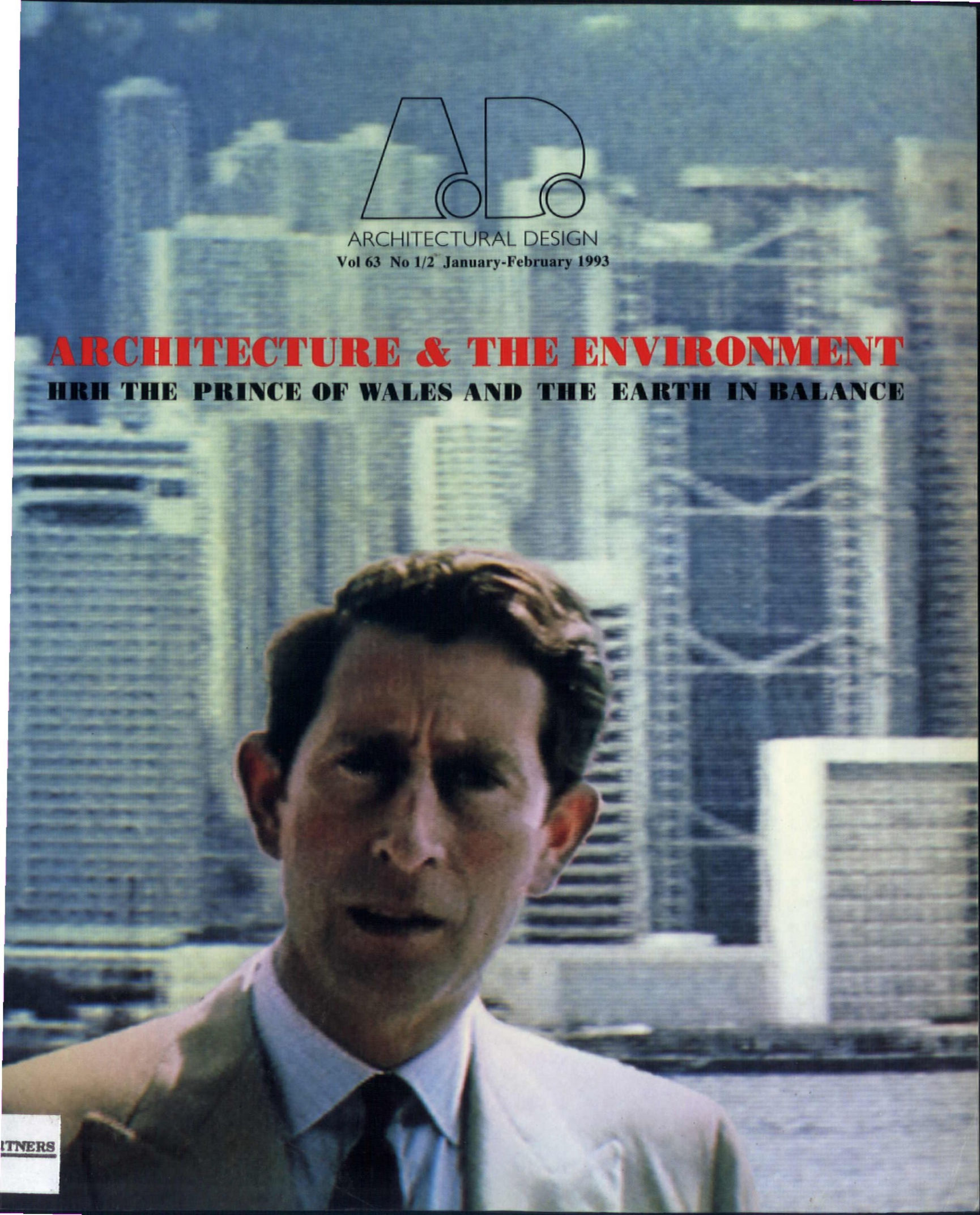

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HRH THE PRINCE OF WALES AND THE EARTH IN BALANCE


Winston

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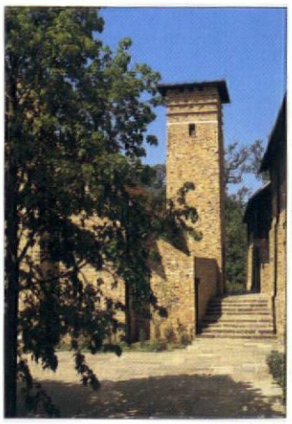

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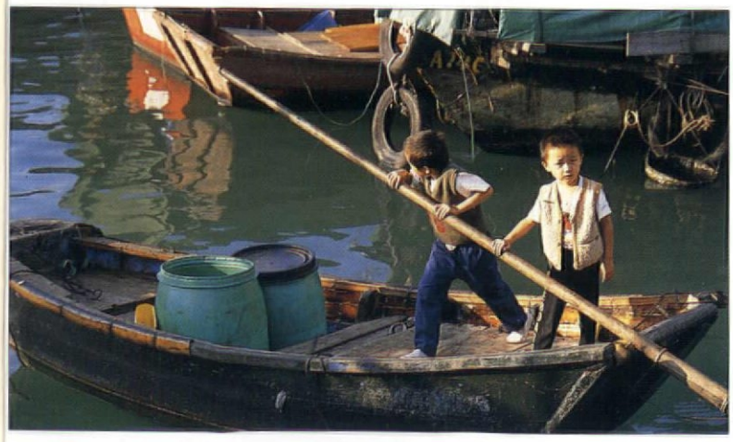


Children, Jakarta, Indonesia

THE CITY AND THE FUTURE

'Built according to the plan' might serve as the epitaph for countless historic towns and cities. While the achievements of the Modern Movement in architecture remain the subject of intense debate (as its buildings become historic moments and its practitioners too pass into the realm of history), modernist planning, for all intents and purposes, is dead. London's Paternoster Square, Boston's Prudential Centre and the confusion of the Brussels ring road remain to remind us of what went wrong. These schemes now stand discredited and disliked, conspicuously at odds with the historic cities to which they are attached.

Indeed, so discredited is the tradition of the Ville Radieuse, the 'city of towers', that even new-generation modernists have resorted to a form of Beaux-Arts planning. The street and square are back with a vengeance, as is the simple truth that towns should grow organically and not by means of violent surgery (the urbanist equivalent of heart transplants).

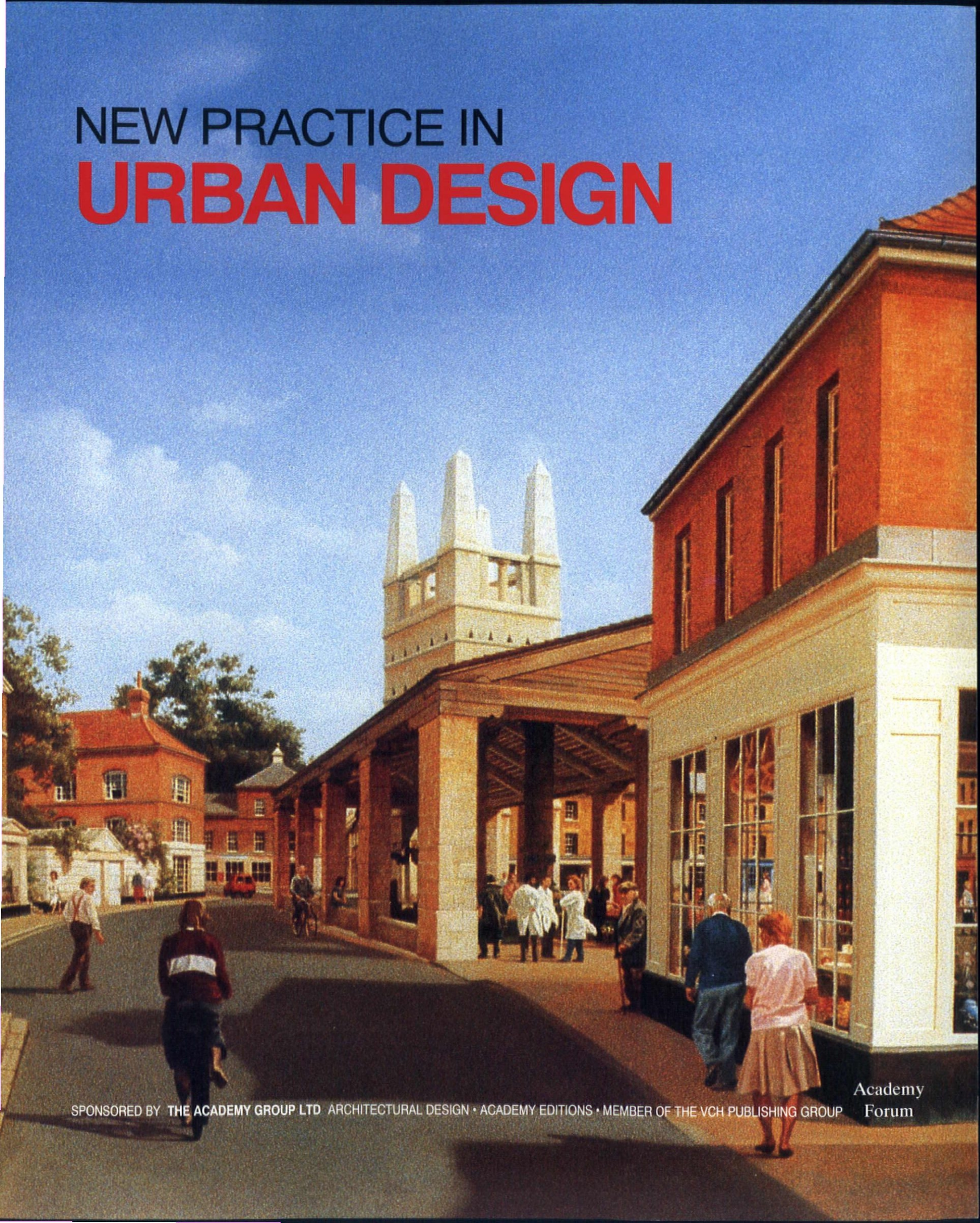
Post Modernism and the Deconstructivist movement have produced distinct views of the city – the latter marked by an acceptance of disjunction, disorder and decay. The competition for the Potsdamer Platz/Leipziger Platz sector of Berlin produced a range of schemes which illustrate the nature of the current urban debate, the most 'radical' being that by Libeskind. Hilmer & Sattler argue that Berliners don't need disorder but a restatement of reassuring traditional values. They argue that the misuse of Classicism in Germany's recent past cannot be allowed to haunt the current resurge of classical sensibility.

All of us have visited towns where we found that there was 'no there, there' – more than one large American city qualifies for the damning epithet. Duany and Plater-Zyberk have pitched themselves against the burned-out downtown and the sprawling suburb. With the folk memory of small-town America in the background, they seek to create a real place, modest in its way but a model for the future too.

At Belvedere Farm, Demetri Porphyrios has given us a taste of what a larger scale traditional settlement (like that proposed for Poundbury) would look like. The absolute integrity of Porphyrios's architecture is the anchor of the scheme. If Poundbury is to be realised as a 'real' place, it will need that integrity. The destruction of the sense of place and community is the most powerful charge laid against modernist planning. But if radical traditionalism is to remain at the forefront of the current architectural debate it will need to continue steering away from purely stylistic issues and maintain its critique of existing attitudes in urbanism and design.

Kenneth Powell/Andreas C Papadakis

NEW PRACTICE IN
URBAN DESIGN



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Academy Forum

ANDRES DUANY & ELIZABETH PLATER-ZYBERK

THE VILLAGE OF WINDSOR

Windsor is a resort village on Florida's east coast. The heart of the village is a neighbourhood of intimate scale, designed in the urban tradition of the Caribbean. It is bounded by a golf course and two polo fields. The village is located on a barrier island in the coastal town of Vero Beach, Florida and covers 416 acres bordered to the east by the Atlantic Ocean and to the west by the Indian River. The site is the last major parcel of ocean front land to be assembled and developed on Florida's tropical Atlantic coast.

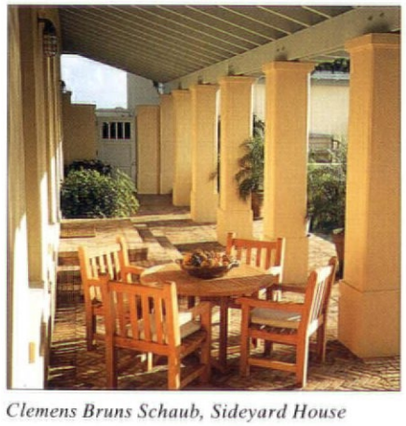
Windsor is designed to function as a real community. At its centre is the market crescent, a two-storey building which includes a general store, post office, restaurant, cafe, a fully equipped business office space for use by residents, an inn, and apartments. This serves as a focus for the daily public life of the community as well as a gateway. Other community facilities are within walking distance of the crescent, including the meeting hall, and the beach, tennis and golf clubs.

