of Marton and Saljo

"The Learner's construction of meaning...of content is the very heart of the teaching experience. We consider the finding and describing of conceptions (meanings), of fundamental aspects of various learning materials to be one of the main tasks of research into student learning. (Marton and Saljo, in Ghaye and Robinson, 1989, p. 121)

The essential difference between concept mapping and phenomenography, however, is that concept maps are child/student constructed with a set of given concepts, where as in phenomenography the concepts themselves are elicited from the students. The outcome space represents the researchers' cognitive understandings and resultant cognitive structure of their interpretation of the students' cognitive structures of geographical phenomena. The concept map approach starts with teacher constructed concepts to investigate the way in which students make sense of them whereas phenomenographical research imposes teacher constructed concepts (the categories of description) at the end. These can be defined in a referential way with regard to more global meanings of the phenomena. Both concept mapping and phenomenography involve a degree of researcher influence in outcomes

FIGURE 13b.

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Source: Ghayre, 1984 p. 521

FIGURE 13a.

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Source: Ghayre, 1984, p. 520.

related to students' understanding or meanings. They attach to geographical phenomena. The concept map is fixed within the domain of a taught topic referred to and explained in terms of present criteria/concepts. The outcome space of phenomenography is referred to in terms of criteria selected by the research at the end of the process, based not only on student responses but in terms of how they fit into those of the researchers' own conceptual structures of phenomena.

In the analysis of concept maps, the teacher clarifies the links in terms of complexity, quality, variety, match (between taught and learned concepts) and dynamism (the amount of reorganisation/change in cognition taught over time). They are also analysed for structural (hierarchical) links, functional, locational, sequential and logical links. Ghaye and Robinson suggest that this classification needs to be sufficiently elaborate to be 'transcontextual' and 'transdisciplinary' to be able to make sense of childrens' constructions of meanings. This is indeed the opposite to the analysis of ,phenomenographic research. Although it is the concepts in this case which are being classified rather than the links, the process is 'decontextualising'.

By decontextualising the data there is some question over the methodology in that by decontextualising the data and categorising one might be in danger of imposing one's own perceptions of the realities before us. Would other

researchers arrive at the same categories? Saljo has suggested that with this methodology it is not the construction of reality which may encourage a phenomenological bias, that is the aim but the description of different conceptions of reality that appear before us.

Gough (1991) however maintains that analyses and constructions of data are caught up in the process they are analysing. perhaps creating more selected fictions of reality based on our own experience of phenomena. Phenomenographers, in order to establish reliability to their work have used a method termed 'inter-rater reliability'. Other researchers familiar with the process confirm or reject categories of description. If a level of 75% agreement is reached then the categories are accepted. Since the categories of description are not context specific the validity of the work can be checked by decontextualising the data and grouping meanings from a study of the same phenomena in a different context.

Phenomenography was chosen as a research methodology over concept mapping for the reason that students' own conceptions of geographical phenomena were required. The outcome space is to reflect a 'concept map' of researcher interpretations of students' cognitive structures of the geographical phenomena central to this research. Concept mapping as Ghaye and Robinson describe is also used later in the action research spiral undertaken in the development of

a curriculum unit to further explore students' cognitive processes in understanding geographical phenomena related to environment/development issues.

Phenomenographic research can easily be applied to geographical education, in particular approaches to teaching in terms of education for sustainability. The meanings students attach to the concepts or phenomena of 'environment', 'development' and 'sustainable development' can be elicited and categorised by this methodology. The meanings can be applied to a variety of contexts or case study examples used in the case of geography teaching. The method can also be used to support discourse in the learning process in geography, students having the opportunity to discuss each other's points of view and understandings of the concepts before them and also those of others. This is also part of the approach to education for sustainability in that students should explore alternative viewpoints and strategies for sustainable living.

Critical Action Research

The methodology used in this study is set in the context of action research, in particular socially critical action research as discussed by Tripp (1990).

"Educational action research is a term used to describe a family of activities in curriculum development, professional development, school improvement programmes and systems planning and policy development. These activities have in common the identification of strategies of planned action which are implemented and then systematically submitted to observation, reflection and change. Participants in the action being considered are intricately involved with all of these activities." (Tripp, 1990 p 159).

The term action research was first used by K.Lewin in 1948 and described as a disciplined process involving a spiral of activities.

- Clarifying and diagnosing a problem situation for practice.
- Formulating action-strategies for resolving the problem.
- Implementing and evaluating the action strategies.
- Further clarification and diagnosis of the problem situation which leads to the next spiral of reflection and action.

In the case of educational action research the teacher embarks on what Stenhouse^{quoted} (in Cochran-Smith 1990, p 2) describes as 'systematic intentional (or self-critical)

enquiry. This enables teachers to make sense of their experiences and become involved in the research process to help clarify and uncover assumptions about teaching and learning. This should involve making sense of the processes involved in curriculum design/delivery rather than an objectivist approach focusing on outcomes expected or those that can be observed. Outcomes in terms of student achievement can be viewed as particular products of the educational and content theory of teaching but are also determined by practice. All teachers have theoretical views (beliefs and assumptions) which guide and influence their classroom activities, therefore

"...the unique feature of the questions that prompt teacher research is that they emanate solely neither from theory or from practice but from critical reflection on the intersection between the two." (Cochran-Smith 1990, p 6).

Carr believes that it is wrong to regard research as the 'theory' and teaching as the 'practice'. Both are theory guided practices. In this respect

"All practices have 'theory' embedded in them and this is true for the practice of 'theoretical' pursuits like educational research as it is true for the practical pursuits like teaching."
(Carr in Robottom, 1987 p 106)

Teachers have educational theory in terms of which their activities are structured and their decisions are made. It is therefore impossible to look at phenomena which can be observed independently of the process.

"To regard learning as a process which is directed

toward some fixed end state is to distort its educative value, because what makes it educative is not its instrumental effectiveness in producing 'knowledge' outcomes that can be independently defined but the quality of the thinking realised in the process." (Elliott 1985, p 233).

This process is just as important for the process of curriculum development as it is and indeed related to the process of student learning.

In the case of my research on environment and development issues it is the nature of the classroom activities that is crucial in being able to elucidate student perceptions of the issues and to enable them to determine their own informed interpretations of evidence put before them. This evidence is located within particular theories and concepts which form part of the curriculum. However, the selection of material or evidence used in the classroom is to a certain extent determined and characterised by certain values, beliefs and attitudes held by the researcher and also those behind the design of curriculum materials. It is these ideas and concepts of the discipline that are intrinsically problematic and open to divergent views and interpretations. The nature of teaching strategies and activities are therefore dependent on particular interpretations of the materials selected. Carr therefore interprets educational theory as a rational criticism of the dialectic of theory and practice. The epistemology of this interpretation is interactionist in that it views knowledge as the relationship between the individual's subjective views and the social and

historical context. This also reflects a phenomenological perspective in that our knowledge is the result of a relationship between the person experiencing it and the world itself.

Teachers therefore have a 'double dialectic' to contend with in educational research in view of the above comments. The researcher must recognise discrepancies between theory and practice of individuals and also discrepancies between individual theory and practice on the one hand and social structures and relations on the other. In other words practice can be constrained and shaped by the structure of the setting or context.

"Understanding the human actions of educational practice requires an exploration of both the subjective justifications and meanings of those actions and the practitioner-context relationship which constrains them." (Robottom 1987, p 112)

Robottom goes on to argue that educational research

"...must adopt a politicised view of environmental education...recognising ideology in its various forms - false consciousness, oppression or hegemony."

Self-reflective inquiry (Robottom 1987) or action research by teachers is therefore essential for a critical approach to developing teaching and learning strategies.

Perhaps there is another dimension to the double dialectic which teachers should be aware of - that of the relationship between the wider society and how this influences the values and attitudes which the students themselves bring to the classroom activities and the learning outcomes. The personal geographies of the students in relation to

environment/development issues are as important as the personal geographies, values and attitudes of the teacher within the double dialectic mentioned above.

R. Robinson (1988) suggests the importance of not only teachers *recognising* this dialectic between students' values and wider societal influences in learning situations but also *acting* on it to encourage 'realistic empathy' through 'regenerative' knowledge within the classroom. For Robinson, realistic empathy should counter paternalistic attitudes towards developing world issues stemming from a lack of realism in the social, economic and political context of , in the case of this research, environment /development issues. Regenerative knowledge is based on

"...collectivity and interdependence in a social group and interaction and communication are used to create that knowledge." (Robinson 1988, p 152)

Although this form of knowledge is rarely legitimated within classrooms, it provides opportunities for students to discuss - through interaction with each other and resources provided - the context in which other people live and how decision makers act in resolving problems. Although this is experienced by individuals in the context of their own value systems, the teacher researcher aware of the 'double dialectic' can encourage the same reflection by students in terms of the relationships between their values and attitudes, their learning experience in the classroom and the context of different ideologies within society. This should enable them to explore the context of

environment/development issues from different perspectives.

In action research and more specifically critical research, it is also important for the researchers to question the basis on which materials are selected, identifying their own values and attitudes (which determine interpretation of their resources and classroom activities). Their own frame of reference must be critically considered before enabling students to critically reflect on evidence presented to them to uncover hidden values and attitudes. Carr and Kemis (1986, p 180) suggest that

"...the problems of education are not simply problems of achieving known ends. They are problems of acting educationally in social situations which typically involve competing values and complex interaction between different people acting on different understandings of their common situation..."

Teacher research therefore has a very definite location within a societal context. The teacher must be aware of the ideological context in which he /she is working. The aspirations of educational research to be value free is a contradiction in terms. Ideological bias cannot be avoided and objectivity can best be conceived as an awareness of one's value biases. Carr and Kemis (1986, p.180) suggest that thought and action are

"...socially constructed and historically embedded."

This then requires teachers to be retrospective in explaining the location of current practice, educational materials and values and attitudes students bring to the classroom within the ideologies dominant in society which

shape and influence the teaching profession and also to take prospective action in order to reconstruct rather than simply reproduce societal relations through education. This 'ideology critique'

"...is aimed at revealing to individuals how their beliefs and attitudes may be ideological illusions that help to preserve a social order which is alien to their collective experiences and needs. By demonstrating how ideological forces generate erroneous self understandings, ideology critique aims to reveal their deceptive nature and so strip them of their power." (Carr & Kemis 1986,p137)

ACTION RESEARCH IN THE LIGHT OF PREVIOUS INITIATIVES TO DEVELOP ENVIRONMENTAL EDUCATION.

Robottom (1987) has argued the need for action research in his critique of international initiatives to develop environmental education. The Stockholm Conference on the environment in 1972 marked the beginning of long term involvement by the United Nations in the development of an international programme in environmental education. Subsequent conferences on environmental education at Belgrade in 1975 and Tblisi in 1977 produced documents including recommendations for the development of environmental education. However, Robottom has argued that these recommendations reflect a

"...rationalist, objectives based view of educational change." (Robottom 1987, p. 91)

The documents recommended that practitioners become involved in the research but also convey the notion of teachers as technicians to carry out instrumental type work to test the effectiveness of activities and materials,

centrally produced.

"...it...seems particularly urgent for educators to receive not only general teacher training in the devising of simple methods and instruments of research and evaluation enabling them to test, in the light of the objectives pursued, the effectiveness of various components of the process..."

"...it seems necessary to undertake experimental projects which could serve as convincing examples to persuade the authorities, the teachers and the learners themselves of the possibility of developing interdisciplinary environmental education with a view to the solution and prevention of immediate problems..." (UNESCO 1977, in Robottom 1987, p. 92)

Robottom notes a division of labour between expert, knowledgeable developers and passive, persuadable practitioners. This

"...managerial-hierarchical form of organisation, informed by empiricist, objectivist epistemology, de-politicised and technocratic...view of educational change..." (Robottom, 1987, p. 99)

conflicts with statements elsewhere in UNESCO documents which point to the context dependent problems associated with socially critical environmental education. There are observations

"...that the adoption of a problem orientated approach...is made difficult by the fact that education overlooks the complexity of real life for theoretical, abstract studies."
(UNESCO 1977 in Robottom 1987, p. 93)

This observation or the aspiration of critical environmental education is undermined by the 'technocratisation' of innovation proposed by UNESCO according to Robottom. The innovation imposes control over practitioners and reproduces an entire view of knowledge and social order since the structures of institutional education are maintained.

Action research centres on the practitioner. It

"...acknowledges that teaching and educational practice in general, is problematic and uncertain, and takes place in a context which is equally complex, changeable and politically shaped."
(Robottom, 1987 p. 109)

Socially critical action research is a form of research to promote and develop a critical pedagogy to serve an emancipatory interest. Elliott (1985) views educative action as encouraging the development of understanding rather than instrumental or technical effectiveness. This can be applied to empowering teachers in terms of increasing their autonomy and the development of a critical professional community, aware of the social implications of their practice but also in terms of student awareness and ability to deal with divergent interpretations of evidence and an understanding of the social context. Tripp (1990, p 166) views critical action research as more than improving the quality of classroom interaction but also challenging the existing social order.

"...education is a social practice, it's techniques are not socially neutral. They produce, reproduce and transform people's attitudes and ideas. They need to have some understanding, influence over and responsibility for the social conditions and outcomes of education."

For Tripp, critical action research involves the recognition of constraints in practice but also looks beyond the nature of the constraints to the reason behind their occurrence rather than asking the question 'how can I change what I'm doing to better achieve my aims?' teachers

should ask 'how is it such a gap occurs between achieving the aims and the means of implementing them?'. It is recognising and overcoming the constraints that is the challenge and Tripp argues that it is the perception of constraints and evaluation of the possible means of overcoming them that is important for the critical action researcher. Indeed action research only becomes socially critical when the challenge to constraints becomes incorporated as part or the whole of action research leading to new practices.

The above ideas around critical action research should also apply to the teaching and learning of students particularly in the case of development strategies for teaching about environment and development issues. These issues have a social context and many educational resources fail to significantly address the relationship between the two. The concepts/theories of sustainable development and sustainable growth have strong ideological justifications with sustainable growth more firmly embedded in the technical and empirical logic of society. The aim of my research is to encourage students to identify causal links between environment and development issues and I perceive potential constraints in terms of the influence of dominant consumer ideology to which most students have been exposed heavily influencing a critique of alternative viewpoints centred on sustainable growth rather than sustainable development.

In order to achieve a critical pedagogy involving critical thinking by students classroom practice will involve exposing the various ideological stances to students within the contexts of specific geographical case studies. There will be discursive opportunities through planned activities to encourage students to test and apply evidence of environmental and development issues against the various ideological stances which influence societies. The

"...shared understanding of the social construction of reality..." (Livingstone in Tripp 1990, p 158)

should then form the basis of empowering people to challenge and reconstruct societal relations in order to achieve in this case (and from my own ideological stance) sustainable development. In this way theory and practice cannot be looked at separately in terms of action research. The nature of theoretical content of the curriculum topic and the practice within the classroom are dependent on each other. It is the process of thinking and critical reflection on theory through action which is important rather than the final outcome. Elliott (1985, p 245) suggests that an adequate or coherent educational science

"must be concerned to identify and expose those aspects of the existing social order which frustrate rational change and must be able to offer theoretical accounts which enable teachers...to become aware of how they may be overcome..."

Normative theory underpins much of critical action research since it is concerned with *what ought to be* rather than *what is, was or will be* (positive theory). Normative theory and the search for alternative, more equitable forms of development with sustainable use of resources for example can only be achieved through the interrogation of competing value systems, some of which are more dominant than others in various societal settings.

My investigation into student perceptions of environment and development issues will follow critical action research in terms of identifying the ideological contexts of the teaching module and developing strategies to encourage critical student debate towards a greater understanding of the social and political contexts in which environment and development issues arise and problems can be solved. Socially critical action research operates on two levels. One is the critical reflection on the retrospective explanations of teaching and learning actions and the prospective strategic actions in order to facilitate the second level. This is the critical reflection by students on the retrospective explanations of geographical phenomena and the consideration of prospective action to bring about change in the case study contexts used to illustrate environment/development relationships.

Action research involves recurrent cycles of three phases. The planning phase in which teachers critically look at the

dissatisfactions of their activities and revise them. In the action phase the revised activities are put into practice in an educational setting. The process is monitored and the third stage involves reflection or the evaluation of information collected during the monitoring phase. This reflection should involve an evaluation of activities in the light of the double dialectic explored earlier in this chapter. There should be successive cycles of the three phases - planning, acting/observing and reflecting. Figure 14 (p 110) illustrates this action research spiral.

In summary, in action research

"...the locus of control must remain internal"
(Robottom, 1987, p. 113)

Only the practitioner can research the phenomena under study, namely educational practice. This practice is informed by intentions, justifications and commitments which depends on the rationality of the practitioner. It is also related to the context of action, the constraints and opportunities provided by the structure of the setting in which the practice takes place. .

This chapter has outlined the research methodology to be adopted. In order to initially discover the students preconceptions about environment and development issues/problems a phenomenographical methodology has been chosen. There is a critique of this methodology in that

FIGURE 14

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it cannot escape the interpretation and constructions (of the phenomenon under investigation) of the researcher and therefore cannot claim to necessarily arrive at 'essential' globally accepted meanings. Given this critique and as the phenomenography is subsumed within a general critical action research methodology (as an initial stage) in which the researcher acts and reflects on his/her own assumptions, values, beliefs and attitudes, the phenomenographical research can be justified and results interpreted within this context.

In critical action research the researcher is clarifying his/her own assumptions about teaching and learning in the context of their evaluation of student responses to particular methods, resources and areas of study within the wider context of societal structures and ideological influences. This is no more important than in the development of education for sustainability and transferring the critical, self reflective practice of the teacher into the self reflective and critical evaluation by students of the attitudes and assumptions about environment/development issues. Critical action research as a methodology can itself promote a critical pedagogy.

4. PHENOMENOGRAPHICAL RESEARCH

AIMS AND DATA COLLECTION

The purpose of this part of the research is to explore the ways in which students make sense of the environment and the notion of development before the trial of curriculum activities and resources which is the focus of the action research programme.

The research took place with students from Esher Sixth Form College (November 1993), and Grey Coat Hospital School (November 1994).

Students were asked to talk about a statement given to them. One about the environment and the other about development. The conversations were conducted without myself present and were taped. The aim was to generate comments for analysis to establish the meanings that students attached to environment and development. The two statements were:

"We hear a lot about the state of the environment. What do you understand by the 'state of the environment?'"

"There are many places, regions or countries planning development. What do you understand by development?"

The transcripts of the taped conversations are included in appendices 1 and 2.

ANALYSIS AND EVALUATION

PART 1

November 1993

Part 1 involves the analysis of data collected from students at Esher Sixth Form College. There were four groups of three students. Two groups had the statement about the environment and the other two had the statement on development.

THE STATEMENT ON DEVELOPMENT

(Esher Students)

The students comments were grouped into the categories of description shown in fig.15)p 115). They represent the general concepts which I consider, represent in turn the ideas/meanings the students were using in their discussions to illustrate their understanding of the statement on development. The resulting outcome space of categories of description is arranged, given my own interpretation of student statements and my own cognitive structure built up from the student evidence to my own learning experience of development issues. The categorisation was not rigorous in the sense of true phenomenographical analysis since I did not start off

Figure 15

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with many categories reducing the number towards so called 'core' meaning. This was because collapsing the categories into a few core meanings was not possible without losing the rich variety of ideas the students discussed. This difficulty is explored later in the chapter. What was interesting was the multitude of angles from which the students approached the statement.

Fig. 15 (p,115) has 5 main categories of description: time; spatial scale; prerequisites for development; values; and impacts of development. The latter three were divided by grouping the categories to the right of the outcome space, e.g. prerequisites for development was divided into resource availability, technological development and government. Below are some examples of student statements used to generate the categories of description.

TIME/SPATIAL SCALE

Students saw development as a linear or non linear process through time and with different time scale references, as something that can happen in the short or long term. I linked this to impacts of development in the outcome space since the use of the word 'aspects' in student statement 3 below, could refer to impacts.

1. "They haven't developed yet so they're developing all the time." (linear)

2. "They've got development that was about 10 miles out of the city (Mexico City) these big Aztec pyramids so that was development historical development" (non-linear in the context of Mexico being 'less developed' today)
3. "They look at the short term aspects probably and the long term aspects..."

LOCATION/SCALE

These were important frames of reference in terms of development comparability between places, although this may have been influenced by the wording of the statement the students were given.

4. "Like you get development in Britain which is different in a different class level to development in somewhere like a third world country."
5. "Yes we've got to talk about how development differs in regions because development is different within a country. There can be different sorts of development like urban or rural areas."

PREREQUISITES FOR DEVELOPMENT

This category was devised from three sub-categories shown in fig. 15 (p 115).

Development was seen as something to do with resource availability and level of technological development.

2. "They've got development that was about 10 miles out of the city (Mexico City) these big Aztec pyramids so that was development historical development" (non-linear in the context of Mexico being 'less developed' today)
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PREREQUISITS FOR DEVELOPMENT

This category was devised from three sub-categories shown in fig. 15 (p 115).

Development was seen as something to do with resource availability and level of technological development.

6. "Everything boils down to money really, in development, in the cost and that third world countries don't have the money to develop do they?"
7. "It could be improved mechanisation and technology for farming."
8. "That's like that agricultural development in Egypt and that they took all that technology over there."

Government was also seen as instrumental initiating and influencing development.

9. "Proposals and things like the government. What did they do? They put money into developing derelict land...They're mainly planned by a government aren't they."

VALUES

Values is an important concept for the students in exploring the idea of development. This category of description derives from 5 sub categories, reflecting the meanings in the statements below.

The question about the end goal of development was raised. Implicit in the statement is a value attached to development and a question about optimum levels of progress is implied.

10. "Why do some places... plan to develop. I mean even if say in England there's real technological advance and its really advanced why do they need to keep on developing, why don't they just let the other countries catch up?"

This statement, however, also illustrates a linear approach to development in terms of 'other' countries

following the same path to 'catch up' in time with the level of development in rich countries.

11. "Some people might not agree with it. Some people might think it's good , others might think it bad."

Development in terms of exploitation was also explored by the students.

12. "Well sometimes, well westernised countries make, well try to...aid developing countries but that will lead to complications and stuff and often the westernised countries are just wanting the other countries to advance so that they can profit themselves like the cash cropping."

Below is another example of the 'them and us' North/South relationship and domination in competition as a form of exploitation maintaining the unequal relationship.

13. "They just want to keep ahead and they don't want competition from the other countries do they?"

(i) Although I interpreted 'competition' as a value position, it could also be seen as a prerequisite for development from a particular value position on development (a growth economy perspective).

(ii) The following statement was interpreted as a value statement on priorities.

14. "And they want to build an extra 4 lanes on the M25! I mean what's the point - they should invest in public transport."

IMPACTS OF DEVELOPMENT

Statement No. 12 above was categorised as exploitation given the value attached to profit but it can also be categorised under 'impacts of development' from the phrase "try to...aid developing countries but that can lead to complications."

Students also recognised the environmental effects of development.

15. "That's development but they've gone too far because they've got that pollution problem."

An appreciation of Dependency theory is illustrated by the statement:

16. "Yes you could say they pay too much for that development and they can't pay any more because they owe too much."

Examples of statements about social inequality are given on page 122 (17, 18, 19) within a broader discussion of the reliability of my categories of description.

In terms of phenomenography, the outcome space is illustrated by the range of categories in fig. 15 . However, I have been imposing my own perceptions of development on

the comments by the headings given to the categories and in the way that I have interpreted and grouped the comments. This has been dominated by a space/time, humanist/critical approach to geographical enquiry. My categories are defined in a way that is referential to more global meanings or ideological interpretations of the phenomena 'development'. I would agree with Gough (1991) that the analyses and constructions of the data are my own 'selected fictions' of reality.

To test my assumptions about the student meanings of development, it would be necessary to use the process of 'inter-rater reliability' ie. another researcher analysing my data in the same way of categorising the comments.

With each grouping and regrouping of comments and justifying the criteria on which to do this the researcher is adding in more and more selected assumptions and interpretations of their own understandings influencing the process of data analysis. What is important is not to progressively reduce the conversations down to a skeleton of essential meanings of the phenomena but to categorise the subjective assumptions and factors which influence the thinking, attitudes towards and perceptions of a particular phenomena.

To illustrate this point, inequality as a frame of reference or factor influencing the perception of development can be considered from different angles in the

context of the conversation, but it can be seen in a number of different ways in relation to development. Inequality can be seen as a problem necessitating development or as a factor to measure of the success of development or as a factor on an international scale to be exploited as a means to development. Decontextualising the comments and progressively categorising them does not allow for the number of ways in which this one factor affects the way in which students explore the concept of development.

17. "well there is a wider gap between rich and poor."

Out of context this statement could be seen as a rationale for development but in the context of the conversation it is a result of a particular form of development therefore inequality is being used as a measure of the success of development. This interpretation is also supported by the following statement later in the conversation.

18. "...it's like they've been sort of forced to moving on more quickly than they would have done if they'd been left alone and that's resulted in people being poorer."

International inequality can be interpreted as a rationale for exploitative development.

19. "Often westernised countries are just wanting the developing countries to advance so that they can profit themselves like cash cropping."

However, this statement could be interpreted as competitive economic development generating wealth which

will benefit both countries, wealth which will trickle down to the poorest people.

In general I was pleased with the variety of ideas explored by the students in their conversations and the level to which they explored development in a critical manner, looking at causal factors beyond the need to alleviate poverty.

THE STATEMENT ON THE ENVIRONMENT

(Esher Students)

The outcome space (fig.16 p 126) was generated in the same way as for the statement on development. Below is an illustration of how it was done and the examples of statements used to establish the categories of description. As before, the outcome space represents my own frames of reference in categorising the statements, developed from my understanding of the relationship between environment and development issues.

SPATIAL SCALE

From the student conversations the environment was referred to on a variety of spatial scales.

1. "It's the whole area everything that surrounds it or just an individual field...or a wider area "

It was viewed as a resource which people are exploiting by over- use and pollution.

VALUES AND THE ENVIRONMENT AS A RESOURCE

Various value positions were identified by me, either the values and attitudes evident in the students' own thinking and/or the values they themselves identified in others as important factors in establishing the nature of changes to

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to the environment.

2. "...and what you understand by it I suppose is your own personal opinion."
3. "It depends what area you're in and depends obviously again on what your values are."

Values influence how the environment was or could be perceived as a resource for human consumption or with ethical respect as a resource for the non-human world.

4. "We've got to destroy some of the natural environment. We've got to live."
5. "Deforestation...in areas like South America where the land is needed for cattle ranching."

The environment was linked to values behind economic development and consumer demand...

6. "We just want more. That's mainly from the developed world. They are cutting it (forests) all down for food for the developed world. We're actually all the time just increasing production and money which is all they are looking for. It's economic reasons."
7. "I think that the state of the environment has gradually depleted over the years due to the impact man has had on it, as money has become... material wealth has become part of life and people will go to any lengths to gain as much out of the land as possible."

Technocentric rationality characterised the students comments in terms of a need to measure the scale of damage in order to assess and create a 'technological fix', addressing the symptoms and not the causes.

8. "It's the level of damage. If you could

measure that."

From the ecocentric perspective the environment was also seen as a resource for the non-human world.

9. "It's (farming) detrimental to the ecosystem because they've removed the hedgerows which leaves the animals out of homes."

IMPACTS

The students thought about the state of the environment as the result of the impacts of particular activities arising from the utilitarian attitudes towards the environment.

10. "The state of the environment is...The impacts that people, that human use has had on the land and the environment."

Environmental degradation was a common theme in their conversations as illustrated by the first part of statement 7 above. Desertification, deforestation, soil erosion, ozone depletion were mentioned among other problems as examples of environmental deterioration.

11. "Go through the impacts like soil erosion... also desertification...deforestation was a major issue."

Pollution was also identified as an impact.

12. "There's Thermal pollution, which is industry using river water for coolants and it leads back into the river and kills fish..."
13. "We can have nitrate pollution brought about by industry and fertilizers...increasing production for humans is increasing the state of the environment in a worse..."

Despite the negative focus there was one positive comment about the environment but one in which preservation was viewed as an optimum state rather than conversation with sustainable use even though this is not completely valid in reality in terms of national parks . The example given:

14. "I think it's improved because we've got places like national parks where land has been preserved."

Sustainable development ideas including human equity were evident...There was the notion that equity could be achieved (statement 16 below).

15. "But we've got to remember the environment's got to be available to everyone for the next God knows how many years."
16. "There is a state which should be beneficial to everyone."

Human equity, however, is also jeopardised by our use of the environment - in the following example equity between north and south.

17. "We just want more. Thats mainly from the developed world. They are cutting it (forests) all down for food (cattle/beef) for the developed world..."

Time was an important frame of reference for the students. The environment was also seen as a phenomenon that changes over time, in the short and long term and they related this to resource depletion and human wellbeing.

18. "...at the moment some of it we can't see
or in the long term and at the moment we don't seem to
be able to ...see the effects of our pollution."

There was also a tentative look at different futures,
possible and probable...

19. "But in years to come it could go one way or
the other. It could either go back to things like
organic farming where everything is natural or it
could go the other direction where it gets
gradually worse or it can't be reversed."

The students were able to identify several environmental
problems and their causes which were related to economic
growth and exploitation of the environment. There was an
appreciation of scale and effects through time. Although no
direct links were made to development there was some
indication that related factors were discussed.

All four conversations illustrated that students could
explore the environment and development issues through a
number of related factors influencing their perceptions of
the issues and nature of the phenomena.

ANALYSIS AND EVALUATION

PART 2

November 1994

This data collection involved A Level geography students at Grey Coat Hospital School. One group of four students was given the same statements on environment and development as the students at Esher Sixth Form College.

STATEMENT ON DEVELOPMENT

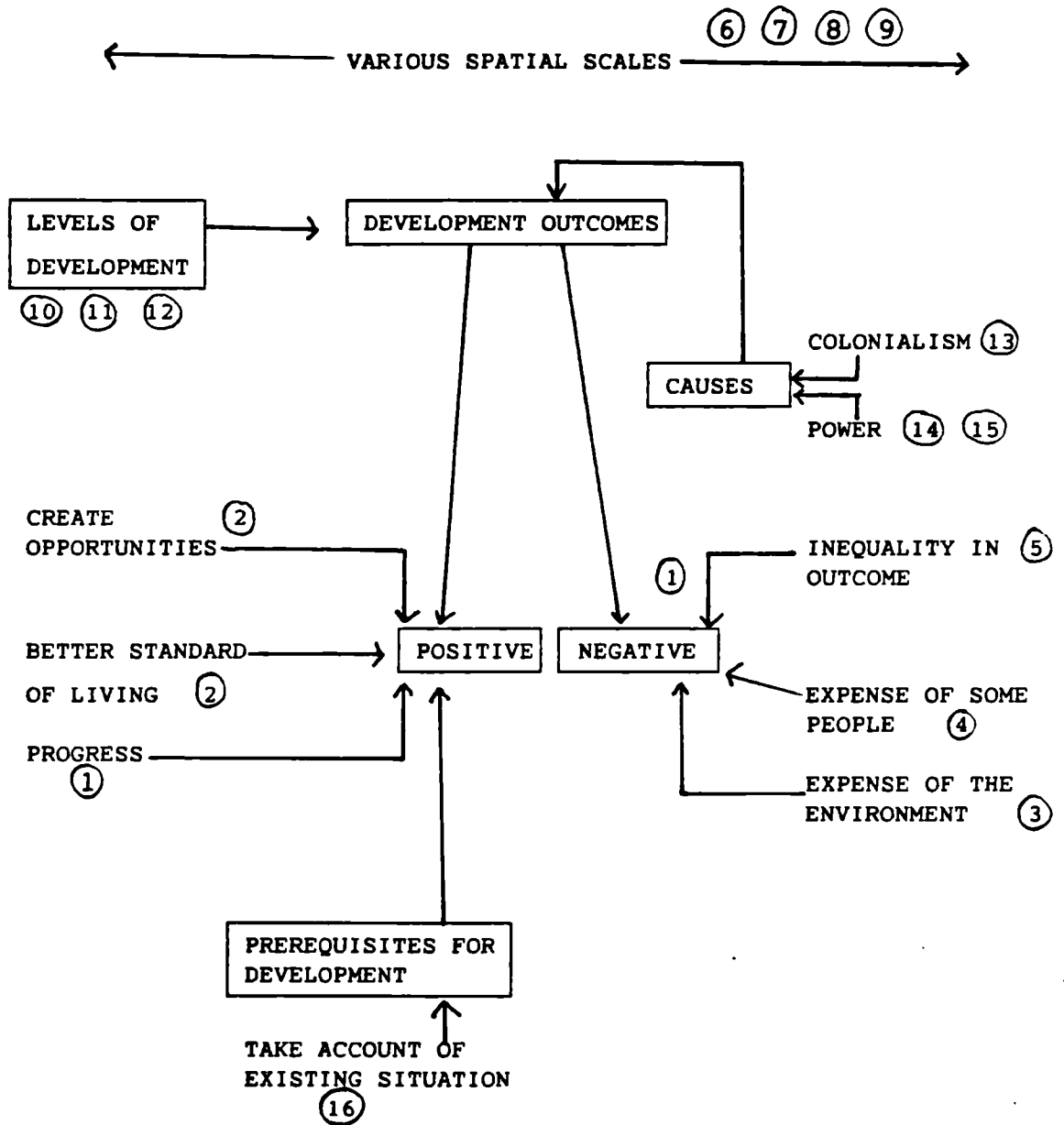
The students comments were grouped into the categories of statements outlined in figure 17 (p 131). The students focused predominantly on what I have categorised as 'development outcomes'. There was rather limited discussion on what they considered development to actually be or to look at a variety of measures of development. I categorised the 'development outcomes into 'positive' and 'negative' outcomes.

I also identified causes of development outcomes in the students discussions and prerequisites for positive development outcomes. They perceived development at different levels and saw development occurring on a number of different spatial scales.

Figure 17

Phenomenographic Analysis of
Conversations on Development
(Grey Coat students)

OUTCOME SPACE



○ STATEMENT NUMBER IN TEXT.

Positive and Negative Development

1. "When it says development it's progress but it doesn't have to be positive, it can be negative."

Positive development was seen to

2. "...create opportunities...to increase employment...the development of towns and buildings...benefit society."

The students identified negative development as that which is at the expense of the environment.

3. "...although their standard of living may be high, they've got consumer goods and luxuries and all the rest of it, the environments not all that good."
4. "They make mistakes. It's expensive but not just money expensive because it affects people, the environments..."

It was also seen in terms of what I have termed 'inequality of outcome'. The students made several references to the idea that development means benefit to some people but at the expense of others.

5. "Alright we've got this big supermarket by Docklands whatever....who else lost out because of the developments?"