The Urban Regulations require houses and continuous garden walls to be built at the property line, defining the streets and squares of the village while forming private gardens. With only 300 residences across 416 acres the housing is low density. The Architectural Regulations mandate the vernacular architecture of the region with masonry at the first floor, wood construction above, and with porches, balconies and roof overhangs. With the exception of the Poundbury Code, this is the most precise small town code. Windsor buildings will be harmonious to a high degree.

Streets vary in size and character, from the broad entrance boulevard flanked by avenues of trees and leading to the market crescent, to small neighbourhood streets. North-south neighbourhood streets measure 48 feet in width and east-west streets are 28 feet across.

The 18 hole golf course will be one of only a handful of championship oceanside courses from Vero Beach to Key West; a tennis centre with six courts; two polo fields, reserved for special tournament play and an equestrian centre with a three mile riding trail on site. Other amenities proposed include a beach clubhouse, a croquet greensward and a meeting hall.

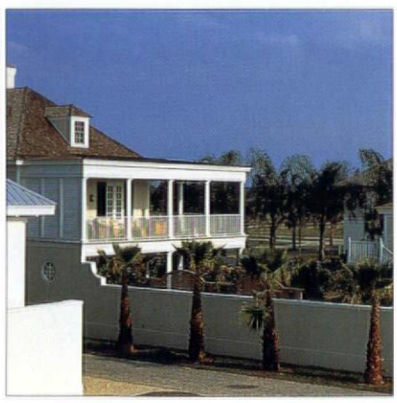
Duany & Plater-Zyberk, Courtyard House

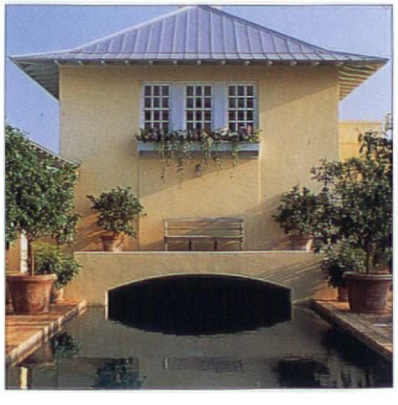


Clemens Bruns Schaub, Sideyard House

Opposite: Gibson & Silkworth Architects, Sideyard House

Above: Golf Courses and Houses
Right: Gibson & Silkworth Architects, Sideyard House
Far Right: Duany & Plater-Zyberk, Courtyard House and Windsor Boulevard





Above: Scott Merrill, Row Houses
Far Left: Duany & Plater-Zyberk, Interior view of Courtyard House
Left: Scott Merrill, Sideyard House

ANDRES DUANY

Marketing studies have concluded that Americans prefer to live in towns, and that they value community as much as security. In fact, those who want to live in towns are not being provided for because it is unlawful to build towns. Even if planners knew how to design towns, and even if developers wanted to build towns (neither of which is that difficult, it turns out), those developers would have to get variances from top to bottom, from street widths to mixed uses to the way cars are parked. Inadvertently, over the years, codes have been modified to the point that we can no longer build traditional American towns. We can no longer build Williamsburg, or Winter Park, or Nantucket, or Annapolis. We can no longer build the places that are among the great collective memories of America.

Gibson & Silkworth Architects, Alley House

Miami in Kendall is an example of a contemporary planned suburb on the pattern of the 70s and 80s. It is by no means the worst I could find. The area is one of the square miles that the Continental Survey laid out in the 1790s. As such it represents a typical piece of America. Within it we find all the typical building and planning of contemporary America. There is a building complex surrounded by a sea of parking. It could be a shopping mall, some type of industrial park, an office complex, or a community college. As it happens, it is a community college, but it doesn't matter. For our purposes it can be any one of those massive new single-use complexes where hundreds of people work or shop. Next to this, but disconnected, is a welter of curvilinear streets with little houses along them. Zoning calls it R-5 (residential, five units to the acre); houses with little five-foot yards on the sides, and 20-foot yards in the front. It is also called the American Dream. Nearby, and again disconnected, are houses at two units to the acre, called R-2. These are for people exercising their option to particularly dislike the neighbours, or who particularly like to mow lawns. Presumably, they are wealthier sorts. There are town house clusters also known as R-10 (ten units to the acre) and some R-16 zoning with garden apartments that are three storeys tall.

Fife Avenue

At the highway intersection, in accordance with the best current practice, are the shopping centres with their parking lots in front. You can also find churches, church schools, institutions of various types, post offices, and so forth. This square mile in fact has the right number of people living, the right institutions, the right amount of retail and workplaces. Current planning methods at their best do that. With all the ingredients of a community provided, why is it not a community, a neighbourhood, nor a town?

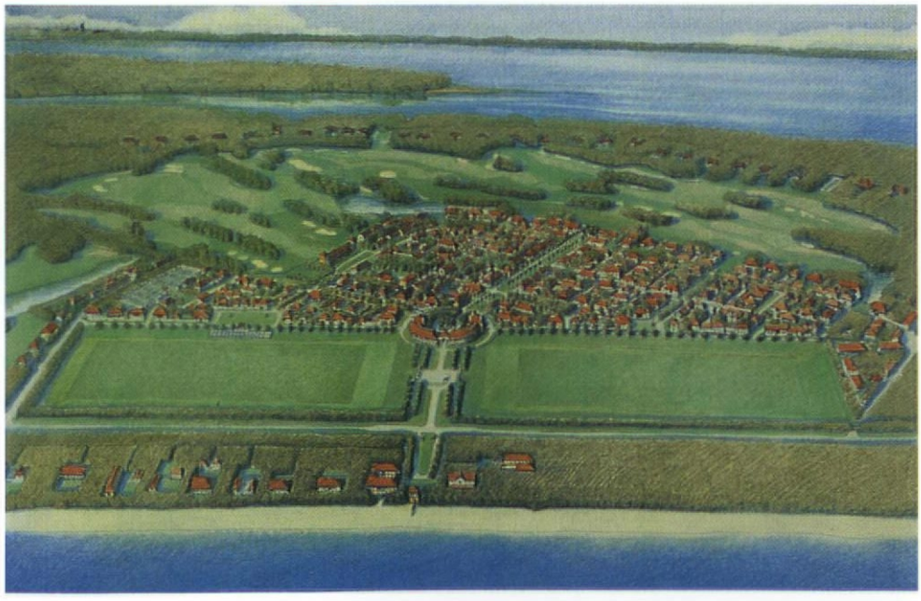
The answer is quite clear: there's no public realm, no street life, no social life. Everything in suburbia built since the 60s suffers from that disconnection, and that disconnection is often legislated.

Traditional towns, on the contrary, are extremely resilient and able to sustain modern life. Don't let any planners tell you they don't work. In fact, what doesn't work are the modern suburbs which are congested. Whatever happened to the civilised alleys that permitted the dumpsters and electrical transformers to be in the back? We have now become a society that is accustomed to step out of our front door and past the garbage dumpster. This would have been intolerable at any time until 1950. We have been forced to lower our standards.

Or consider vehicular traffic. Salem, North Carolina, is a pre-revolutionary town, a beautiful place. It has the free standing houses that Americans prefer. It indicates that even the most delicate old towns can absorb a modern complement of parking and traffic. In fact, cars look fine when parked on streets. It's incredibly unpleasant to be on a sidewalk and have a car go by, even slowly. It splashes, creates noise and wind, and feels dangerous. When drivers see a street that is devoid of parking, they speed up. Drivers will go as fast as they think they can safely go, regardless of the speed limit, and it is usually too fast for pedestrian life. Only parked cars truly slow traffic because drivers instinctively know that somebody might be pulling in, pulling out or opening a door, and they are cautious. They also protect the pedestrian. The pedestrian can wait between two cars, totally protected, and then make the crossing. Current planning manuals advise against it because it slows up traffic. But that is precisely why we need the traditional street as a public space where both cars and people are comfortable. It is a balanced equation.

Duany & Plater-Zyberk, Courtyard House

The Polo Field



Duany & Plater-Zyberk, Aerial View of Vero Beach

DEMETRI PORPHYRIOS

BELVEDERE VILLAGE, ASCOT

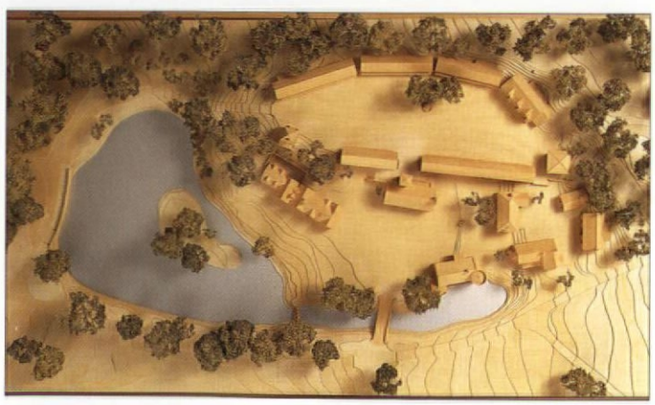
Nowadays, we have become accustomed to the idea that our buildings and towns express the 'spirit of the age'. But architecture has grown up with man, not merely with the circumstances of an age. Our buildings and towns are not the monopoly of one particular period but arise with man and endure with human nature. Consider the beauty of the English village – wedded to the countryside and to the simplicity of straightforward construction. Its buildings are pleasurable and at the same time convey a sense of the necessary by remaining close to nature for inspiration.

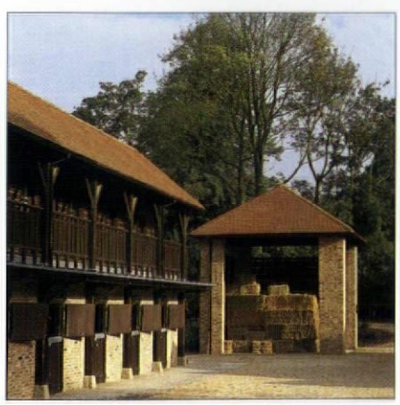
In a beautiful Surrey landscape setting close to Ascot, this project comprises a number of cottages, farm buildings and stables. A village unfolds around three main spaces: the farm court, the residential court and the stable yard. The courts provide spatial unity and containment for the various aspects of the brief. Although of dissimilar type and scale, they connect to form a chain of interrelated spaces. The surrounding buildings hold a constant dialogue with each other so that together with the landscape, they create a sense of place establishing open vistas, perspective views or dramatic closures.

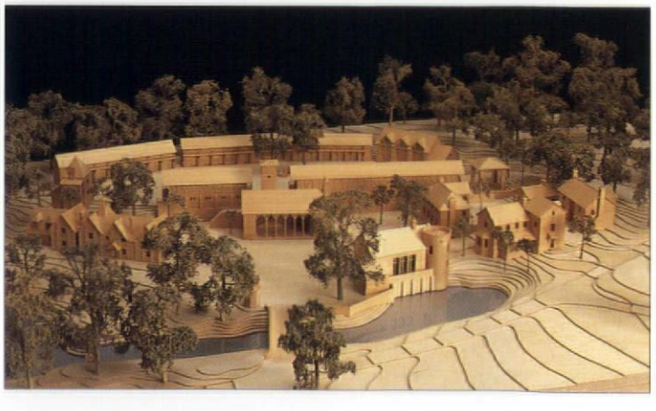
The Dovecote Tower

Opposite: The Main Barn
Left: View of The Hall

Above: General View of Belvedere Village
Right: Model of the scheme
Far Right: The Stables and Headgrooms' Cottage



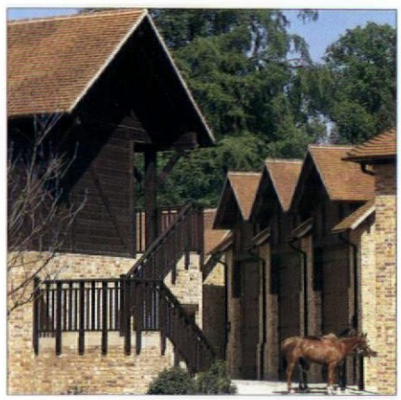




Far Left: The Cottages
Left: Model of the Scheme
Overleaf: The Stables

DEMETRI PORPHYRIOS

Nowadays, architects are increasingly drawn into public debates about urban design, conservation and, generally, debates about an overall awareness of our built and natural environment. Some of them contribute to these discussions happily; others fear that engaging in such discussions might compromise their talents and distract them from their proper concern with architecture as a search for formal originality.



Stables and Carriage House

But as the century draws to a close it becomes progressively clear that such debates on urban design and environmental policy are no longer issues that lie outside architecture: they are architecture itself. We can no longer afford to indulge cynically in the destruction of our cities through zoning or traffic engineering. The 20th-century city might work well from the sewers, to the skyscrapers, to the strip as long as one considers the wastage in human and natural resources as a concomitant to the sustaining of the overall edifice.

The time-honoured principles of the traditional city constitute the only body of knowledge to which we can look for guidance today. Indeed, it is the neglected wisdom of the traditional city – whether European, English, American or otherwise – that is now showing fresh signs of life, at a time when both modernism and post-modernism alike seem incapable of delivering a socially and ecologically responsible programme of urbanisation.

To architects caught up in post-modern deconstructivist exercises, the practical suggestions of the traditional city do not look untrue but beside the point. The priority issue on their agenda is the aesthetic heightening of the experience of estrangement that – they claim – accompanies modern life. But truly, this is fiddling while Rome burns.

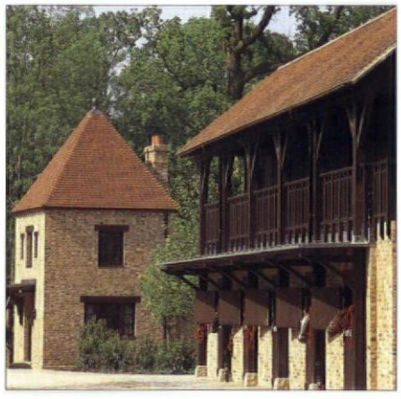
Residential Court

The issue today, however, is *not* one of stylistics but of design with a view to ecological balance. This is a wholesale programme of re-awakening: from controlling the sprawl of our cities, to reconsidering the scale and measure of the urban block, all the way to encouraging a typological understanding of design that establishes hierarchies between public and private buildings, as well as a concern for the civic open spaces of our cities.

Megastructural developments similar to those of the 60s have recently been resurfacing as serious urban renewal projects. Surely, those expansive landscrapers of science fiction cannot be counted as a contribution to architecture. As for the so-called 'new' or 'hi-tech' materials, we all know too well that they have not only proven utterly unreliable in

performance, but also resisted human domestication. Timber, stone, brick, plaster and sheet metal still reign today as the most reliable and pleasurable building materials.

It is, therefore, instructive that although 20th-century applied science and technology have made unprecedented strides, few of these have been of any consequence to architecture. Applied science and technology have turned their attention away from architecture towards other fields, like those of medicine, artificial intelligence and genetics. Thus, Brunelleschi's dome cannot be repeated. What I mean here is that the erection of a building which can capture the imagination of its contemporaries because it marks a scientific/technological breakthrough, is an experience that belongs to bygone eras. Those who look today at high technology for their clues, formal language or narratives, do not deal with building technology but with gadgetry; that is, with a surrogate consumer language of make-believe.



Stables and Hay Barn

Instead, experience and history reveal that what makes architecture possible in the first place, is the relationship between building and architecture. Architecture makes us see the building craft from which it is born, from which it detaches itself as art, and to which it always alludes. This relationship between the craft of building and the art of architecture is characteristic of all traditional (that is, non-modernistic) architecture.

Carriage House

Traditional architecture also needs another relationship: the relationship between one building and another. For that reason, traditional architecture has no copyright laws. On the contrary, our market ethic of the original and the authentic is based on the pretence that every work of art is an invention singular enough to be patented. It is unfortunate that it is not only the inexperienced Modernist architect who looks for a residual originality as a hallmark of talent. Today, most of us tend to think of an architect's real achievement as having nothing to do with the achievement present in what he borrowed. We, therefore, tend to concentrate on peripheral issues of personal stylistics. I am afraid that this frame of mind will never allow us to develop an architectural culture.

But let us think for a moment of the greatness, say, of Alberti. His greatness lies in the fact that he revitalised the humanist theme itself, which he passed on to the 15th century from the sources of antiquity. The times were different, the technology was different, the politics were different, the *haute-couture* had changed, but the great humanist theme of commodity-firmness-delight was still alive and will stay alive. It is in this sense that we can speak of tradition as that which endures; but this defiance of time is always experienced as a sort of historical present.

CHRISTOPH SATTLER

POTSDAMER PLATZ – LEIPZIGER PLATZ, BERLIN 1991

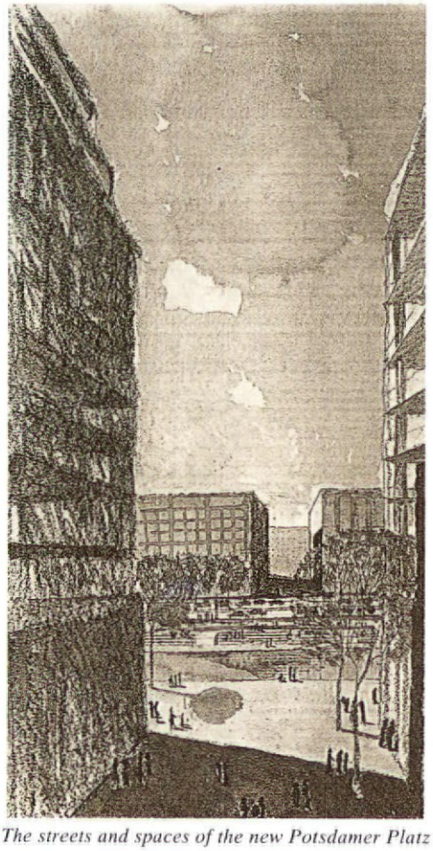
The design is based, not on the American urban model of an agglomeration of tower blocks, which is used worldwide, but on the idea of the compact, spatially complex European city. Urban life should develop in streets and squares between the individual buildings, not in the interior of large-scale building complexes.

Berlin has an intriguing contrast of big open spaces and compact urban areas. The design takes up this typology and thematises it. The big open space elements are: (1) The open space with the water, stretching south from Potsdamer Platz; (2) The sequence of Leipziger Platz, Potsdamer Platz, Potsdamer Strasse when widened and the Culture Forum; (3) The green wedge from Potsdamer Platz into the Tiergarten, in perspective.

A cohesive network of streets will be developed, based on an assumed block of 50 x 50m ground space. The street profile will be in the proportion of 2:1 (height of buildings 35m, width of street 17.5m). The relationship between the volume of the buildings and the street profile will allow for changing light in the streets and natural lighting for the buildings, with good, natural ventilation. The proposed division of the blocks is in exciting relation to the major structures of the Culture Forum and the open space elements in the plan.

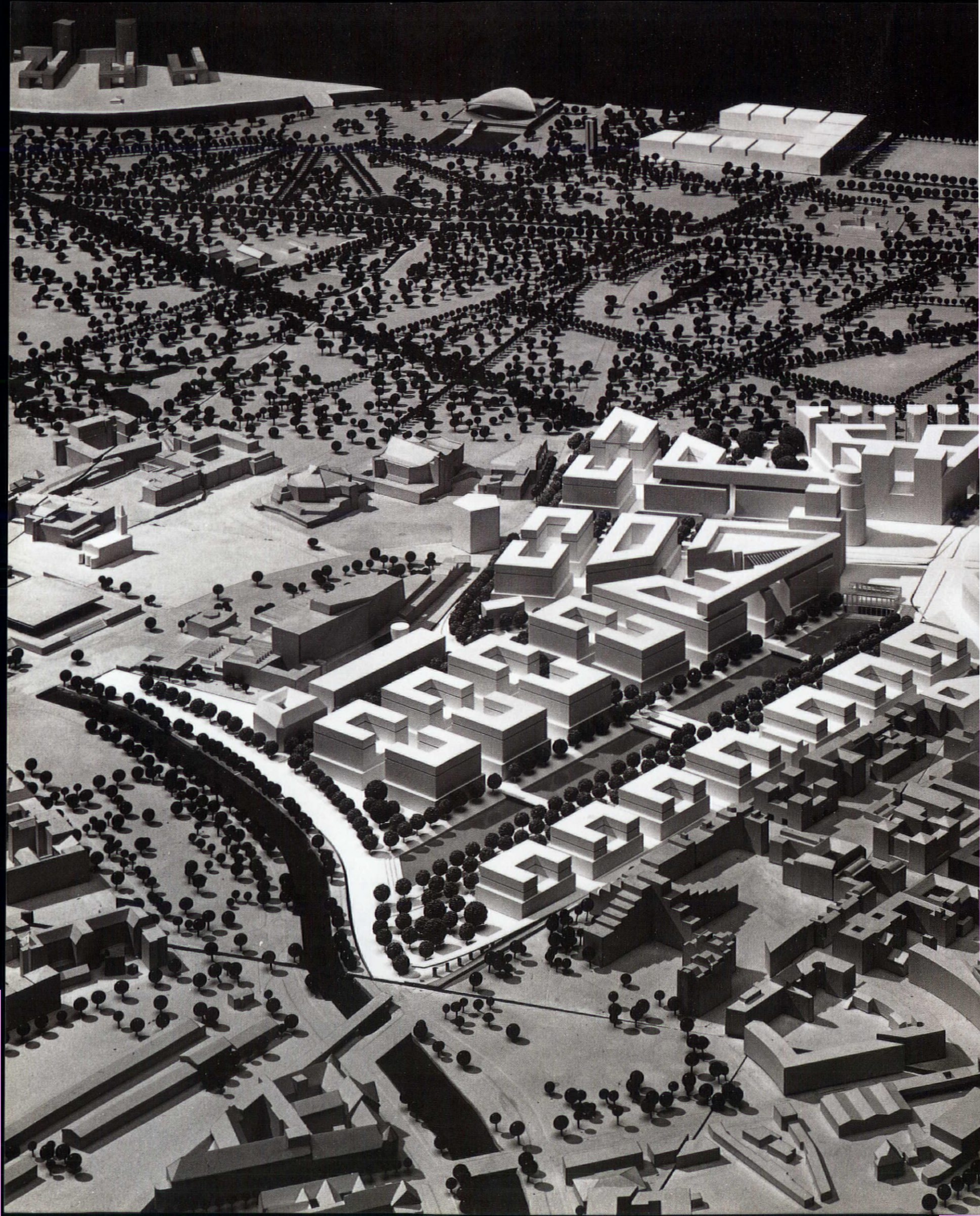
With regard to traffic, the new north-south road proposed will provide local access, rather than serving as an autobahn. Accordingly, junctions with traffic lights are envisaged. In particular, the crossing of the two main directions on Potsdamer Platz will not be a huge traffic junction, but only a simple street crossing. The areas around this road have dimensions corresponding roughly to the typical Berlin block. The inner roads are intended merely as access routes – vehicles will not have priority here. The proposed urban structure is based on the predominance of local public transport directing passengers into squares and streets, rather than from the station to the inside of large building complexes.