SPATIAL SCALE

The students also identified development on different scales from local developments to the development of

countries.

6. ...you have to take each individual country."
7. "They don't look at the whole world."
8. "Its all development on different scales."
9. "The rich countries get richer and the poor get poorer."

Levels of Development

However, they also gave an indication that they found problems in defining areas or countries as developed when there were problems which were indications that a place was not achieving the criteria for being classified as 'developed'. The state of the environment and the position of people in society were broad criteria for this although it was not really discussed at any length in the conversation.

10. "We're all meant to be living in such a developed place yeah and look at the state of the buildings around us..and all the problems all society is facing."

Other statements reflect the students thinking about comparative levels of development.

11. "I think the whole issue of development for us rich countries is it's just gone too much now because our development has been too extensive. I think that we have to reverse."
12. "People like Rostow come up with their stages of development."

CAUSES

Causes of problems related to development were touched on.

I have categorised these as 'colonialism' and 'power'.

13. "When I think of development I just think way back to colonialism..., they were doing fine. They wouldn't have been underdeveloped as they are now."

14. "...Britain's exploiting them."

15. "How far you develop depends on... how much control you take."

PREREQUISITES FOR DEVELOPMENT

Prerequisites for development were mentioned briefly. Money was thought necessary and a consideration of the existing situation in the place to be 'developed'.

16. "How far you develop depends on how much money you're prepared to spend.....and how much money you are prepared to put into the research of looking into the situation as how it was before you start developing."

STATEMENT ON ENVIRONMENT

(Grey Coat Students)

The student's comments were categorised and an outcome space arranged as shown in figure 18 (p 136).

Categories of description were grouped into 4 main areas:
The environment as a resource base; attitudes towards the environment; resource management and time scale.

The students discussed the environment in terms of people exploiting a limited resource base. The abuse of the environment by people was seen as the major problem stemming from high demand and resource consumption rates.

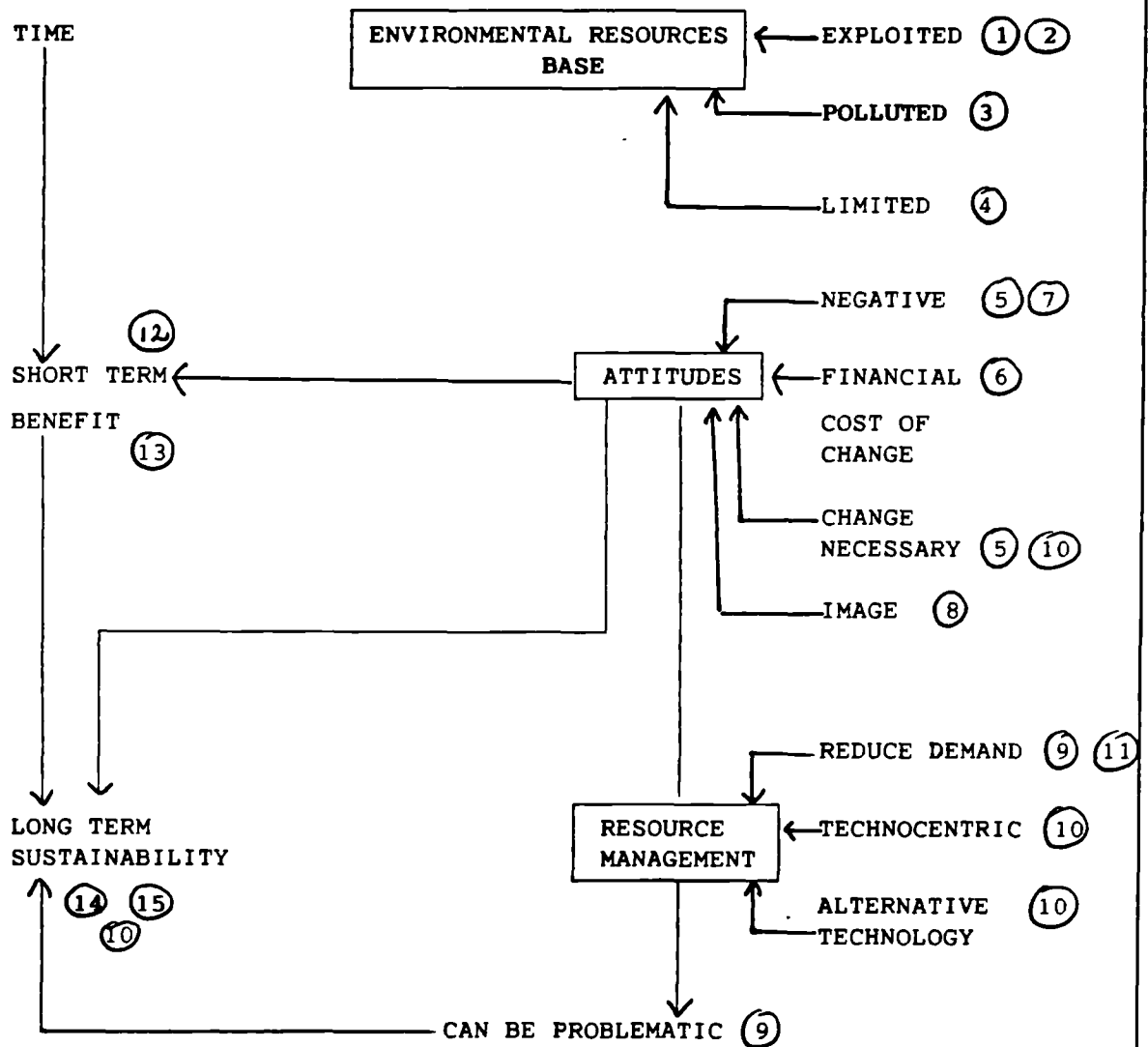
1. "Basically we're abusing our environment...the state of the environment is going down because we're not looking after it...human impact on it is destroying it."
2. "...too much demand on it ...if consumption carries on as it is now."
3. "...you've got global warming, and the hole in the ozone layer and things like that, a lot of pollution."
4. "All our resources are exhausted. I mean we've only got enough coal to last how many years?"

Another dominant aspect to their conversation was the focus on attitudes and their importance for changes to improve the state of our environment. This was very much related to the economic cost to people of changing attitudes and

Figure 18

Phenomenographic Analysis of
Conversations on Environment
(Grey Coat students)

OUTCOME SPACE



○ Statement number in text.

the short terms gains for people of continuing their present activities rather than considering longer term objectives in environmental resource preservation.

5. "Unless the majority of people change their attitudes to the environment things aren't going to change...the only real solution I suppose is for people to change their attitudes towards it."
6. "It comes down to spending money and people aren't prepared to do that."
7. "It's a negative attitude as well...when you say to someone coal will only last another 200 years, they'll say, well I won't be around."

The image of environmentalists and attitudes towards them was highlighted as perhaps a factor inhibiting change.

8. "...They also think that environmentalists are wacky...really silly like they've got a screw loose. They don't take it seriously."

Developing new technologies was also considered in finding solutions in addition to changing attitudes - the development of renewable sources of energy was given as an example. However, there was also caution in terms of solutions that might cause more problems and a change in consumption patterns was suggested as a more appropriate solution.

9. "...they cut the CFCs out but there was another gas...that was doing just as much damage. You're better off just not using it at all."
10. "We haven't developed our wave power whats it

called...alternative...yeah, renewable energy..
we need sustainable energy."

This also represents technical fixes to environmental problems (from a technocentric view point). This statement can also be categorised under resource management.

Resource management in terms of recycling was stressed,

11."Like we're trying to recycle things now."

although the higher cost for recycled products was seen as a constraint on success given peoples' attitudes and reluctance to consider long term advantages.

As in the other outcome spaces, students viewed environmental issues through time.

12."...yes we're abusing it too much. We're thinking about it in the short term..."

13."...people don't want to pay money. People are concerned with benefit to themselves and short term."

14."They don't look at the long term effects. They only look at the immediate effects."

15."Nothing is sustainable."

A COMPARISON OF PHENOMENOGRAPHICAL RESEARCH UNDERTAKEN AT
ESHER COLLEGE AND GREY COAT HOSPITAL SCHOOL

It is interesting to compare the outcome space established on the two occasions given the fact that according to the phenomenographical technique of decontextualising the data, I should come up with a limited number of understandings of environment and development issues which can be applied to different contexts (conversations). These categories of description should therefore be similar between the groups of students from the different schools.

However, the outcome spaces for the two schools are different. Although many of the categories show similarities their arrangement (to show how they are related) varies. The same meanings generated from both groups of students have been put into different categories. For example technological solutions to environmental problems are put into the values section of the Esher outcome space (fig.16) but in the resource management category of the Grey Coat outcome space (fig.18). The reasons for this relate to the context and development of the conversations. The Esher students tended to focus on ideas which demonstrated a technocentric approach to looking at the environment as a resource to be used, in other words they placed a particular value on the environment. In contrast the technocentric 'meaning' in the other outcome space was a more direct practical understanding of a solution to a problem - appropriate

resource management to achieve long term sustainability. This was a general emphasis of the Grey Coat conversation in looking at the process of change for a better environment and the constraints operating. The Esher students, however, focused on the nature of the problems in their conversation.

The above comparison emphasises the importance of the general context of the statements and the frame of reference - not just the students life experiences but also the frame of reference created by the contributions of individuals and the group as a whole in a conversation context.

As mentioned earlier in the summary following the analysis of conversations of Esher students the context of the statements is important. Although similar ideas or 'meanings' were elicited from the conversations, these were of importance for curriculum development only in their context. It appears that the Esher students need to be encouraged to think more about solutions to environmental problems often being problematic and the Grey Coat students need to address issues of values in the variety of ways in which people can view particular environment or development issues. The methodology used did establish that students perceive environmental problems as an impact of development although the complex interrelationships were not explored. The Grey Coat students were asked at the end of their conversations whether they thought there were

any links between their two conversations. In terms of development there was little discussion.

"With development comes the exploitation of the environment."

"I think with an increase in development you get a decrease in the environment...because it's not necessarily beneficial to the environment."

It is interesting to identify factors which the students had not discussed. There was little discussion of the actors in the development process. There was no real discussion about what the end goal for development should be or what does to be 'developed' mean? The students did not come to grips with what development actually meant for them and/or attempt to define development. However, they were able to discuss a range of related and integrated concepts and the context on which the nature and process of development depends. The concept 'development' itself is based on many factors and other concepts. It is neither a static or uniform phenomenon in time more space and is so value laden and attitude dependent that only a complex multifaceted representation of this phenomenon provides us with an adequate understanding. One student puts this point succinctly in her group conversation:

"Well we can't specifically define development unless you put it in some sort on context and then

you can define that certain development."

This emphasises the complex nature of the concept, associated ideas and context , reinforcing the assertion that to reduce the students' conceptualisations into limited categories of description reduces the 'global' view of students perceptions. There is no global definition of development but it can be defined in terms of context. That the students recognised this is important in that they are able to step outside their own perceptions and view development from a variety of contexts and perhaps they are also more open to considering and evaluating alternative viewpoints. On the other hand, it is perhaps important that students should have a more focused conceptualisation in defining development in terms of end goals because, although the context and processes through which development occurs is important, to be able to direct that process and resolve the many problems associated with inappropriate development which the students identified, it is necessary to have a clear idea of what they would expect to achieve. The nature of aid and/or a range of resources necessary for development was also not discussed and there was little consideration of the management of a future resource base on which development can be sustained - the environment. The absence of the above factors perhaps suggests a need for them to be more specifically represented in curriculum materials and activities.

A CRITICAL ANALYSIS OF PHENOMENOGRAPHY AS A
RESEARCH METHOD IN THE CONTEXT OF THIS STUDY

In the results of this study it was found that the outcome space was being determined by the context of the conversations rather than the meanings which students attach to particular phenomena which phenomenography seeks to disclose. There exists a contradiction here in that although meanings are not specific to context, phenomenography is concerned with the relationship between the individual and the phenomena. The particular experiences of the individual will shape and influence the conceptualization and perception of a phenomenon. The decontextualised categories of description are an end product of that process by students and the only process of conceptualization taking place, is that of the researcher in finding the 'core' meanings of the students' comments.

In my analysis I am selecting students' meanings based on my own interpretation of them. I influence the outcome yet again by selecting my own categories of description from my interpretation of the statements and also influenced by my understandings of the issues. My own frame of reference is extremely important and relevant in the analysis as mentioned earlier.

Because different categories of description have been used

by me there is a question over consistency in the research methodology. This however may not be a problem if the importance of conversation context is valued. I categorised the statements from both Esher conversations together. If I had worked on them separately would I have come out with two different outcome spaces as I did between the Esher and Grey Coat conversations? The extent of researcher influence perhaps could then be more easily established or perhaps confirm that group dynamics and particular shared experiences within a group will always generate different outcome spaces confirming the importance of context.

Although the outcome spaces for the conversations on development are also different in arrangement many of the 'meanings' generated appear in both. However, the difference in arrangement again reflects the emphasis I interpreted as existing in the conversations as a whole. The Grey Coat students focused on the negative impacts of development rather than discussing the aims or a definition of development. This was more evident in the Esher students' conversations which have been categorised under values.

It is perhaps useful here to explore the relationship between the methodology of phenomenography and the philosophy of phenomenology since the analysis of the data in this study was more concerned with 'constitutive' phenomenology. This deals with the frames of reference

individuals use (dependent on their experiences) to make sense of phenomena around them.

Phenomenology is a philosophy seeking to understand the world as it is and distinguishing it from the subjective world of human experience. It initially provided a powerful critique of objective empirical science. It represents an interpretive science in humanist tradition.

"The common aim of humanist geographers is to describe man's geographical experiences as they are 'actually' experienced - as meaningful value laden experience prior to the abstractions of science." (Buttimer, 1976 in Clacherty and Ballantyne, 1993 p 29)

Phenomenology puts the emphasis of research on the individual.

"The relations which constitute knowledge are located between individuals and the phenomena of the world around them." (Saljo, 1993 p 303)

It is also seen as a method.

"...the systematic investigation of subjectivity...to study the world as it appears to us in and through consciousness."
(Tesch 1990 p 48)

Husserl^{quoted} (in Johnston 1986 p 343) sought to reflect on our presuppositions of the world and to focus on the way in which phenomena are actually given through a process of 'phenomenological reduction' to disclose the very essence of the phenomena or 'regional ontologies'. The very nature of reality was to be pursued. The purpose of this was to

"...ensure that the world could be identically reconstructed in each individual through a similar reflective procedure."
(Gregory in Johnston, 1986 p 345)

This essential nature of phenomena or structures characterising the world has been called descriptive phenomenology.

"The task of phenomenology is to depict the basic structure of our experience of various aspects of reality and to make us conscious of what the world was like before we learned how to see it."
(Marton, 1986a)

Pickles (1985) also argues that the task of phenomenology is to clarify the general structure of the world and reality. However, the search for the essential nature of phenomena does not necessarily guarantee success because this in itself is not reality. Reality is a construction of interpretation. Constitutive phenomenology deals with this epistemological question of the relationship between the individual and phenomena. It deals with frames of reference and structures of meaning which constitute multiple realities. The focus in phenomenology shifted from suspending our presupposed ideas and subjective thoughts on phenomena to seek reality to recognising reality as a subjective stance we have with phenomena and exploring the multiple determinants of reality as experienced.

Given the above context of phenomenology it is possible to develop a critique of phenomenography as a methodology. Phenomenography focuses on the individual, the

conceptualisation of particular phenomena and the qualitatively different ways in which people perceive them. This is akin to constitutive phenomenology. Phenomenography goes one step further in attempting to explore patterns in the conceptualisation of meanings. However, in doing so it takes one step backwards towards descriptive phenomenology in decontextualising the meanings to find essential structures (outcome space determined by agreed categories of description) of a particular phenomenon. The resulting description of reality is in itself subject to the perceptions of the person seeking that reality, hence the concerns about the methodology used in this study in terms of minimising the influence of the researcher (given the varying outcome spaces, figures 15-18, for different groups of sixth formers). There appears to be an inherent contradiction in the methodology of phenomenography. If multiple realities of a phenomenon exist (according to phenomenology) then so do multiple perceptions of data gathered by researchers. Constitutive phenomenology focuses on the world as experienced by an individual and surely this must influence the perceptions and understandings which phenomenography seeks to disclose. There cannot be one rule for the observed and another for the observer.

Constructions of reality and meanings attached to phenomena are

"...rooted in the previous experience, belief systems, values, fears, prejudices, hopes,

disappointments and achievements of the constructor..." Guber and Lincoln, 1989 p 143)

and influence phenomenography in two layers, that of the individual whose ideas are being elicited and that of the researcher in searching for patterns in conceptualisation.

These multiple realities or constructions imposed on the data begs the call from adherents to the methodology for inter-rater reliability. As stated earlier, this takes us full circle back to descriptive phenomenology and the desire to observe reality (the reality perceived by others in this case, rather than reality itself, if indeed it exists) without our own cultural and ideological experiences impairing our vision. Perhaps what would be most interesting is inter-rater reliability, not to agree on a limited number of conceptual understandings of a phenomena, but to reveal the full range of interpretive understandings. Indeed Guber and Lincoln (1989 p 143) suggest that

"...constructions can only be judged adequately by criteria appropriate to the paradigm out of which the constructor operates."

Hence the influence of researcher bias in the methodology used is as important in understanding student perceptions in a particular context as is the context of their own conversations.

The research aims regarding the investigation of the perceptions of environment and development issues was best

served by using the categorisation techniques of phenomenography but only to the extent of categorising the factors and phenomena that influenced the exploration of environment and development issues. In other words the context of the conversations and indirectly the geographical education received by the students and the wider influences experienced beyond the classroom.

CONCLUSION

To concentrate on agreed categories of description of environment and development issues is to indicate some sort of end point of investigation or enquiry. This is not the focus of critical action research, the methodology used in the second part of this thesis. It is in this instance that the context and structure of frames of reference in any exploration or enquiry into phenomena are crucial. They give an insight into the thinking processes, provide a focus for a critical evaluation of those processes and can assess the extent to which students may be able to accommodate alternative frames of reference in the development of ideas about environment and development issues. Environmental problems were viewed as an impact of development although the complex interrelationships were not explored. The action research will therefore focus on developing a strategy to enable students to specifically explore these interrelationships and also the other areas they did not cover in their conversations. These were the

importance of 'actors' in determining environment/development issues. The impact of 'aid' set in the context of a global political economy and of course enabling students to identify alternative futures in helping them to identify and describe development objectives. The researcher interpretation of student perceptions on environment/development issues through the phenomenographical research will help facilitate the development of learning materials to enable them to make transitions towards other perceptions of reality in an interdependent world and clarify and reconstruct their own interpretations of geographical enquiry.

5. THE ACTION RESEARCH SPIRAL

THE PLANNING STAGE

The Action Research is set within the context of 16-19 Geography A level teaching. The action research aims to develop curriculum materials to facilitate student learning about an environment/development issue, in this case changing agricultural systems in Northern Yemen. The strategies used however should be transferable to other environment/development issues. The aim was to teach the material through two year groups (two action research spirals) studying the agriculture module of the 16-19 A level Geography Project course, reflecting on the outcomes of the first trial before continuing with the second action research spiral.

The students involved in the research were very much dependent on the circumstances within the schools I worked in and on the constraints of following and completing an examination syllabus. The first action research spiral took place at Esher Sixth Form College where two parallel groups of students were following the changing Agricultural Systems module of the syllabus. My sample size was therefore limited to those two groups of students (thirty students in all). There was only one group of four students following the course at Grey Coat Hospital School

where I worked during the following school year. As the emphasis is on the collection of data, which has qualitative value, the sample size of student groups is small. The data collection involved several weeks of lessons to complete the initial phenomenographical research, the curriculum unit and evaluation. The context is therefore firmly set as a group of students known to me which helps in the clarification and interpretation of their understanding and perceptions through the curriculum unit. It also enables additional evidence to be collected from other units of work in which the ideas and skills the students might have developed from the research curriculum material may have influenced their own critical learning skills applied to other curriculum units or learning situations.

The validity of the research comes from the extent to which the action researcher is aware of the ideological context in which she is working, how closely the research integrates theory (interpreted within this ideological context) and the practice of teaching. The research also has validity in terms of the cycle of reflection and development of educational practice through a succession of action research spirals. The small sample size can be justified in that it is not the knowledge outcomes as such that can be quantified from a large number of students, but the quality of thinking that occurs throughout the process. The evidence of this was to be gathered by analysing students' individual work, groupwork outcomes (written and

oral) tape recorded and transcribed conversations and general classroom observations of discussions noted.

Planning the curriculum unit first involved looking at the first component of the double dialectic (explained in chapter 2), namely the dialectic between theory and practice. In the context of this research this constituted a discrepancy between a perceived relationship between environment and development issues and the practice where students rarely have an opportunity to explore this relationship and have a limited understanding of it. My perception of the theory is based on my reading of environment/development literature and the influences of the debate on sustainable development. I also identified a discrepancy between the influence of critical theory in educational debate and the provision of opportunities in classroom situations for the development of political literacy among students and the skills for critically challenging evidence put before them.

The second component of the double dialectic is the relationship between my own theory and the wider context of social structures and relations. This involves a contradiction between the development of my own practice in providing opportunities for critical learning and the constraints imposed by a social structure which reproduces dominant technocratic attitudes/approaches to environmental issues and maintains a rich world hegemony in approaches to aid and development. However, in planning the

module of work on changing agricultural systems in Yemen, the dominant ideology governing social structures and relations provided an opportunity rather than a constraint. A World Bank information document representing the dominant ideology was used in exercise three to explore the ideological assumptions that lie behind the text and hence to develop critical analytical skills for students to 'read' other material or images in non-educational settings.

Exercise 2 was devised to develop 'integrative' or 'relational' non-linear thinking in order for students to take a more questioning stance to the problems and issues put before them such as 'what caused this problem? what consequences arise as a result of policy or action taken by individuals or groups? The exercise is based on ideas taken from the technique of 'concept mapping' as described earlier in chapter 3. The aim is for students, however, to identify the concepts themselves as a group regarding the collapse of the traditional farming system in Yemen from resource material/information given to them. By arranging and linking the concepts on paper, the students build their own cognitive structure or 'reality' of the geographical issue through discussion, altering, deleting and reorganising ideas and links between the factors/concepts influencing the issue in question. The result is a systems diagram representing the group's understanding of the situation.

Although there is a heuristic aim to this exercise for the teacher in obtaining an insight into the reality of the issue as perceived by the students in order to assess their understanding of the issues but there is also a emancipatory aim for the student. If students can

"...structure, enrich and reconstruct their own experience then... (they are) ready to study critically, the structures of others."
(Ghaye and Robinson, 1989, p. 124)

In this way critical evaluation for an effective participatory role in society (in terms of critical theory/education) is enhanced for the student.

Exercise four was then devised to develop critical thinking further in terms of the critical evaluation of material to detect bias and vested interests in policies, plans and actions taken by groups in society.

Exercise five was used to assess the extent to which my activities in critical evaluation would enable students to identify alternative solutions to the problems they had studied and identify constraining factors in realising the effective implementation of solutions. It was also to be a measure of how far students might support the existing dominant attitudes and structures in society or to what extent they proposed to reconstruct social relations. The curriculum unit of work developed is described in detail below.

CASE STUDY CURRICULUM UNIT BASED ON EDUCATION FOR
SUSTAINABILITY

AGRICULTURAL CHANGE IN YEMEN

The aims of this unit of work were:

- to devise a curriculum unit incorporating the components of education for sustainability;
- to assess the extent to which students were able to view environment and development issues as integrated issues;
- to assess the extent to which students could compare and evaluate different approaches to tackling environment and development problems, recognising the social and political structures involved and varying interests served.
- to assess the extent to which students can put forward their own alternative solutions and justify them in relation to the problems identified and evaluation of development initiatives already implemented.

Background to the case study.

Agricultural systems in North Yemen for centuries have involved interdependent relations between the farmers in the mountains and those in the plains. In order to make best use of infrequent violent rainstorms in the summer months a system of water harvesting and transfer was developed between the two areas. With increased development in the plains and the introduction of groundwater pumps to provide increased irrigation for intensive farming, the traditional system collapsed. A lot of this development was funded by World Bank loans. A development project was introduced to the mountains by the United Nations Development Programme (UNDP) in an attempt to revive mountain communities and the environment on which they depend.

THE CASE STUDY

CHANGING AGRICULTURAL SYSTEMS IN THE YEMEN

As a Yemeni agricultural researcher, you have been asked to sit on a committee which will meet to

(a) establish the main problems facing agricultural systems in
North Yemen

(b) develop strategies for dealing with the problems

You must read the briefing material given to you to identify the key problems for discussion at a committee meeting later in the month.

First of all, in order to present a seminar to visiting European university students on the traditional agricultural systems in North Yemen, you need to prepare an OHP summarising the key points. Follow the exercises below.

EXERCISE 1

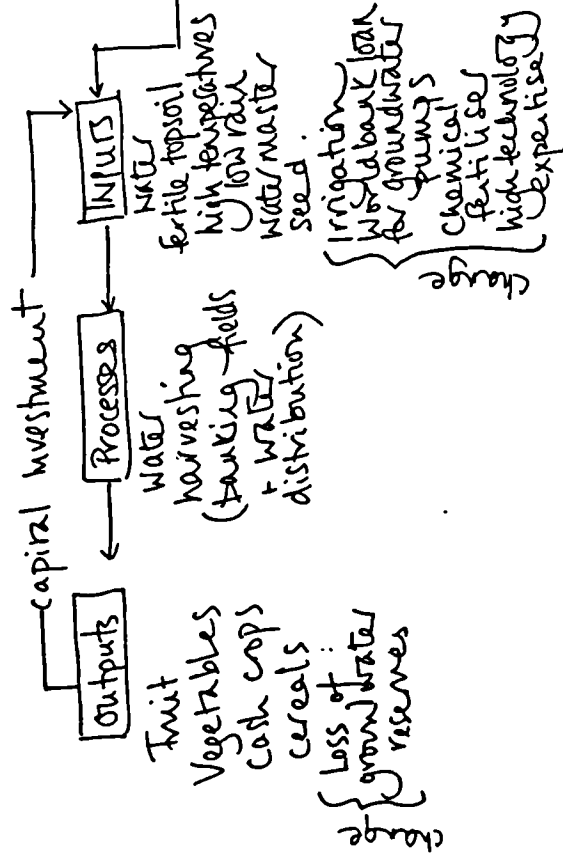
An investigation of the traditional agricultural systems

To construct a systems diagram (fig.19 p 160) of the traditional agricultural systems in North Yemen from the video 'Hanging Gardens of Arabia' and the information on the information sheet (fig.20 p 161)

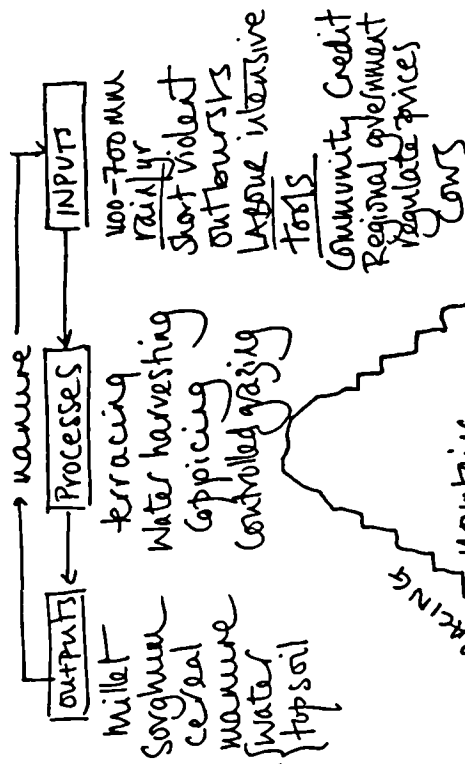
Figure 19

Traditional Agricultural Systems in North Yemen

Lowland farming



Highland Farming



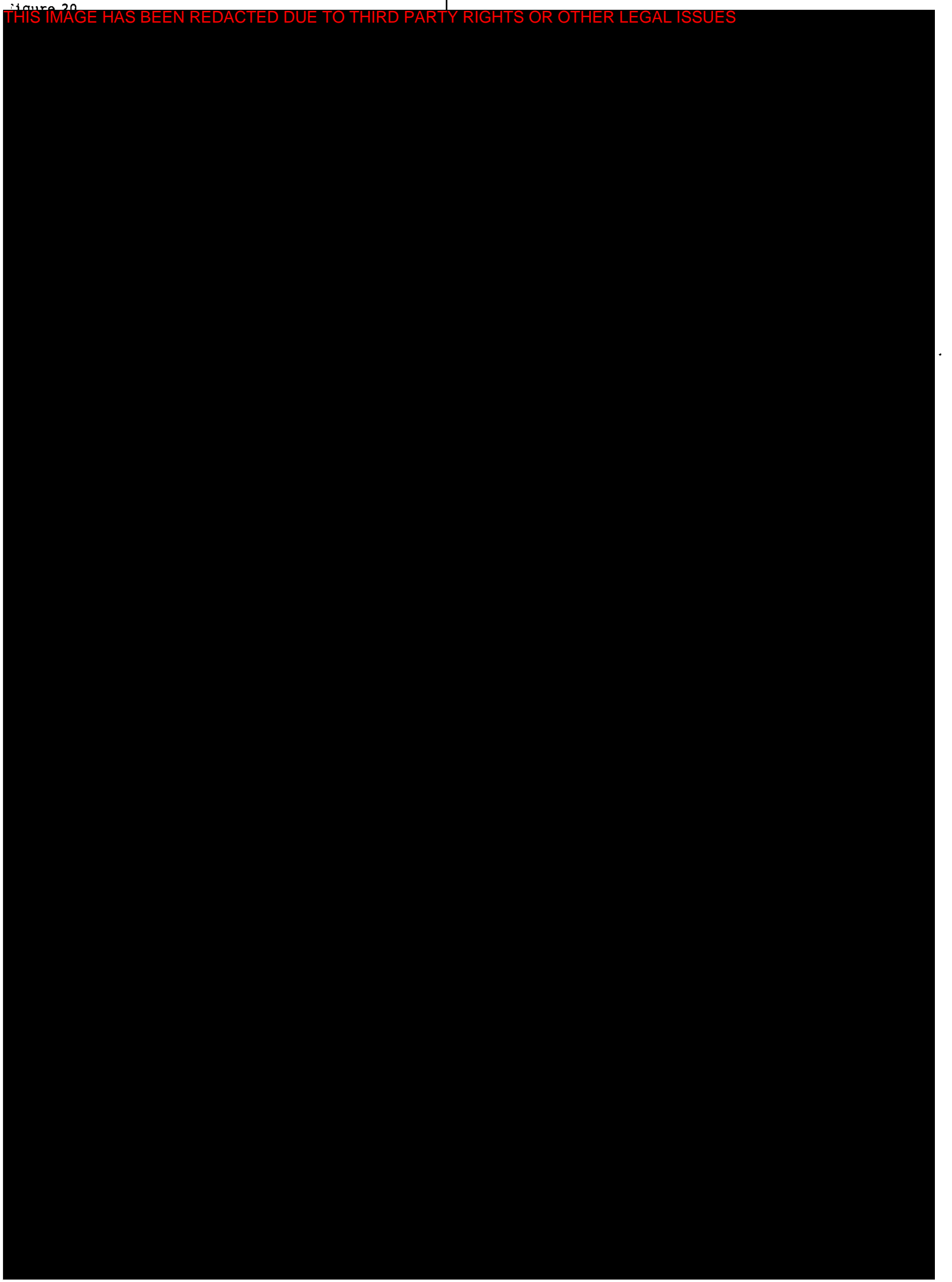
terracing
Mountains of North Yemen
3000 m

Tihama Plains

Red Sea

etc...

Figure 20



EXERCISE 2

Problems for North Yemen agricultural systems

1.

From the video and the information sheet identify all the problems facing agriculture in North Yemen.

2.

Pool ideas in groups of three and write out final set of problems on individual cards.

3.

Place cards on a large sheet of paper and place in order of importance.

4.

Stick the cards down and draw linkages between the problems ie. which problems cause other problems. Annotate the diagram with the reasons for the relationships between the problems if necessary.

EXERCISE 3

Sustainable Development

In this exercise students are introduced to the concept of sustainable development.

1.

Brainstorm the concept first of all.

2.

Give students the statement in the middle of fig. 21 (p.164) and ask them for ideas as to how this might be achieved or what it might involve.

3.

Finally discuss the components of sustainable development in fig.21 (p 164) and note that it involves both environment and development issues.

This exercise can be done as a class or in smaller groups.

Figure 21

SUSTAINABLE DEVELOPMENT

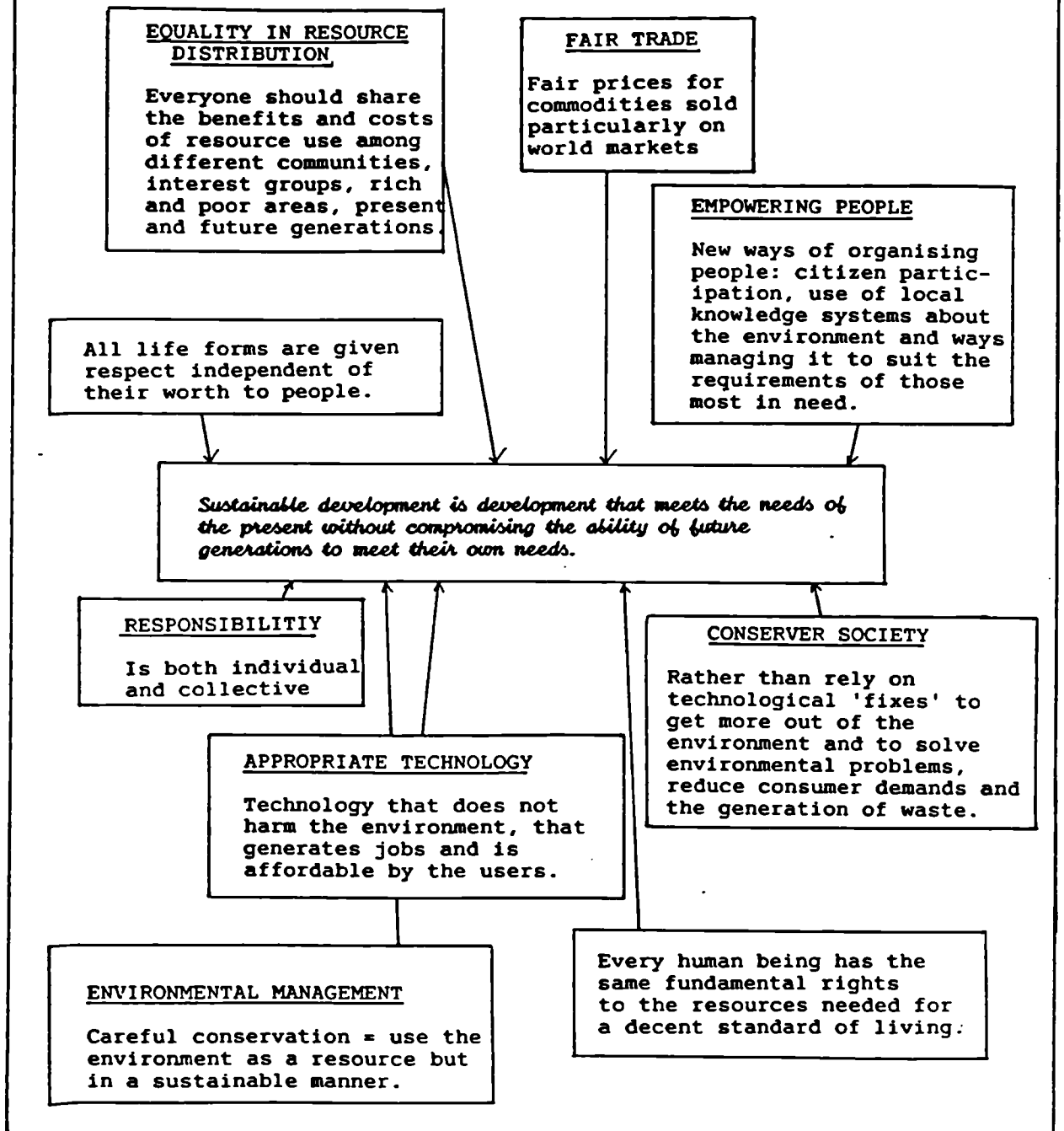


Figure 22

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EXERCISE 4

An evaluation of development solutions

In this exercise students are asked to critically evaluate the World Bank perspective (figs.24 & 25, pp.169-171) on development in North Yemen and the United Nations Development Programme (UNDP), (fig.23, p.168) perspective in the light of their knowledge about sustainable development. The World Bank analysis can be done as a class using handouts and an OHP of the source material. Fig.26 (p.172) provides some ideas for tackling the numbered points.

EXERCISE 4

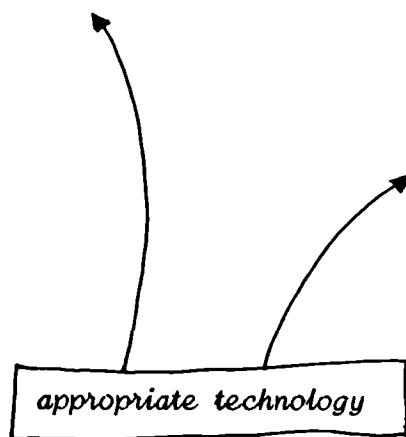
An Evaluation of development solutions

THE UNDP AND ARID LANDS INITIATIVE PROJECT

(a) Select evidence which shows that this project reflects aspects of sustainable development from the two sources. Use annotated web diagrams to collect case study evidence e.g.

*wire mesh boxes filled with
rubble to block gullies*

*Roottrainer -
small sheet
of moulded plastic
plant pots for tree
seedlings for reforestation
to prevent soil erosion*



(b) Add information to your previous notes about the causes of problems in the region .

(c) What are the likely short term and long term advantages and disadvantages of the UNDP project?

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Figure 24

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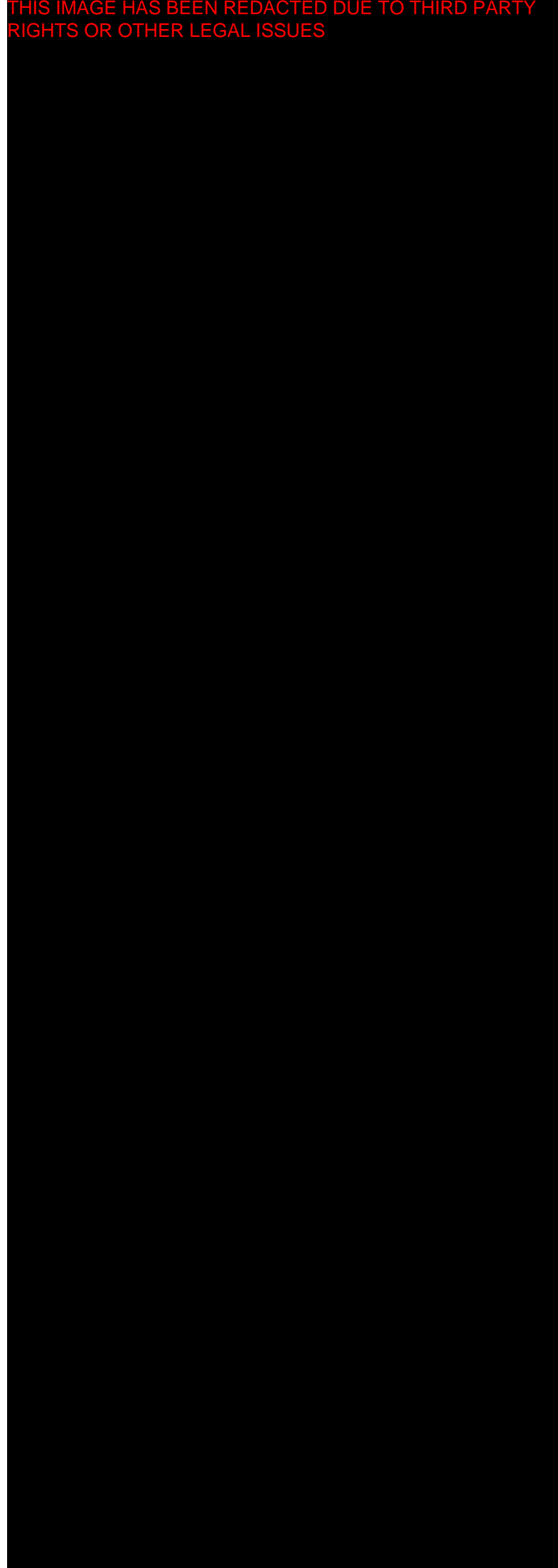


Figure 25

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Extension agents — "reasonably well-trained, mainly young, civil servants, some with degrees, some with technical training" was how an expert described them — have visited the majority of the farm families in the project and given demonstrations on subjects such as how to introduce improved varieties of crops, how to use fertilizer and how to control pests. Five women agents have also been recruited; they go to the villages to talk about health, home economics and handicrafts.

Drawing up the Electoral Rolls

The agents have had a positive impact, Al-Salihi said, although there were constraints in the period after the two Yemens, (the Yemen Arab Republic in the North and the People's Democratic Republic of Yemen in the South) were formally merged in 1990. The civil servants, for example, also had to draw up electoral rolls for the first, freely-held, national elections. Another constraint is transport. Seventy motorcycles were recently sent out to Yemen, but some extension agents felt that these were unsuitable because of the terrain. There is now a debate over whether mini 4-wheel drive vehicles might be more suitable for future purchases.

The traditional crops here are millet and sorghum, but because of changing diets, wheat has also become important over the last 20 years, Michael Nightingale said. He is a World Bank agricultural economist who has worked in both the Northern and the Southern regions since 1987.

But, he added: "The big impact over the last 10 years has been the transfer to fruit and vegetables. This was done entirely spontaneously by the private sector. It was done for financial reasons. They could see the benefits. There was increasing demand. The introduction of fruit trees was like an explosion. It needed no particular stimulus from the government."

Pilot orchards were set up, mostly of apples and peaches but with coffee plantations as well — to teach pruning techniques and use of fertilizers. A recent report noted that "the interest of farmers in apples has considerably declined recently, and they generally feel that peaches are more profitable."

Meanwhile, nine nurseries are now operating which produce seedlings of fruit and coffee. They produced 622,000 root stocks and seedlings in 1992, together with 22,000 mother trees.

These products are not exported because the quality is still low, Nightingale said. "You need a substantial number of specialists and you don't develop those until you have a substantial wealth of experience. It's one of the few hopes for exports for Yemen." But, he added, "in horticultural products the international competition is severe."

At the mid-point point in the project, almost all the crops show yields above what was estimated. The yields were particularly high for vegetables — 100% over projection for tomatoes and potatoes and 250% over projection for onions. Some of the farmers were interviewed, and it seemed clear that those who had worked closely with the extension agents were the most successful. And investments in irrigation, supported by the project, have particularly helped those who grow fruit and vegetables.

As for livestock, some 325,000 sheep were vaccinated against rinderpest and sheepox, as well as being treated for other diseases. Animal husbandry programs have been held back, however, by a lack of qualified staff and a lack of research findings.

Creating Regional Agencies

The real impact of IDA, Nightingale said, had been in decentralizing the organization and support of agriculture. This had been through the creation of regional development agencies. "There are five of these in the North (the three governorates of Sanaa, Saadah and Hajjah make up one of them). With this decentralization, it became far easier to focus on the needs and priorities of farmers through extension. You can see this approach spreading into the South. At the same time, this was supported by the World Bank providing assistance in a national way for research. The research was oriented on selecting the best varieties of crops, in trying out new crops from outside and in testing the fruit and vegetables." (No 6. September 1993)

Figure 26

THE WORLD BANK PERSPECTIVE

This is an exercise in taking a questioning and sceptical stance to evidence in order to detect possible bias and to uncover the interests served by particular groups.

- (a) Read the World Bank Information Brief, source 1.
 - (b) Read through the World Bank at Work, source 2. At each numbered point analyse the statements or words underlined. Pose your own questions and use those below to help you.
 - does the choice of terminology affect the interpretation of the statement?
 - How valid do you consider the statements to be and why?
 - What interests are being served?
 - How might those who offer the information benefit from it being accepted unquestioningly as correct?
 - Can you detect any contradictions or has any information been omitted?
 - (c) Go back to source 1. To what extent do you agree with statement A?
 - (d) Read statement B. What positive links between income growth and the environment exist?
 - (e) If you have identified links do you think they should be "aggressively exploited"?
- Support your answers with detailed explanations.
- (f) Assess the ability of the World Bank to contribute to sustainable development in Northern Yemen.

Teacher Resource

Analysis of World Bank Source 2

1.

Implies that population growth threatens water supplies. What else threatens water supplies for the majority? Fruit farming on the Tihama Plains. Also growing urban concentrations of people increasingly divorced from natural environments have higher consumption levels.

2.

Word 'allowed' implies fault. Whose fault? Individual farmers or wider changes in the nature of society? Whose responsibility is it to prevent soil erosion?

3.

Why are towns and other countries so attractive?

4.

Why are water levels declining? Do farmers have reason to complain? Over dependence and use of ground water supplies.

5.

What are no-interest loans?

6.

Why is it so important in the light of number 5, to respond to a cash economy and the market place? To pay back the loan. Who controls the market place?

7.

Why is irrigation in the mountains important? For 2000 years farmers have developed efficient water harvesting techniques.

8.

Who are the extension workers?

9.

What sort of technical assistance - surely there would be no need if appropriate technology was introduced? Who pays?

10.

Is this not the ancient method of water harvesting? Why then do they also need to know about 'modern irrigation' Contradiction.

11.

Why not use indigenous varieties? Why use fertiliser? How much does it cost? Who pays? Where is it made? Who benefits from the sale? What are the environmental effects?

12.

Gender bias.

13.

Where is it made? How much does it cost? Who pays?

14.

Benefits but what about disadvantages?

15.

Why is international competition so difficult to compete with? What are the risks and why?

16.

Investment helps those who grow fruit and vegetables.
Is this at the expense of anyone else?

17.

Who runs and makes decision at these agencies?

EXERCISE 5

Put forward your own solutions to the problems resulting from the changing agricultural systems in North Yemen.

Additional background reading on Yemen can be found in the Geographical Magazine September 1990 - Fragile Unity in the Arab World by Sarah Searight pages 10-14.

THE ACTION AND REFLECTION

STAGES

IMPLEMENTATION OBSERVATIONS/DATA COLLECTION AND DATA

ANALYSIS

This section contains comments about the implementation of the activities, observations and data collection in the form of students' work and taped conversations. Included is also some analysis of the data collected. A reflective overview of the module of work and the results in terms of student learning related to the original research questions will follow this section.

Exercise 1

The video programme 'Hanging Gardens of Arabia' was edited to remove the discussions of solutions to the problems in Yemen as it was thought this might influence the students' ideas on how to tackle the problems. One aim of the research was to establish to what extent students used their knowledge of the causes of the problems to devise strategies to deal with them. In retrospect this was probably unnecessary since students were subsequently given two sources of

information about contrasting approaches to the

problems. However, the edited video programme did then allow students to concentrate on the nature of the area, the agricultural systems and the causes of problems facing Yemen. The programme set the scene for the subsequent enquiry into the issues surrounding the environment/development problems.

Exercise 2

In this exercise students were asked to construct a systems diagram of the problems facing North Yemen agricultural systems and linking them in terms of cause-effect relationships. This was done in groups of three or four students. There were six groups altogether. The diagrams (figures 27a-32a pp.180-182) were used as data for the analysis of student understandings of the links between environment and development issues.

The exercise proved to be a good way of raising awareness of the interdependence of a number of factors in the case study. Students were able to identify cause-effect relationships between environment and development factors. The discursive nature of the exercise also enabled students to develop and clarify their understandings of the issues and inter-relationships to a certain extent.

Although students were asked to identify problems from

the video and the background notes, the problems they wrote up on cards were limited to extracts taken from the text in most cases. This reflects a degree of what Ghaye and Robinson (1989) describe as 'context bias' in concept mapping. This is perhaps inevitable, given the nature of and need for written resource material to be made available to the students. The exception was group A who also produced the most complex and detailed systems diagram.

Social, political and economic factors were seen as the causes of environmental problems and in three out of the six groups they were placed at the top of the systems diagram, indicating that these were considered most important in context of change in North Yemen. It was interesting that in two out of these three diagrams more than one problem was placed at the top of the diagram reflecting the multiplicity of causal factors of equal importance.

Figure 27a

GROUP A

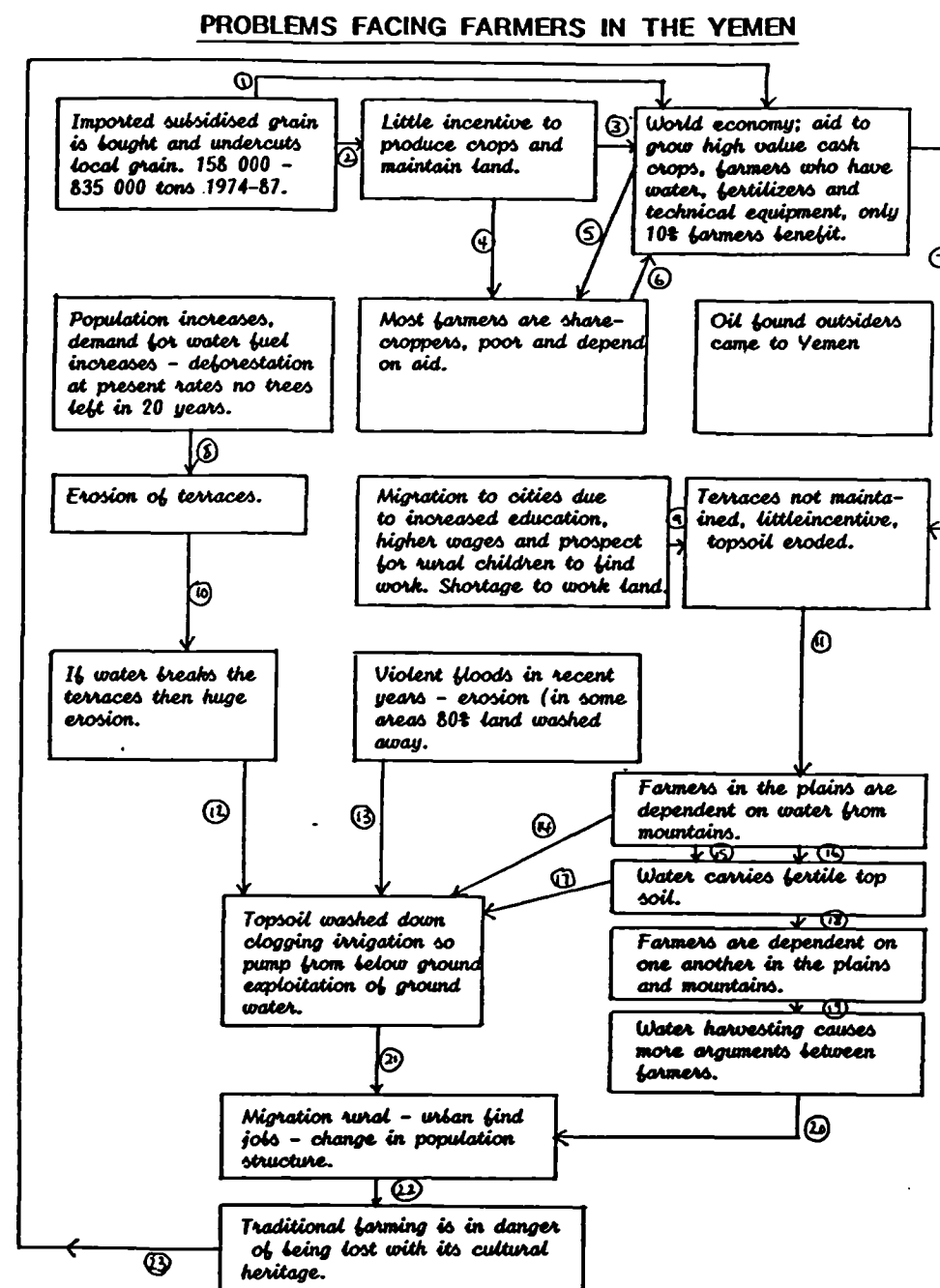


Figure 28a

GROUP B

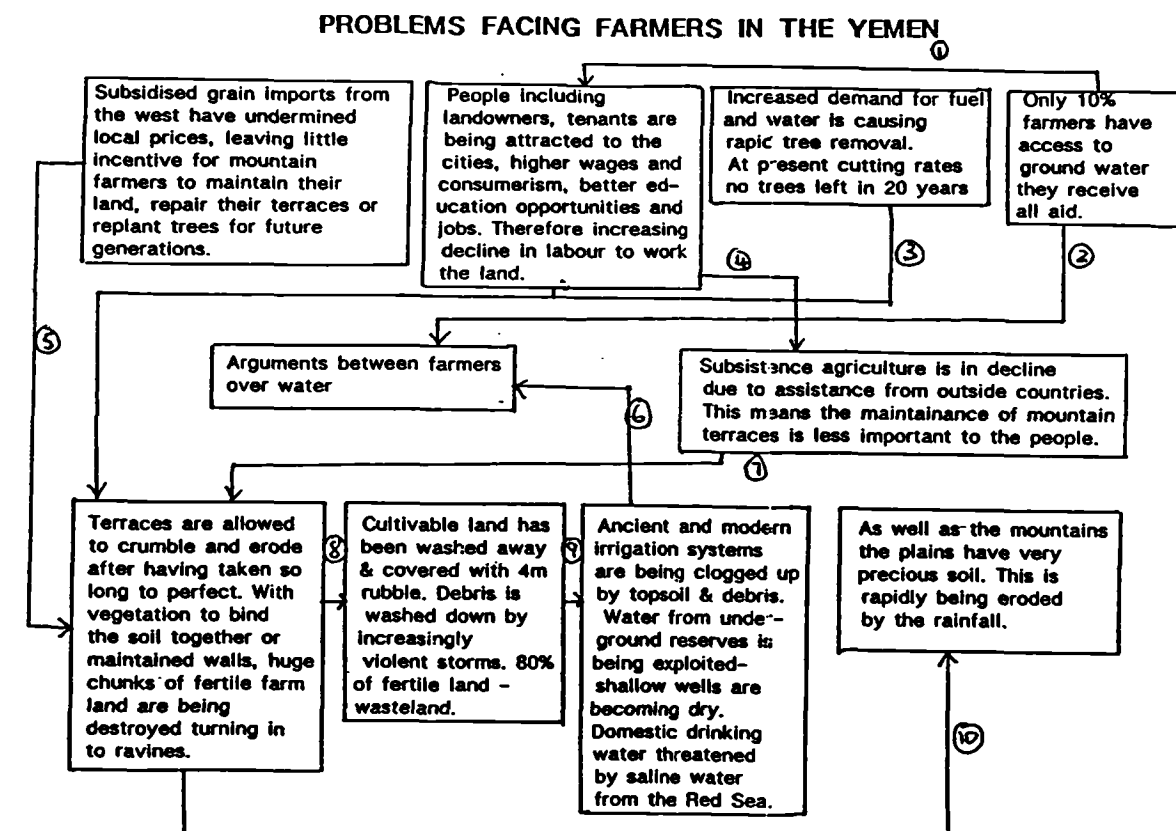


Figure 29a

GROUP C

PROBLEMS FACING FARMERS IN THE YEMEN

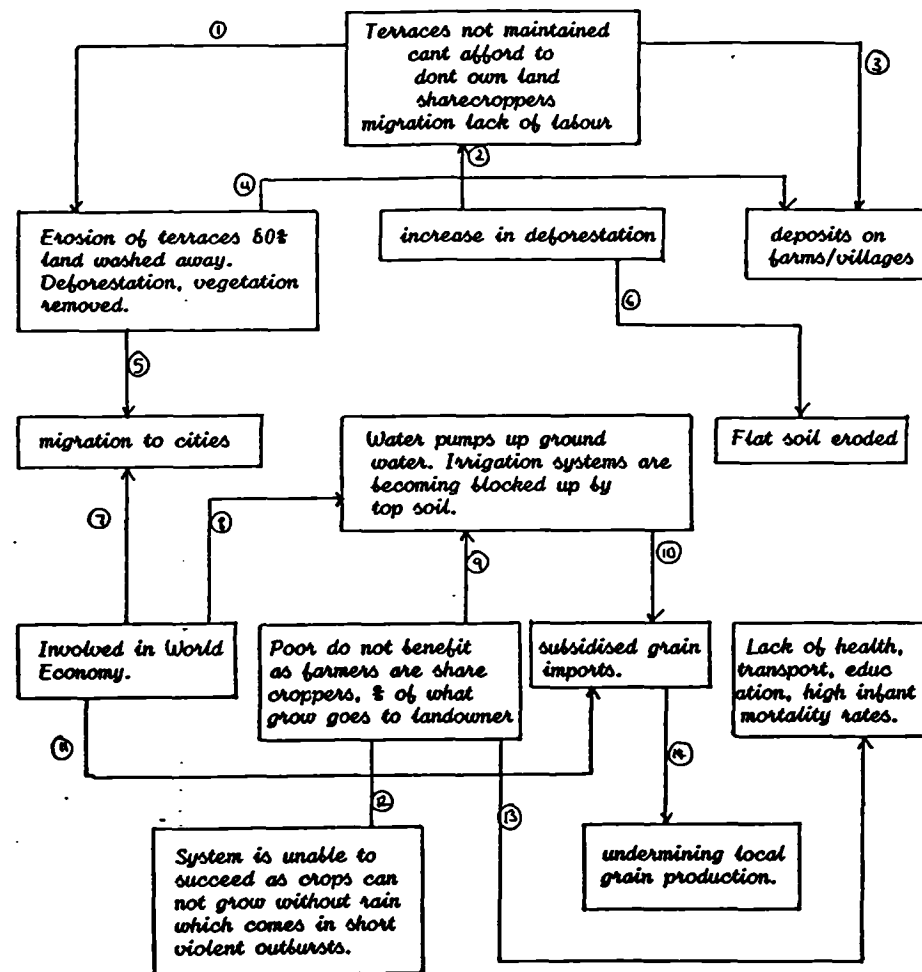


Figure 30a

GROUP D

PROBLEMS FACING FARMERS IN THE YEMEN

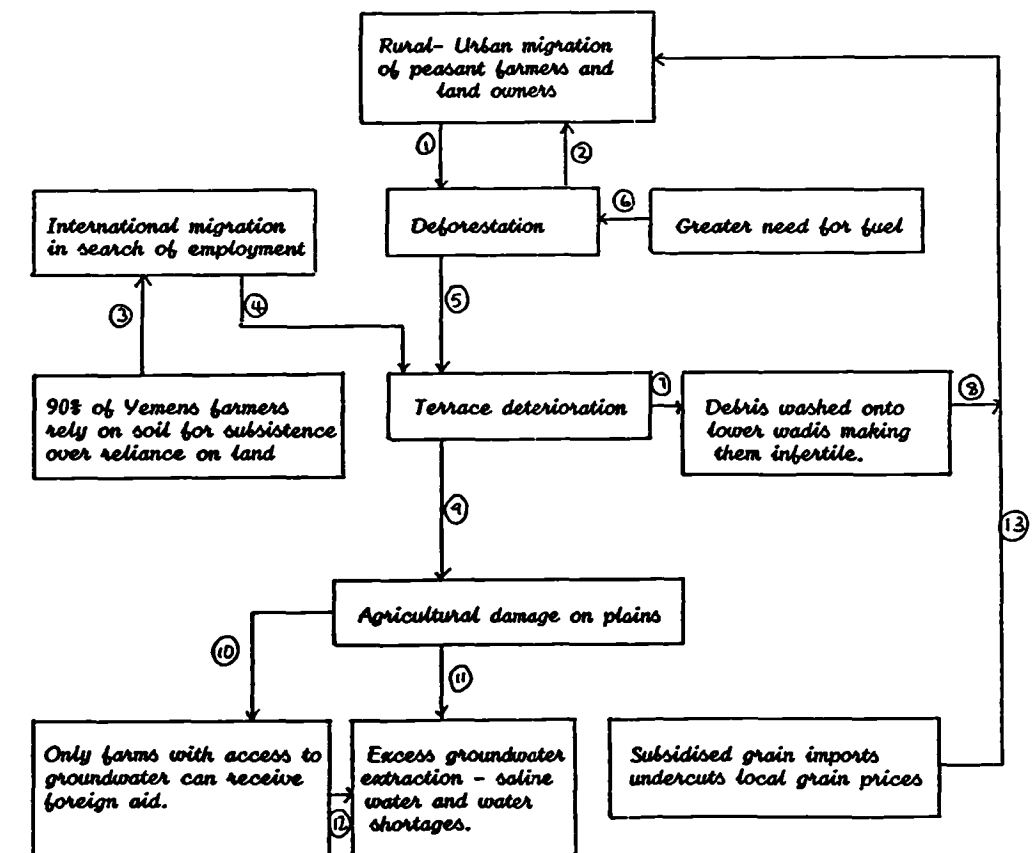


Figure 31a

GROUP E

PROBLEMS FACING FARMERS IN THE YEMEN

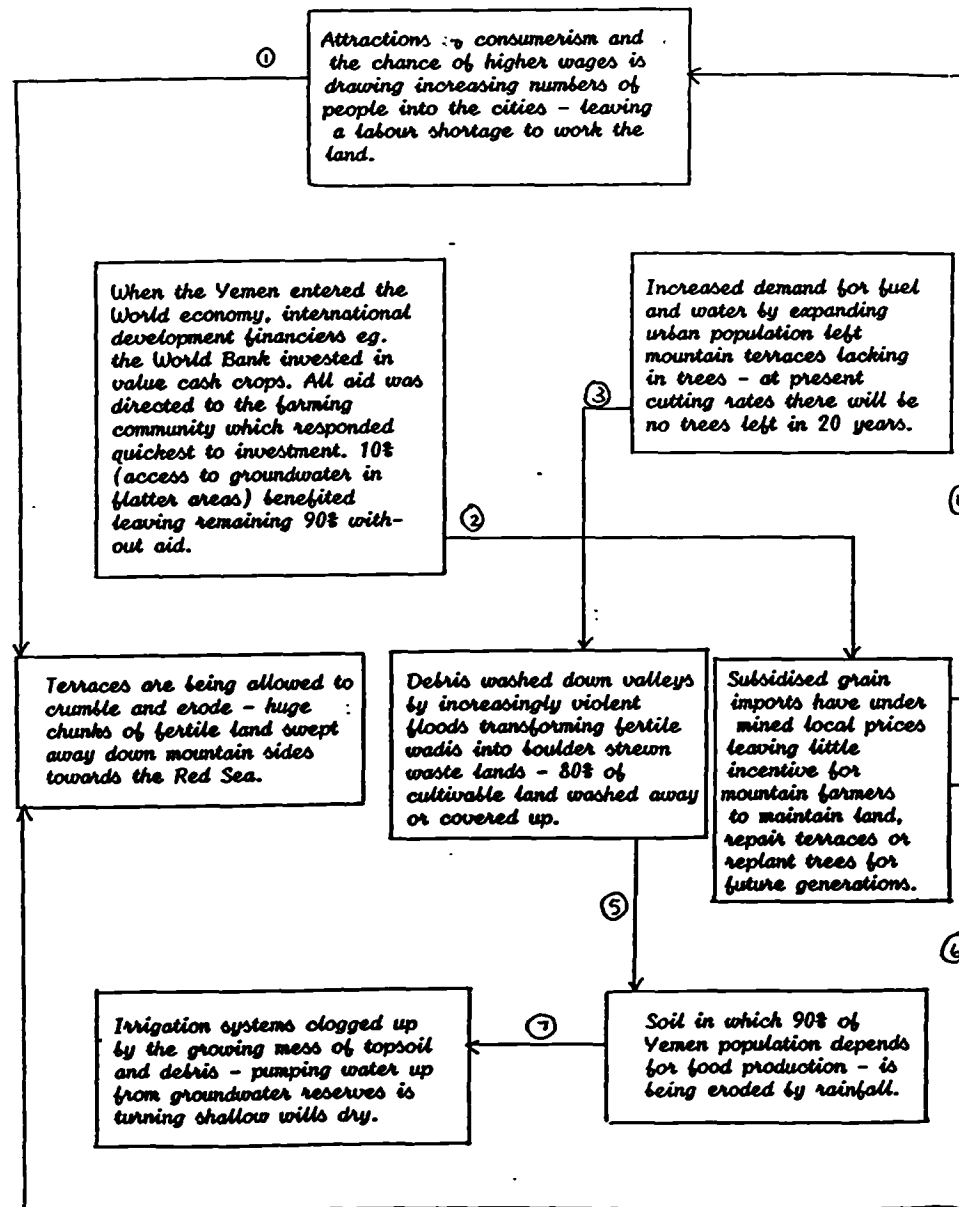
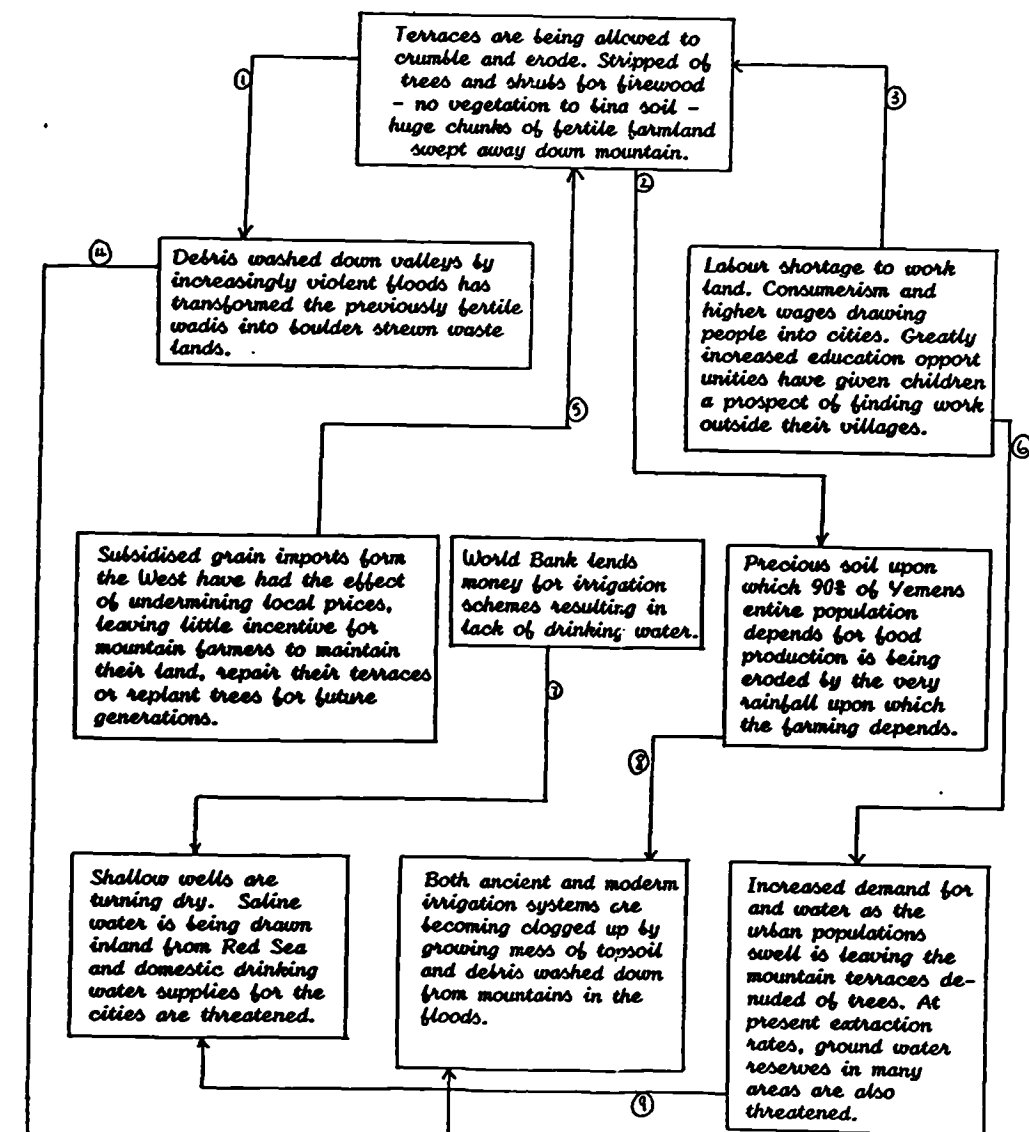