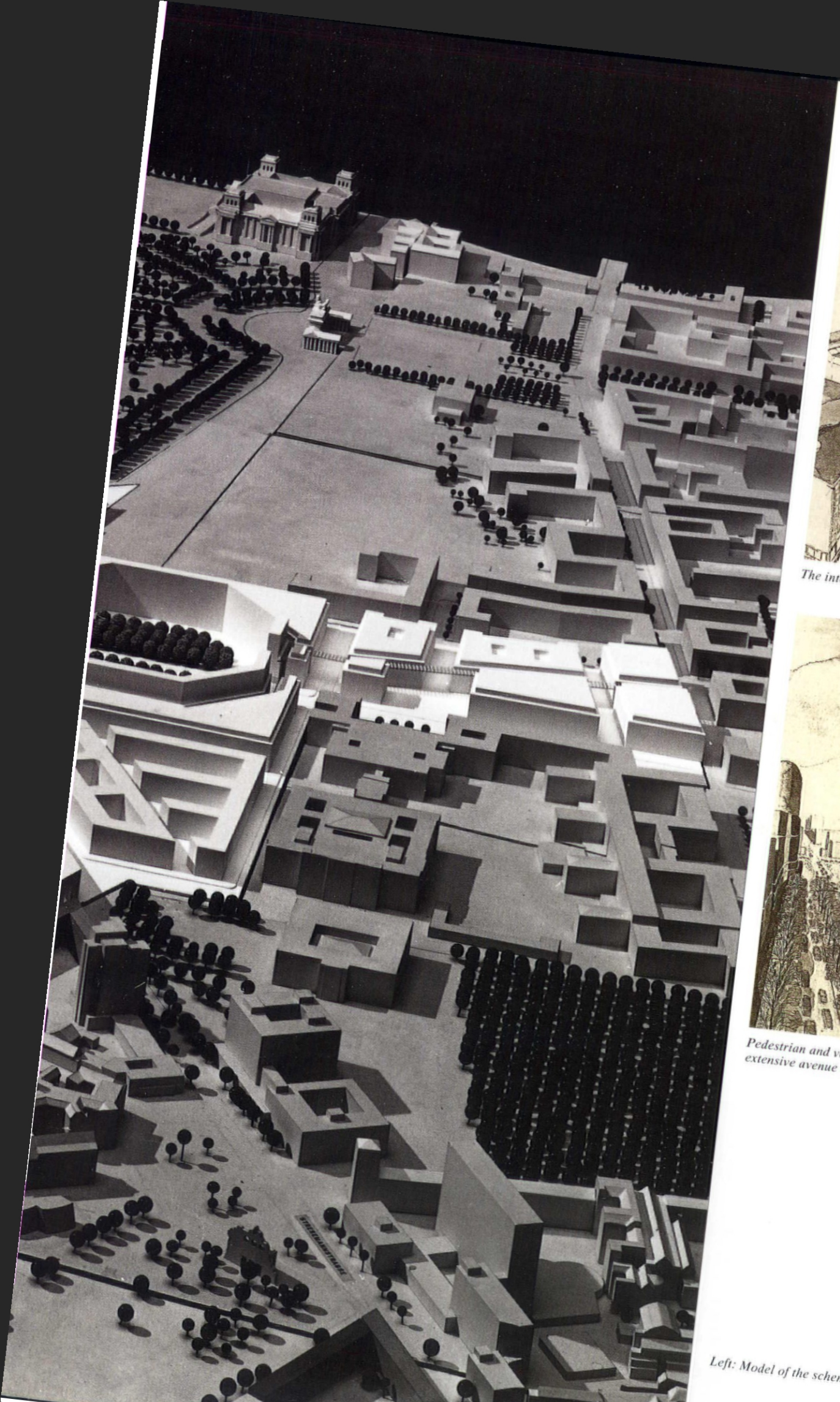
The concentration of use inside the buildings will diminish as one progresses upwards, while the quality of the daylighting will increase – dictating the gradation of uses: shops in the basement and lower storeys, offices in the middle and mainly residential apartments on the two top floors. The gross surface area of one of the proposed buildings, about 20,000m², would appear large enough as a unit to provide a manageable building and give easy orientation. Larger units could always be created by overbuilding or bridging.

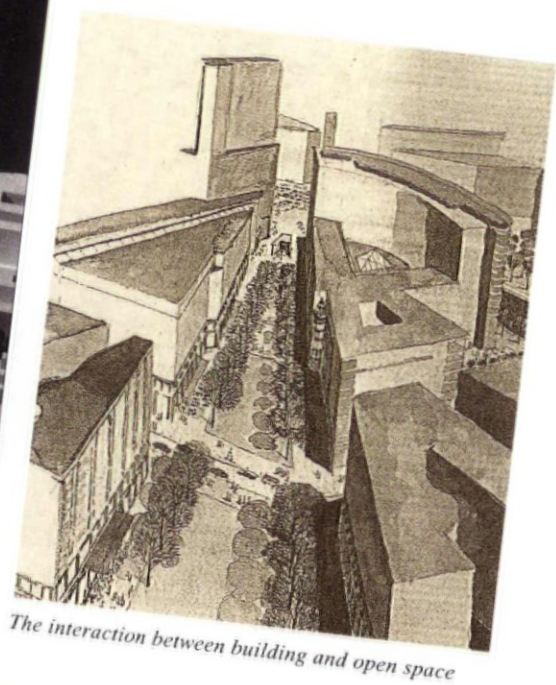


The streets and spaces of the new Potsdamer Platz

Opposite: Potsdamer Platz, overall scheme



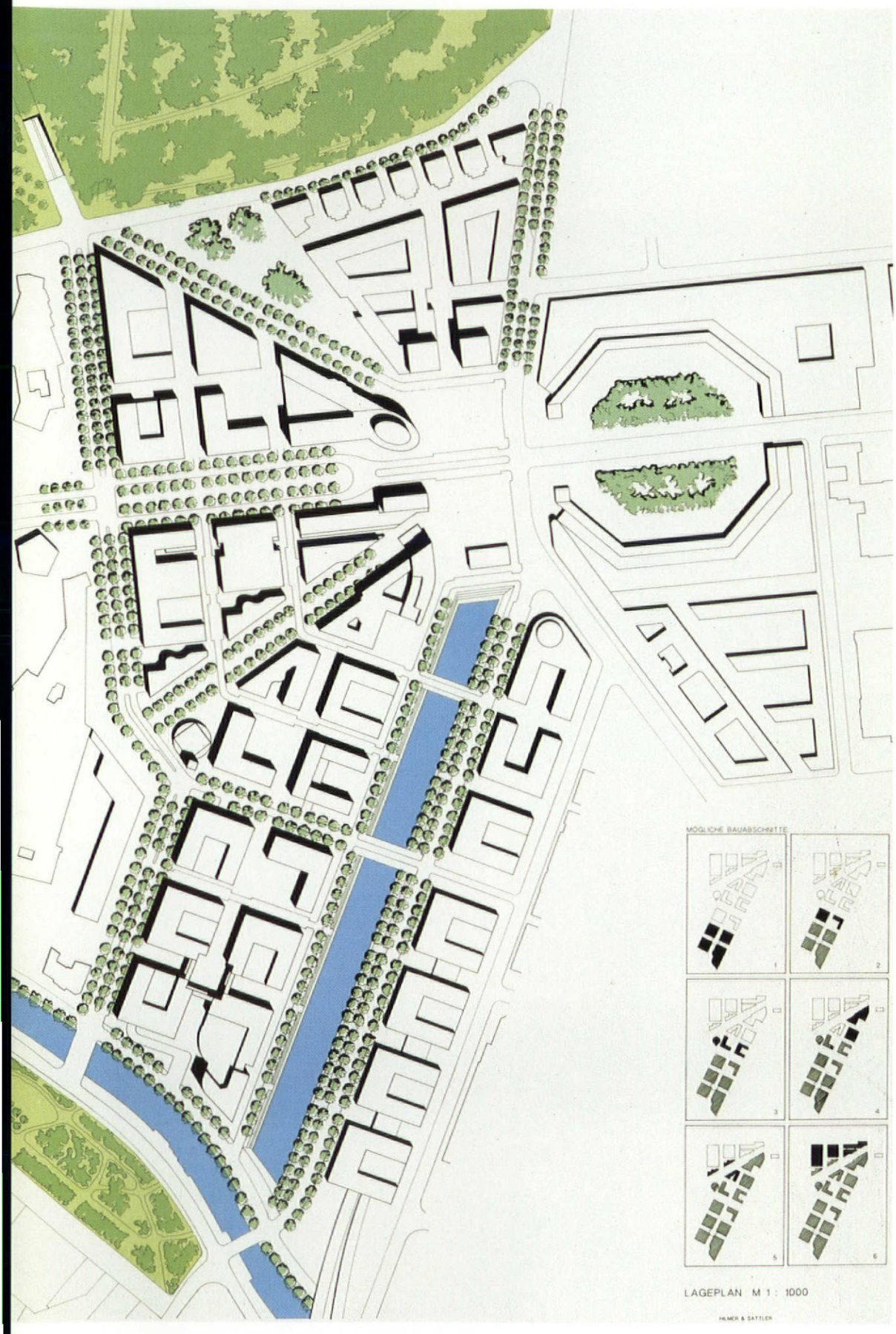




The interaction between building and open space

Pedestrian and vehicular traffic separated by extensive avenue of trees

Left: Model of the scheme



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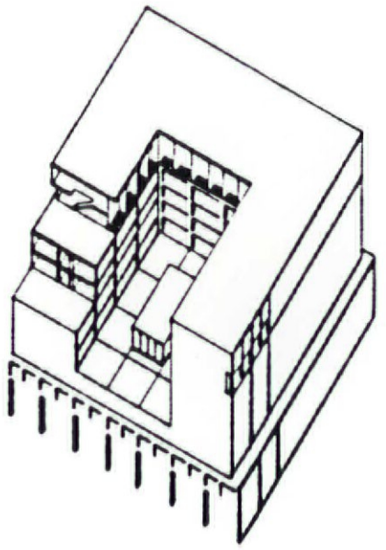
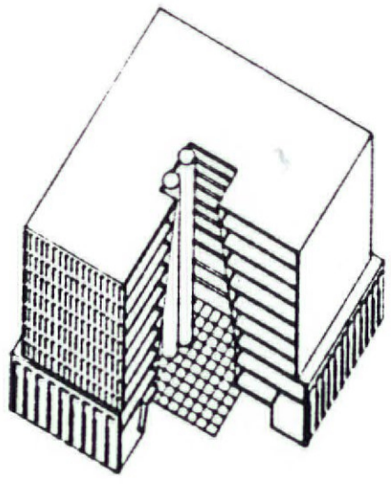
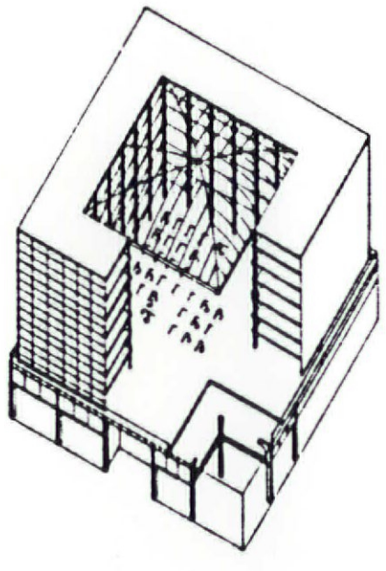
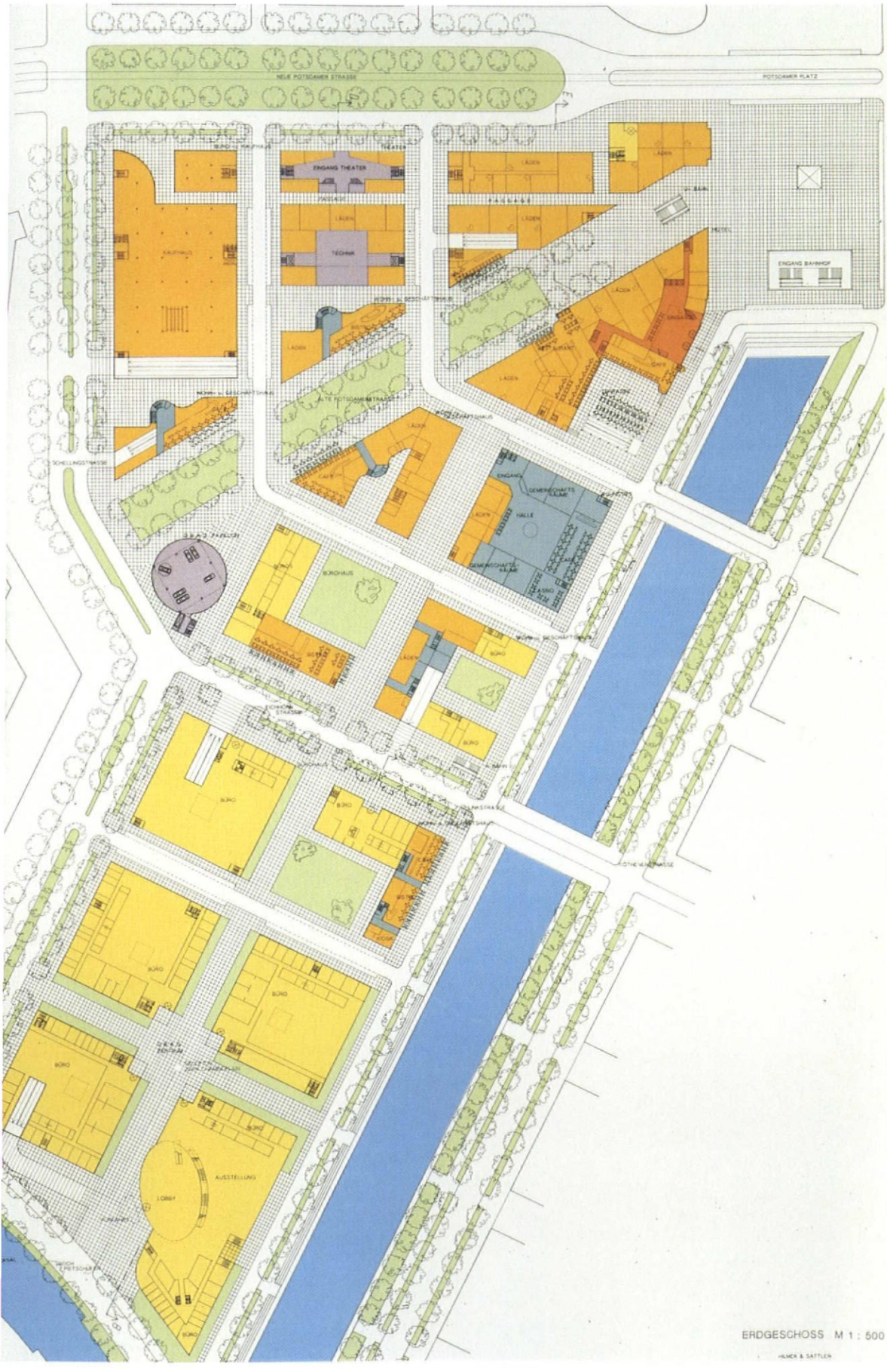
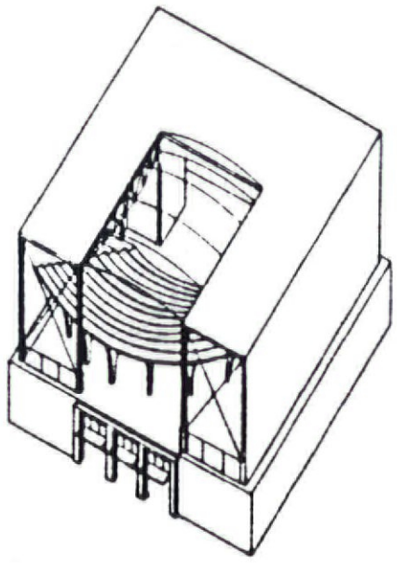
HILMER & SATTLER

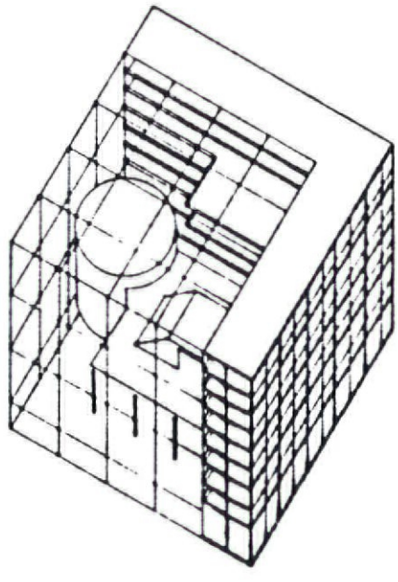




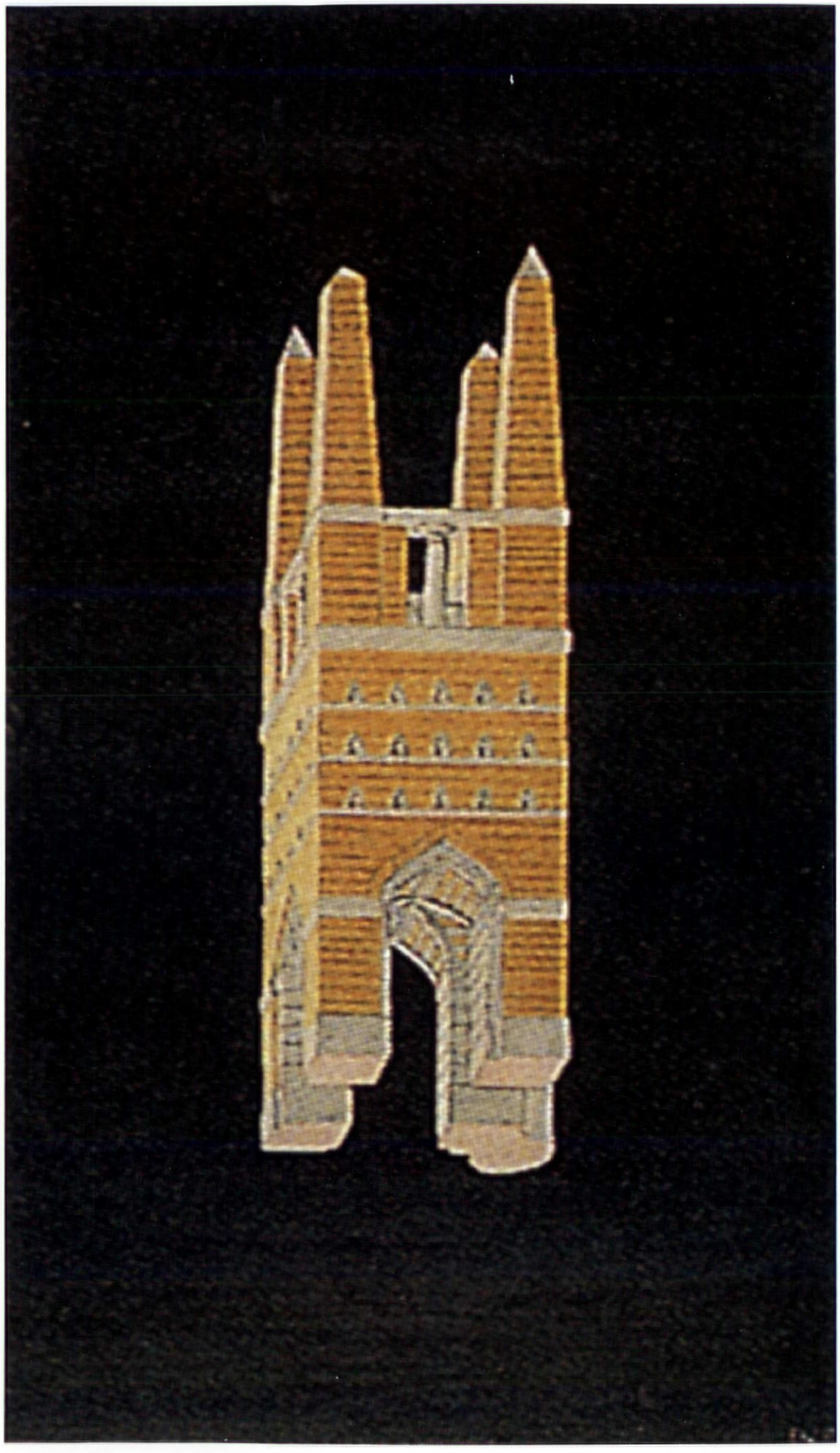








Opposite: Potsdamer Platz 1:1000 and a variety of cutaway axonometrics
Left: Potsdamer Platz, 1:500 and a selection of cutaway axonometrics



LEON KRIER

POUNDBURY, DORCHESTER

Phase one of Poundbury is a mixed development which comprises shops, offices, workshops, public buildings, as well as approximately 250 houses and flats.

The planning reflects the layout of traditional Dorset towns. It is the design intent that buildings should be of the Dorset vernacular using traditional materials local to the area.

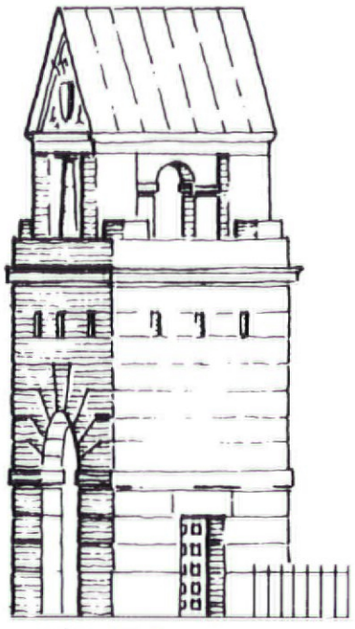
The Duchy of Cornwall intends to procure construction of roads and infrastructure and to sell single or groups of plots to individuals, house-builders and developers for construction of buildings.

Some of the buildings are of special importance in the townscape. The plots on which these are situated will be sold with scheme designs prepared by architects commissioned by the Duchy of Cornwall. These buildings are intended to set high standards which others should strive to match.

It is intended that other buildings be designed and constructed to the requirements of this code. For those which are of special importance in the townscape, control of the design will be more stringent.

The aim of the code is therefore to communicate the intended character of the scheme and ensure conformity to the master plan without stifling creativity and spontaneity.

The requirements of the Poundbury Building Code are standard and additional to the normal Planning and Building regulations. Exceptions to the code may be granted on the basis of the merit of each building design, as determined by the Poundbury Architectural Review Committee (PARC). This committee reserves the right to adjust the provisions of this code at its discretion.

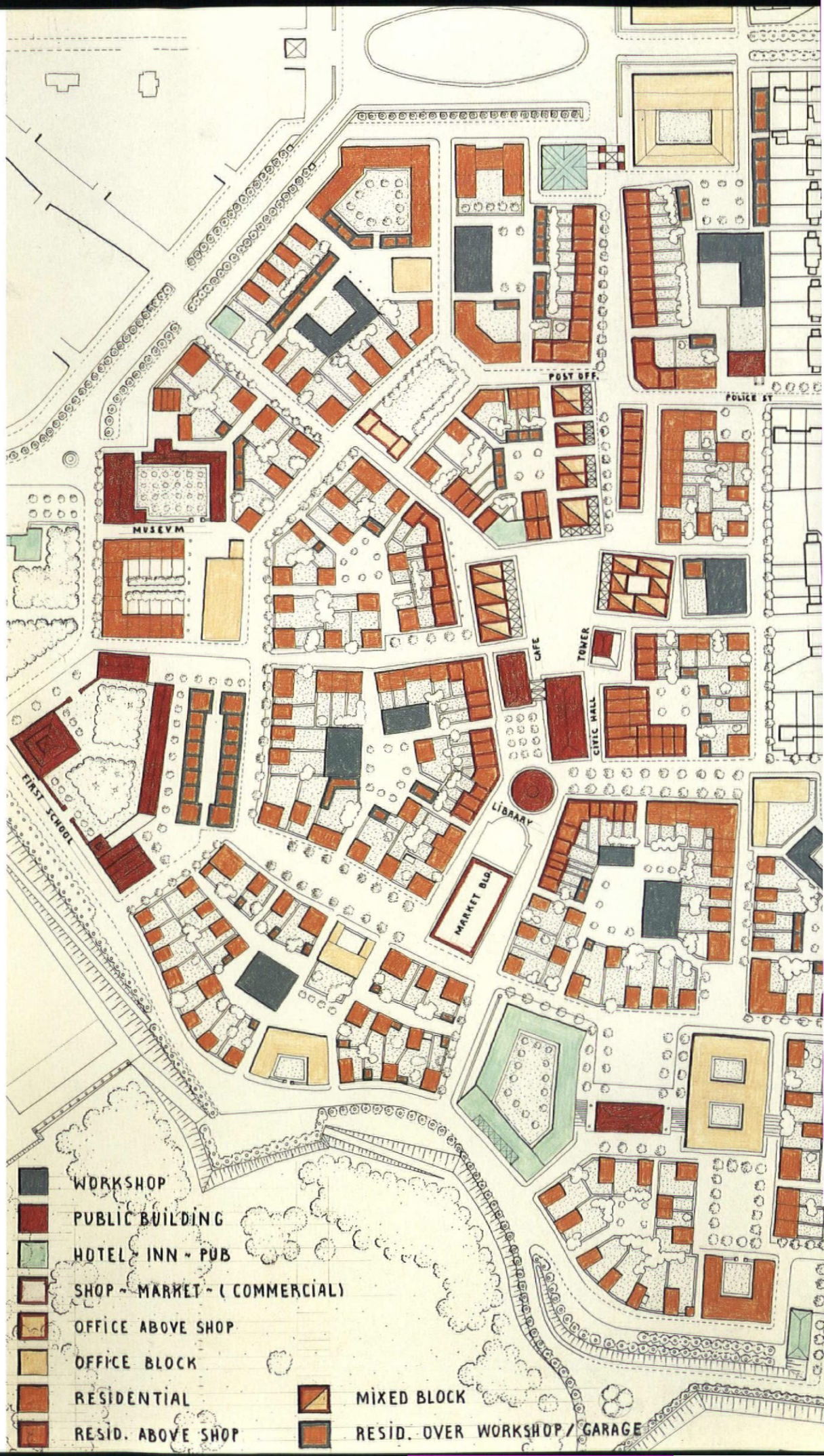


Gateway in the Middle Farm Quarter

ENVIRONMENTAL ISSUES

The Duchy wishes to provide a development which, environmentally, is an improvement on conventional designs. To assist in this aim, all houses will be assessed environmentally, using BREEAM, the Building Research Establishment Environmental Assessment Method. The scheme uses independent assessors to evaluate the environmental effects of the building at the design stage. The issues included affect the global, local and indoor environment. A predetermined number of credits will be given for design features which

Opposite: Axonometric of Tower



Right: Mixture of uses within the farm quarter

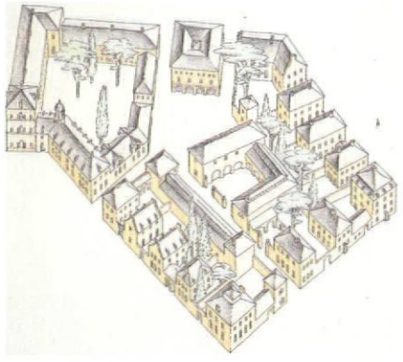
are better than normal practice and the minimum requirements of Building Regulations.