Figure 32a

GROUP F

PROBLEMS FACING FARMERS IN THE YEMEN



```

graph TD
    1[1 Imported subsidised grain is bought and undercuts local grain. 158 000 - 835 000 tons. 1974-87.] -- 2 --> 3[3 Little incentive to produce crops and maintain land.]
    1 -- 4 --> 5[5 World economy; aid to grow high value cash crops, farmers who have water, fertilizers and technical equipment, only 10% farmers benefit.]
    3 -- 4 --> 6[6 Population increases, demand for water fuel increases - deforestation at present rates no trees left in 20 years.]
    3 -- 5 --> 5
    5 -- 6 --> 5
    6 -- 7 --> 8[8 Most farmers are share-croppers, poor and depend on aid.]
    6 -- 8 --> 8
    8 -- 9 --> 9[9 Oil found outsiders came to Yemen]
    8 -- 10 --> 10[10 Erosion of terraces.]
    9 -- 11 --> 11[11 Terraces not maintained, little incentive, topsoil eroded.]
    10 -- 12 --> 12[12 If water breaks the terraces then huge erosion.]
    11 -- 13 --> 13[13 Migration to cities due to increased education, higher wages and prospect for rural children to find work. Shortage to work land.]
    11 -- 14 --> 14[14 Violent floods in recent years - erosion (in some areas 80% land washed away.)]
    11 -- 15 --> 15[15 Farmers in the plains are dependent on water from mountains.]
    12 -- 16 --> 16[16 Topsoil washed down clogging irrigation so pump from below ground exploitation of ground water.]
    13 -- 16 --> 16
    14 -- 16 --> 16
    15 -- 17 --> 17[17 Water carries fertile top soil.]
    16 -- 18 --> 18[18 Farmers are dependent on one another in the plains and mountains.]
    17 -- 18 --> 18
    18 -- 19 --> 19[19 Water harvesting causes more arguments between farmers.]
    19 -- 20 --> 20[20 Migration rural - urban find jobs - change in population structure.]
    16 -- 21 --> 21[21 Traditional farming is in danger of being lost with its cultural heritage.]
    20 -- 22 --> 22[22]
    21 -- 23 --> 23[23]
    22 -- 23 --> 23
    23 -- 24 --> 24[24]
  
```

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GROUP B PROBLEMS FACING FARMERS IN THE YEMEN

Figure 28b

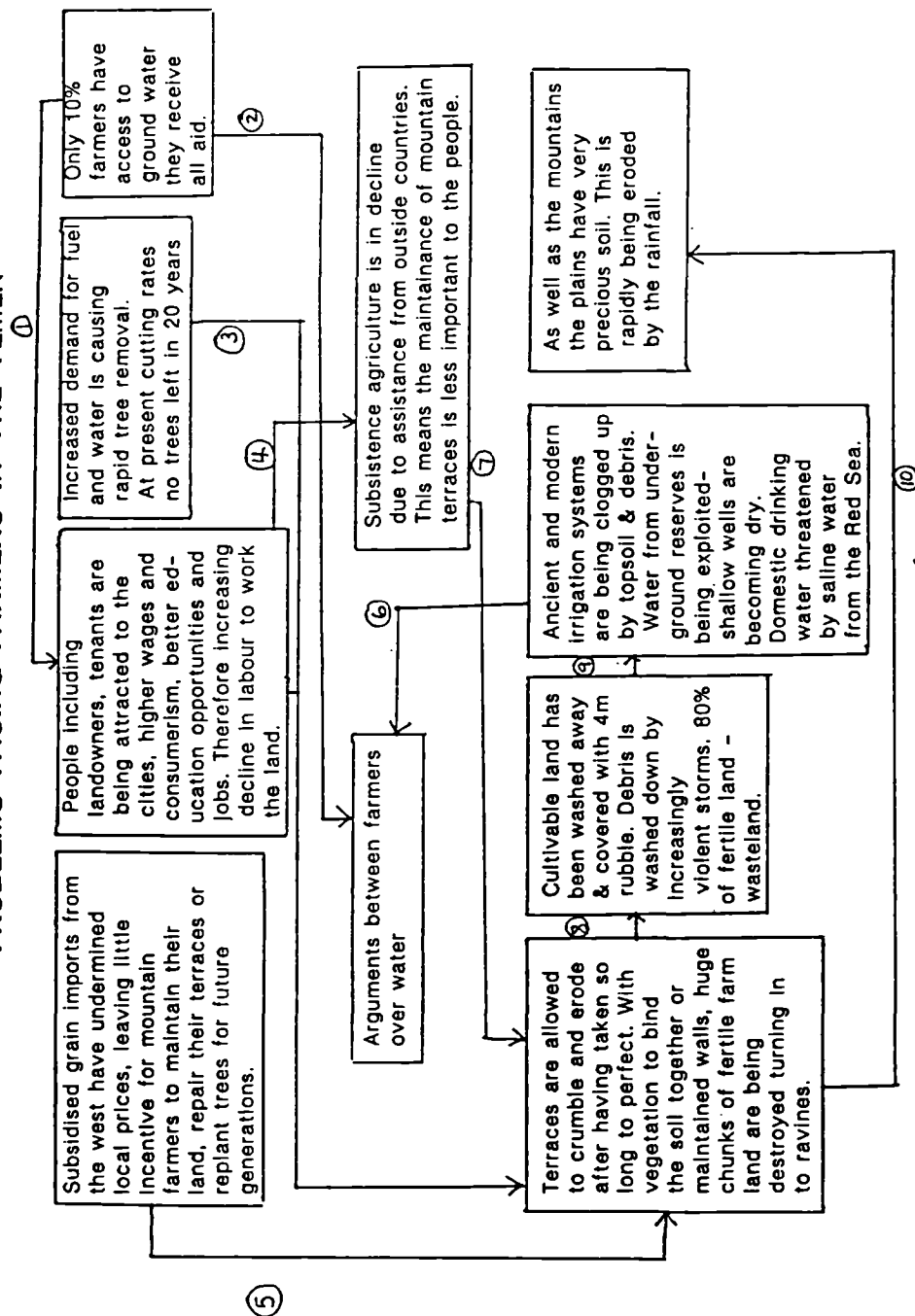
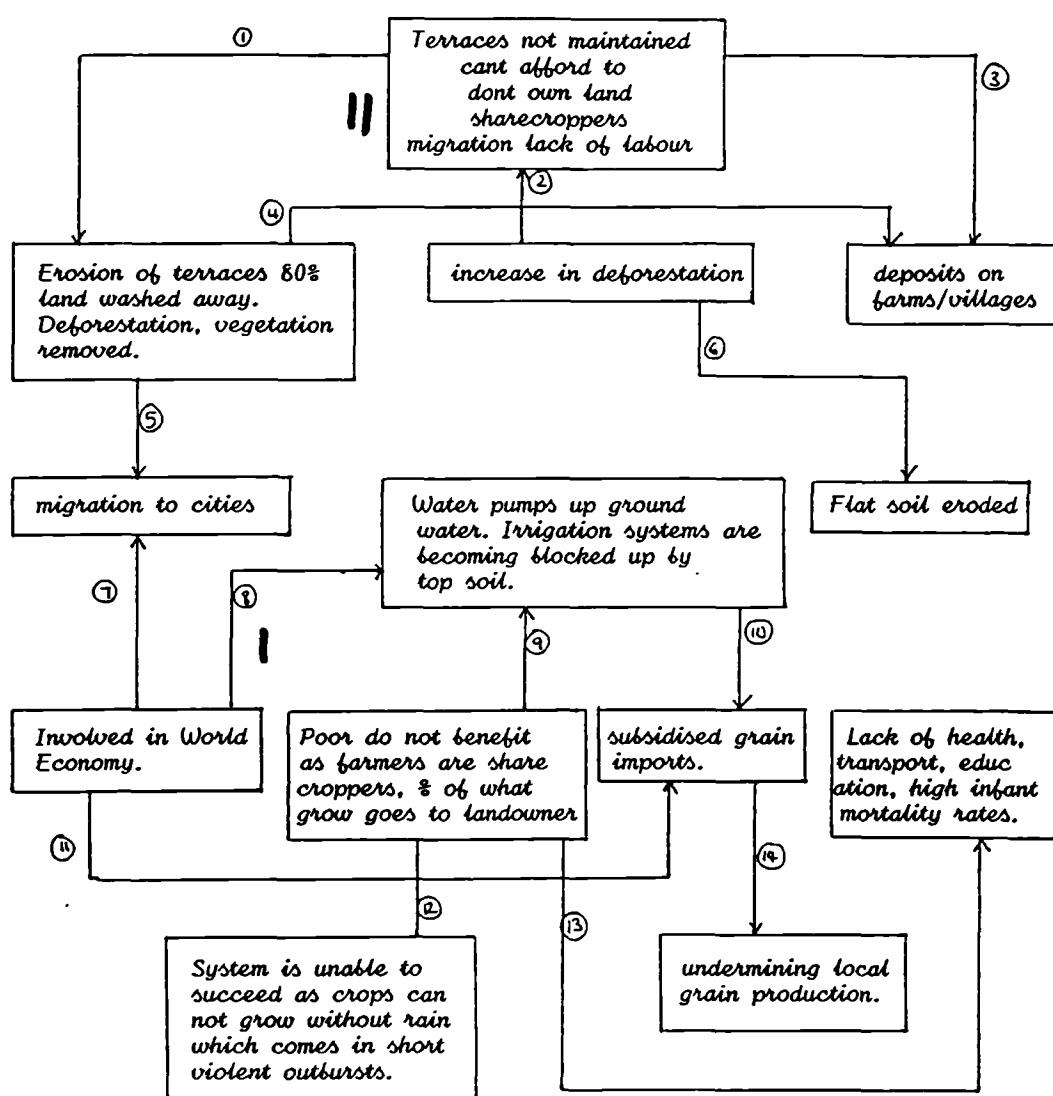


Figure 29b

GROUP C

PROBLEMS FACING FARMERS IN THE YEMEN



GROUP D

Figure 30b

PROBLEMS FACING FARMERS IN THE YEMEN

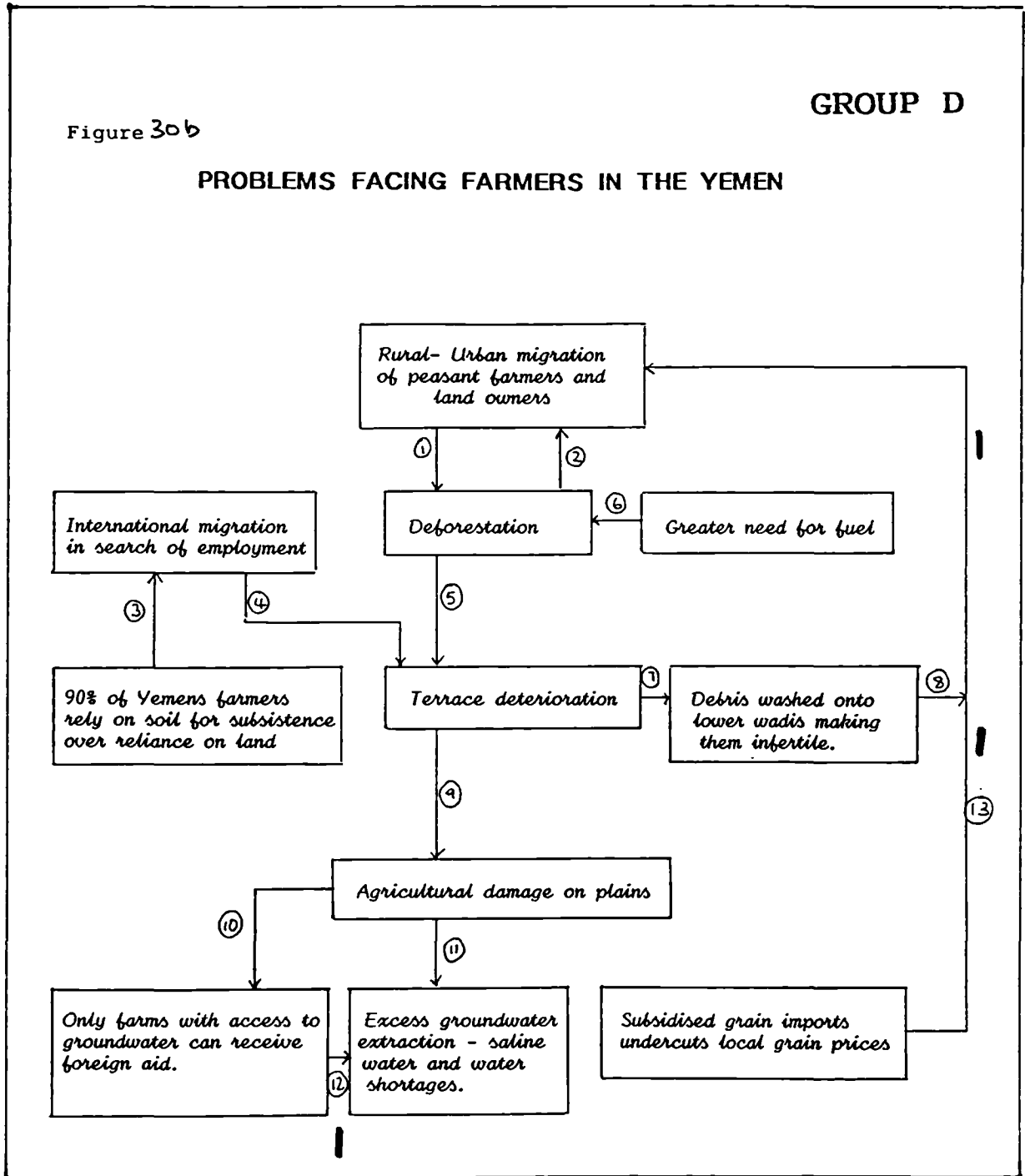
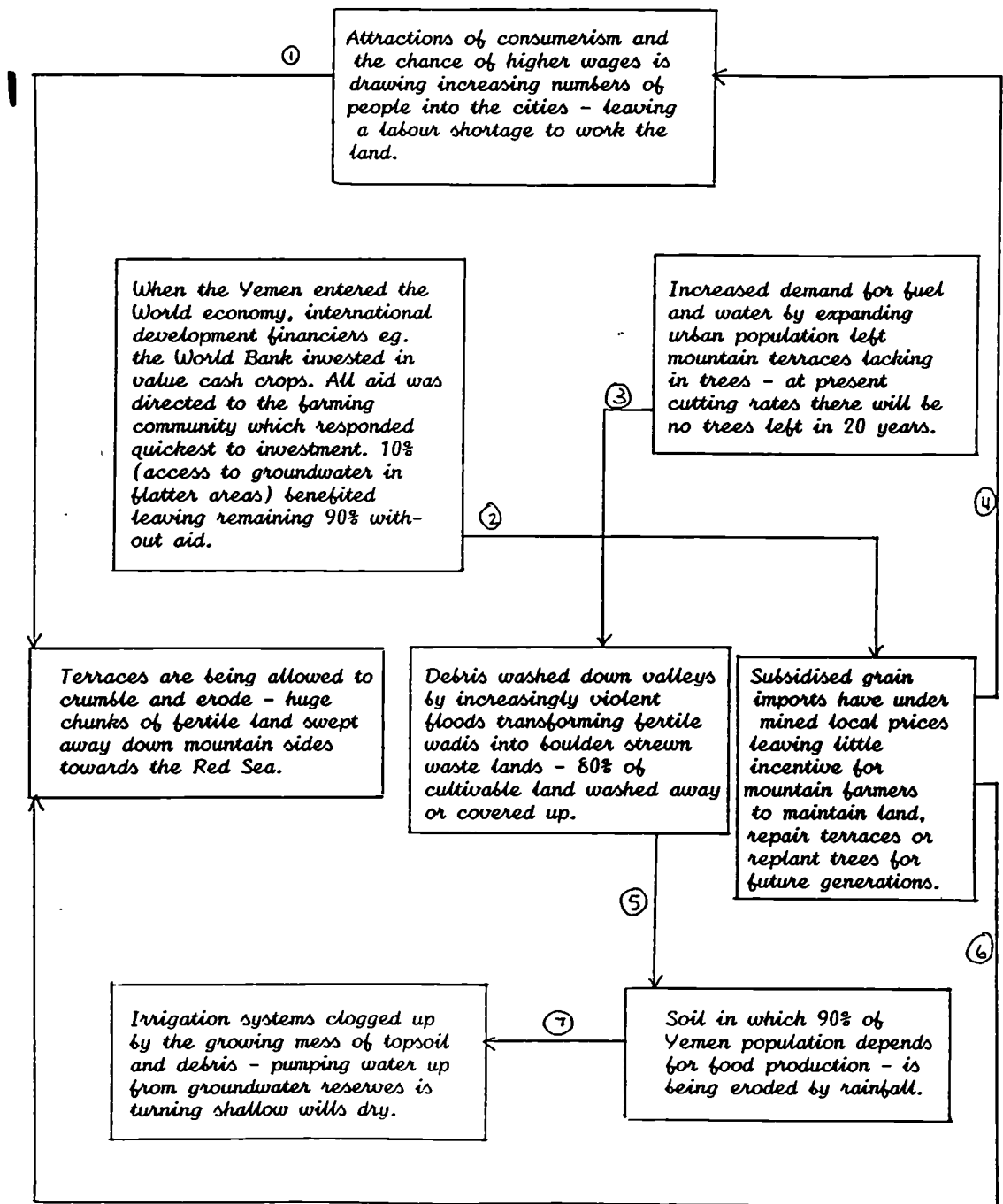


Figure 3|b

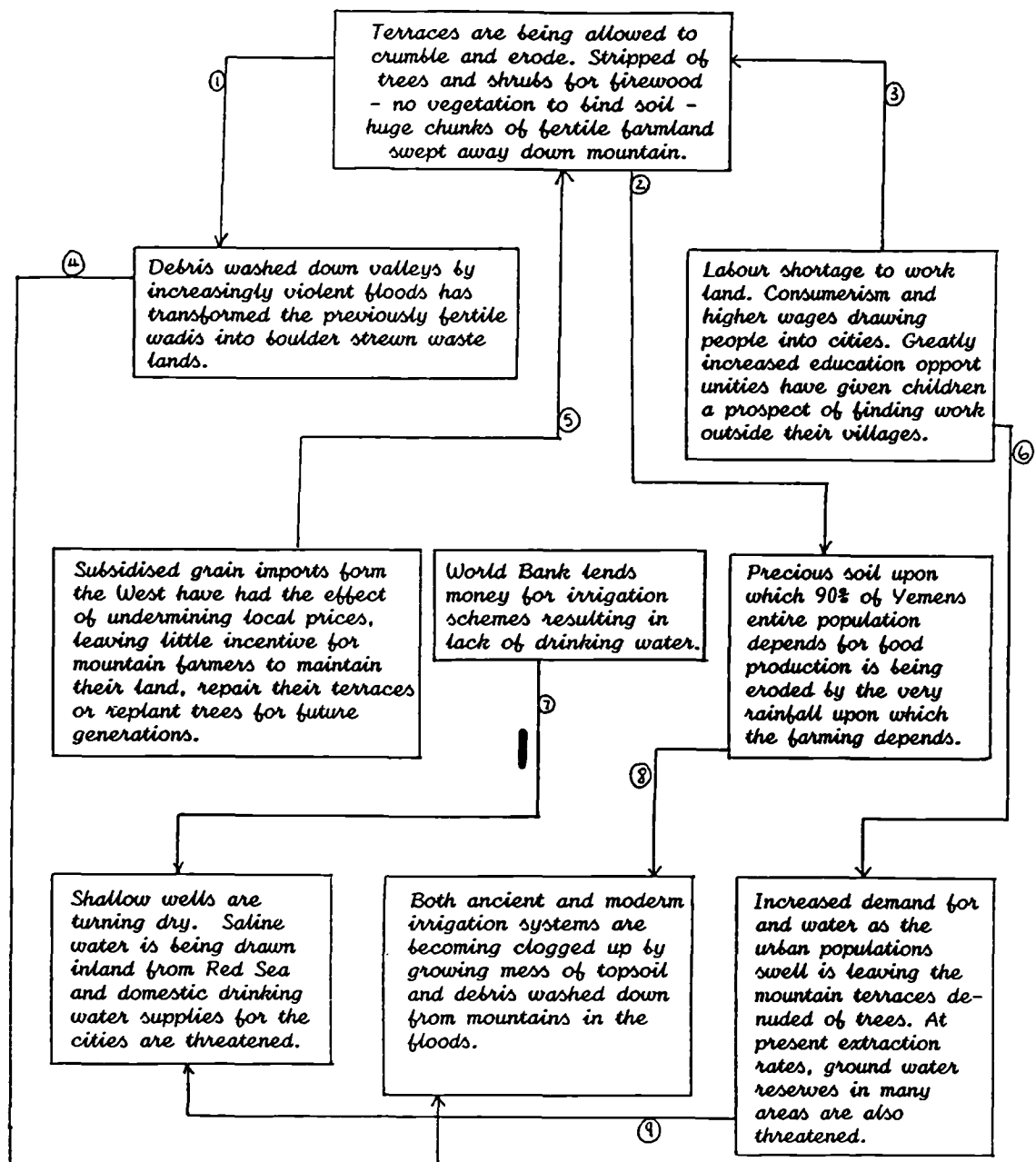
GROUP E

PROBLEMS FACING FARMERS IN THE YEMEN



GROUP F

PROBLEMS FACING FARMERS IN THE YEMEN



DATA ANALYSIS

To assess the extent to which students perceived there to be links between the environment and development issues in this context of agricultural change in the Yemen, a scoring system was devised. One point was given for each direct link in the three categories below and one point for each stage in an indirect link.

A -links between development project strategies and environmental problems.

B -links between the economic and political factors in the broader context of Yemen as a developing country and environmental degradation.

C -links in between environmental problems created and subsequent development patterns.

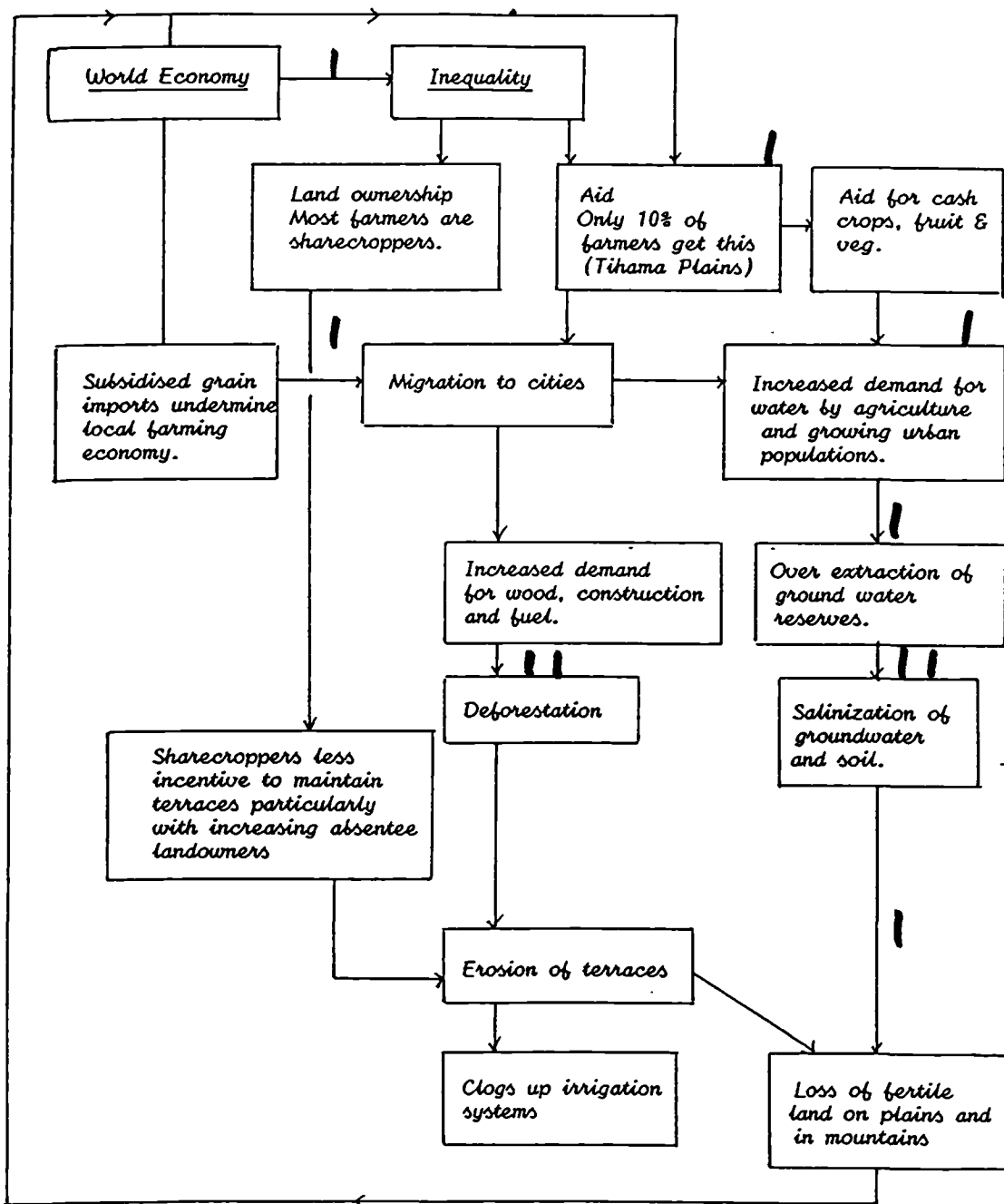
The greater the final score, the greater the students understanding of the complex interaction of the factors contributing to the situation in North Yemen. A second set of the diagrams are annotated to show how they were scored. The total scores are shown in fig.33 (p. 190). A discussion followed the exercise and fig. 34 (p. 191) was used to illustrate the key relationships.

Figure 3.3 STUDENT LINKS BETWEEN ENVIRONMENT AND DEVELOPMENT PROBLEMS
TAKEN FROM SYSTEMS DIAGRAMS A - F

	ECONOMIC, POLITICAL/ ENVIRONMENT		DEVELOPMENT PROJECT/ ENVIRONMENT		ENVIRONMENT/ DEVELOPMENT		TOTAL
	D	ID	D	ID	D	ID	
GROUP A	3		1			16	20
GROUP B		9		8			17
GROUP C	3						3
GROUP D		8	1		1		10
GROUP E	1	5		2			8
GROUP F		5	1				6
OHT		15		10		4	29

D = Direct links
ID = Indirect links

Figure 34

PROBLEMS FACING FARMERS IN YEMEN

SUMMARY OF MAIN CHARACTERISTICS OF SYSTEMS DIAGRAMS

GROUP A

This was the most complex diagram in terms of the students' attempt to define a range of problems. Although there are many cause-effect relationships indicated (scoring 21), some are not fully developed, the group having run out of time. The students have recognised the impact of political, social and economic factors which dominate the top half of the diagram (the links between them however should have faced the other way round - links 2 and 3). They also recognise regional inequalities despite the traditional interdependence between the plains and the mountains (links 15,18,19). These problems and those of irrigation systems being destroyed lead nicely into migration out of the region reinforcing the development route Yemen finds itself taking - three chains of links (10,12,21,22,23), (11,14,21,22,23), (11,15,18,19,20,22,23) - all leading back to the world economy. This group have recognised cyclical inter-relationships between development, environmental problems back to development issues. Migration is seen as a cause and consequence of environmental problems.

GROUP B

Again, political, social and economic factors dominated the top of the diagram. These all lead to environmental problems in the mountains and the plains. The diagram is less complex than that of group A with fewer links between cause-effect relationships. Links 6 and 7 were treated as one due to the box between them containing repetition of other causes included. Clear relationships were identified, although none between environmental problems leading to development issues explicitly. It could be inferred that clogged irrigation systems and over-exploited ground water reserves could pose a development problem, however, questions would need to be asked to the students to validate any assumptions.

GROUP C

This diagram indicates that the students failed to clearly identify and synthesise the issues. The problems are not well defined and lack detail. There seems to be very little logic to the organisation of problems on the page. The lack of terrace maintenance is at the top with limited explanation of the causes of this, and not linked to the wider influencing factors such as subsidised grain prices undercutting local production and the lure of the cities. Although the influence of the world economy in Yemen is represented

in the bottom half of the diagram it is not connected to environmental problems. This diagram scored only three.

GROUP D

Although this diagram was limited in detail there were clear cause-effect relationships identified. Again rural-urban migration, a result of subsidised grain imports was seen as a cause of terrace deterioration. A result of the terrace collapse was then identified as declining fertility of fields in the plains. There was very little development of other factors considered for example, inequality in aid provision at the bottom of the diagram. There is an attempt to show how environmental problems might exacerbate the cycle of poverty and the deterioration of the environment as fields become infertile then even more people migrate out of the area (links 8-13). The students have identified this cyclical cause-effect relationship.

GROUP E

This diagram featured strong political and economic causes to the problems facing farmers in the Yemen put within the top of the diagram. These were logically linked to terrace collapse and soil erosion (links 1, 2, 4 and 6). Wider impacts were identified in the plains due to the erosion in the mountains (links 5 and 7)

although terraces eroding hasn't been linked to debris washed down into the valleys.

GROUP F

A good cause-effect diagram although terraces eroding was seen as the major problem leaving economic and political factors lower down in the hierarchy. These were, however, recognised as causal factors for terrace collapse (links 3 and 5). There is a good attempt to link increasing urban populations and increasing demand for resources leading to deforestation and decreasing ground water reserves (links 6 and 9).

Two groups of students agreed to have their conversations taped while they undertook exercise 2. The transcriptions are included in appendix 2. These conversations were used to investigate further, the way in which students made sense of the relationships between the problems facing farmers in Yemen and their causes. A difficulty with the conversations was that the students often referred to problems and causes on their cards without explicitly describing them in the conversation. This made it difficult at times to follow their arguments from the tapes and to relate this to the pattern they built up on the diagram.

However, it was possible to select some evidence to support their completed systems diagrams and explain

some of their links.

Group E focused to start with on the environmental problem of eroding terraces. This emphasis was soon shifted to consider the impacts of subsidised grain imports and out-migration. This appeared to be clearly understood and explained in the course of their discussions. Although the students did recognise underlying factors contributing to some of the environmental problems, they did get stop short of explaining exactly *how* these factors related to erosion of the terraces. For instance student ST couldn't explain to student J how the distribution of aid linked up to any of the other problems

"...90% don't get aid because they can't respond quickest.."

"So how does that link up to the rest?"

"I don't know. It's one of the problems."

(aid in the plains encourages over extraction of ground water leading to salinisation and lack of aid in the mountains forces people off the land, leading to lack of terrace maintainance and subsequent erosion). The

students also did not explore the possible reasons for increased demand for fuel. Their limited explanation of possible relationships was reflected in their low score (8) for their systems diagram.

Group A in contrast were able to suggest more relationships between the problems. Migration and it's causes was the main focus of the discussion. The group thought in a more non-linear way in terms of cause-effect relationships. They identified a cyclical process - the poor farmers becoming poorer leaving the land as a result of inappropriate aid policies and trade agreements, only reinforcing Yemen's dependence on imported grain as farmers leave the land and increasing numbers of particularly urban poor demanding further aid. Aid was seen as a cause of problems facing farmers in Yemen

"We can put that with the world economy and the lack of aid"

"It's aid to the wrong places"

and aid was also seen as a consequence exacerbating the problems

"Imports lead to aid because they're being undermined. They need aid then."

Exercise 3

Sustainable development was an unfamiliar concept to the students. The concept was brainstormed by students and the principles were built up progressively around the definition.

This was an information giving exercise in preparation for exercise 4.

Exercise 4

The students were asked to explore and evaluate two development strategies against the concept of sustainable development. Initially students were given World Bank statements I had devised myself as no alternative resources were available. However, at a later stage in the year I found the World Bank information sheets. Revision before the A Level exams enabled me to return to the case study and trial the new material with the students as explained in exercise 4 (p.166). In the light of the students' knowledge of the case study and their more developed understanding of sustainable development (applied to other case studies in the course of the year), the students were able to question and assess the numbered statements on the document. If students had used this in the course of the module I think it would have enabled them to develop more informed strategies to dealing with the problems

in exercise 5.

Exercise 5

Groups A to D were asked to come up with solutions to problems facing farmers in Yemen (fig. 35, p.200). My aim was to ascertain the extent to which the students

(a) thought about solutions in relation to the causes they had been studying

(b) incorporated the range of principles associated with sustainable development.

The degree to which the strategies the students suggested illustrate their understanding of the issues and the concept of sustainable development can be analysed using Redclift's adaptation of 'Environmental Planning Methodologies in LDCs (1987, p 144) shown below in fig.36 (p.201)

Figure 35

SOLUTIONS TO THE AGRICULTURAL PROBLEMS IN YEMEN

GROUP A

1. Better law enforcements for control of water.
2. Better allocation of world aid - help poor.
3. Young farmers incentive to stay in rural areas.
4. Flood control, filter top soil out of water then relocate
5. Local grain preference.
6. Deforestation monitored, if occurs afforestation must occur.
7. Aid or education for farmers as to dangers of Yemen on top soil erosion, increase awareness.
8. Tariffs on subsidised grain.

GROUP B

1. Give ownership of terraces to the farmers and educate them so they can maintain the land properly.
2. More education for the children so that they don't leave for the cities.
3. Make the area dependent on subsistence farming to reduce the assistance from other areas, therefore concentrate more on the maintenance of terraces.
4. Make water distribution more equal.
5. Proper meetings to stop arguments over water and discuss things logically.
6. Start a forestry scheme to maintain the amount of vegetation on the areas prone to erosion.
7. More water storage facilities that catches the flood water from the mountains, therefore saving water to be used for irrigation purposes.

SOLUTIONS TO AGRICULTURAL PROBLEMS IN YEMEN

GROUP C

1. Pay to maintain terraces, incentives such as more land.
2. Encourage afforestation, government pay?
3. Structured removal of trees.
4. Educate about problems.
5. Pass legislation to limit water extraction.
6. Educate about water management.
7. Reduce influence of world economy, limit imports, encourage dependence on local grain, emphasis on domestic productivity, include taxes on foreign goods.
8. Improve facilities in rural areas by diverting funds from cities, include taxes on wealthy, communist system?

GROUP D

1. Forest management, replanting to prevent soil erosion
2. Educating people about the problem.
3. Consider views from locals and aid agencies.
4. Restrictions on ground water extraction.
5. Cutting subsidised grain imports, make local grain more competitive.
6. Incentives to maintain terraces.
7. Engineering projects to protect certain lower areas from dangers of flood.
8. Taxes on oil extraction to pay for schemes and reduce dependence on World Bank.
9. Taxes on imports.
10. Reservoirs to trap flood water and reduce dependence on limited ground water reserves.
11. Give water masters more powers and authority.

FIGURE 36.