On completion of an assessment, a certificate is issued which confirms the areas of environmental concern and criteria that the building design has satisfied. A record of all assessments will be kept by the Duchy. The main points for which credits are given are summarised below. Further details are available from the Duchy of Cornwall.

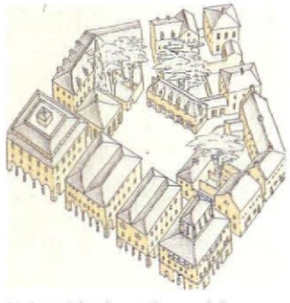
GLOBAL ISSUES

Up to six credits are given for reducing carbon dioxide greenhouse gas emissions from fossil fuel burning. (For example, 100mm wall insulation (U= 0.3); 200mm roof insulation; 50mm floor insulation with double or triple glazing; low emissivity glass; draught sealing; and a condensing gas boiler, would gain four credits.) A further two credits can be achieved with super-insulation and high-efficiency heat exchanged for hot water heating and a low temperature heat distribution system, ie, under floor heating.

Avoidance of ozone depleting CFCs or HCFCs in insulants. (Confirmation from the supplier is required.)

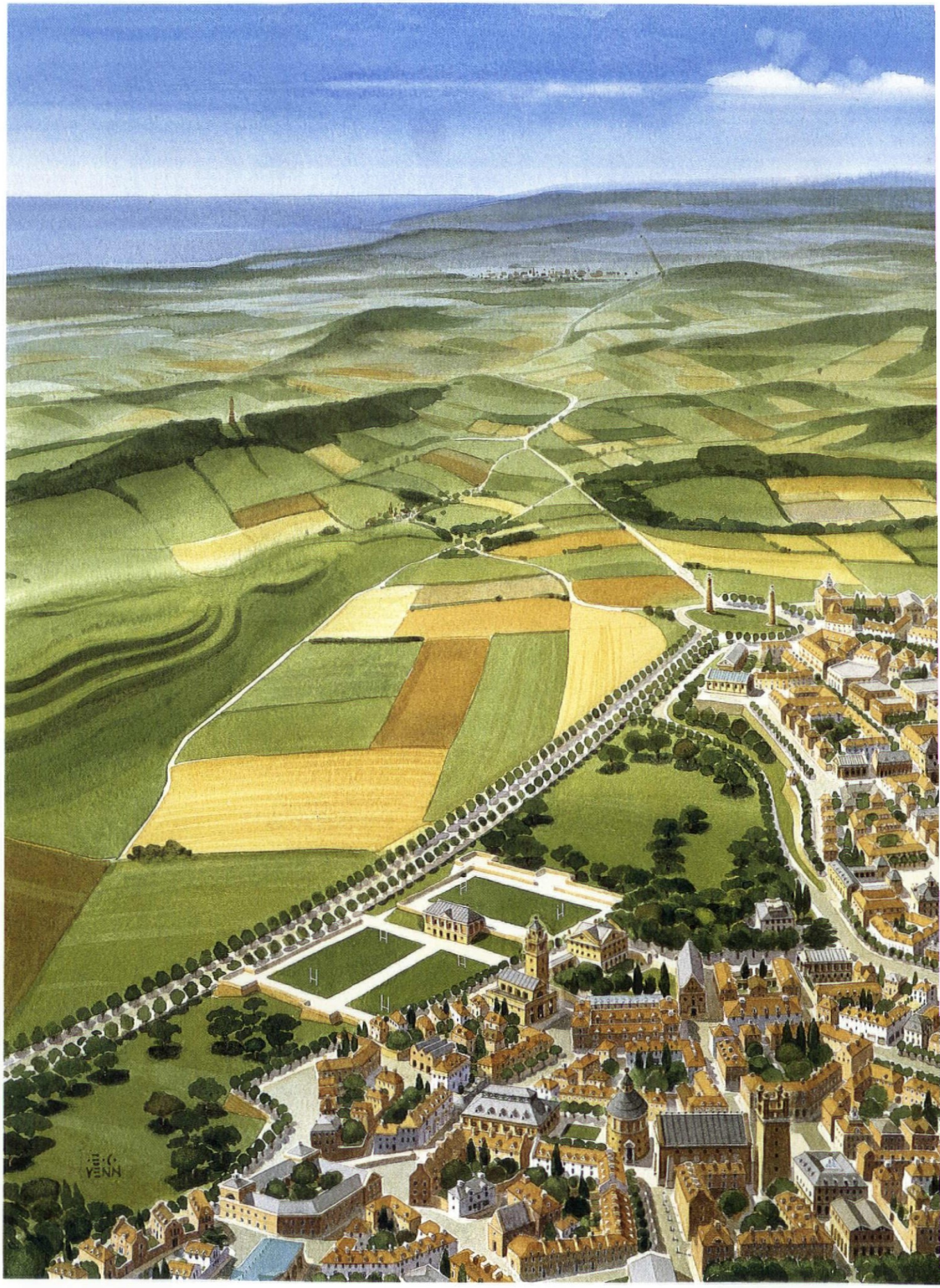


Urban Block on Bridport Avenue

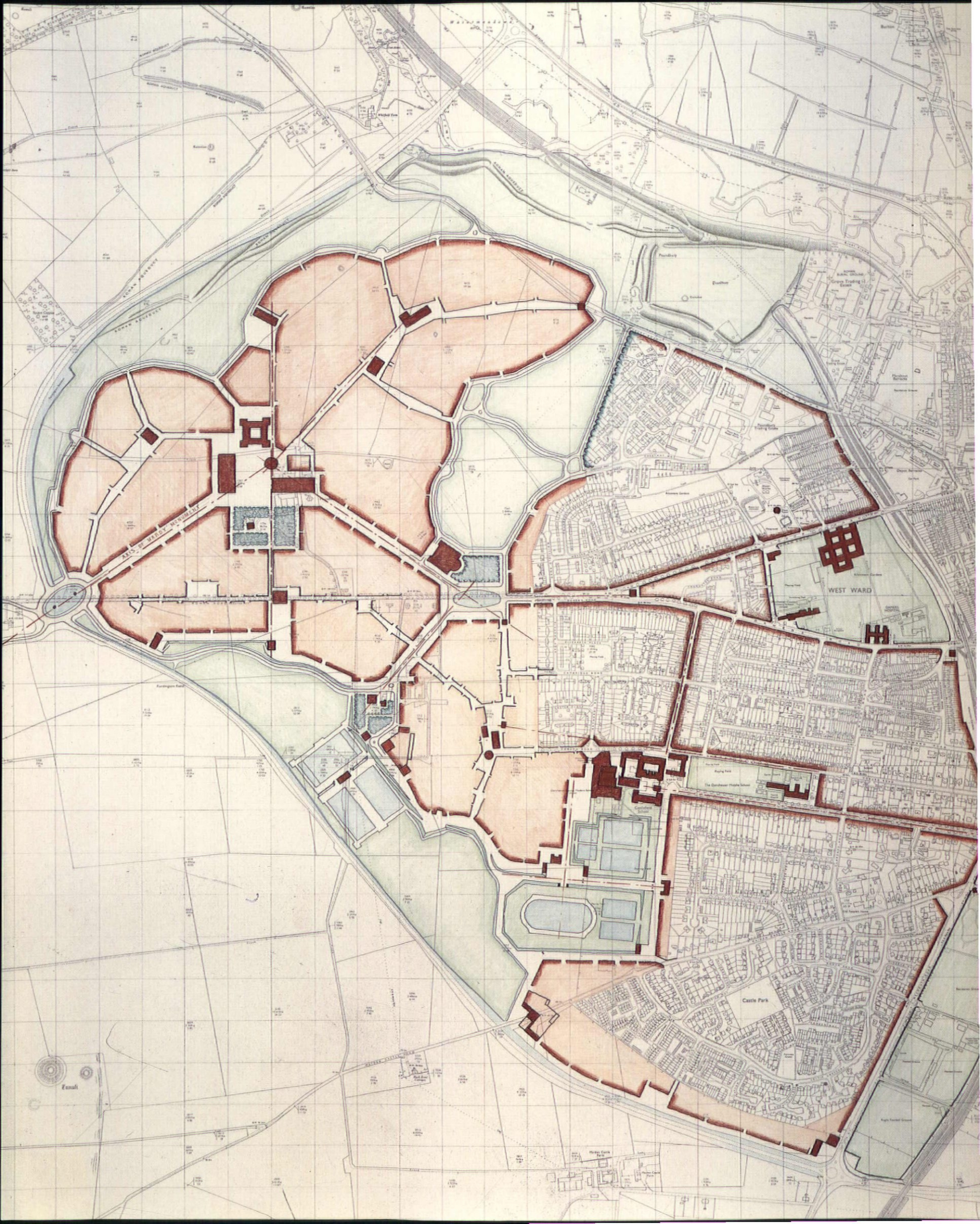


Urban Block on Central Square

Left: Dorchester as a polycentric town where most activities can be performed on foot



Master Plan for the Poundbury development


WEST WARD
Castle Park

LEON KRIER

THE ARCHITECT AS MASTER-PLANNER
MASTER OR SERVANT?

In Western Europe public authorities in the past decade have almost ceased to be clients in matters of architecture and urban planning. Even in France it is quite evident that the so-called 'Grand Projets' are in fact very small but centrally placed symbolic eye-catchers; not expressing government or state philosophy, but a private hobby-horse of the president.

If the market economy shapes our environment the question is whether it can produce a public realm? Or will this in the future be reduced to private precincts with limited public access and interest such as traffic infrastructures, shopping malls, business districts, even schooling complexes and suburban closes.

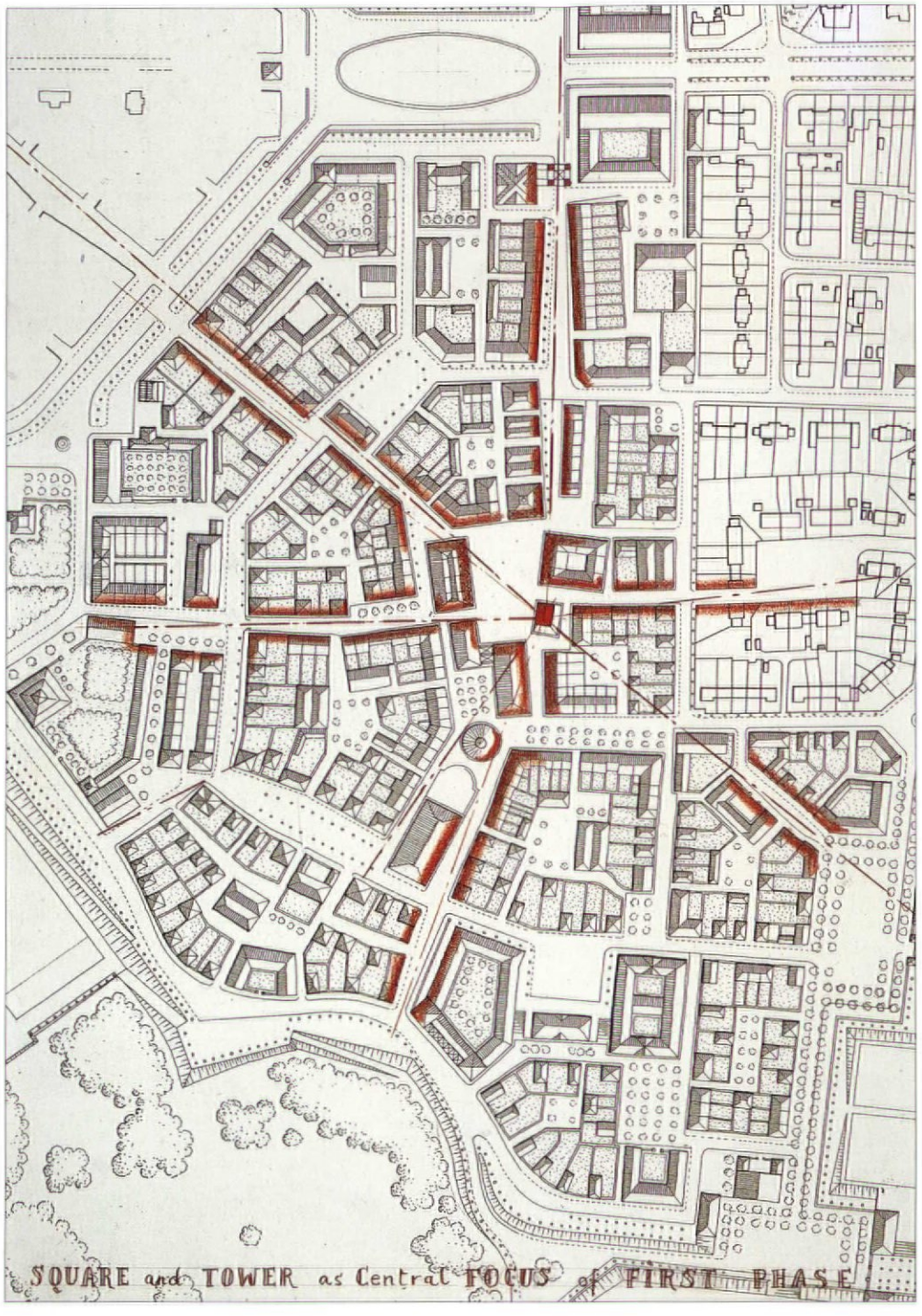
The second question is whether the established public realm of streets, squares and parks, which has solidified over centuries to become second nature to us, can survive a market economy which is regulated primordially not by public interest but by private investment and cost-benefit policies. I think it is evident everywhere that private developers and private foundations, however well-meaning, are not able to build and maintain a public realm of a quality and solidity which we find in European historic centres. It is also true that the recent degradation of centres of civilised European society is caused by a radical reduction in urban residents and a parallel increase in the number of suburban users.