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LEGAL ISSUES



All groups demonstrated that they could assess the problem in an explanatory way by the nature of their systems diagrams and to a greater or lesser extent these were non-linear. Causal relationships were identified and influenced the solutions in that most groups suggested a need to reduce subsidised grain imports. This together with reducing the wider influence of the world economy (group C), illustrates the 'modifying of the policy context' (fig.36, p. 201), or institutional structures and mechanisms which influence Yemen's farmers. Group C also suggested a redistribution of resources (urban to rural) which reflects consideration of 'different options and 'strategies linked to normative development styles' (fig. 36, p. 201 - consideration of what ought to be rather than what is or will be, preferable rather than probable or possible futures). They suggested alternative future systems such as communism. Group C came up with the most radical solutions despite a poorly developed systems diagram. Changing institutional systems of resource allocation was also suggested by group A in terms of a 'better' allocation of world aid.

Group D considered 'local knowledge systems' and development agencies as instruments for change rather than rich world 'experts' as a prerequisite for more equitable, appropriate development. 'Local knowledge systems' and 'experts' could be included in Redclift's

table as (c) under policy instruments. There was also a recognition that the 'environment' is a system that responds to human activity (fig.36) rather than human activity influenced by environmental determinism. Three out of the four groups included incentives for farmers to maintain terraces, illustrating the concept that the degree to which the environment constrains agricultural productivity is dependent on the extent and quality of investment by people in the natural environment and the values they place on it.

Although the students showed the above examples of planning for sustainable development in Yemen, some of their suggestions also reflected 'environmental planning' (fig.36), ignoring the human development aspects of the problems. 'Prohibitions' (fig.36) featured in the strategies of all groups - ground water extraction controls monitoring of deforestation and enforcement of afforestation. The limits on ground water extraction are short term relief for the symptoms of wider development issues resulting in the collapse of an efficient integrated irrigation system shared between the highlands and the plains and the increasing water demands of cash crops. In this case the groups had not transferred the knowledge they had acquired from the systems diagram about cause-effect relationships to their solutions. Water masters were thought to need more powers (group D) and law enforcements for the control of water (group A) were thought necessary.

Again this is addressing the symptoms of wider development issues.

Although group A recognised the need to consider views from local people and aid agencies, they also demonstrated a paternalistic attitude towards the people of North Yemen in that along with groups B and C they thought that people needed to be 'educated' about the problems. This is an indication that there is still an inherent bias in the way that the students view the situation, perhaps reflecting the absence of significant information given by voices from the people of Yemen.

There is also evidence in the solutions that the students are confused about some of the issues. Statements 5 and 7 from group B, 4 from group A and 10 from group D indicate a lack of understanding about the problem concerning water. They seem to be concerned with limited water supplies which could be solved, they suggest by more water storage facilities, again forgetting that for 2000 years Yemen's farmers had successfully channelled, diverted and distributed the seasonal rainfall.

Although there is some evidence of planning for sustainable development by the students, their suggestions contain contradictory strategies, failing to fully integrate environment and development issues. As mentioned previously, their strategies may have been more consistent if they had access to the World Bank resource in

the course of the module. Their own solutions in retrospect could have been swapped around the groups and analysed for bias and validity by the others using the techniques adopted for critically evaluating the World Bank proposals.

REFLECTIVE STAGE

CONCLUSIONS AND REFLECTIONS

The students started the module of work on changing agricultural systems with some ideas concerning the factors influencing environment and development issues, although with limited perceptions of how the two conceptual phenomena might be related. The phenomenographical research illustrated that there was an appreciation of rich/poor world relations or the political economy, the structural mechanisms by which social relations are reproduced. The students demonstrated an awareness of various time and space scales and that attitudes and values played a role in the perception of issues. The students, however, had little awareness of the mechanisms by which change could occur. If environment/development education is to lead to emancipation or students becoming agents of change in society it is crucial they develop this awareness and that it be promoted through the curriculum materials of teaching and learning strategies.

In the course of the module on changing agricultural systems in Yemen, students were able to perceive a relationship between environment and development issues (research question 3) implicit in the systems

diagram they constructed on the problems and causes of agricultural change. The integrated, multifaceted nature of the problems was recognised by the students

"...they are all related." (appendix 2)

"They all link. They're all important. Without one you don't get the others." (appendix 2)

However, the way in which the links were made reveals an interesting pattern. The majority of links for all groups except group A were made between the environmental problems being the result of political/economic factors, thereby counter to the view of environmental determinism which I was afraid the students might take. Particular paths to development were also considered to have an impact on the environment. Therefore, environmental problems in themselves do not determine the ability of people to use the environment as a resource. It is people constraining their own future use of resources through indirect consequences of their decisions and actions. The full cycle was made only by group A in that environmental problems directly affected people reinforcing or reproducing the perceived need for more development of the same kind that caused some of the problems in the first place. During a class discussion at the end of the group exercises the ideas of group A

were brought to all the other students and the environment/development relationships were made explicit. The task was therefore successful in facilitating student thought about the interrelationship between environment and development issues. It must, however, be considered that the above assumptions are my interpretation of student understanding from what I consider implicit assumptions in their systems diagrams. The students would need to be interviewed to discover whether these assumptions were valid.

Exercise three provided a structured framework against which the sources in exercise four could be evaluated. The students found it helpful as a tool to analyse the text and sorting the information. Given that sustainable development has been used by such a variety of interest groups to justify policy, students do need to be aware of the contradictions in the promotion of the concept by certain groups and the sustainable development/sustainable growth debate. The activity emphasises the need for at least the majority of principles outlined in figure 21 if not all of them to be explored and applied as criteria for evaluating development strategies.

The exercise on bias with the World Bank source alerted students to vested interests being supported by the nature of statements. They were able to use their

knowledge of the problems in Yemen to challenge the statement. This activity was carried out informally by students in small discussion groups. Some of the students annotated the information sheet with their comments about the text. More important than the fact that students had applied their knowledge gained in previous exercises are the skills students need to acquire for critical evaluation of their experiences. These I did not feel were fully acquired and or developed by this activity. It would have been useful for students to write down their questions or challenge to the numbered statements followed by the evidence they had to support the challenge. The evidence is less important than the ability to know what questions to ask in order to seek the evidence and then to test it against the source and alternative viewpoints. In a way the students were being guided by their previous knowledge. Reflecting on exercise five is more problematic since it again relied on building on students' previously gained knowledge and ideas and the World Bank evaluation took place later in the year. The solutions may have been different if the work on bias had preceded it as mentioned in the analysis section. The solutions of each group contained a range of strategies from different ideological standpoints. However, there was a dominant theme that the people of Yemen needed to be alerted to the problems and ways of managing the environment. This view may not be held so strongly if the curriculum materials used contained

explanations of the situation from the perspective of people living in the area. The video programme used 'Hanging Gardens' (source unknown), the newspaper article 'Getting dug into Sheba's terraces' (Whitaker, 1992), the World Bank information (1993) and myself reflected the perspective of 'north'. There is, however, a constraint on the development of curriculum resources on environment/development issues in that materials from the perspective of people from the 'south' are hard to come by. The magazine 'New Internationalist' is a source of voices from the South. The articles could be adapted as curriculum resources. Not only should these viewpoints counter and diffuse the bias around a core/north-periphery/south structure to development/environment thinking, but also highlight the ways in which people are empowered to challenge the economic and social powers threatening environments and people. New Internationalist has provided a forum for people such as Medha Patka (a member of the opposition campaign against the Narmada Dam project in India), Serge Cherneghin (secretary general of the national federation of sugar workers in the Philippines) and Wangari Maathai (professor of the university of Nairobi and greenbelt activist in Kenya) to voice their views and inform people in the north. These voices should have a higher profile in curriculum materials.

The ideas and skills acquired by students in the course

of the module demonstrated that to a certain extent students had successfully explored conflicting interests, values and attitudes to environment/development issues and evaluated strategies to solve the problems. The final stage of critical environmental education was not, however, fully realised in equipping the students with the skills and ability to effectively challenge the causes of the problem with alternative social, economic and political relationships between people and environments. Constraints were recognised by some students in the further evidence of understanding sustainable development, but no attempts were made to explore ways of overcoming them.

The second cycle of the action research spiral is influenced and shaped by the reflection on the previous cycle above. In the light of this, it appears that in the next cycle, the solutions exercise needs to be far more structured in allowing for more critical evaluation of students' ideas by themselves and to give them opportunities to explain the rationale behind their ideas. This would perhaps give the researcher a clearer idea of how their ideas had developed and what had influenced those strategies put forward.

The teaching techniques used in the resources developed could be applied to any module of geographical enquiry in the context of environment/development issues so the research need not be centred in the Yemen in the next cycle of planning, implementation, data collection and reflection.

FURTHER EVIDENCE OF STUDENT UNDERSTANDING OF SUSTAINABLE DEVELOPMENT

This part of chapter 5 provides additional and different evidence from that of the case study module and was not part of the pedagogy used in the course of teaching the case study module about changing agricultural systems in the Yemen. The evidence below does provide an additional insight into the values and attitudes of the students in the context of continued work throughout the academic year on geographical examples relating environment and development issues.

Towards the end of the A Level course the Esher College geography students who had studied the Yemen case study on changing agricultural systems were given the exam question in fig.37 (p 214). The aim of this exercise was to see if the students were able to apply their critical analytical skills developed through the case study to another environment/development issue context and to further investigate their perceptions of the relationships between the environment and development. Their answers give an insight into their own perception of the contrasting views of technocentrists and ecocentrists and the debate between sustainable growth and sustainable development. They had studied the table in fig.38 (p.215) below in relation to environmental impacts of manufacturing industry earlier in the course.

Some of the students referred to this table and others to sustainable development. A selection of students answers is included in figures 39-43 (pp. 217-221).

It appears that some of the ideas and concepts discussed and investigated by students in the course of the year have influenced the way in which they view environmental problems or issues. Development issues have also been addressed in relation to the environment in some answers.

Figure 37

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FIGURE 38

	Extreme economist	Accommodator	Extreme environmentalist
VALUES	Economic development and the raising of people's material living standards must always have priority.	?	Economic development is only acceptable if it has no adverse effects on the environment.
BELIEFS	Wealth has to be generated in the first place if people are to enjoy the environment.	?	Industrial development causes irreversible damage to the environment, including loss of species, wildlife and habitat.
	The environment is a distraction which would raise costs, limiting a country's ability to compete internationally.	?	The quality of life is not measurable just in terms of income and material possessions.
	Damage to the environment is localised and its overall impact is exaggerated.	?	We have no right to destroy the environment. We have a duty to protect it for future generations.
	As people's material needs are met it will be possible to give conservation a higher priority.	?	Industrial development benefits governments and large industrial corporations rather than the people. It is ordinary people who suffer the consequences of environmental destruction and pollution.
ATTITUDE	In favour of industrialisation.	?	Against industrialisation.

Source: Manufacturing Industry: the impact of change, M. Raw 1993 p 20

The answer in figure 39 includes ideas from both ecocentric and technocentric approaches to environmentalism. A link was made here between environmental degradation in the countryside leading to rapid urbanisation in poorer countries. The answer however only tentatively relates environment and development issues since improving people's living standards is given priority over the environment. The two are seen as mutually exclusive. The student looks forward to a more equitable future without firstly taking a historical perspective to identify the causes of north/south inequality. Equity has not been achieved in many cases because economic development has exploited both people and environments so without a historical perspective on the causes of inequality integrating environment and development issues it will be difficult to realise future aspirations of global equality. The student does, however adopt a compromising position in somehow restricting or controlling economic growth.

The second student's answer (fig.40, p.218) takes one step further in looking at the constraining factors in achieving sustainable development. He recognises that priorities may vary according to values and that dominant social attitudes will influence the way in which society tackles issues of environment and development. This student has successfully applied the abstract ideological debate to case study examples. He also steps away from a rich world perspective and considers potential differing views from the poorer countries.

Figure 39

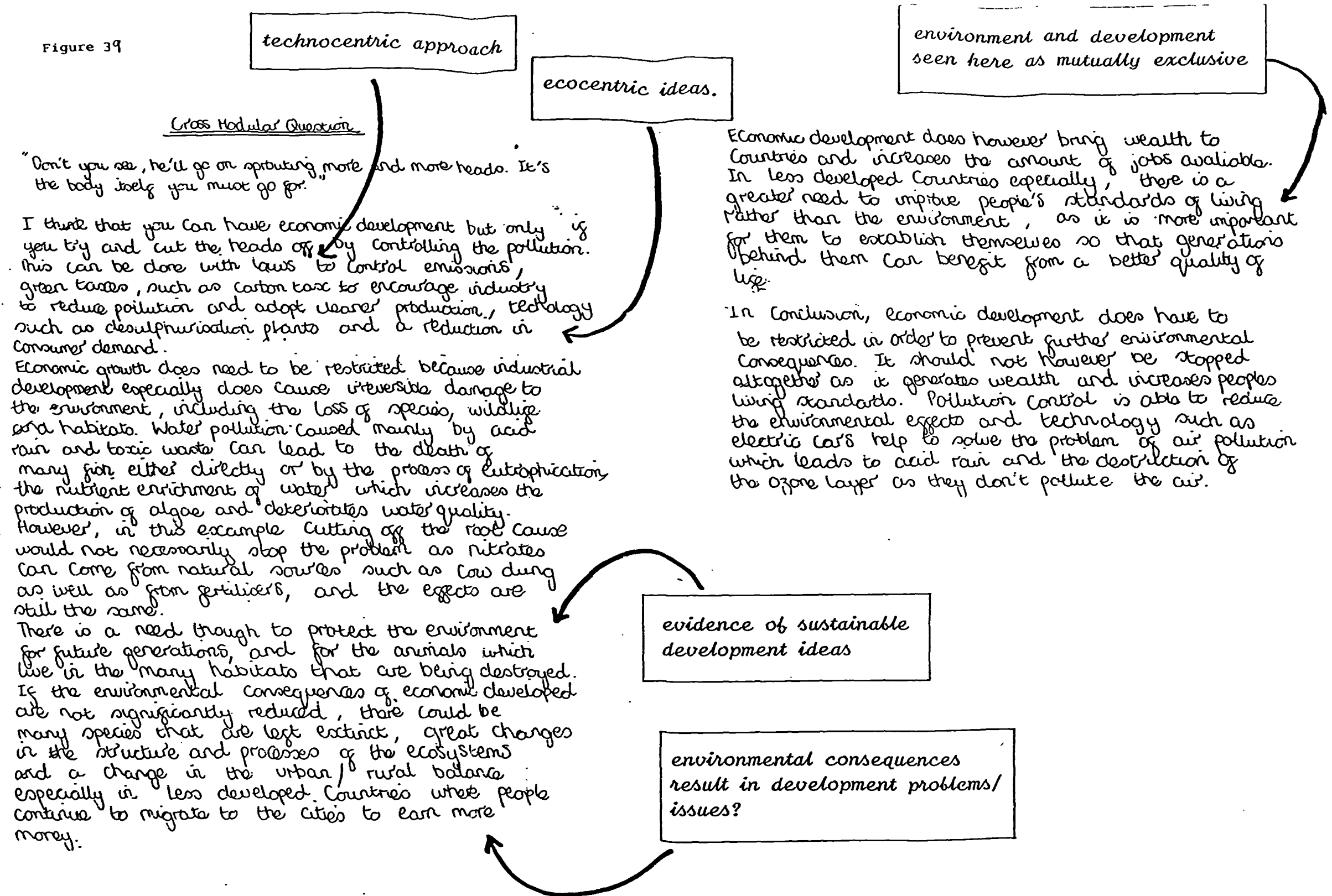


Figure 40

equity issues

The advice given of an ecocentric is the belief is that the way is to slow down economy as it ; destroys the environment (which we have only benefits the rich, life and wildlife. The technocentrist, who development raises people's and that technology provide environmental problems efficiency). They feel the localized and the environment.

I myself am stuck between two views, as I can see development exploits the environment, and are major offenders. There is a £500 million bank, meaning that countries have been impossible due to the fact is exported to the UK. British Banks, including Barclay provided money for a war in the Philippines. It had a

wider institutional structures influence development/environment

technocentric

to St. George is
meaning that
help the economic
development
moment for future
(no right to do),
the quality of
poor view is of
thinks that economic
standard of living
the answer to
increased
cost is exaggerated,
moment is on
in between these
that economic
environment. Third
trade and debt
in the Philippines
debt to British
of logging
debt; rainforest
to pay debt. Five
years and Northwest
ear power station
over function and

costs the country over \$200,000 a day in
interest payments.

However, I find it ridiculous to
stop economic development; it would
be impossible. What right does the
developed world have to stop areas
countries like Bangladesh ~~the~~ managing
their rivers (Brahma Putra, Ganges and Meghna)
if they want economic development. I also
feel that technology will play a
large role in conserving the environment.
Increased efficiency is the priority, meaning
not wasting energy and cutting down
waste/pollutants. For example in Malmö
(Sweden) they have a District Heating
System, which utilises a Combined Heat
and Power Scheme. The local energy
authority is responsible for heat and
electricity supply. Thermal energy from
electricity production is used for heating
making it a useful output instead of
an environmental nuisance (CO₂).
Similarly central Rotterdam is heated by
a C.H.P. station.

I believe the ecocentric and
technocentric ideals are both too
extreme. The technocentric one has
the 'wrong' priorities and the ecocentric
one is appealing and sounds like a
good idea, but it would not work in
our materialistic greedy orientated
society.

recognition of dominant values in
society influencing development/
environment issues

7a) To what Extent do you agree with the advice given to St. George below the cartoon

"Don't you see, he'll go on sprouting more and more heads. It's the body itself you must go for"

I agree to a certain extent that it is the economic development which has led to the environmental problems shown in the cartoon, the deforestation, urban sprawl and acid rain etc which is why St. George should be "going for the body" - the cause of the problems, rather than attempting to deal with the problems themselves. By stopping Economic development, ~~therefore~~ the "heads", the problems associated with Economic development, would be automatically "killed" whereas with so many problems to deal with it is difficult to isolate them and stop each individual problem because more and more "heads" will be growing.

When various problems are dealt with, sometimes the root cause of them is ignored, thus allowing the problems to grow or diversify and become more out of control than they would do if their root cause were not dealt with.

In this case, I would ~~disagree~~ agree that by stopping Economic development, the other problems too would be dealt with, but I disagree that this would be possible, or that it would be a simple and final solution.

Economic Development leads to technical advances, such as in Europe, the 19th Industrial Revolution which revolutionised energy production, industry and manufacture and in the process has led to many environmental problems as a consequence. However, now that these problems have been recognised, they can be controlled or dealt with by new inventions which themselves would not have come about had it not been for Economic development. It is impossible to "kill the body" of

Economic development because it is an on going, progressive process, but since it has been recognised that the environment problems, the "heads" come from "the body" - economic development it means that they should be able to be kept under control. The cartoon implies that this is not possible, that the environmental consequences are too out of control to be handled as they occur, than ~~by~~ by dealing with them at the root.

To deal with the root cause - economic development would, doubtless, solve all the environmental problems but is an impractical, impossible solution. Economic development can actually be used to help lessen the environmental problems, and even bring a complete halt to some of them. The new advances in technology that economic development has brought about can be used to stop acid rain for example by fitting converters and extractors of SO₂ and NO_x from power station and factory flues, so economic development can to an extent put right the wrongs that it has caused

technocentric ideas

equity issues

~~The advice~~ The advice given to St. George takes the environmental viewpoint that economic development needs to be stopped to stop the environmental consequences of economic development, and that economic development is not really possible without the ^{adverse} environmental consequences.

Environmentalists do not believe that economic development should ~~take~~ take place without the environment being protected. They believe that often ~~development~~ economic development ~~leads to~~ damages the environment to such an extent that the environment cannot repair itself. They also think that economic development is not always necessary since often only governments benefit and large corporations benefit, and the environment which all the rest of us live in is damaged, and we often suffer in terms of the consequences of pollution e.g. asthma. They believe the only way to stop the environment being damaged further is to reduce consumer demand and thus stop economic development.

Conversely all economists would believe that economic development can continue and that technology is able to stop or at least reduce the environmental consequences. For example by the introduction of ~~tax~~ taxes on fuel, the fitting of de-sulphurisation equipment to power stations. They believe that people's material needs are very important and that the environment is worth damaging so that economic development can continue.

In my view I think that it is unrealistic to believe that you can stop economic development all together, but at the same time believe that people shouldn't be allowed to exploit the environment in the way they have been. However if things continue to develop and the environment isn't considered and exploited perhaps the only way to stop exploitation of the environment is to stop economic development all together.

technocentrist tendencies but willing to consider alternative futures

Figure 43

NV Maston, a subsidiary of the Japanese Nissan-Lexus Company (the world's second largest component supplier for the motor vehicle industry), manufactures car radiators at a site in Shipley, near Bradford. Due to winning a contract to supply radiators to Japanese car assembly plants in Japan and Sweden, it needs to expand output, which requires enlarging the factory into an adjacent field which forms part of a green belt. This issue discloses a number of conflicts, principally concerning the land use, with regard to its opportunity cost.

The main conflict appears to be between economic growth or regeneration, entailing urban sprawl or environmental preservation, sought by Green Belt legislation.

This extract is taken from an answer to a decision making exercise on the issues arising from land use conflicts between manufacturing industry and green belt/agricultural land.

identifies relationship between development and development issues

.... If it is necessary to hold both economic and environmental interests in high regard as each is becoming increasingly dependent on the other. It is the case that economic development depends on the natural environment to produce both finite resources, such as certain mineral ores, and renewable resources, such as wood. However, economic development is needed to protect the natural environment, because it creates prosperity and wealth which can then be used to preserve the environment and provide an adequate supply of renewable resources. The emphasis should therefore be on sustainable development.

technocentric ideas

appropriate technology

environmental protection at the expense of social justice in the short term.

Although, in this particular case, the issue is on a far smaller scale, this statement can still be considered.

It seems that ultimately preserving the environment is a higher priority than economic development, but only by a narrow margin. This means that social justice, at least in the short run, is sacrificed for the values of the natural environment. However, preservation should bring higher long term rewards.

The answer given by student number three is written from a predominantly technocentric approach to environmentalism. There is very little discussion of alternatives to economic development or the rationale behind it. Student number 4 shows an understanding of the two extreme approaches to environmentalism but does not offer a great deal of insight into her own opinions and views on the issues.

Student number 5 (fig.43, p.221) applied the ideas on sustainable development to an answer he wrote to a decision making exercise on the potential conflicts arising as a result of the expansion of manufacturing industry onto green belt land. He has identified a conflict between economic growth and environmental protection but also the interdependence of the two given that the environment is a resource to fuel economic development. They are not seen as mutually exclusive as some 'deep' green ecocentrics would argue. Sustainable development is the answer the student puts forward in order to protect both economic growth and the environment. The student does not identify any alternatives to the particular economic development proposed to ensure social justice (which I assume to be provision of employment opportunities in the context of the exercise) and hence views the protection of the environment as only beneficial in the long term, although he does not elaborate on this.

This further evidence of understanding of sustainable development was analysed to assess the extent to which the curriculum unit on Yemen used as the main focus of the critical action research was successful in developing the students' critical skills in evaluating and investigating environment/development issues and to gain further insight into their perceptions, values and attitudes. The students did show that to varying degrees they could apply their work to other environment/development scenarios put to them. In general, referring back to fig. 38 (p.215) their views seem to reflect perhaps the values of the extreme economist, beliefs from the extreme environmentalists and an accommodating position in terms of attitudes.

6. THE SECOND ACTION RESEARCH SPIRAL

THE PLANNING STAGE

The aim of running the module on changing agricultural systems in Yemen for a second time was to gather more data on student thought processes in tackling an environment/development issue. Another aim was to refine the module of work to take into account new material from the World Bank. It was necessary to slightly change the order of the exercises in order to adapt the module to the different pattern of lessons and the smaller group of students at Grey Coat Hospital School. At this stage I did not want to radically change the content of the module or the structure of the learning activities. The aim was to collect more data.

EXERCISE 1

This involved the four students in the class reading together the background information sheets on Yemen and identifying problems as they read through. Each one was written on a card for use in subsequent lessons.

EXERCISE 2

This lesson was the same as exercise 1 in the previous module. Students constructed a systems diagram of traditional agricultural systems in the Yemen from the video 'Hanging Gardens of Arabia'.

EXERCISE 3

This was the same as exercise 2 at Esher College. The problems identified were ranked and linked together to show cause-effect relationships.

EXERCISE 4

This lesson involved the evaluation of development solutions for the Yemen using the World Bank information and the UNDP and Arid Lands Initiative Project. The World Bank information was critically evaluated posing critical questions to analyse the text and the Arid Lands initiative was evaluated using criteria for sustainable development (fig.21, p.164). The students were already familiar with the concept of sustainable development but not necessarily all the criteria associated with it in fig. 21.

EXERCISE 5

This was the same as exercise 5 in the previous scheme of lessons with the addition of an evaluation of the entire module by the students.

THE ACTION AND REFLECTION STAGES

IMPLEMENTATION, OBSERVATIONS/DATA COLLECTION AND DATA ANALYSIS

EXERCISE 1

The four students worked throughout the module as a single group. This enabled me to observe and guide them through the exercises more than I was able to with the Esher students.

In this first exercise the students successfully identified a number of problems facing farmers in the Yemen. They shared the reading out loud and all students contributed ideas as to what they should write down.

EXERCISE 2

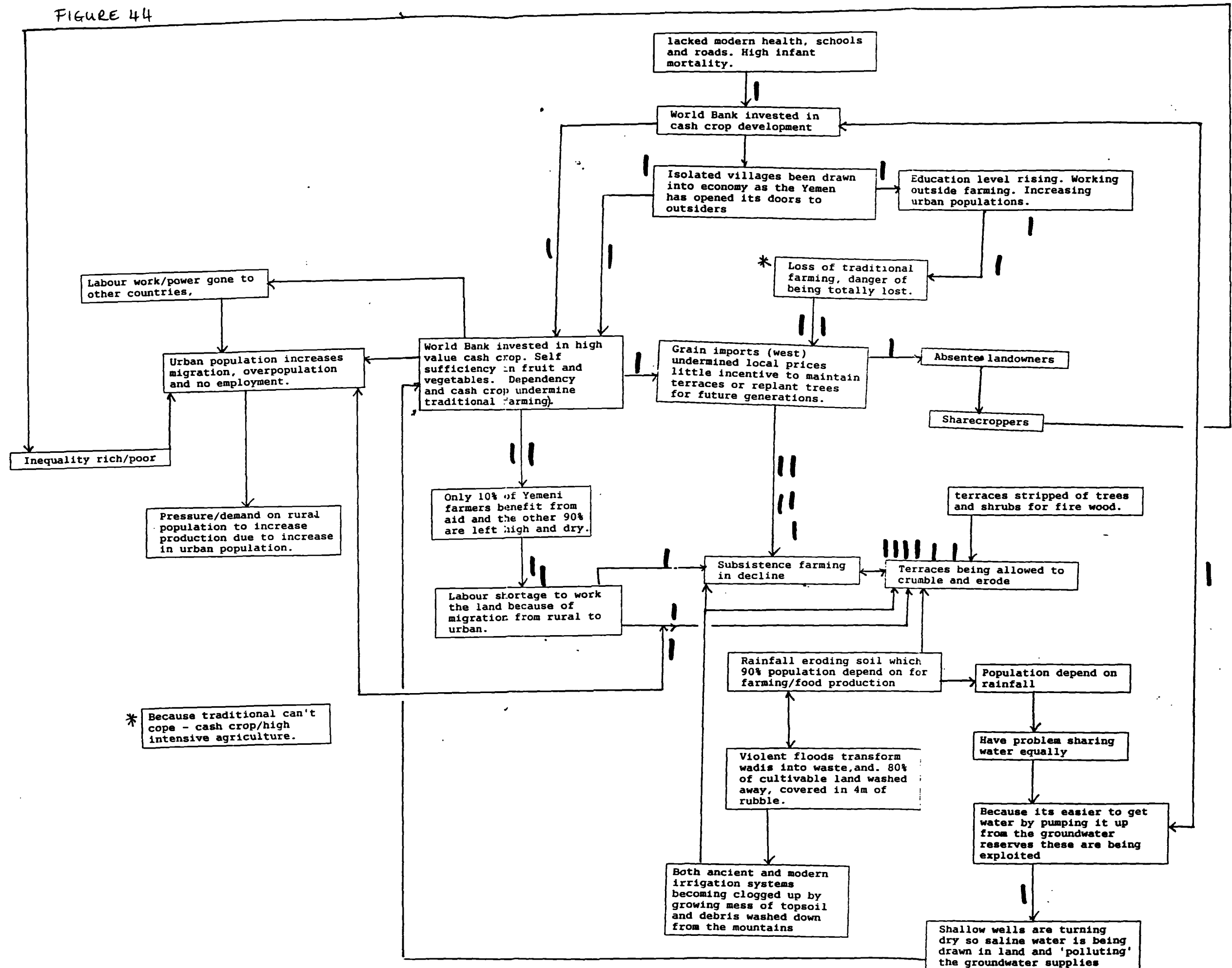
The video gave the students an opportunity to visualise the information they had gathered from the text in exercise 1 and to clearly record the traditional system in diagram form. This as before was really an information gathering and 'place awareness' exercise.

EXERCISE 3 (research data collection/analysis)

The students used their cards with problems written on them to establish relationships between the problems in the Yemen. There was a lot of discussion in the process. This was taped. Although I was present I had very little input into the lesson. The students debated for a considerable amount of time which problem should go at the top of their diagram. They changed their minds and added more problems they hadn't originally identified. One of their main difficulties was the number of cards they had written. They went through a lengthy process of getting rid of cards which were too similar to others, writing new ones and trying to group them into categories before they decided on their final structure. All the students contributed to the discussion and they worked very well together asking each other questions for knowledge they didn't know or were unsure about, for reassurance and to obtain agreement from the others. It was a cooperative learning experience.

The resulting systems diagram is shown in fig. 44 (p.229). However, the process by which it was achieved is worth some discussion. As in many of the other systems diagrams from Esher, this group finally had political, economic and development problems towards the top of the diagram indicating their importance. Environmental problems are towards the bottom of the diagram. One difference however is that this group took another step 'backwards' in trying

FIGURE 44



to think in terms of cause effect relationships. They wanted to show why the particular economic factors and development strategies were there in the first place. The 'poor' state of Yemen in terms of lacking modern health care, few schools and so on resulted in Yemen being attracted to 'traditional' western development aid. Originally the group had the decline of traditional farming systems at the top of the diagram and became increasingly dissatisfied with this since they were constantly finding causes of this.

S

"Should this be before the subsistence agriculture in decline?"

C

"What the economy?"

R

"Yes because in a way that's why they've opened up their doors and then people have given the aid..."

S

"But why did the World Bank invest in cash crops? Because there was the decline?"

R

"No there's decline because the World Bank have invested in cash crops... I think."

"I still think this one should go at the top so in order to change that and improve education the World Bank was turned to for financial help and that led to isolated villages and being drawn into the economy."

The students thought through the causes and effects carefully and together found multiple causes of some of the problems.

K

"...so absentee landowners is linked to terraces being allowed to crumble."

S

"And we also said that the labour shortage was why the terraces are being allowed to crumble."

The students began to realise the complexity of the problems and the integrated nature of the causes.

"They all connect up."

"It's all interlinked. It's all one big problem."

Towards the end of the lesson I intervened to ask questions in order to get the students to elaborate on some of the links they had made. As a result of this they made some more of their own changes. I also wanted to question some of their links which showed some lack of understanding. Like some of the Esher groups some students were under the impression that the arguments over water were to do with the problems caused by the developments and was a reason for putting in ground water pumps. This is not the case. The students had misunderstood one aspect of the problem over ground water. Guber and Lincoln (1989, p 143) refer to this as a 'malconstruction'. To a certain extent this is due to the level of ability of the students. New constructions of the reality of a situation

"consist of certain available information configured into some integrated systematic "sense making" formulation whose character depends on the level of information and sophistication of the constructors."
(Guber and Lincoln, 1989 p 143)

R

"Because they have problems sharing the water..."

and when it doesn't rain it's easier to get it from the ground water pumps."

SY

"Is that why they're using the ground water pumps, because it's easier than the rain?"

S

"Isn't that one of the schemes from the World Bank?"

R

"So we have to draw an arrow from up there to here."

The malconstruction was worked out in the group with a little prompt from me and another member of the group recognising the relationship of the environmental problem to a development issue.

The student's system diagram was analysed in the same way as those from Esher. The Grey Coat diagram had the highest score (38) out of all the diagrams. They had identified the most problems and had far more engaged discussions about the ordering. This is perhaps due in part to the fact that they are the only group in the class and they had worked more closely as a group in identifying the problems. They also made connections between the resulting environmental problems from World Bank intervention and the perceived justification for yet more development of the same kind. Development was perceived as a cause of environmental degradation and that this would need further development to put right. There were many social implications identified as a result of the development Yemen experienced as well such as inequality between rich and poor and urban problems created. Although related to the environmental problems

the students did not effectively link these up. Increasing urban populations resulting in increased pressure in rural areas to produce crops was not linked to the intensification of agriculture through World Bank investment and resultant environmental problems.

When I asked the students what they had learnt from the exercise at the end of the lesson it was encouraging to hear their comments.

"...That all the problems are linked together."

"...they all depend on each other, all the problems. It's not just one problem causes everything."

"Did they know that the World Bank would lead them into so many problems?"

"You would have thought the terraces, the erosion is the main problem. It shows you that it's not."

This last comment reinforced my thoughts that this exercise was good in encouraging students to investigate the interrelationships between environmental problems particular paths to 'development'.

EXERCISE 4

The students went through the World Bank exercise as described in the first action research spiral. The exercise worked well and students were able to critically read information and draw upon previous knowledge to challenge the statements in the World Bank text. The UNDP Arid Lands Initiative Project was

tested against sustainable development criteria successfully. They annotated fig. 21 (p.164) with examples from the Arid Lands Project.

EXERCISE 5

The ideas the students presented for solving the problems in the Yemen can be related to some of the problems they had identified. It was suggested that problems could be

"solved without exploiting the environment and people."

This was encouraging - that the student took the environment into account when considering development. There were suggestions to move away from the 'western cultural schemes'. Ideas were taken from the UNDP project in terms of involving local communities.

"Aid should be the foundations of projects to enable the villagers to help themselves."

"Aid needs to go straight to the people who need it."

The ideas were disappointing though in terms of stereotyped images of development. Two students thought the people needed to be

"educated in knowing what was best for the land."

The ideas were poorly developed and did not really tackle the problem of wider economic and political power and

dependence in development.

Only one student suggested a way of tackling this through education.

"Involving children in conservation, give them the task of working towards solutions...by teaching children about the problems and solutions in the curriculum. This will teach children about rural life. Those who do not take high power urban jobs have 'knowledge' of the problems and what they can do. Those who get important positions in the government for example will also have 'knowledge' of the agriculture and influence important decisions."

This solution can be seen in context of Redclift's clarification of environmental planning methodologies (figure 36 p.201). The student has focused on modifying the policy context of the situation (under policy instruments

in fig.36 p.201) with an analysis of the situation in a long term context. This corresponds to Redclift's 'developmental/environmental' planning methodology. The solution came out of an old development problem, that of improved education drawing people away from agriculture resulting in environmental degradation and turning this old problem around through 'appropriate' education to challenge existing policy making which presently works against the survival of traditional and 'modern' agricultural systems in Yemen.

The students were asked to distinguish between local problems and wider problems. Local problems were identified as sharecropping, terrace collapse and absentee

landowners. Wider problems were the World Bank, money and inequality. Student C stated that the World Bank pushed Yemen into a corner so it has to borrow more. The agricultural system changed so much causing problems such as soil erosion that more money is needed to solve these new problems. Although the students found it hard to suggest how these issues might be solved they did demonstrate one element of Redclift's developmental/environmental planning methodology (p.201) in that the focus of the preparatory thought was explanatory in character as opposed to descriptive in that they reflected on the causes of environmental problems such as particular development strategies in Yemen.

As with the Esher College Students, although some of the solutions illustrated what Robinson (1988) categorises as sympathetic paternalistic values and attitudes there is a degree of 'realistic empathy' in recognising the social, economic and political context of the Yemen case study. Indeed Robinson (1988 p.155) does state that

"Realistic empathy may not counter paternalism completely but it seems that sympathy without it is almost certain to involve paternalism."

The students did agree that the problems could be solved if they reversed the process of dependency and Yemen became self sufficient. There was a feeling of despondency that they couldn't change the world economic system which locked Yemen into it's present position.

REFLECTIVE STAGE

CONCLUSIONS AND REFLECTIONS

STUDENT REFLECTIONS

A questionnaire was written to evaluate the module from the student's perspective on the content of the module, the style of learning used (teacher/student participation) and the issue of environment/development issues in the context of the Yemen case study. The questionnaire can be found in appendix 3.

On the whole the students did not want to change the ratio of student/teacher participation in the different lessons. They did enjoy the student centred learning. This was particularly evident from one student's comment about the

lesson on the solutions and sustainable development. It was a lesson she thought was too heavily led by me and wanted far more time to explore the ideas in the group (this was not written on her questionnaire but her explanation to me of her score in class). The whole group then agreed that working things out for themselves made them think and question each other about what they thought. They thought the lesson on arranging the problems in a systems diagram was the best.

"I think we were able to learn from each other and had enough background knowledge of the Yemen from previous lessons, we became more involved in the issues."

"By doing it it nearly all by ourselves it made us think and helped us to realise what the problems actually were."

The only lesson where one student wanted more teacher input was the World Bank analysis. She found the questions difficult although she did comment

"...although the information made sense once it had been pointed out and was helpful."

Despite the students not being able to come up with solutions in terms of challenging the wider problems, two students did make a relevant comment to the following question

Do you think this module has given you any skills or made you aware of any way you can act as a member of society in the future to contribute towards a 'better world'?

"It's made me realise that it's not always enough just to realise what the true situation in a country is, you sometimes have to put thought into action...unless a protest is made nothing is going to change."

"Yes I have now developed skills to understand both sides of the argument...I would feel confident to write letters to MPs."

I was concerned that there was too much bias in the module of work against the World Bank and that I hadn't treated the two approaches to development equally. I considered that perhaps I should have subjected the UNDP project to the same questioning as the World Bank information and similarly

tested the World Bank information to criteria for sustainable development. I put a question in the student evaluation to determine whether they thought the materials were biased and whether they could identify my own position to the issues.

Two students commented that the information was biased against the World Bank but recognised the aim of critical analysis.

"Yes in a way. The evidence for both sides of the case was shown to us but with the World Bank view we were told to analyse it in what could be called a critical manner - which isn't a bad thing but was biased against the World Bank."

Another student also commented that it

"...encouraged us to think critically of the World Bank."

She also went on to say that she would have preferred to see if they

"could understand the motives and create our own bias."

There was a mixed response about my own bias. One student couldn't determine my position and thought that the approach I used was to help them argue from both sides and to discourage bias in their views. Another thought quite clearly my message was that there are serious problems with development programmes and that benefits only really go to the country who is giving aid.

The final question on the links between environment and development issues was carefully considered and one student did use the case study of the Yemen to illustrate the point that environmental problems are the result of particular projects or paths towards 'development'.

RESEARCHER REFLECTIONS

The module of work on changing agricultural systems in Yemen did prove to be successful in achieving the main aim of encouraging awareness of the relationship between environment and development issues. The learning process which the students followed was important to them in understanding the issues and perhaps changing and reformulating their ideas.

It appears that the students appreciated the freedom and responsibility to develop their understanding of the issues themselves - constructing their own personal reality of the geographical case study - by selecting and justifying information used in the process and developing a critical but accommodating stance to a variety of viewpoints. Their evaluation demonstrated an ability to reflect on the way in which they learned and to evaluate the process by which they developed their critical skills. Nisbet and Shucksmith in Ghaye and Robinson (1989) suggest that teachers should encourage the development of 'metacognition' in students. This is the

"...ability to reflect on how one learns and ultimately perhaps the ability to respond to the demands of the task-in-context more appropriately and richly." (Ghaye and Robinson, 1989, p. 137)

It is in this context that I would hope students could more easily analyse and evaluate other geographical issues from a more critical standpoint and apply the principle underlying concepts of the case study example studied to other environment/development case studies and/or issues.

7. REFLECTIONS ON THE CURRICULUM UNIT TRIALLED IN A COMPLETELY DIFFERENT EDUCATIONAL SETTING

I had the opportunity to trial some aspects of the curriculum unit on changing agricultural systems in the Yemen in a completely different educational setting, the teacher training college in Guiné Bissau, West Africa. The aim of this exercise was to assess the extent to which the student centred/discursive approach to the case study facilitated students understanding of the issues and concepts. My interest in investigating student responses stems from the fact that the students have only been used to a very teacher centred approach to learning and that it would be interesting to compare the response of students in Guiné Bissau with those in the UK who have had more experience of student centred learning. Another aim was to see if students from a developing country would perceive an environment/ development issue in a different way to the British students.

THE EDUCATIONAL SETTING

The curriculum unit was taught to a group of students in the Escola Normal Superior "Tchico Té". This is the only teacher training college in the country where secondary school teachers and students graduating from the 3 year course gain the highest academic award they can in Guiné

Bissau after the schools of Law and Medicine. The students vary in age from 18 to 30+. There are no opportunities for tertiary level geography study other than at Tchico Té. Many students come straight from the equivalent of year 12 in secondary school. Some have already been teaching in schools for up to 10 years without any formal training. Despite the older age range than UK A Level students, the level of teaching was not much higher than that for the A Level syllabus. For this reason it was appropriate that I could trial the material in the college.

To put all of this into context, the rate of secondary school enrolment is the lowest in Africa. Only 35% of those enrolled are female. Of every 100 pupils only one finishes secondary school and 77% of the teachers do not have any type of professional training. There are only 3 high schools in the country (all in the capital) which provide education to the last 2 years of secondary education. The language of education is Portuguese although this is a third language for the majority of students after their mother tongue (one of the ethnic languages) and creole (the main language of communication). This presents the students with difficulties in expressing themselves. There is very little access to books in Portuguese to improve language skills and geographical knowledge.

The students at Tchico Té have generally experienced education in terms of dictated notes, often from a syllabus taken from their Russian equivalents, where a

FIGURES 36 a-f. RESOURCES AND
Fia. STUDENT WORK AT "TCHILLO TÊ" GUINÉ BISSAU
45a.

O SISTEMA AGRÍCOLA TRADICIONAL NO IÊMEN.



Este sistema agrícola foi bem sucedido. Realmente são dois sistemas, inter-relacionados: o sistema na serra de Iêmen do Norte e o sistema nas planícies de Tihama. Na serra, os principais produtos são o sorgo e o milho e nas planícies são os legumes e as frutas. A serra de Iêmen do Norte tem uma altitude de 3000 m. Tem uma precipitação entre 400 e 700 mm por ano em chuvadas curtas e violentas, durante o mês de Julho/Agosto. Para controlar a água de chuva é necessário fazer um sistema de 'colheita de água'. É um tipo de irrigação.

O SISTEMA DE COLHEITA DE ÁGUA

Cada campo em socacos na serra está ligado a outros pelos canais para controlar a chuva e cada campo é nivelado e cercado com bancos de terra. Quando a chuva chega, a água passe pelos contornos e fixada pelo solo antes de correr para o campo seguinte. Com isto os socacos conservem a água da chuva, não permitindo desperdícios para baixo através das encostas escarpadas. A água é canalizada montanha abaixo até as planícies de Tihama para ser utilizada pelos fazendeiros. As planícies são quentes e não há chuva. É um lugar muito seco. Os fazendeiros de Tihama esperam que a água que desce da serra, juntamente com a camada superior do solo que é fértil. Os fazendeiros preparam seus campos cercado-os com bancos de terra, para conservar e espalhar a água. Cada fazendeiro retém a água durante um tempo que é acordado entre os fazendeiros e um chefe de água na região consoante os princípios islâmicos de distribuição de água. Os fazendeiros também utilizam os utensílios e técnicas tradicionais maximizando a conservação da umidade e fertilidade no solo.

A comunidade local dá apoio para os fazendeiros e o governo regional também. Os fazendeiros têm acesso a crédito sem juros ou com baixa taxa de juros. O governo regional fixa preços dos produtos favorecendo os fazendeiros de forma a encorajar um sistema agrícola forte e promover a auto-suficiência.

Esses dois sistemas agrícolas foram bem sucedidos. A comunidade de fazendeiros desenvolveu um sistema de agrícola que lhes permitiu sobreviver à seca e à fome. O meio ambiente pode constranger a agricultura mas, depende das capacidades dos fazendeiros que foram desenvolvidas pelos fazendeiros durante muito tempo. Mas, durante os últimos dez anos o sistema está a falhar devido influências externas.

Fig. 4.5b

O SISTEMA AGRÍCOLA TRADICIONAL NO IÊMEN

Esse sistema agrícola foi bem sucedido. Realmente são dois sistemas interrelacionados: o sistema na serra de Iêmen do Norte e o sistema nas planícies de Tihamã

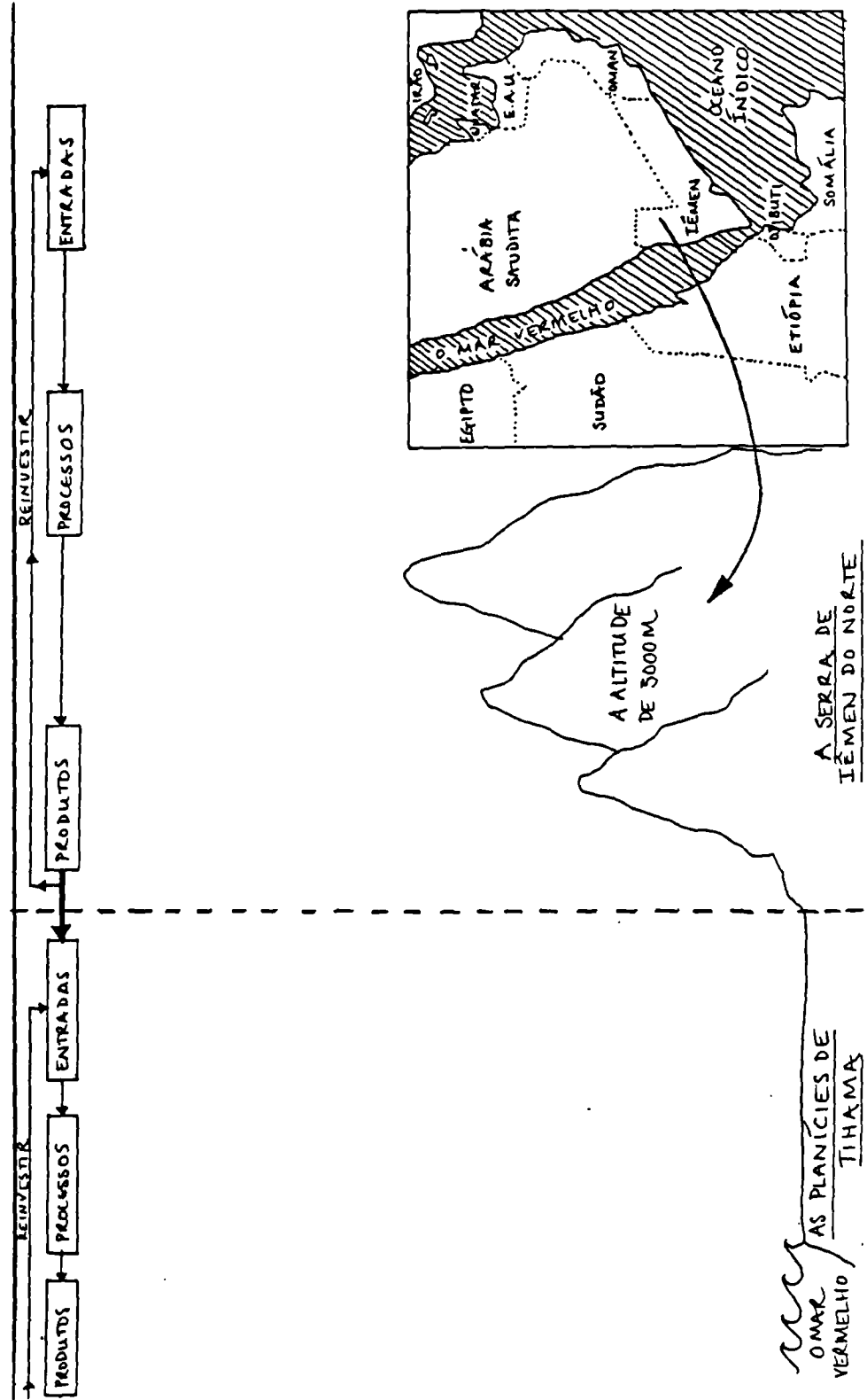


Fig.
45c

OS FACTORES QUE PROVOCARAM O FALHANÇO DO SISTEMA AGRÍCOLA NO IÊMEN

DESFLORESTAÇÃO

A desflorestação pelo povo para lenha tem ocorrido na serra particularmente desde que a população urbana aumentou nos últimos anos, procurando um aumento da procura, não há vegetação e segurar o solo resultando em erosão.

EMIGRAÇÃO DA SERRA

A população jovem emigra para as cidades e outros países. O consumismo e o oportunismo dos salários mais altos atraem. A educação também dá às crianças a possibilidade de encontrar trabalho fora das aldeias. Por isso há falta de mão de obra para fazer agricultura na serra.

OS SOCIALCOS DESABAM

Os socialcos não são mantidos. As paredes dos socialcos desabam e os escombros de rochas caem encosta abaixo.

A DESTRUIÇÃO DA TERRA FÉRTIL

80% da terra fértil dos vales e planícies é coberta com os escombros de rochas da serra e os escombros bloqueiam os canais de irrigação nas planícies.

A EXPLORAÇÃO EXAGERADA DE ÁGUA SUBTERRÂNEA

A água subterrânea tem sido utilizada mais durante os últimos anos. Quando as poças de água ficam secas a água salgada do mar vermelho entra nos poços contaminando a água.

A URBANIZAÇÃO

O aumento da população urbana tem provocado um crescimento na procura de água e lenha. Os recursos naturais - os árvores, durante só vinte anos e os recursos da água também estão ameaçados.

A ECONOMIA DO MUNDO

CEREAIS SUBSIDIADOS

Cereais mais baratos de outros países tem sido como efeito o estrangulamento dos preços locais, deixando poucos incentivos para os fazendeiros da serra manterem os seus campos, repararem os socialcos ou replantarem os árvores para as gerações futuras.

O SISTEMA DE PARTILHA DA COLHEITA

Muitos fazendeiros da serra não possuem terra própria. Eles fazem agricultura no sistema de partilha da colheita e muitas vezes porque os donos estão ausentes, os fazendeiros não têm muitos incentivos para manter os socialcos.

O TIPO DE AJUDA PARA O DESENVOLVIMENTO

O Banco Mundial tem investido dinheiro em colheitas com valor elevado - as frutas e os legumes - em lugares onde o sucesso é mais provável (principalmente nas planícies). De facto foi só para os 10% de fazendeiros no Iêmen que tem acesso à água da terra. O Banco Mundial deu fertilizantes, químicos e bombas para utilizar os recursos de água. A agricultura está a ficar mais intensiva. Nada foi dado para ajudar os fazendeiros da serra.

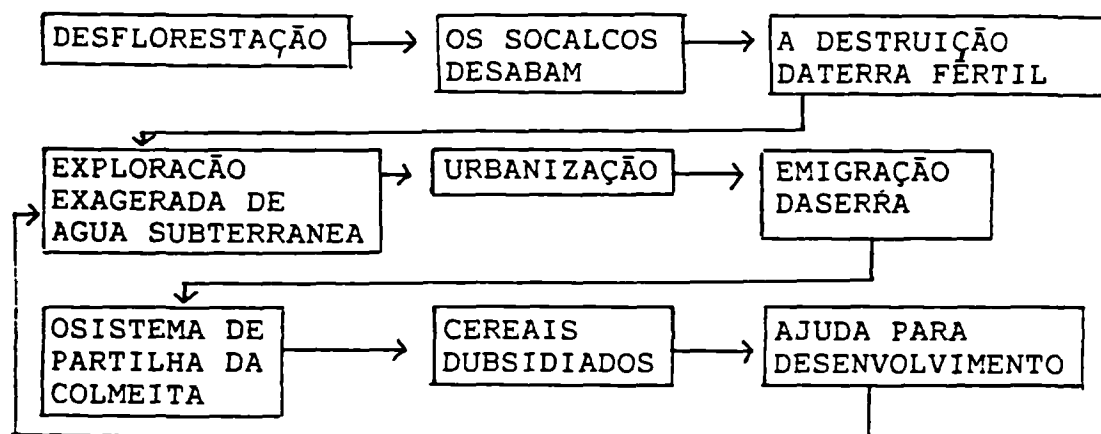
TRANSLATION:

- DESFLORESTAÇÃO - Deforestation
- EMIGRAÇÃO DA SERRA - Migration from The highlands
- OS SOCIALCOS DESABAM - Terraces collapse
- A URBANIZAÇÃO - Urbanisation
- O SISTEMA DE PARTILHA DA COLHEITA - Share cropping
- O TIPO DE AJUDA PARA O DESENVOLVIMENTO - Type of 'aid'
- CEREAIS SUBSIDIADOS - subsidised grain imports
- A DESTRUIÇÃO DA TERRA FÉRTIL - Destruction of fertile land
- A EXPLORAÇÃO EXAGERADA DE - over exploitation of ground-
ÁGUA SUBTERRÂNEA - water.

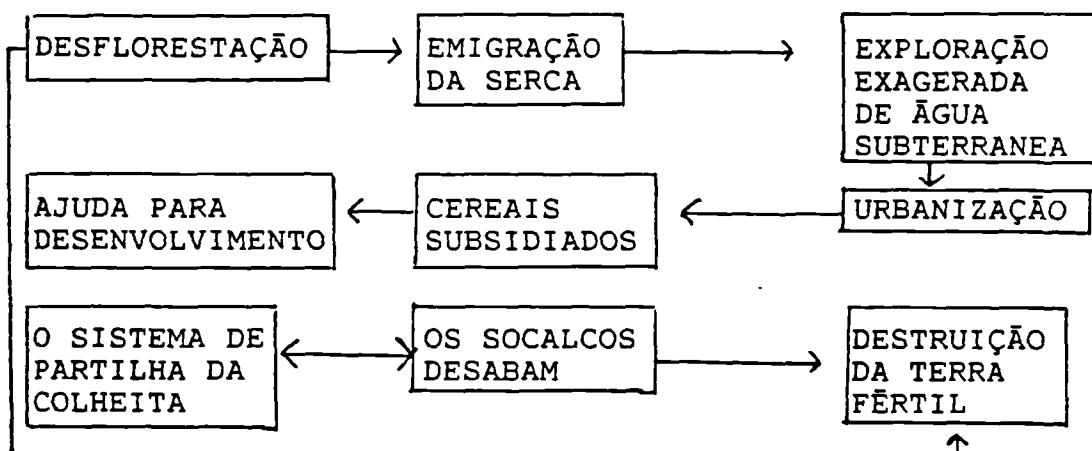
Fig. 45d(i)-(v) (Refer to translation in fig.36c).

Systems diagram of PROBLEMS FACING FARMERS IN NORTH
YEMEN (Guiné Bissau students)

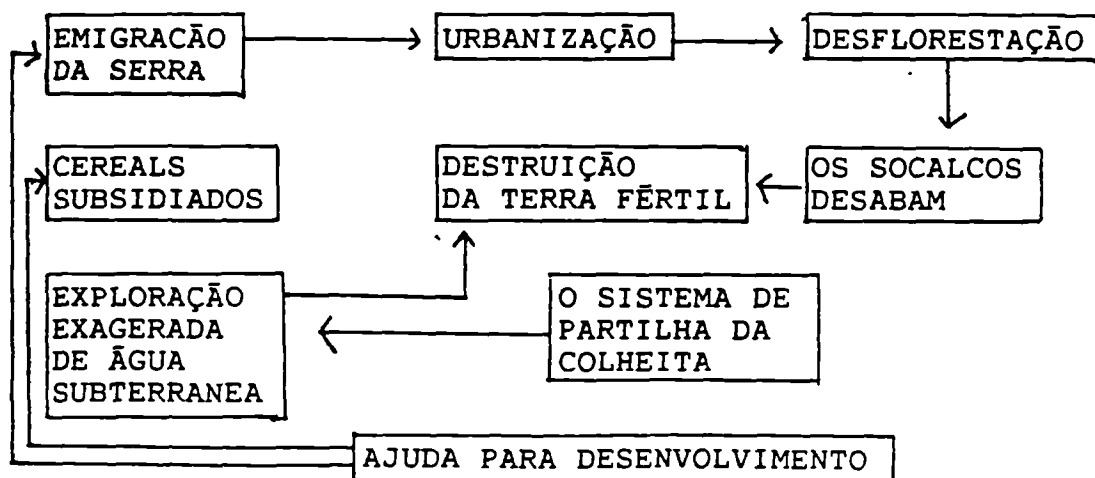
(i)



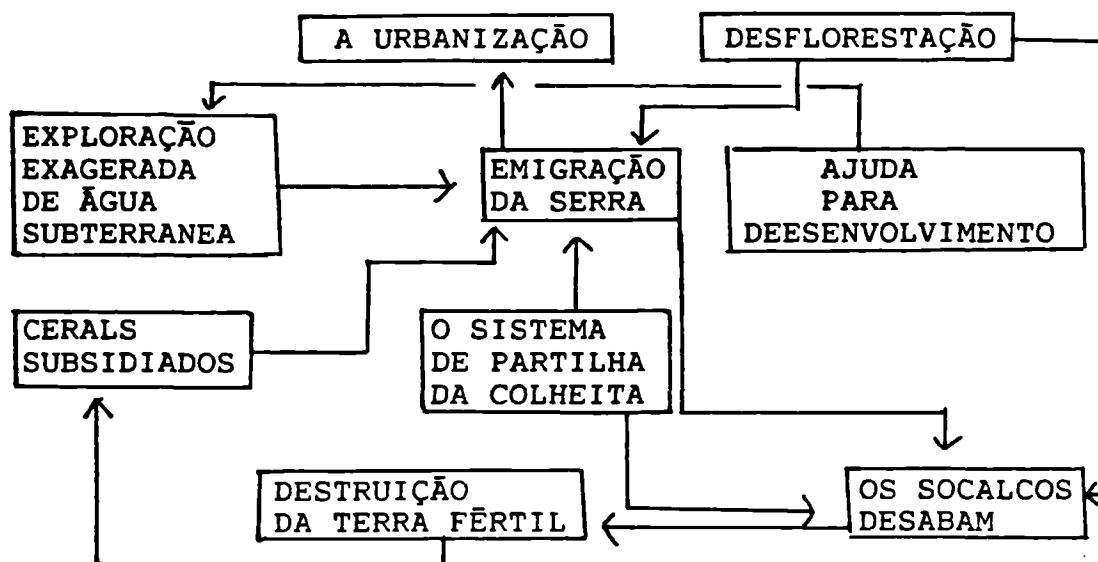
(ii)



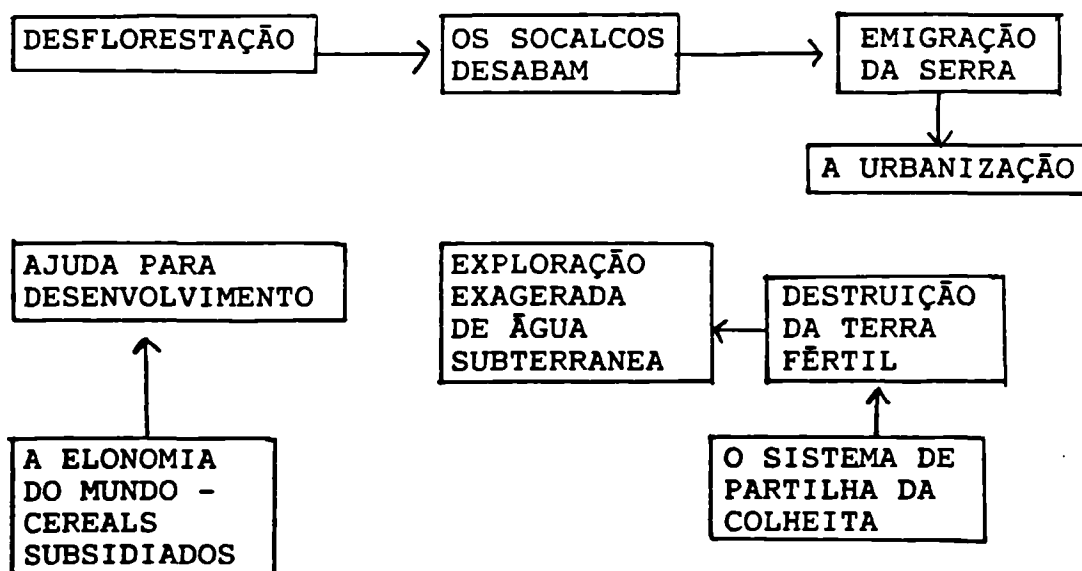
(iii)



(iv)

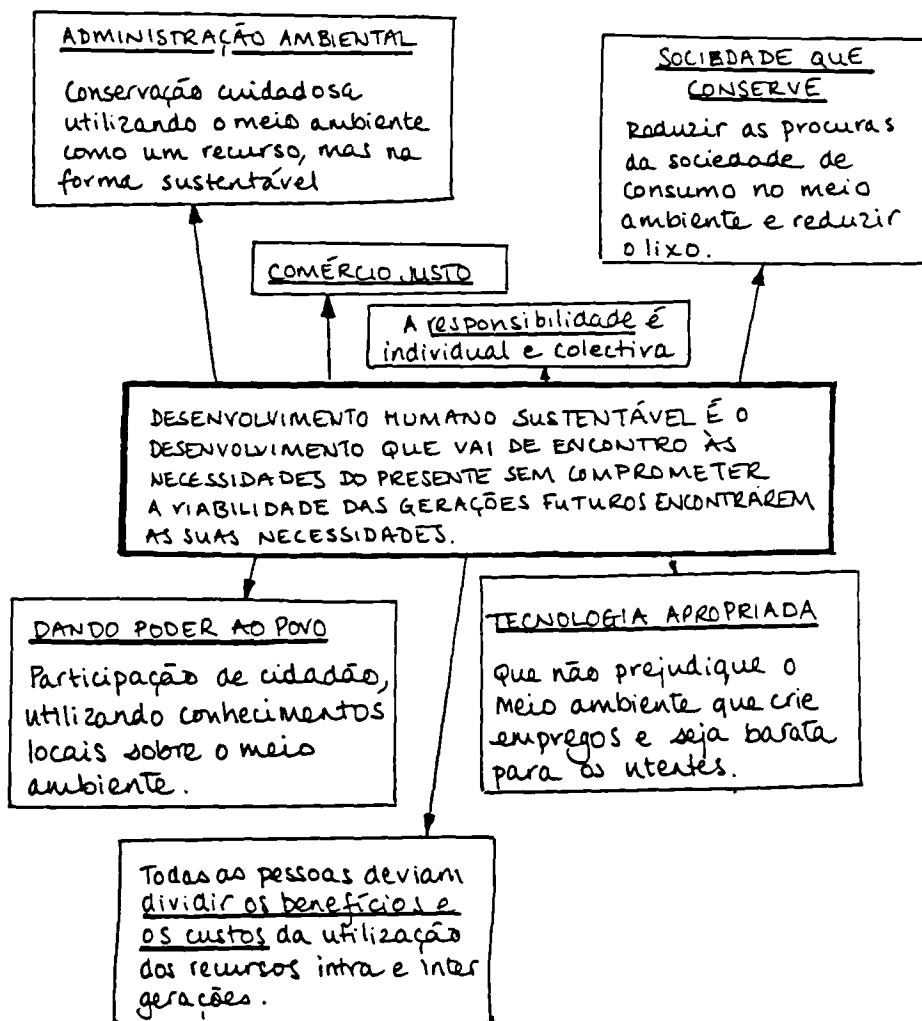


(v)



DESENVOLVIMENTO HUMANO SUSTENTÁVEL Fig. 45e

Desenvolvimento Humano Sustentável (DHS) é o desenvolvimento que se dirige tanto à equidade intra-gerações como inter-gerações, ajudando todas as gerações presentes e futuras a darem um melhor uso às suas capacidades, sem destruir as bases naturais dos recursos necessários para um desenvolvimento sustentado no futuro. Os recursos não devem ser usados de maneira a provocar danos ecológicos por sobre-exploração da capacidade produtora e armazenadora do planeta. DHS consiste em repensar todos os tipos de capital físico, humano e natural de forma a que as futuras gerações possam encarar as suas necessidades no mínimo, ao mesmo nível com que o fazem as gerações actuais. Também um desenvolvimento humano sustentável autoriza a povo capacitando-o a esboçar e a participar nos processos e nos acontecimentos que concebem as suas vidas.



large proportion of the teachers at Tchico Té were trained. The teaching is teacher centred, the teachers giving factual detail about geographical phenomena with little student participation. Set in this context and the fact that I had been learning Portuguese for 3 months and the fact that Tchico Té has no resources, I had to adapt the curriculum unit. I had access to a photocopier outside the school so I was able to produce some limited materials for the students to work with. Figures 45 a-b (pp 244-255) illustrate the introductory material I used. Fig 45c (p.246) is a summary of the problems facing farmers in North Yemen (with a translation) which the students had on cards to sort and place in a hierarchy showing how they were linked together to create systems diagrams as the British students did. The main aim of the exercise was to compare the Tchico Té student diagrams to those of the British students. The resultant systems diagrams are shown in figures 45d (i)-(v) (pp. 247-248).

In general the systems diagrams show that economic and political factors were not seen as influential in the collapse of the agricultural system. With the exception of 'urbanisation' most were relegated to the second or third tier of the diagrams. Emigration from the highlands was seen as a major factor but the causes of it were given less importance. This is in comparison to the dominance of political and economic factors in the diagrams of the British students. With the exception of group 45d (iv) the links between the factors were linear in nature and showed

little complexity in thought about the interrelationships.

There are so many intervening and situation specific factors influencing the nature of student achievement from their learning within this curriculum unit that it is difficult to come to specific conclusions. The students found it very difficult to think outside an environmentally determinist vantage point. I can only infer that their difficulties stem from a lack of exposure to geographical education integrating physical and human geography from the syllabus that exists in the school and the teaching which I have observed. The exercise itself did facilitate the students learning for themselves initially. With greater teacher input subsequently on the different paths to development in Yemen contrasting the World Bank and Arid Lands Initiative they began to critically evaluate the issue as an integrated environment and development issue. Despite the difficulties in a comparison with the experience of the unit in Britain, the nature of the previous experience of the Guiné Bissau students inhibiting their ability to formulate more complex systems diagrams adds weight to my assertion that a pedagogy involving a student centred approach to encourage critical thinking is necessary to facilitate understanding of complex interrelated geographical phenomena.

CONCLUSION

The focus of the research for this thesis has been the development of critical pedagogy for a greater understanding of environment/development issues among sixth form geography students. It has resulted in a critical reflection of the way in which sustainable development as a concept integrating environment and development issues has been understood and adopted by various groups. The research has also resulted in a critical reflection of phenomenographic methodology in the context of the study. Above all the research has highlighted the ability of students to actively participate in critical reflection themselves and to be able to analyse the complex nature of one particular case study of an environment/development issue presented to them.

The concept of sustainable development as it is applied in so many varied contexts had to be carefully considered. It has been 'hijacked' by many interest groups to support a growing concern for the present state of our environment and it's ability to provide us with sufficient resources in the future. As an integrating concept it can support and highlight the inter-relationship between environment and development issues in terms of causes and consequences of

human action in varying environments.

Although

"Arguing against sustainable development these days is tantamount to arguing in favour of sin."
(New Internationalist 1992a, p7)

there is debate over how it could be achieved or even whether it can be achieved. The debate in the academic literature on sustainable development centres on the contradiction in trying to promote sustainable development within the dominant structures of the political economy which to date have resulted in the problems which various groups are now claiming to solve. The resources for this research have focused on the issue of environment and development issues between the rich and poor world. Developing countries are increasingly articulating their own interests and concerns related to their position in north/south political and economic relations and the environmental problems they face. Since

"...the causes of environmental degradation reside in the economic, social and political structures of human societies..."
(Williams, 1993, p 15)

it has been recognised that

"Environmental and economic issues have to be resolved simultaneously. The operating principles must be ecological sustainability and social equity." (Khor Kok Peng, New Internationalist, 1992a p 27)

Indeed the rise in renewed environmental debate in recent years has enabled developing countries to use global environmental negotiations to broaden the agenda of change in north/south relationships and to reform those economic policies and structures which so often give rise to environmental problems such as the debt crisis, northern protectionism and consumptions patterns and the regulation of transnational companies. The research case study materials reflected some of these issues.

Without the reconstruction of social, political and economic relations, thought necessary by critical theorists, and developing countries calling for a reform of the international economic order, sustainable development will remain an unattainable goal and continue to sustain the unsustainable as Porritt (1988) and Fien and Gerber (1988) suggest. In order to change the mechanisms by which society works, effective challenges need to overcome considerable constraints. It is the necessary skills to do this which critical environmental education seeks to develop in students. This study has achieved this to a certain extent in the action research module of work on changing agricultural systems in Yemen.