Urban civilisation has been defeated by suburban barbarism. Essentially mobile, suburban masses present a universal threat to town and country. Modern barbarism can be defeated only by bringing urban civilisation into the suburbs. Not expanding the cities, but expanding the public realm by redeveloping the suburbs is, I believe, the main goal of civilisation now. Even though commerce is a constitutive part of it, the establishment of a public realm is not and cannot be merely a by-product of commerce, it is primordially a matter of public interest, of building committees. Private developers are interested essentially in the commercial aspect of public space, they are therefore unfit to act as masterplanners and legislators over large tracts of urban land.

Architects working for large land developers are servants to private interests. Thus, technically speaking, they cannot be called *masterplanners* in the true sense of the word because the urban masterplanner needs the *independence of the legislator* – loyal to the 'public interest' of the community and not to the private interest of shareholders.

Model view of the scheme

Opposite: Plan showing boundaries of existing and new urban quarters



Left: The Tower forms the main focus of the Middle Farm quarter located on the central square
Below: Middle Farm quarter elevation

ARCHITECTURE & THE ENVIRONMENT

SUNSET OVER AN INDONESIAN VILLAGE

Architectural Design

Edited by Andreas C Papadakis

ARCHITECTURE & THE ENVIRONMENT

HRH THE PRINCE OF WALES AND THE EARTH IN BALANCE

OPPOSITE: THE DECIMATION OF THE AMAZON RAINFOREST
ABOVE: VIEW OF HONG KONG HARBOUR AT DUSK

ACADEMY EDITIONS • LONDON

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The images illustrating the 'The Earth in Balance' are taken from the film with kind permission of the BBC. We are grateful to Margaret Kirby of the BBC for her assistance.

Front Cover: Aberdeen Harbour, Hong Kong; *Inside Front Cover:* Skyscrapers, Hong Kong;
Inside Back Cover: Amazonian River; *Back Cover:* Indonesian Rainforest

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Unless otherwise stated the photographs in this issue are by Julian Charrington, a cameraman on the film crew of 'The Earth in Balance'

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THE PRINCE, NATURE AND ARCHITECTURE

The essence of architecture is the conquest of nature. When Man first moved indoors, seeking (as Alberti put it) 'health, dignity and pleasure' in addition to mere survival, he cut himself off from immediate contact with natural forces. Civil architecture flowered in the ancient world as one of the hallmarks of a civilised society, distinguished by laws, religion and culture from the brute existence of the savage. Throughout history, architecture has reflected humanity's relentless thirst for technical progress. To build higher, larger and more permanently, more ingeniously, defying nature and time, has been the aim of societies striving to glorify God, reason, mankind or simply the idea of progress itself. The Biblical account of the Tower of Babel indicates the heights to which human pride can aspire and the depths into which it might fall. In the present century, architecture has moved beyond being a mere reflection of human aspirations and been presented as a way of changing the world. For Le Corbusier, architecture was a weapon for dispersing the 'stifling accumulation of age-long detritus'.

In the 20th century, architects have been participants in a massive process of change which has pushed back the natural world and partly destroyed it. The high-rise housing of a 'third world' megalopolis like São Paolo or Shanghai, the energy consuming ostentation of New York, Tokyo, or Abu Dhabi, and the sprawling motorway suburbs and industrial parks of contemporary Europe and North America are all part of an assault on nature. The consumption of scarce raw materials, the reckless burning up of energy to make artificial environments, the pollution which results, the destruction of traditional settlements and the creation of new ones where human as well as natural values are denied, and the physical, psychological and – dare one say – spiritual problems which are the inevitable consequences, constitute a serious indictment against modern architecture. The Prince of Wales, who has often been accused of conducting a purely stylistic campaign against architectural modernism, has drawn attention to issues which are far more significant than the mere look of buildings. His interest in the natural world is inseparable from his interest in the built environment, in the buildings and cities where most people live. He sees the fate of cities and of rainforests, wildernesses and of rural life in the more 'developed' countries as closely linked. He argues that more civilised, greener cities can regenerate decaying urban life and stave off an urban collapse which would have the gravest consequences for human life as a whole.

The Prince's vision is both passionate and for many of his audience, persuasive. Modern architecture is identified with a misguided pursuit of 'progress', part and parcel of an industrial/technological juggernaut which has gone out of control. People, he argues, must take control of their own future. For architecture, this implies a return to traditional, small-scale, hand-crafted ways of building and an emphasis on the needs of those who occupy or use the finished structures.

The Prince's architectural crusade has been far from fruitless. If nothing else, it has given a new impetus to disparate groups of traditionalists and other anti-modernists and struck a positive note at a period when windows that open, low-cost heating, renewable materials and 'user-friendliness' are on the agenda of every responsible architect, of whatever 'school'. Modern architects have abandoned wholesale the functionalist fiction that architecture is a branch of technology. Indeed, the most innovative strand in modern architecture is that which denies the certainties of the recent past, symbolising its change of heart with a daring reaffirmation that architecture is, above all, an art. The new generation of modern architects reassert the essential independence of thought and action that any artist must possess. They combine a concern for human welfare with a deep feeling for nature – witness the work, in particular, of some of the leading Japanese designers. In a country which has moved further than any other to a blank acceptance of the dominance of technology, they have reasserted ancient Japanese ways, hallowed beliefs about the relationship between man and nature.

'Traditionalism' is, of course, not primarily a matter of visual style. Applying a rigorously ecological test to any architectural proposal is a way of determining the extent of its traditionalism. As Leon Krier has demonstrated again and again, real traditionalism is, by the standards of modern industrial society, a revolutionary creed, implying the dismantling of much of the apparatus of urban life – the motorway, the commuter suburb, the out of town shopping centre, the soulless business district.

Real traditionalism is really another term for sound, practical building – the raw material of the historic cities which continue to provide a model for urbanists. Architecture begins, it is often said, where function stops. If there is scope for architecture as an art beyond the provision of shelter, it is within the context of the town, the city and the village.

The key issue for architecture in the late 20th century is not one of style but one of response to nature. Architecture can no longer be practised in defiance of nature or it will find itself irrelevant to mankind. We need to create a new architecture which is in tune with the natural world, not a constant affront to it – a fact which architects (and clients) are beginning to comprehend. The architecture of the future must be urban architecture. In Europe, this means an end to the anti-urban sprawl. Where buildings are matters more than what they are or what style they assume. The renaissance of our cities is a necessary step towards the saving of the countryside. Saner, cleaner, more enjoyable, less wasteful buildings, whether 'traditional' or 'modern', are part of the process of halting the ruination of the world and the steady degradation of the life most people live in it. *KP/ACP*

Opposite: An environment of technology, Hong Kong


SD

THE PRINCE AND THE ENVIRONMENT

CHRISTOPHER MARTIN

The Prince of Wales did not particularly want to make a film about the environment for BBC TV, but then he had initially opposed quite strenuously the idea of making his earlier film about architecture, *A Vision of Britain*. Persuading him to tackle an even larger subject, although not a pushover, was relatively easy.

After all, through his speeches and his example, he had become a potent voice in a movement that in 1989 seemed to have begun to transform the way people looked at nature and how it should be used. For many years before it became commonplace for 'green' issues to be considered even speculatively – let alone as a matter of urgent necessity – the Prince had been talking to those who would listen of his environmental concerns, of his belief that something had gone wrong with the way in which mankind viewed and was exploiting nature and that unless something was done, a fearful price would have to be paid. A television programme would not only reach millions all over the world, but would mobilise the power of the medium to enhance his message.

Although widely reported, his speeches have perforce, only limited audiences. So it was that I, director James Hawes, a BBC film crew, Richard Aylard, his Private Secretary (no small authority on the environment himself) and the Prince of Wales, were soon to be occasionally found in a Benedictine monastery in Italy, a forest in Java, by an alligator infested swamp in Florida, or eating sandwiches companionably by a Norfolk beach on a freezing January day.

It sounds agreeable and it was. But do not imagine that the film was undertaken in other than the same thoughtful and heavily researched way that marks the speeches. The Prince has many friends and advisors who, he cheerfully acknowledges, know far more about such matters than himself. He will draw out of them their opinions as to what is important and where the emphases should be put. He could see that the dangers of a film about the environment – a subject of enormous political sensitivity – exceeded even those of a film about architecture. There was a danger of seeming to espouse facile economic or political solutions, of oversimplification, of appearing a prophet of doom causing panic rather than thought, there was the peril of being over-solemn and appearing to preach.

Some advisers took the view that a sturdy, no-nonsense, confident approach to the subject was best. The public wouldn't stand for too much of the 'spiritual' message favoured lately by Prince Charles. Others thought that there were already enough programmes like the former. Here was a chance to go behind the issues explored endlessly by the media and ask a few more profound questions, to go beyond advocating this or that technical or economic 'fix' – in which, anyway, the Prince did not for a moment believe. A non-expert he might be, but his knowledge, his instincts and his commitment have made him listened to by those who are, and if he directed their attentions, as well as those of the general public, to the importance of Greek myth, the life and practice of St Benedict or the words of Indian Chief Seattle, rather than come up with breezy solutions, so much the better.

The Prince is aware of the incongruity of a man in a privileged position advocating abstinence from material things and a return to those of the spirit. He realises the perils of cultural arrogance – of advocating solutions that have no relevance to other cultures or are corrosive to them. What he seeks rather, is what Saul Bellow described as 'the rediscovery of the magic of the world under the debris of modern ideas'. He affirms the value of instinct – 'We know something has gone wrong' – and to find a way out of the impasse he looks at the past. We need history, not just because it tells us about the past, but because it helps to explain how we came to be where we are and how we might shape the future. The wisdom of tradition, although rooted in the past, does not exist there alone. It can be consulted and revived into a living corpus of belief again.

This is often too much for the media. His criticisms go against conventional thinking and have earned him criticism – not least because the Prince is publicly sceptical of the benefits of 'progress' as the idea has evolved since its formulation in the 18th-century Enlightenment. He sees its modern meaning as ever increasing production, consumption and profit to the disregard of the effect of these things on the quality of life and upon what Erich Fromm called 'the unfolding of man'.

Doubtless, he is inspired by his friend and mentor Sir Laurens van der Post, who wrote of conventional views of progress as 'a mortal danger to almost all forms of natural life and even the earth itself'. Like Sir Laurens, he observes that our devastation of nature is not a new thing. What is left of Nineveh and Tyre and Babylon and the abundant world of a nature that once nourished them? Could it happen again, to us? He talks of a 'loss of soul', of our hubris and the tyranny of mere rationalism. He calls less for a new ethic, as many environmentalists do, but for a reaffirmation of some old ones – of our duty of 'stewardship', of our sense of wholeness and oneness with nature which we once had. We have lost our ability, he says, to see the life and harmony in things.