Before students embarked on a curriculum module to explore these issues and to gain a greater understanding of the relationships between environment and development issues, phenomenography was used to elicit their present

perceptions or constructions of reality. The students showed that they perceived problems with particular forms of development in terms of social equity and environmental quality, and that these had specific causes in a wider economic context. Development was also linked to environment in that development was seen to depend on resource availability and technological development in utilising those resources.

Perceptions of the environmental issues included views regarding the environment as a resource and fair distribution of resources, economic development and consumer demand. Values and alternative futures were also considered. As good geographers the students also perceived environment and development issues not only as related, interdependent phenomena (albeit indirectly) but also as varying through space and over time. It was encouraging that students had some notions of the ideas underpinning the sustainable development issue.

In the process of the research it became more evident that phenomenography as the methodology used was being adapted to take account of contradictions identified in chapter 4. It was important to consider the context of conversations as students evaluated their own constructions of development/environment in peer group discussion. The resultant categories of description of environment and development as I perceived them, after phenomenographical analysis were very dependent on the context of the

discussions and the context of my own experience and thoughts on the issues.

"Constructions can only be judged adequately by criteria appropriate to the paradigm out of which the constructor operates."
(Guber and Lincoln, 1989, p 143)

The process of conceptualization by the students was also considered to be more important in developing a more focused critical pedagogy for students to explore the issues in a real life case study context.

In developing critical pedagogy, importance was placed on the need for students to identify and evaluate their own attitudes to environment/development issues and explore the relationship between individual attitudes, beliefs and the dominant and alternative views of society maintained by structures of particular economic, political and social relations.

The action research methodology used to develop this critical pedagogy is related to the 'constructivist inquiry paradigm' (Guber and Lincoln, 1989). This paradigm provides

"...a context and a methodology (hermeneutic/dialectic) through which different constructions and different claims, concerns and issues can be understood, critiqued..."
(Guber and Lincoln, 1989, p 72)

This can be applied to my own evaluative processes in the research but it was also applied to the nature of the

student centred approach around which the case study module was devised. Students also had to evaluate and re-evaluate their understandings and the viewpoints of others centred on environment/development issues in Yemen in the context of sustainable development. They and I had to

"...tease out constructions that various actors in a setting hold and to bring them into conjunction with whatever other information can be brought to bear on the issues."
(Guber and Lincoln, 1989, p 143)

Within the constructivist inquiry paradigm the pedagogy developed included what Klein and Merritt (1994) call constructivist teaching to encourage critical thinking. Klein and Merritt describe this teaching as student centred instruction facilitated by the teacher of a real life problem through productive group interaction. The rationale behind it is that

"ideas are constructed or made meaningful when children integrate them into their existing structures of knowledge...these interpretations are shaped by experiences and social interactions."

(Clements, ^{quoted} in Klein and Merritt, 1994, p 15)

This teaching strategy was used in exercise two of the case study module on changing agricultural systems in Yemen. The students changed their constructions of the situation from environmental determinism (erosion and terrace collapse as the cause of problems) to recognising the political power and economic dependence which resulted in environmental degradation.

There was also some recognition of the value positions which supported the particular path to development. This showed an ability to look at the wider global political and economic structures beyond the students' direct experience to understand a particular situation. Students were able to ask

"...questions of themselves and others that help(ed) them to clarify their positions and validate learning."
(Klein and Merritt, 1994, p 16)

Through peer group discussion in exercise four the students were also successful in evaluating (in constructivist tradition) divergent views or the constructions of groups involved in the case study, namely the World Bank and UNDP Arid Lands Initiative Project. From a critical theory perspective this was a success in understanding the wider interests and structures in society (increasingly global in nature) which determine the function of society. It also reflects a constitutive phenomenological perspective in terms of recognising multiple realities of a phenomenon (in this case environmental degradation in northern Yemen) and the various frames of reference two groups involved in the case study use to justify their actions.

Exercise four was more teacher led than exercise two and it was interesting that the students in their evaluation of the module wanted a more student centred approach. They

felt they gained a better understanding of the situation from peer group discussion about the causes of problems facing farmers in Yemen they had selected themselves from the text provided. It would appear that critical education can

"...assist students in recognising the sources of their ontological insecurity...It would encourage critical reflection and action on the threats and opportunities of new times...and would assess and seek to equalise access to a range of cultural and political resources they might use in constructing their own identities and life plans." (Huckle, 1994, p 8)

One student puts this in her own words

"I think this module has made me more aware of the extent of problems in many countries. I understand the root of the problems and also the difficulty in finding solutions. The inequality which the case study highlighted has made me realise that steps need to be taken to ensure that the needs of people all over the world are not ignored and exploited in the short term greed of the powerful organisations and individuals." (Appendix 3)

It is Agenda 21 (UNCED, 1992) which puts great trust in education for sustainability, however, the question is whether education has the power to achieve change. If it can it is certainly only in the long term. Perhaps it is society in late or post modernity which is encouraging a more reflective pedagogy. Beck in Huckle (1994) suggests that with the globalisation of capitalist economy, the nation state system, the world military order and the international division of labour, social change is taking place so rapidly that societies are becoming more

reflective about their positions based on the risk of losing their fundamental characteristics. Social struggles arise out of risk assessment or determination. That critical education might contribute to this process of struggle against the status quo may on the one hand seem utopian but at least it should give students the critical skills and creative skills to contribute at some point in their future lives to a changing world for the 'better'. Students need to have a vision of the future as a time, a place, a condition in which 'we' (globally) could live nearer to sustainability. That might require fundamental changes to the way we live as radical, deep greens suggest. To enable these changes to happen requires courage to challenge the status quo.

"...You cannot carry out fundamental change without a certain amount of madness. In this case it comes from non-conformity, the courage to turn your back on the old formulas, the courage to invent the future..."
(Thomas Sankara, 1985 in New Internationalist, 1995, pp 26-27).

This, it is proposed resurrects ethics, philosophy, culture and politics into reflections for example on environment and society. There is a debate on how risks may be concealed, interpreted, managed and exploited in many different ways in determining actions to realise particular futures. The past and present are considered in determining the future.

"There is just one place where yesterday and today meet, recognise each other and embrace, and that place is tomorrow."
(Eduardo Galeano, Uruguayan writer, New Internationalist, 1992a, p 15)

Many environmental movements in the South reflect the ideology of risk assessment in determining their futures given northern influences on the state of their environments and societies. They advocate changes in northern attitudes and emancipation from the northern economic and political hegemony which only works to maintain the vulnerability of the South.

"...a fight has been going on in the Narmada valley and it is now quite clear that the valley is being led towards destruction - not just of it's environment but also of it's human communities...the real challenge of 'modernity' faces everyone...the real challenge is not to find a single project costing hundreds of millions of dollars, but to develop participation as the focus at 500 or 500 000 different points... otherwise you are more traditional than we are."
(Medha Patkar, a member of the opposition campaign against the Narmada Dam Project, New Internationalist, 1992a, p 17)

Risk determination is a method of enquiry and evaluation which is familiar to critical education. Whether critical education is a function or a result of post modern society or indeed both it is hoped that

"...such pedagogy should be able to advance the Agenda 21 process in ways which extends radical democracy." (Huckle, 1994, p 10)

To conclude, pedagogically the action research was a success in developing critical thinking and evaluation by the students about an environment/development issue. The students were able to identify key problems deconstructing the issue into it's component parts and then reconstructing the issue by exploring causal relationships, assessing the values and attitudes of the actors in the process and reformulating their own stance on the issue to build up a conceptualization of a complex inter-related environment/development issue in a geographical context. Only to a limited extent could the students suggest challenges to a situation which perpetuate and exacerbate some of the problems.

The implications of the research are three fold. Firstly there are implications for the use of the concept 'sustainable development' in geography curricula. From the research to establish how the term could be used I have to conclude that it is a problematic concept to conceptualize and define. It is the process of debate and conceptualization through deconstruction, and reconstruction of the issues within an environment/development case study which enables students to clarify their thinking through critical debate which will enable a critique of the concept sustainable development and an articulation of perhaps reorientated attitudes and values towards the term and the inherent contradictions within the concept. This is in contrast to using the concept as the focal point in exploring an

environment/development issue.

The second related implication of the research for sixth form A Level teaching lies in the nature of the pedagogy trialled and developed through the case study. Through a concrete, real example the students were enabled to investigate an environment/development issue, gradually building up a wider picture of the complex inter-related nature of the social, political and environmental factors from their own perspectives challenged and developed by productive group interaction with relevant resource material. The students themselves comment on the fact that they were given the opportunity and responsibility to explore the issues themselves. The research offers an approach to student learning which enables students to sort a complex assortment of concepts to investigate and to draw wider conclusions in the context of sustainable development. However, good case study teaching and learning resources need to be developed through further research to enable students to explore other environment/development issues in a geographical context not only to address the theoretical aspect of the concept sustainable development as a concept linking environment and development but also for the students to articulate their own goals for sustainable development through critical debate of the goals of others and to articulate factors important in strategies for realizing those goals.

The influence of critical theory on critical education and on this research has promoted discursive forms of communication and decision making in working towards a better world/society. However, it is in this respect that the research was not so successful in enabling students to see how this could be achieved. The solutions proposed by the students were weakly thought through and they were very despondent, realising the power of the organisations and structures which maintain the status quo in Yemen. Further research to develop classroom practice and resources is suggested within the action research methodology. Perhaps a series of solutions and possible approaches to overcoming some of the obstacles could be presented to the students with activities for allowing comparisons. There should be options for students to debate solutions working within the dominant global economic and political environment and alternatives for breaking out of it and sustaining the alternative. There are no easy solutions and according to the constructivist inquiry paradigm,

"All reconstructions that emerge from an evaluation continue to be problematic...such an evaluation effort cannot converge on "truth" but continually expands as it forms reconstruction after reconstruction."

(Guber and Lincoln, 1989, p 253)

It would appear that a critical pedagogy is not enough to realise the aims of critical theorists and their application of ideas to education. If critical education is to serve an emancipatory interest it requires education to present students with or to enable students to construct

strategies for challenging the processes at work in society.

The third implication of the research is that students still have stereotyped images of developing world communities who need to be "educated" about the problems despite a good grasp of the issues of the particular case study. Robinson's categorisation of these attitudes of 'paternalistic sympathy' (1988) are evident among the students despite the promotion of opportunities for the development of what he described as 'regenerative knowledge' within the critical pedagogy undertaken. It is suggested that a research focus is necessary to address this issue, perhaps in an exploration of student attitudes after undertaking a study involving resources/materials presented by developing world voices to encourage a greater degree of what Robinson describes as realistic empathy.

Within the context of action research to improve and develop classroom practice and resource material a critical pedagogy has the potential to facilitate sixth form student understandings of the inter-relationship between environment and development issues, integrating social equity and environmental quality together with the opportunity to enable students to develop the skills necessary to continue to redefine their attitudes and values towards these issues beyond their A Level geography education.

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APPENDIX 1

TRANSCRIPTS OF CONVERSATIONS ON THE ENVIRONMENT AND DEVELOPMENT TRANSCRIPT - DEVELOPMENT

A. ESHER COLLEGE (Nov 1993)

S.
Change is progress.

L.
Yes.

S.
Its mainly building things.

L.
Conservation isn't it?

K.
Urban development and things like that I suppose.

L.
Like you get development in Britain which is different in a different class level to development in somewhere like in a third world country.

K.
Urban development , rural development, agricultural development, industrial development and..

L.
Docklands is one that we've been doing, that an urban development plan.

K.
Which was centred in the Mill... the Tower Hamlets area, Isle of Dogs.

L.
£3 million something or other... I can't remember.

S.
Theres quite alot going on in the third world.

K.
They haven't developed yet so they're developing all the time.

S.
So that's mainly agriculture.

L.
That's like that agricultural development in that Egypt and that they took all that technology over there.

S.
You mean like irrigation and sanitation.

L.
And that didn't exactly work did it really.

K.
I can't remember. I can't think of other development.

L.
What We've just been doing about India, thats development -agricultural development.

K.
That's scientific development.

L.
Green revolution and that. That's technology really.

K.
There are many places, regions, countries planning development. What's it mean by planning development?

S.
Proposals and things like the government. What did they do, they put money into developing derelict land.

K.
In creating green space.

L.
Or building roads. God knows why they want to.

S.
the Docklands was a derelict area and they put money into that.

K.
And now look at it! Half of it's still derelict and the other half is too expensive for the people that did live there any more.
Urban development, err... I mean there are different things about development. You can have development regarding geography, you can have historical development where you discover more facts and it progresses into ...

L.
..evolution. Evolution is development.

K.
Political development, cultural development.

S.
They're mainly planned by a government aren't they.

L.
Well they would be.

K.
Cultural development isn't I suppose because it's more the changing of traditions and things. I suppose you can have social development.

L.
Everything boils down to money really in development in the cost and that an third world countries don't have the money to develop do they? So they can't develop so will as...

K.
You could have fashion development. It can mean so many different things.

S.
Yeah it's a progression.

K.
Take fashion development from the 60s to the 90s.

L.
I suppose it means what do you understand by development in terms of region countries and planning.

K.
Well that's just a statement they meant.

L.
Yeah but what do you understand by that development?

K.
It doesn't say that, it just says what do you understand by development. If it was just regarding that you'd be concerned with urban development and government policy and planning wouldn't it. International planning would be the EEC.

L.
and that's development, political development.

K.
Economic development.

L.
And being a united currency and all that.

K.
We're still not united.

S.
Building a road can be a development say for traffic reasons. You can have good and bad development like the Docklands.

K.
No, if it wasn't so expensive and ... I don't like Canary Wharf at all. Some of them are nice. Got to go

there on a field trip.
Good developments - health developments, stopping diseases, development of vaccines.

L.
That's medical development, that's scientific isn't it really.

K.
It's still development. I can't think of any positive urban developments. We're not in favour of motorways.

L.
There's no point in building any more motorways. We've only got 10 years of fuel left which will get more expensive when it starts to run out anyway. Which means cars won't be needed any more.

K.
You could go into wars.

S.
And they want to build an extra 4 lanes on the M25. I mean what's the point - they should invest in public transport.

K.
Discourage people from using..

S.
I mean the money they're using on the M25 they could put on the channel tunnel.

K.
Oh yeah...?!

S.
£3 million a month

K.
It's not going to finish on time. I thought they wanted it finished by 1994. It's going to be running they just won't have the high speed trains.

S.
it'll be really embarrassing for Britain.

L.
Privatisation could be considered a development.

S.
Some people might not agree in it, some people might think it's good, others might think it's bad.

K.
Railworkers aren't particularly pleased.

L.
Mind you they might get more pay so they might be.

K.
Oh can you imagine that?

L.
But think about your traditionalists who like the big red bus.

K.
I like the Red buses.

L.
They'll get rid of them when its privatised. You get green ones like the ones that rock.

K.
I think we've exhausted development.

L.
Yeah we've said about the third world.

S.
Mexico City.

L.
That's development but they've gone too far because they've got that pollution problem.

S.
Mexico was built on a swamp.

K.
Its a lake really.

S.
they've got development, what was it 10 miles out of the city these big Aztec pyramids so that was development, historical development.

K.
Well we can't specifically define development unless you put it in some sort of context and then you can define that certain development. But just saying development , it could mean anything.

L.
Dictionaries don't actually define development in one sentence.

K.
Places, regions or countries planning development that still could mean anything couldn't it.

L.
Yeah because regions have development in terms of roads and countries in terms of their economies. Certain

places that would be like the Docklands and therefore that has its own development.

K.

You've got to put it in a context. You can't just say what is development.

TRANSCRIPT - DEVELOPMENT

B. ESHER COLLEGE (Nov 1993)

J.
Development differs in different regions within a country.

B.
Major development was the Green Revolution into mechanisation and ...em.

J.
Yes we've got to talk about how development differs in regions because development is different within a country. There can be different sorts of development like in urban or rural areas.

B.
Yes in cities.

J.
And regeneration and or agricultural sort of revolutions..um.. in urban areas development could be regeneration schemes, improving the services and access type of things and in rural areas it could be improved mechanisation and technology for farming and agriculture.. um.. but in developed countries it's more subtle change, really than developed countries, I mean developing countries yes.

S.
Development's on different time scales, right, in developed countries usually development towards other things is shorter than in developing third world countries because of resources.

J.
Yes which has happened as third world countries aren't as developed as we are.

S.
They rely on us for their sort of development.. to get anywhere near us basically.

J.
Westernised countries aid development in developing countries..um.. but you can debate that..um..

S.
Yes you could say they pay too much for that development and then they can't pay any more because they owe too much.

J.
Yeah third world debt.

S.
Restricted development.

J.
Arrested development.
And development can be within different.. oh we've already said that.. sectors like industrial, agricultural and commercial... but they're all sort of affected by each other none of them are really independent of each other. You have to go on to industrial development and then technology and then in a sense you've moved on from there.

Why do places, regions and countries plan to develop. I mean even if say in England there's real technological advance and it's that really advanced why do they need to keep on development, why don't they let the other countries catch up? Is there an answer to that question? (laughter)

S.
There is. They just want to keep ahead and they don't want competition from the other countries do they?

J.
So development in westernised countries.. is often to keep ahead of others.

S.
To make money yeah. They look at short term aspects probably and the long term aspects but mostly..

J.
Well sometimes, well westernised countries make, well try to, we've said before, aid developing countries but that will lead to like complications and stuff and often the westernised countries are just wanting the other, the developing countries to advance so that they can profit themselves like the cash cropping.

B.
How can you plan development? Because like, I thought it just, you know occurred like natural progress under something else.

S.
Most of the development countries don't plan it. They usually get forced into it or realise...

B.
it's a natural stage to move on to.

All.
Yes.

J.
In a way I suppose it's arisen in developing countries because lots of farmers and that have become poor

because of the green revolution and agriculture.

S.
Well there's been a wider gap between rich and poor farmers but..

J.
yes.

S.
There has been development in rich farmers so..

J.
Yes but its not... its not like that was planned but its like they've been sort of forced to moving on more quickly then they would have done if they'd been left alone and thats resulted in people being poorer and going without food.

S.
The problem of development for third world countries is that all their traditional ways of life, families get broken up because they have to move out to get employment, things like that whereas its much easier to cope with development in developed countries because they can move around they're mobile.

J.
Yes having said that it still does cause the err..rural degeneration what's it called?

S.
Yes it does but it has much less effect.

J.
Its not on such a wide scale because people in developed countries are free to move to places, cities where there are more jobs but having said that there are high unemployment levels in developed countries.

S.
Yeah

J.
Developed countries, westernised countries can develop with technology and the same with agriculture and industry. They work out ways of being more profitable and efficient ways of going about things.

B.
Some development that takes place in western countries I think is unnecessary.

J. Yes.

TRANSCRIPT - ENVIRONMENT

C. ESHER COLLEGE (Nov 1993)

M.

To me the state of the environment is how the environment is , how the environment has changed in previous years and how it stands now.

C.

And whether the land is fertile and in good condition and whether it is eroded.

M.

The impacts that people , that human use has had on the land and the environment.

F.

Not just the environment, everything.

M.

Yeah but is it like man's fault or is it just natural?

C.

It also includes the environment as in pollution wise, pollution from vehicles, fuel, factories and things.

M.

And the trees are cut down. They produce carbon dioxide which is essential to plant and soil growth. Without trees there's a lack of oxygen.

I think that the state of the environment has gradually depleted over the years due to the impact man has had on it, as money has become...um...material wealth has become more part of life and people will go to any lengths to gain as much out of the land as possible.

C.

Like with farming.

F.

But that is only a small part.

M.

It's detrimental to the environment to ecosystems because they've removed the hedgerows which leaves animals out of homes and then they die. It ruins the whole ecosystem.

C.

People have different views on what they class as the state of the environment.

M.

I think it's improved because we've got places like national parks where land has been preserved and the whole of the environment has been preserved as a natural one and then you've got places like _____ park and stuff which have got man made built things in it which just don't look...

z

F.
There's nothing wrong with _____ park!

M.
No there is nothing wrong. It's been preserved, yes that's the good part of it. Also they've got like sandpits. They allow the public in there, therefore the land's been eroded etc. and it's got like roads through it, man made things are being built into it.

F.
OK.

C.
They're trampling the land and animals.

M.
OK, the trampling of animals is natural so that no one can be blamed for that. I think quite often man's use of the environment is detrimental. I don't think they need to go to the extent they are.

F.
Yeah, but that's just on the agricultural land.

C.
The environment is also about the rain, the state of the area or the atmosphere around us.

M.
Pollutants.

C.
And whether it is damaging our health and increases the cases of asthma due to the pollution in cities and things.

M.
They've also got things like Sellafield and pollutants being transferred through the soil into plants and producing many cases of leukaemia.

C.
There's a state which should be beneficial to everyone.

F.
It has to come eventually.

C.
But in years to come it could go one way or the other. It could either go back to things like organic farming where everything is natural or it could go the other direction where it gets gradually worse or it can't be reversed.

M.
But whose fault's that?

F.
But then again you're just talking about agriculture.

C.
No.

F.
Organic farming - you are!

C.
No that was an example.

F.
Oh yeah. So have we got a good state of the environment or a bad state?

M.
It depends what area you're in and depends obviously again what your values are, I mean...I think..

C.
If you're living in the countryside...

M.
and you come to a town you'd think...

F.
That they abuse the environment.

M.
Yeah, because everyone, my parents think that we just, that we abuse the environment so much because you know we go to the park and look at the floor and say they've dropped all this litter bla bla bla, and it's got nothing to do with us, it's just the environment in general.

F.
Yeah.

M.
Everyone's views are going to be different on what the state of the environment is.

F.
If we went into the city we'd think they abused it.

M.
Well yeah.

F.
We've got to destroy some of the natural environment. We've got to live.

M.
But we've got to remember the environment's got to be available to everyone for the next God knows how many years.

C.
It's the levels of damage. If you could measure that.

F.
Yes but is building houses damaging to the environment?

C.
It's nothing to do with houses.

M.
Well it could be. Consider that as well.

C.
Yes, because it's the living environment, how crowded places are getting.

TRANSCRIPT - ENVIRONMENT

D. ESHER COLLEGE (Nov 1993)

J.
What you hear about the environment is what you hear through the media.

R.
The media and ...

J.
...and what you understand by it I suppose is your own personal opinion. What you understand by the state of the environment.

R.
You need to define the state of the environment. It's the whole area everything that surrounds it or just as individual fields or..I don't know, or a wider area.

J.
In terms of ecosystems.

R.
Or in terms of human impact and then onto the natural impact which humans

J.
initiate.

R.
Yes thats it.

J.
Go through the natural impacts like soil erosion, pollution

R.
and also desertification.

J.
Deforestation.

R.
Deforestation was a main issues.

J.
Natural impacts.

R.
Which climate isn't it. Hurricanes and things can effect the environment.

R.
We can have nitrate pollution brought by industries and fertilizers. Increasing fertilizers overall the production, increasing production for humans is

increasing the state of the environment in a worse..

J.

..negative way. The more humans do..

R.

..the more it seems to damage the environment. But at the moment some of it we can't see or in the long term and at the moment we don't seem to be able to ..we don't see the effects of our pollution.

J.

So what, what effects can we see?

R.

We've seen...

J.

Industry.

R.

Acid Rain is one and in nitrate pollution which is damaging human health, Blue Baby Syndrome and also the animals because of cancer. Its allegedly thought that increase nitrate in water supplies increases the risk of cancer.

J.

There's thermal pollution which is industry using river water for coolants and it leads back into the river and it kills the fish because its at high temperatures. But, it initially also increases algae growth and takes oxygen out of the water which also kills the fish - eutrophication.

R.

Oh, Greenhouse Effect and Global Warming as well, isn't it the same, it probably is.

J.

Yeah, greenhouse. Depletion of the ozone layer is a different thing.

R.

Ozone layer increases of CFCs in the atmosphere making holes in the ozone.

J.

Deforestation, impacts on the environment which affects the state mainly in areas like South America where the land is needed for cattle farming. They cut down the tropical rainforest, revealing the poor soils beneath the trees and they farm the land and its only used for one to two seasons because the soil is so poor and they leave the land. The land doesn't regenerate, the soils are nutrient free.

R.

But why do we do that?

J
Because we're greedy

R
We just want more. That's mainly from the developed world. They are cutting it all down for food for the developed world. We're actually all the time just increasing production and money which is all they are looking for. It's economic reasons.

TRANSCRIPT - DEVELOPEMNT

E, GCH A LEVEL STUDENTS (4)

(November 1994)

S
Progress that's what development is. Better standard of living, increases in employment.

R
When it says development it's progress but it doesn't have to be positive, it can be negative.

K
It can end up being negative but development is supposed to be progress.

R
Progress but it doesn't have to be positive.

K
It's designed to be positive sometimes it goes wrong.

R
It's supposed to create opportunities

C
Create new things.

R
Supposed to be of benefit to society, to increase employment so you can buy better housing.....and

C
But it's all developed for one thing. It's all development for one idea.

R
Comes back to how much money they've got.

C
Yes also it's about you know one persons got this idea of development which everyone's got to follow and it's not about development. It's about the development of towns and buildings.

R
People like Rostow come up with their stages of development take off model but its his own interpretation. Where was he? Chicago?
But you put it somewhere like Ethiopia or Egypt and it's not going to work because there's different social attitudes.

C
Yes but is it really good tough?

R
Traditions so you have to take each individual country.

S
We're meant to be living in such a developed place yeah
and look at the state of the buildings around us.

R
And the problems all society is facing.

K
If we're developed how come it's still going on?

R
How many unemployed have we got in this country 3
million?

S
on money the amount of money and all that.

R
They don't look at how successful society is as a whole.

S
But you find that..

C
They don't look at the whole world.

S
Almost all of the rich countries aren't. Although their
standard of living may be high, they've got consumer
goods and luxuries and all the rest of it the
environments aren't all that good.

C
They think that if this place is going to become
developed they're going to it doesn't matter what
everyone else has to put up with while they're
developing ...

S
I think the whole issues of development for us for rich
countries it's just gone too much now because our
development has been too extensive. I think that we have
to reverse.

K
Some things are stupid, look at Docklands development.

C
It's all development on different scales.

R
They make mistakes. It'S expensive but not just money
expensive because it effects people, the environment
habitats you know.

S
Do you think population rise with development?

R
Because if any area becomes developed it's like the bright lights syndrome. When they're attracted to an area that is developed they think life is going to be so much better there.

C
But Docklands is a development and a decreasing population.

K
Medicine has got something to do with development so more lives are being saved. Maybe population is increasing?

S
What places are being developed?

K
The rich countries, the rich get richer and the poor get poorer.

R
No the places that have been developed are... most of Europe is considered developed. It's mainly the countries ...the countries developing are in South America and Africa.

K
They're not though.

S
Alright we've got this big supermarket by Docklands whatever. I think whose losing out there must be some loss somewhere. Ok developments didn't work out but what else didn't work, who else lost out because of the developments?

K
All the people that lived there.

C
They weren't important. It's all money.

R
Benefits come from it as well. A lot of people have got better housing. There are a lot of people who live there and can also use those facilities. They've got better shopping access. They've got a transport link DLR.

K
That's a laugh it never works.

C

But listen all the people that were taken away weren't replaced in better housing. They were all for the rich people.

R

A lot of those apartments were warehouses that were converted. People did lose housing but they were complaining their housing was bad anyway.

K

Who lost on a larger scale then?

R

People did lose but they also got some benefits.

S

When I think of development I just think way back to colonialism and just think about those poor little Black People (S is of Afro-Caribbean origin!)

K

You make them sound like stick men.

S

They were more developed than you was now and they were doing fine. They wouldn't have been underdeveloped as they are now.

R

They might have still been developing but the situation might not have been as bad as it is now.

S

Just that they wouldn't have been as underdeveloped as they are now.

K

But we haven't got any proof of that.

S

What do you mean we haven't got any proof of that?! Britain's exploiting them.

K

Not Britain other countries.

S

Yeah Britain just think how much Britain's doing.

C

It's all greed it's all money it comes down to.

R

How far you develop depends on how much money you're prepared to spend.

C

And how much control you take.

R

And how much money you put into the research of looking into the situation as how it was before you start developing.

S

I see development as just a short term issue because I don't think that it lasts very long.

SY

Do you think there's any connection between the things you've talked about?

C

Yes

R

One money is involved in both of them and plus also with development comes the exploitation of the environment.

SY

Why?

C

All the negative attitudes because they develop at the expense of the environment and it doesn't work sometimes. I think with the increase in development you get a decrease in the environment. Yes because it's all about money.

S

Because it's not necessarily beneficial to the environment.

SY

Can you give me an example?

C

Well building cities. There is an increase in cars. They build cities and roads and more cars and more pollution.

SY

So is the building of a city development?

C

Well it's seen as development. Development also that they get more money..um...the government gets money and the rich the rich the ones who build it.

TRANSCRIPT - ENVIRONMENT

F. GREY COAT SCHOOL (Nov 1994)

S
State of the environment is...

R
What I understand by the state of the environment is when they talk about it in the newspapers they say um about how we're abusing it and about what state it's got into um...you've got global warming and hole in the ozone layer and things like that, a lot of pollution.

S
The state of the environment basically is going down.

C
Why?

S
Well, they talk about global warming and pollution..um... deforestation, desertification and all of that...

R
Basically we're abusing our environment um...and the state of the environment is going down because we're not looking after it properly.

C
The state of the environment is the state we're putting it into.

S
Like we're trying to recycle things now though in it.

K
Yeah but nuclear waste makes up for it doesn't it I mean..

R.
You like your nuclear waste don't you.

S
But all the recycled products are expensive in it, so people don't really go for it, so they prefer just to use...

R
But they choose the cheaper stuff rather than the more expensive recycled stuff so the state of the environment again is going down unless people change their attitude...

K
But if everyone changes to recycled stuff then it would be cheaper

R
Unless the majority of people change their attitudes to the environment things aren't going to change.

S
In India remember that case study we did they were talking about how a lot of the land is turning into desert land because they're using up all the firewood. The large population is using up all the firewood and the land is depleting or whatever it is.

K
What happens is they chop the trees in one area to make a farm, cattle and the soil loses all its nutrients and then they can't use it anymore so they have to find another piece of land and there's more deforestation.

C
So the state of the environment is going down because

K
human impacts

C
Yes we're abusing it too much. We're thinking about it in the short term...advantages.

K
Nothing's sustainable.

R
I mean basically when it says what do you understand by the state of the environment basically is just the situation the environment in at the moment which isn't a very good state.

S
It's not very balanced.

R
No because of the human impact on it is destroying it.

S
Too much demand on it now.

C
Yeah

S
I think

K
all our resources are exhausted. I mean we've only got enough coal to last how many years?

R

A couple hundred years at the most if consumption carries on as it is.

C

Which it will.

R

Or increases then it's not even going to last that. If people got ...the only real solution I suppose is for people to change their attitudes towards it.

C

But that can't be done unless...

R

But people, people don't want to pay money, people only are concerned with benefit to themselves and short term. They're thinking well I'm not going to spend this money on doing this because...and like when you say...

C

It's a negative attitude as well because I mean when you say to someone coal will only last until 200 years they'll say well I won't be around.

R

I won't be here.

S

The coal's going to last longer than that.

R

No

C

Even if they carry on using it it's still destroying the environment.

R

Even if it lasts 200 year I mean you think about it, it's 200 years is a lot to us but in sort of taking it context with time as a whole if you get what I mean..

K

It's nothing at ...

C

In the 200 years they're just going to, it's going to pollute the environment.

K

We haven't developed our wave, what is it called, power and all that what is it called?

C

Wave power

R

Alternative

K

Yeah renewable energy, we haven't developed that.

S

We need sustainable energy.

r

It comes down to spending money and people aren't prepared to do that.

K

That's why we don't get coal from Britain because it's deep mined it costs more money.

R

People aren't prepared to spend their money they're thinking short term rather than long term and so they think well you know, in the space of 10 years we've got to spend so much....

K

It all comes down to money basically.

R

and they, and they don't want to spend that money.

k

And attitudes

R

Well that's part of the attitude though.

K

Yeah

R

People think well if I'm going to buy this recycled toilet paper

K

It's going to cost

R

It's going to cost me an extra 50p or whatever it is...I'm not prepared to spend that where if more people did spend extra they'd end up getting it back because the price would go down and because less people would be buying the um stuff that's not sustainable.

K

CFC that all the CFCs were taken out like of the aerosols and now everyone buys them. First of all they didn't.

R

A lot more people don't use aerosols I mean they cut the CFCs out but there was another gas apparently put in it that was doing just as much damage. You're better off

just not using it at all.

C

The thing is that people become more aware of the ozone and the problems, people wanted to stop the cause.

R

But they only get worried because it's going to affect them because the hole in the ozone layer can cause skin cancer.

K

I think it's , I mean a Lot of m don't know what it is , I mean if you ask someone what the green house effect is they think What? They say oh its the ozone layer and then you say well, the earths hotting up but they don't understand whats going to be the consequences.

R

They can't separate the two issues, global warming and the hole in the ozone layer are two separate issues but people associate them with each other. I suppose in a way they are associated.

K

Yeah they are.

R

But that's not the point people think it's just one problem rather than two separate problems needing two separate solutions.

K

I think they also think that environmentalists are wacky, way out people, outrageous people and they look really silly like they've got a screw loose. They don't take it seriously.

R

Because they only see a small minority of the group. It's um...a um.... oh whats the word?

C

Image. But the environmentalists take that image but the ones at the top you know...

R

Its like people see people who go to university are all off somewhere or students wasting time and spending the governments money.

S

Because CFCs are like mainly ...It's not affecting us here now is it, It's more affecting Antarctica isn't it?

K

Well if it does all the sea levels will rise.

S

They don't look at the long term effects they only look at the immediate effects.

C

They can't see how their little safe world is going to be destroyed by anything.

S

Not because it's not real but because they'd rather not know.

K

Sit in their happy little cars wasting fuel in traffic jams.

R

It's not just big things like that either it's like dropping a sweet paper or something on the streets. That's why I didn't want to come back from the Alps. The air was so fresh there you breathe and you could actually feel the air going down. I had trouble breathing when I got back because my lungs just got used to breathing the clean air.

K

People like their little traditional ways. If we stuck to traditional ways there wouldn't be a problem. I don't think or maybe they would because of the smog they had. We were walking over the bridge there was this rainbow stuff on the top and it looked like it, someone had just chucked an oil can in the river Thames, not caring.

R

They are seriously not bothered at all. There's a small minority of people who are trying to change things but it needs the majority of the population to sit up and realise.

C

Yeah.

K

That there is a big problem. That it's not just something that might happen in 100 years. It's affecting all of us today unless it's something going to happen directly to them then those people aren't bothered about it.

C

But what about people increasing getting asthma?

APPENDIX 2

TRANSCRIPTS OF CONVERSATIONS ON PROBLEMS FACING FARMERS IN YEMEN

TRANSCRIPT - PROBLEMS FACING FARMERS IN YEMEN

A. ESHER COLLEGE (Nov 1993) GROUP A

S.

What's most important? Terraces not maintained.

R.

Hang on - aid.

S.

They only need world aid to maintain the terraces and to get higher yields.

R.

Migration.

S.

People only move if there is a problem, there's got to be a problem causing migration.

R.

Migration to the cities.

S.

That only comes after the problem.

R.

That's why I put it on the bottom.

S.

Shall we go historically by hierarchy?

R.

So we've got imported subsidised grain which undercuts local farmers, that's because of the oil..no..hang on.

J.

They found oil.

R.

That was migration ...caused people to go to cities because of...

S.

So down here to rural-urban migration.

R.

Right, deforestation.

J.

Oil - the economy became multi-national didn't it. Outsiders came to the country and exploited it.

S.

We can put that with the world economy and the lack of aid.

R.
It's aid to the wrong places.

S.
I know it's to the wrong places but they both lead to an expansion don't they.

R.
Right, deforestation. That's due to increasing population. Demand for water and fuel...needs to be put there. Terraces not maintained because fewer incentives.

S.
That's migration.

R.
Because of imports of cereal.

S.
And that's migration as well. Landowners to the cities.

R.
And that means traditional farming has been lost. Top soil washed down so when the terraces aren't maintained the water breaks the terraces.

S.
Most farmers are sharecroppers so a proportion of what they grow goes to the land owner so that goes there and then they migrate to the cities.

R.
Violent floods causes erosion, water carries fertile top soil down. Water harvesting causes arguments between farmers.

S.
Put them in a line then you can interlink them.

R.
Arguments. That's social.

J.
That branches off, it's just a link.

R.
Right, where does the oil go to? Oil causes migration, migration to cities because of increased education. Population increase...

S.
I reckon this one ...farmers in the plains depend on mountains because that should go before water harvesting which causes arguments between farmers about period of use. Then we should put in the one where farmers in the plains are inter-dependent on each other.

R.
Yeah.

R.
So you've got imports of grain undercut local grain, imports of cereal, the subsidising of grain decreases prices leaving little incentive to produce crops on mountains and maintain land...so then terraces not maintained and top soil eroded...
We're going to need arrows.

S.
Farmers inter-dependent on each other will go onto water disputes. I don't knowis there any argument between mountain people and plains people?.....

R.
What about this. Most farmers are sharecroppers.

S.
No that goes up there.

R.
Why does it go up there?

S.
Just below there, before migration to cities because the landowners migrate to cities because they're sharecroppers...connected to rural-urban...

R.
World economy, aid and high value cash crops to farmers who have water. That leads back to the beginning. That's the subsidies.

S.
Yes.

R.
traditional farming is in danger of being lost. They all link. They're all important. Without one you don't get the others.

S.
Well that can lead back to the one that goes as farmers are sharecroppers they're poor and depend on subsidies and aid.

R.
Yeah, no hang on, as farmers are what?

S.
As farmers are sharecroppers, They're poor and depend on aid.

R.
No, but they don't receive aid.

S.
I know, that's what leads back to it and that also leads to migration to the cities.

J.
That links to the traditional farming and sharecropping.

S.
We've got a big, big loop that circles everything.....

S.
Right, world economy, lack of aid.

R.
No. The aid to the wrong persons.

S.
But only 10%. Those all lead to

R.
They don't lead to the oil.

S.
If multi-nationals come in it could lead to migration to cities. That's why we put it there.

SY.
Traditional farming is collapsing so that leads to what?

S.
More aid, but not the right aid so also leads to outsiders coming in.

SY.
So you've drawn a cycle?

S.
Like agrarian poverty in Nigeria. My case study from GCSE. Imports also lead to aid because they're being undermined. They need aid then. Most of them are poor so depend on aid.

TRANSCRIPT - PROBLEMS FACING FARMERS IN YEMEN

B. ESHER COLLEGE (Nov 1993)

W.

I think the terraces are being allowed to crumble and erode.

ST.

No thats not the most important.

J.

I think the most important thing is the soil. 90% of the population depends on food production and its being eroded by rainfall.

W.

But thats the result of that cause, they're crumbling and the top soil is being eroded.

J.

Isn't the terraces crumbling the result?

Sa.

Its raining, that's why the chunks are falling so it goes the other way.

W.

No its because the terraces are crumbling that soil is being eroded.

Sa.

Being eroded by rainfall.

J.

I dont really get this because it all links.

W.

Oh you're just thick!

J.

Oh shut up. There's not one problem thats more important than the other, they all link up.

W.

Terraces are being allowed to crumble and erode.

ST.

I reckon its the attraction to consumerism because then they're not going to maintain them. They're going to go to the capital and that will cause the terraces to crumble.

J.

Consumerism leads to grain imports undermining local prices, less incentive bla bla bal then because they are allowed to crumble and erode.

ST.

Then soil eroded.

J.

..and as a result of all that the irrigation system gets clogged up and oh.. when Yemen entered the world economy....so where's it go?

ST.

Access to ground water, because only 10% have access to ground water all the rest won't get aid because they go to farmers who respond quickest. In other words 90% don't get aid because they can't respond quickest. I mean 10% can.

J.

Sq how does that link up to the rest?

ST.

I don't know, its one of the problems. I don't think it has to link up its to do with growing cash crops, entering the world markets.

W.

If it goes to the quickest response farmers then all the other farmers are left out of it aren't they.

ST.

It affects alot of the farmers. .

W.,

90% dont have aid.

SA.

Only 10% get aid. I think this is quite important.

ST.

I think its quite important.

J.

Increased demand for fuel like the cutting down of trees, that's to do with..

ST.

..deforestation.

J.

Yes which leads to more erosion.

W.

Yeah. I dont think thats very important.

J.

It is important.

ST.

In terms of priorities there are other things which have to be looked at first.

J.

Like what?

ST.

Like maintaining the terraces.

Attraction of consumerism is linked to grain imports.

J.

And that goes to enter the world economy.

ST.

Its linked to surplus. They are getting pushed away to cities.

J.

Attraction of consumerism to subsidised grain imports.

ST.

Because they're leaving farms because they can't produce because they're being pushed away from farming, and entering the world economy is linked to subsidised grain imports.

J.

That way?

ST.

Yes.

J.

Terraces are being allowed to crumble thats linked to drawing people to cities.

ST.

No

J.

Yes it is.

SA.

Terraces aren't eroding because people are leaving.

J.

Yes it is, they're leaving and not farming the land.

W.

Well yes I suppose so.

J.

Ok, why are terraces being allowed to crumble and erode?

ST.

Yeah you're right because they are attracted but thats not why, the terraces aren't eroding because... its because they're not maintaining them.

J.

And why aren't they maintaining them?

ST.

Because they're leaving. They are all linked.

W.
Attractions of consumerism linked to subsidised grain.

ST.
They haven't any incentive to stay on the land. Because of subsidised grain imports their price has to be cheaper so they move to cities.

W.
Prices have been undercut.

ST.
The government aren't going to buy their grain are they.

TRANSCRIPT - PROBLEMS FACING FARMERS IN YEMEN

C. GREY COAT SCHOOL (Nov 1994)

S I think that one should be in the middle somewhere. There used to be subsistence agriculture but now ...

C What else?

R Loss of traditional farming. In danger of being totally lost.

C And what about this World Bank investment?

R Yes that's part of the reason its being lost.

K Linked with what though?

11 C With loss of traditional farming

R Because that's why its being lost isn't it?

S Yes but isn't there something that comes before that like..um..?

R We can put it in if we find it can't we.

S Like them opening up to other countries.

C Education level rising and children working outside the farms in cities. Have we got that already?

R Yes labour shortage to work land because there's migration from rural to urban so that's the same thing or not?

S No because of education.

R OK that can go over there can't it. It can be linked to that. That can go with it as well. Labour gone to other countries.

R And that can go with the aid as well - only 10% of Yemeni farmers benefit from aid and the others are left high and dry.

K How about that - the World Bank then.

R Yes that goes with the other World Bank one as well - investment in cash crops.

K The World Bank investing will go with....

R It can go with anything... yes or not? Yes no?

Pause

R I' just putting in order.... yes grain imports undermine local prices little incentive to maintain land and repair terraces or plant tress for future generations. Yes so that goes there....

K So terraces stripped of tress and...

C for firewood..

K Goes with grain imports..

R And that leads to um... saw it just a minute ago...terraces being allowed to crumble and erode will go under...

K under those two.

C And this one rainfall eroding soil which 90% of population depend on for farming and food production goes with eroding soils.

R So that one goes up there as well because that was to do with aid.

C So that goes there.

R Or it can go underneath it can't it because it's a result of those two.

K As a result of what?

C Where does this one go?

R

The World Bank investment.

C Where's this go?

R They'll stay there as well won't they?

C It's in the way. They can go under there.

R Do it like that yeah....um...

K Demand increases

R um...

C Violent floods transformed into wasteland covered in four metres of rubble. That's to do with eroding soil isn't it?

S Are we meant to find the cause and work our way down?

SY All I want you to do is to work out which you think are the most important problems put those at the top. You can rearrange it after if you want and link up the causes as you go. You don't have to keep them in that order.

S Absent landowners.

R Which is with that one isn't it

K No absent landowners.. there's no incentive to maintain the land. It goes with grain imports.

C Also it goes with the trees being destroyed for firewood..that's undera cause of that.

R of that so if we put those two there

C but..

R Those two there and those three go underneath it like that.

S Where's that one then?

R um...

S Isolated villages brought into economy.... and new goods in economy.

R This ones about going to urban areas....there.

C And that demand increases and rural quality decreases and urban demand...

R Find somewhere to put those now.

C This is connected to urban as well.

S Should this be before the subsistence agriculture in decline?

C What the economy?

R Yes because in a way that's why because they've opened their doors and then people have given the aid haven't they and..... But I think that

R But I think that's more important than that.

C I reckon that these are a cause of that and that....

R So put them both at the top.

C World Bank invested in the cash crops.

R So put both these at the top.

S But why did the World Bank invest in cash crops? Because there was the decline.

R No there's decline because the World Bank have invested in cash crops.. I think.

C Yeah, so that should go at the bottom.

- K It's probably one of the reasons.
- R So put both....so put the subsistence and isolated villages....
- S So the first thing should have been rising population shouldn't it?
- C Well...
- R But I don't know... but has the population as a whole increased?
- S I don't know maybe I'm on the wrong track...
- C Lacks modern health, schools and roads...
- K Don't you think that's a reason for giving aid ...oh I don't know.
- C Um....This is erosion as well. Modern irrigation schemes becoming clogged up by growing mess of top soil.
- S Violent floods and...
- R That can go down there..um.. I'm losing track of what I'm doing now...what about the shallow wells... that's because of.. they're getting water by pumping it up from the ground water reserves and they're being exploited which means the shallow wells are turning dry.
- C Yeah
- R And it's turning to saline water
- C That's partly to do with...
- S And that's to do with...
- C Irrigation schemes.
- R So put that like that.
- S Isn't that to do with this ...to do with sharing water?
- R Yes so....
- S Is that why they're turning to the pumps?
- R So put it like that...those above the other water ones like that...oh god there's too many rural and urban.
- C They all connect up.
- R Where are we going to put these rural and urban ones? They've got to go somewhere. That might be that because of only 10% benefit from the aid the others are left high and dry but they've got to do something apart from faring. That one can go first.
- K They go to...
- R Urban population increases and that can go next to it as well. The labour shortage because they're both sort of the same thing aren't they? And that one as well, the labour power has gone to other countries. We're running out of room - if we it the other way um...pressure on rural population is to increase production due to increased urban populations....education level rising working outside farms and in cities, increasing urban populations.
- C That leads to that.
- D What subsistence agriculture...
- S I still think....
- R We can link them up afterwards. We can just draw arrows and link them up.
- C So what's this one - demand increases as rural quality decreases?
- R Put that under there - that they've gone to other places so they've...
- C Pressure and demand on rural population

due to increased urban population - that's the same thing.

R Is it?

C Yes

R Get rid of one of them there's no point having two of the same thing.

S If we start with sharing the water quality yeah, that being a problem and this yeah...and then ..the way the terraces are being stripped and then that because of the landowner ...I don't know. I just don't think that should be at the top any more - a subsistence agriculture.

C No I don't either.

R That's just a result of it so it should go at the bottom and its a cause as well..

K You could write two and put one at the top and one at the bottom.

C The thing is that all these things like education ..that affects subsistence agriculture.

SY Remember you've got arrows and you can link things up.

S Well leave it at the top then link it up.

K Yeah a flow diagram.

S What if we put it in the middle and just do arrows going out.

K Yeah...

C But then they don't...

K But should it...

R But then they go in order anyway.

C

Education level rising, working outside farms is increasing urban population.

R If we put that at the top that's another reason is it? And then link it...

C Why don't we say education level rising then this, say lack modern health, schools roads.

S That was before. Before there was a decline actually...

R That 'S one of the big problems.

S Was it before because remember it was split into north and south.

R I don't know was it?

S Yeah.

R Lacked modern health.

SY Remember most of the better health facilities are in the towns.

R So that's one of the reasons they went to the city as well..the fact that ...oh I don't know.

C There should be...

S If we say there was a lack in health and everything yeah, they needed money to improve it so...they took out loans yeah...the loans...when they took out loans the education system started to develop um.....yeah?

C Yeah

S So that led to them moving to urban areas and that led to the decline in children working on farms putting pressure on adult farmers and that led to subsistence which it used to be now being in decline.

R Yeah

S

9

You're not just saying yeah...

R

No go on..

Change order of cards

R

So what have we got left then?

C

Wait where does the education level rising come in?

R

There next to

K

Next to only 10% of farmers...

R

It's because they are both results of the aid.

S

Where's the infant mortality rate one?

R

SO what have we got left?

C

Isolated villages have been drawn into economy as Yemen opened it's doors to outsiders.

R

That will go up there at the top as well then with the aid and everything.

C

Aid and cash crops.

R

That will go between the top one and the next level I suppose because everything got moved down.

C

Yes

R

So I'll put it like that.

C

So it's...

K

It doesn't look very organised does it?

S

It's like a circle.

R Yeah, its all interlinked. It's all one big problem.

S

I still think this one should go at the top so in order to change that and improve education the World Bank was turned to for finance, financial help and that led to isolated villages as being drawn into the economy.

C

Yeah

S

And from there the lass of traditional farming. Yeah?

R

And the World Bank invested...

S

Also increasing dependency.

C

Yeah maybe...

R

I would say traditional farming was starting to be lost...

S

andum...

C

undermining...

S

The education level rised.

C

And that one as well only 10% of Yemeni farmers benefitted and they started having to migrate.

S

So that meant people migrated.

C

No hang on. That says because...it was because of the labour shortage.

R

That's that, a result of those two together, the education level rising and 10% of them benefiting from it.

C

But then that's labour power gone to other countries...

R

Put those there.

C

So that was a result of that, of labour shortage on the land.

K You know the absentee landowners, that goes under the loss of traditional farming.

S Yeah I suppose so yeah...and terraces being allowed to crumble and erode.

K Go under absentee landowners.

S And that's also due to labour shortage as well.

C Subsidised grain...goes to ...

R That goes here.

S That would go right at the bottom.

C But that would go under that one, subsistence agriculture in decline because that's basically saying that's what they do.

K So if we put that like that, that can go in there...so absentee landowners is linked to terraces being allowed to crumble.

S And we also said that the labour shortage was why the terraces are being allowed to crumble.

R Is that staying there?

K No

S Yeah, because this also connects with the 10% of farmers.

R SO terraces being allowed to crumble is also exactly thatleads to that so if I draw an arrow to that...

C And that one, World Bank investing in cash crops to urban population increasing.

R Also 10% of Yemeni farmers as well.

C

That goes to there.

S What? Only 10% benefit...

C Oh I get it, you see where it says terraces being allowed to crumble...

R Yeah.

C If we put the terraces stripped of trees and firewood and then put underneath itthat's why they've been allowed...

R So if I just stick that on the side like that...

C And then we've got all the problems like water sharing.

R So because terraces being stripped of trees - crumble and erode...

S And we haven't put seasonal rains which come heavy which is why... and that leads to rainfall eroding ...

R I'll put that one up there and we can link it to an arrow there. an arrow back up...

S Because they've been allowed to crumble because of absentee landowners.

K Does this one go here?

R Is it going up or down?

S This one's going up to here. No that one's coming down?

C That one about population increasing in urban areas is linked to labour shortage and migration.

R What about this one - both ancient and modern irrigation systems being clogged up leading to that one... can we have arrows going both ways?

K Yes you can.

R Because they wanted to improve I suppose, the education system.

S So with the aid coming in and cash crops being introduced to make money, that meant that the whole of the Yemen...because the whole of the aid wasn't free the Yemen was in debt to the World Bank... meant that the isolated villages that used to be sustainable just for their community had to be drawn into the economy so that not only to pay back it's debts but so it could also encourage exports. Right? Wrong?

SY So if they invested in cash crops why is that linked to labour going to other countries?

C Because it undermined traditional farming so a lot of people had to find work in other places...so it's also linked to urban populations increasing because they migrated to urban areas in search of employment.

SY So that leads to decline in agriculture?

R That leads to that.

SY Decline in subsistence agriculture so you've also said absentee landowners leave little incentive to maintain land so that again leads to decline. Terraces stripped of trees to terraces crumbling which means..

R Subsistence agriculture in decline leads to terraces allowed to crumble and erode.

K So it will go back and you need to do that again.

R Because the farmers...it's a difficult method of farming and it's intensive so the terraces can't cope.

SY Where is the intensive farming taking place?

R At the bottom!!! laughter

SY If the terraces are in decline that's causing people to go?

R I suppose so.

SY

S Population depends on farming and food production which means there's problems in sharing the water.

R It's coming together slowly but surely.

S Rural population increasing production due to increasing urban population

K related to...

S It's related to labour work gone to other countries.

C But it's also related to the loss in traditional farming isn't it?

S Yes.

R Can we have arrows going from both to that?

C Yes

SY Can you just explain to me why you think those are linked?

C Because there's a decrease in traditional farming and population increasing.

R The traditional farming wasn't so intensive and needs to become intensive also girls this one, having problems sharing water. Its easier to get water by pumping...where am I putting it?

C That's connected to opening up its economy changing so they're getting ...developing , taking ideas from other countries and then it connects to that...

SY You've started with lacking in modern schools. Do you think that's the major problem that caused everything else?

R It led to aid coming in.

SY Why did it lead to aid coming in?

Which means that people are moving away and there's no one to maintain the terraces.

R So that one could get moved to that one.

C But this one it says migration is linked to that and that links to migration.

R Do it the long way round.

C All around the top?

R Round the bottom. You don't want arrows crossing each other.

SY So the terraces crumbling and eroding is causing people to move away?

C Yes.

C/R And vice versa! Laughter.

S Say one half of the terraces are being eroded that's causing the other parts of the terraces to be eroded so it's in a sense forcing people away. Because it's a whole system, it works as a whole system, you can't just look after one side.

SY You're saying the terraces eroding that's causing people to move because the terraces are crumbling?

C No it's the other way round.

R Because there's no one to look after them.

S But if only a few people move away like they say the farmers are next to each other, if one farmer moves away the other farmers are going to suffer.

SY So it could go both ways. So another reason the terraces going is that trees are being stripped for firewood?

R

So terraces eroding means there's more rainfall?

K No! laughter.

R The rainfall is eroding the terraces so the arrows going the other way!

K Heavy seasonal rainfall is eroding the terraces. Not the terraces cause the rainfall!

SY Population depends on rainfall?

R Yes

K Yes definitely, they were praying for the rainfall.

R Look the rainfall's causing the terraces to erode. It's also making wadis turn into wasteland. So you've got both systems being affected by the rain.

C Shall I put an arrow going down like that? From the terraces are eroding to violent floods. No it's the other way round isn't it?

S no

C The terraces are eroding because of flooding.

R The terraces are eroding and covering the wadis with rubble but it's not like the whole total problem is it?

SY Can you explain this bit down here to me about sharing water and using water from the pumps.

R Because they have problems sharing the water, because they want to keep it as long as possible sometimes the people who should get it don't so...and when it doesn't rain it's easier to get it from the ground water pumps.

SY Is that why they're using the ground water pumps, because it's easier than the rain?

R So we have to draw and arrow from right the way up there down to here? This is getting silly now!....no no the other way. The World Bank invest in cash crops.

C Where?

R Here. That goes up to subsistence agriculture in decline....and that one as well.

SY What happens if all the wells turn dry and there's no drinking water?

R They'll all die!

S They're going to give them water.

C They need to provide aid, more loans.

K More debt.

R So we're going back from here back up there.

SY So what do you actually think you've learnt by doing this ?

R Not a lot.

K R. you can't say that! That all the problems are linked together.

S If the people had have known that the World Bank or did they know that the World Bank would lead them into so many problems?

R They wouldn't have done it if they'd known.

C It wasn't just that problem they all depend on each other all the problems it's not just one problem causes everything.

S When you think about it if for 3000 years these people have managed to sustain themselves and there haven't been any problems as such but these people come along with their cash crop ideas.

R But it's human nature to improve all the time. Do you know what I

mean?

S Yeah but they improve their tradition...

R No but the thing is though but by having education and health and so on

K Then they wouldn't get anywhere

R They wanted to improve that so they had to do it somehow and they didn't have the money to do it so they get aid, improve that but they couldn't have known the problems that would come from it. That by improving the education and so on like the younger generation....

K So if they didn't have any education in the first place they wouldn't have known the problems that might have come would they?

R Exactly.

K They don't know they just see it as a way out don't they - money.

SY Are you going to be able to solve this problem?

R No

S I think you would....

SY What do you think should be done as a solution?

S Absentee landowners should take care....

R I reckon they should just get rid of them and let the people who work the land own land.

K Own it and then get money.

R It would be much better cared for. People would have more incentive to look after the land if they had it themselves. They'd also be able to do with their crops what they liked rather than giving a percentage to the landowner.

SY

That's one we haven't got down!

C

What's the problem?

R

Sharecropping.

SY

What does it lead to then?

R

It leads to ...don't tell me it's something on that side of the paper because we can't do any more big arrows!

S

Differences between poor farmers and rich farmers?

K

Inequality

R

We haven't got that down either!

S

It also leads to migration.

R

Oh no!

C

Hang on where does inequality come I mean...

R

Sharecropping leads to inequality.

S

Which then leads to urban population.

SY

Is there one key thing here?

R

Yes the World Bank. Get rid of them!

K

The World Bank and the loss of traditional farming.

R

No seriously look how many problems they've caused all over the world.

SY

Doing the lesson like this does it make the whole thing clearer or not?

R/S

Yes

C
It does.

SY
Why?

C
Because you start to see how it's all linked in ...

R
If you write it down in points you don't really see it.

S
You would have thought the terraces the erosion is the main problem. It shows you that it's not.

K
Before I thought that erosion was you know....

C
It shows you how it was caused.

APPENDIX 3

STUDENT EVALUATION QUESTIONNAIRES

MODULE EVALUATION

Changing Agricultural Systems in Yemen

Lesson 1 (Text on background to Yemen, traditional farming systems and the collapse of the system)

How easy was the information to understand?

0						5
---	--	--	--	--	--	---

COMMENT

How much teacher/student input was there?

--	--	--	--	--	--

 Teacher

--	--	--	--	--	--

 Student

--	--	--	--	--	--

Would you have preferred more/less/same teacher input or student input?

--	--	--	--	--	--

COMMENT

Lesson 2 (Video - Hanging Gardens)

How easy was the information to understand in the video?

0						5
---	--	--	--	--	--	---

COMMENT

How much teacher/student input was there?

--	--	--	--	--	--

 Teacher

--	--	--	--	--	--

 Student

--	--	--	--	--	--

Would you have preferred more/less/same teacher input or student input?

--	--	--	--	--	--

COMMENT

How well did this lesson follow on from the previous one?

0						5
---	--	--	--	--	--	---

COMMENT

Lesson 3 (Linking the problems on a large sheet of sugar paper)

How clear was the aim of the activity?

0						5
---	--	--	--	--	--	---

COMMENT

How much teacher/student input was there?

--	--	--	--	--	--

 Teacher

--	--	--	--	--	--

 Student

--	--	--	--	--	--

Would you have preferred more/less/same teacher input or student input?

--	--	--	--	--	--

COMMENT

How much did you use information learnt in previous lessons to help you?

0						5
---	--	--	--	--	--	---

COMMENT

Lesson 4 (Critical analysis of World Bank/Arid Lands Projects).

Was the method of asking questions about the material presented, helpful in analysing the information?

No						Yes
----	--	--	--	--	--	-----

COMMENT

Do you think this module has given you any skills or made you aware of any way you can act as a member of society in the future to contribute towards a 'better world'?

Do you think there was any bias in the way the information was presented to you? Please explain.

What position does your teacher take on any of the issues raised in this module?

Do you think

environmental problems are the result of particular development projects or paths towards 'development'?

OR

development projects or particular paths to development exist because of environmental problems?

How much teacher/student input was there?

Teacher	Student
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

Would you have preferred more/less/same teacher input or student input?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

COMMENT

0	5
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

How relevant was this exercise in understanding the case study?

COMMENT

Lesson 5 (discussion of solutions and Sustainable Development)

How well do you understand the term sustainable development?

0	5
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

COMMENT

How much teacher/student input was there?

Teacher	Student
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

Would you have preferred more/less/same teacher input or student input?

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

COMMENT

MODULE EVALUATION

Changing Agricultural Systems in Yemen

Lesson 1 (Text on background to Yemen, traditional farming systems and the collapse of the system)

How easy was the information to understand? 0 ☐ ☐ ☐ ☒ 5

COMMENT

How much teacher/student input was there? Teacher ☐ ☐ ☐ ☒ Student ☐

Would you have preferred more/less/same teacher input or student input? ☐ ☐ ☐ ☒

COMMENT

I think the student discussions were interesting and encouraged us to think about the issues ourselves, we

Lesson 2 (Video - Hanging Gardens)

How easy was the information to understand in the video? 0 ☐ ☐ ☐ ☒ 5

COMMENT

The video was easy to follow from the work we did the lesson before but it was difficult to

How much teacher/student input was there? Teacher ☐ ☒ Student ☐ ☐ ☐

Would you have preferred more/less/same teacher input or student input? ☐ ☒ ☐ ☐

COMMENT

I think because we were watching a video it was difficult to have much student input

How well did this lesson follow on from the previous one?

0				5
				✓

COMMENT

I think the video followed on from the lesson before by showing the problems and explaining the details and ^{changing} problems in the Yemen

Lesson 3 (Linking the problems on a large sheet of sugar paper)

How clear was the aim of the activity?

0				5
				✓

COMMENT

I think the aim of the activity was to clearly set out the problems in a logical order so we understood the causes and effects and how everything links together making it easier to find the roots of the problems.

How much teacher/student input was there?

Teacher	Student
	✓

Would you have preferred more/less/same teacher input or student input?

				✓
--	--	--	--	---

COMMENT

I think we were able to learn from each other and had enough background knowledge of the Yemen from previous lessons, we became more involved in the issues.

How much did you use information learnt in previous lessons to help you?

0				5
				✓

COMMENT

Lesson 4 (Critical analysis of World Bank/Arid Lands Projects).

Was the method of asking questions about the material presented, helpful in analysing the information?

No	Yes
	✓

COMMENT

Asking questions about the information helped to understand the reasons for the world bank involvement, and also from the knowledge we had we were able to analyse the information and point out the weaknesses in the questions. Analysing the questions helped to understand the reasons behind World Bank projects and how they

Teacher Student
How much teacher/student input was there? ☐ ☐ ☒ ☐ ☐

Would you have preferred more/less/same teacher input or student input? ☒ ☐ ☐ ☐ ☐

COMMENT

i think i would have preferred more student input because alot of the questions were difficult to analyse without alot of help from the teacher. if perhaps if we discussed the effects in more detail. However the information made sense once it had been pointed out and was helpful

How relevant was this exercise in understanding the case study? ☐ ☐ ☐ ☐ ☒

COMMENT

This exercise helped to outline many of the possible routes to the problems in the case study. It also helped to understand why the world bank ~~it~~ acted in the way they did and what motivated them.

Lesson 5 (discussion of solutions and Sustainable Development)

0 5
How well do you understand the term sustainable development? ☐ ☐ ☐ ☐ ☒

COMMENT

i understand that sustainable development is development which uses the resources available without exploitation and exhausting the resources so future generations are able to live using resources available. The needs of the future are considered while present demands are met.

Teacher Student
How much teacher/student input was there? ☐ ☒ ☐ ☐ ☐

Would you have preferred more/less/same teacher input or student input? ☐ ☐ ☒ ☐ ☐

COMMENT

i think the discussion was useful in explaining sustainable development.

Do you think this module has given you any skills or made you aware of any way you can act as a member of society in the future to contribute towards a 'better world'?

I think this module has made me more aware of the extent of problems in many countries. I understand the route of the problems and also the difficulties involved in finding solutions. The inequality which the case study highlighted has made me realise that steps need to be taken to ensure that the needs of people all over the world are not ignored and exploited in the ~~short term greed of the powerful organisations and individuals~~.

Do you think there was any bias in the way the information was presented to you? Please explain.

I think the information was biased against the World Bank, however the information shared the problems and encouraged us to think critically of the World Bank. Perhaps the reasons for World Bank involvement and reasons for changes to cash crops could have been discussed. The information given by the World Bank was criticised, ~~before~~ maybe if we drew conclusions from the information before we criticised it, we could understand the motives and create our own bias.

What position does your teacher take on any of the issues raised in this module?

It was not clear which view was taken. I believe that there was a certain degree of bias against the World Bank that was not shown as an unbiased approach was taken and the ability to argue from both sides to discourage bias in our views.

Do you think

environmental problems are the result of particular development projects or paths towards 'development'?

OR

development projects or particular paths to development exist because of environmental problems?

I think in this case environmental problems are the result of particular development projects or paths towards 'development' because the agricultural system had supported the rural populations for thousands of years. It was only when 'modern' ideas of 'development' were raised that development of cash crops inputs from the World Bank etc and introduction of western crops and technology into the Yemen economy has undermined poorer farmers and ~~discouraged~~ taken land which cannot be maintained. The ~~main~~ ^{main} ~~you~~ ^{you} other statement is not valid because the area has similar climate to other Sub Saharan countries and managed to develop a sustainable economy.

MODULE EVALUATION

Changing Agricultural Systems in Yemen

Lesson 1 (Text on background to Yemen, traditional farming systems and the collapse of the system)

How easy was the information to understand? 0 5

				✓
--	--	--	--	---

COMMENT

easy enough - finding the problems was the hard part

How much teacher/student input was there? Teacher Student

		✓		
--	--	---	--	--

Would you have preferred more/less/same teacher input or student input?

		✓		
--	--	---	--	--

COMMENT It helps to have teacher input as sometimes certain phrases, problems etc are hard to understand. It also gives you more ideas to think about.

Lesson 2 (Video - Hanging Gardens)

How easy was the information to understand in the video? 0 5

		✓		
--	--	---	--	--

COMMENT

It took a while to get into the video and because you're having to read subtitles it means you have to really concentrate on the information.

How much teacher/student input was there? Teacher Student

	✓			
--	---	--	--	--

Would you have preferred more/less/same teacher input or student input?

	✓			
--	---	--	--	--

COMMENT

It was mainly the video but with the teacher stopping the video at certain points and explaining it it was made easier to understand.

How well did this lesson follow on from the previous one?

0				5
				✓

COMMENT

It basically explained everything that'd been on the sheets and showed ~~it~~ it in real terms rather than just points on a sheet of paper.

Lesson 3 (Linking the problems on a large sheet of sugar paper)

How clear was the aim of the activity?

0				5
				✓

COMMENT

The aim of the activity was easy enough to understand it was the actual practice of putting the problems into a logical order that was hard.

How much teacher/student input was there?

									✓

Teacher Student

Would you have preferred more/less/same teacher input or student input?

								✓	

COMMENT

By doing it nearly all by ourselves it made us think and helped ~~to~~ us to realise what the problems actually were.

How much did you use information learnt in previous lessons to help you?

0				5
				✓

COMMENT

It helped to have a background knowledge as it made it easier to see where problems were linked.

Lesson 4 (Critical analysis of World Bank/Arid Lands Projects).

Was the method of asking questions about the material presented, helpful in analysing the information?

No				Yes
				✓

COMMENT

With guiding questions and certain points to look at the analysis of the information was much easier.

Teacher Student
How much teacher/student input was there? ☐ ☐ ☒ ☐ ☐

Would you have preferred more/less/same teacher input or student input? ☐ ☐ ☒ ☐ ☐

COMMENT

WE WERE PUTTING IDEAS ACROSS AND THESE WERE THEN GUIDED SO THAT IF THEY WERE WRONG WE CAME UP WITH THE MOST APPROPRIATE ANSWER OURSELVES. - V. HELPFUL.

How relevant was this exercise in understanding the case study?

0 5
☐ ☐ ☐ ☒ ☐

COMMENT It showed what the World Bank was trying to portray as its role and helped to see how people can be misinformed about the situation in the Yemen.

Lesson 5 (discussion of solutions and Sustainable Development)

How well do you understand the term sustainable development?

0 5
☐ ☐ ☐ ☒ ☐

COMMENT

It's an easy enough term to understand - it just seems to be hard to actually put it into practical terms.

Teacher Student
How much teacher/student input was there? ☐ ☒ ☐ ☐ ☐

Would you have preferred more/less/same teacher input or student input? ☐ ☒ ☐ ☐ ☐

COMMENT The idea was explained and this cleared up any doubts or confusion about it in my mind.

Do you think this module has given you any skills or made you aware of any way you can act as a member of society in the future to contribute towards a 'better world'?

It's made me realise that it's not always enough just to realise what the true situation in a country is, you sometimes have to put thought into action, and do something about it. Unless a "protest" is made nothing is going to change.

Do you think there was any bias in the way the information was presented to you? Please explain.

Yes in a way. The evidence for both sides of the case were shown to us but with the World Bank's view we were told to analyse it in a what could be called a critical manner - which isn't a bad thing but was biased against the World Bank.

What position does your teacher take on any of the issues raised in this module?

That there are serious problems with the way in which many of the development programmes have tried to help. Also that some of the benefits are only actually benefits for the country who is giving the help.

Do you think

environmental problems are the result of particular development projects or paths towards 'development'

OR

development projects or particular paths to development exist because of environmental problems?

This statement isn't completely accurate though. The second statement has an air of validity about it. Development projects tend to go in because there are problems being experienced (not always ^{just} environmental sometimes human) but many of these projects do lead to environmental problems occurring and this is why I ringed the first statement. Thank you!