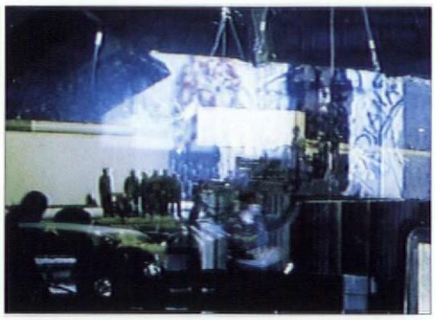
This is stuff for the high ground, yet most of his speeches are full of sound common sense; supported impressively by facts and statistics about GATT and the CAP, species loss in the rain forests, pollution levels in Hong Kong and population figures in Indonesia.

The environmental mission in which the Prince has played so distinctive a part is in for stickier times as the world confronts the problems of economic failure, rather than those of prosperity and success. The environmental consequences of such a failure are even more terrifying than those that seemed to threaten us a couple of years ago when *The Earth in Balance* was made. But the message of the Prince is now more, not less, important as we contemplate the future of our scorched Earth.

The publication of these speeches and the script of the film *The Earth in Balance* add up to an impressive critique – not just of an analysis of various environmental problems, but a heart-felt and perceptive examination of what contemporary life has come to mean, and what it might be instead.

He is not alone. I invited some other informed participants in the environmental debate – from different constituencies so to speak – to contribute their own assessment of the problems that confront us and the Prince's contribution to finding the solutions. I am very grateful to them. They have added another strong and convincing element to what was already a formidable body of work.

Opposite: Shanty town, Jakarta, Indonesia



CONFIDENTIAL

BBC DOCUMENTARY FEATURES

HRH THE PRINCE OF WALES'

"THE EARTH IN BALANCE"

A Personal View of the Environment

Producer: CHRISTOPHER MARTIN
Director: JAMES HAWES
Research: NATALIE MEDD
PA: SARAH HYDE
Film Editor: JEFF SHAW

TX: 23rd MAY 1990
BBC-1 21.30

DUR: 59'43"

N.B. Please refer to Christopher Martin or Jane Astell before using any part of this programme.

HRH The Prince of Wales

"T H E E A R T H I N B A L A N C E"
A Personal View of the Environment

Earth from space.
(NASA footage)

This is where we live.
We haven't been here long.
It took most of our time here
to discover it was round.

We've fought over it, conquered
and exploited it as if there
were no limits to what we could
do to this place.

Music starts.

MUSIC: Henry V
Film Soundtrack -
Opening title.

Aerial shots of
Scottish hills and
lakes.

The world shook to our
achievements.

It took us more time to realise
that the thing we were all
struggling to get a bigger piece
of was more fragile than we
thought. But now, at the
eleventh hour we know.

TITLES:
THE EARTH IN BALANCE

A PERSONAL VIEW OF
THE ENVIRONMENT

We know that the earth is our
home and that, sometimes
unwittingly, we have been
inflicting terrible damage to it
- to the air we breathe, to the
water we drink, to the soils
which give us food.

Unless we alter our approach, I believe that we shall - sooner rather than later - face a reckoning.

Aerial shots of
The Flow Country -
HRH walking.

This is one of the last wildernesses left in Europe. It is the edge of the Flow Country, right up in the North of Scotland. It's a strange, evocative area - and has a wild desolate beauty of its own.

TITLE:
WRITTEN AND PRESENTED BY
HRH THE PRINCE OF WALES

Music ends.

HRH sync standing by the bog.

Only a few years ago this stretch of empty moorland would have been dismissed by most people as of no interest or importance, and certainly of no economic value. You couldn't grow anything on it. You couldn't keep animals here; no-one would want to live in such a desolate place.

But recently our attitude has gone through a dramatic change. We have come to value places like this precisely because they are so remote and so wild. They have become infinitely precious to us, because they <u>are</u> the last stretches of wilderness left in the world.

We have suddenly become aware of just what a devastating impact

we have made on the world. In the last few decades, with our huge advances in technology, that impact has reached a point of crisis.

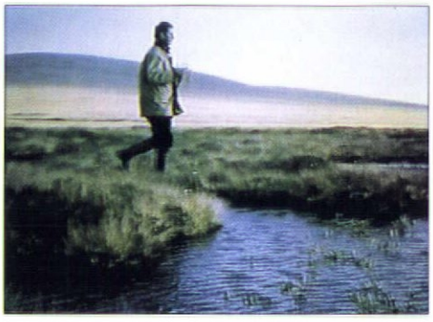
End of sync.

Even the Flow Country hasn't escaped. Remote as it is, it is under threat.

Flow Country: details.

Bog, ploughed-up peatlands, conifer plantation, CUs flowers.

Great machines have been at work ploughing up the bog to plant vast new conifer plantations.



Planting, rather than cutting down trees, may seem like a good idea, but using these methods it's totally at odds with the local ecology - destructive of a very delicate ecosystem that's taken thousands of years to build.

Compared with the fate of the world's rainforests this might seem unimportant. But what we do to the Flow Country indicates our attitude to nature.

HRH sync as he crouches by the bog.

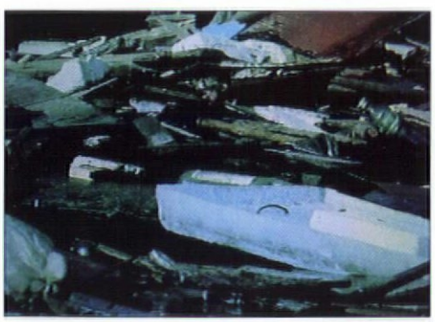
Whatever the case I've certainly reached the conclusion that there are no easy answers - political or technological - to the environmental crisis - even though it is hard to believe, sometimes, that such a crisis exists. We are still tempted to believe that it is all the

result of excessively alarmist talk.

It has been extraordinary to witness the surge of interest that there has been in the subject over the last couple of years: the ozone layer, marine pollution, toxic waste, acid rain, global warming: these rather fateful phrases have gradually become part of our daily lives.

WS HRH stands up and walks R 00S.
MS HRH - Sync continued.

These are the kind of questions which have concerned me deeply for more than twenty years. I am - to say the least - no scientific expert; there are plenty of others who seem to know a great deal more about the subject than I do. But I would like to raise a few questions. I have gradually come to believe that we cannot solve our environmental problems simply by coming up with yet more answers based on technology alone. Every so-called 'solution' seems to unleash a whole new generation of problems. What interests me is the debate going on beneath the actual issues. It's a debate about values; about what we mean by things like wealth, progress and growth.



End of sync.

HRH walks L-R beside bog.

Bird in flight.

Jet screams across Hong Kong skyline.

GV's Hong Kong: Trams, people, Harbour.

High-rise blocks, rubbish floating in water.

Modern Hong Kong skyscrapers.

People in market.

It has become apparent to me that we need to re-develop our vision of the earth, and of the role that we humans have to play as stewards of the earth.

It is not the wild places of the earth that are the source of the world's environmental problems. But its great cities.

Last year I went to Hong Kong. There are few places where you can see more clearly how man is stepping up the pressure on the natural world.

The city has a difficult political future, but its present environmental problems arise from its success. Hong Kong is what most other cities of the developing Far East would like to be.

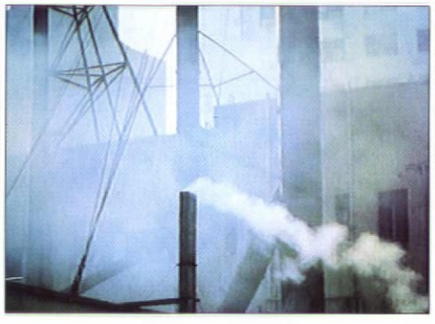
The potent vision of what Western-style industrialisation can offer has been terribly seductive - all over the world.

For people in the Far East, Hong Kong has been a magnet since it was founded as a colony by the British in the early 19th century.

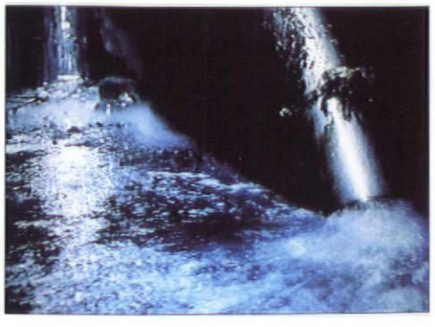
Nearly six million people live here - about 21,000 people to

Track past tower blocks.

WSs Hong Kong factories - fumes, effluent running in gutters.



Dye spreading out into the sea.



every square kilometre - the highest density in the world, the most crowded place in history.

The people who live here would count themselves among the most fortunate in Asia. About half the world lives in poverty. Half the people of the earth, and there are over five billion of us, can't even obtain clean water.

Hong Kong has been famously successful at paying its way - squeezing in profitable factories almost anywhere it's possible. But the fumes and chemical dyes make for ferocious pollution. In some cases the streets literally run with the effluent.

How long can the burgeoning cities of the world like Hong Kong go on in this way? How 'sustainable' is Hong Kong?

'Sustainability' is a word much in use at the moment among environmentalists. It means - to put it rather simply - the ability to meet human needs indefinitely without degrading the environment - or impoverishing the world's natural wealth.

People with handkerchiefs over faces.

Hong Kong Harbour: boat collecting rubbish.

HRH sync on boat.

The citizens of Hong Kong - like their counterparts in the West - have awoken to the dangers and are joining together to fight for cleaner air. The Hong Kong Government is already taking action. But unless we make it plain to politicians that we want something done there will always be excuses for not taking action. There are, after all, plenty of interests lobbying for the other point of view.

I don't believe that tighter environmental controls must necessarily damage the commercial success of cities like Hong Kong. But it's a question the whole industrialised world is having to face.

I suppose this must be one of the most famous views in the world - Hong Kong from the waterway which separates it from Kowloon and the Chinese mainland. The great towers are a pretty good symbol of the impact made on this corner of the Far East by Capitalism - an economic system evolved in the West.

Looking at the city, who could deny the triumphs of capitalism? In a few years, Hong Kong is to become part of a country whose ancient culture is now dominated

by Communism - another system with its origins in the West. Both ideologies, though usually considered irreconcilable, have some things very much in common. Both believe in unlimited industrial expansion; that the proper goals of mankind are material ones and that these can be achieved through science and technology. And - though some in the West are finding it prudent to qualify this nowadays - that the earth's resources are there to be exploited and put to use. That big is beautiful. That progress is the same thing as growth.

End of sync.

Aberdeen Harbour:
Crowded houseboats
and sampans.

But we are already having to ask ourselves if 'growth' can go on for ever. The resources of the earth are not infinite. Already we are finding it difficult to satisfy man's basic needs for things like water, food, power and medicine. Can the conventional economic systems provide them?

Pan R along skyscrapers
on waterfront.

There is no doubt that Hong Kong, in the next few years, will face some fairly dramatic challenges, not just politically but environmentally too. It exemplifies so many of the urban world's problems.

HRH sync on boat.

It's a brilliant 'tour de force' but in the environmental sense

it's the very opposite of 'sustainable'. Yet the challenge of 'sustainability' has to be met - and certainly thought about - in thriving, bustling cities like this - or not at all.

End of sync.

Harbour - pan up to high-rise blocks.

One thing I'm sure of - conventional economic theory and practice are <u>man</u>-made. They are not the natural order of things. They don't have to dominate us.

Music starts.

MUSIC: Henry V Film Soundtrack - 'Upon the King'.

Hong Kong factory chimneys and smoke.

All over the world people want the wealth that industry creates. But more and more they're no longer prepared to tolerate the squalor and pollution it generates.

Potteries - pan L over roofs and chimneys. (Library footage)

Such considerations were not uppermost when the Industrial Revolution - which made so much of the developed world's prosperity possible - began in Britain. It was very much based on the exploitation of natural resources thought to be 'free' - like air and water - and 'cheap' - like coal and oil.

Smoking chimneys - pollution. (Library footage)

In the developed countries today industry is very different from the dark Satanic mills of the 19th century, and some of the scars of the past - and

the wounds of the present - can be healed.

Once we polluted through ignorance - not any more. At last governments are getting to grips with pollution. Measures like 'pricing' the environment are being considered. This means that if industrialists pollute or spoil the environment, they will have to pay the price of cleaning it up. It won't just be left to future generations to pick up the bill.

Oil spillage being cieaned up.
(Library footage)

Music ends.

HRH in meeting with businessmen in Darwen.

It's not just a matter of government legislation. I've been very encouraged by the number of people I've talked to in business and industry, here and in America, who are only too aware of the problems and are keen to work towards solutions. They are very far from being the ruthless Victorian mill owners of legend.

HRH sync to meeting:

There's a great deal that can be done. There is an interesting company, I was going to say later on today, which I discovered called the Minnesota Mining and Manufacturing Company which, you know, has a turn-over, doesn't it, of eight billion dollars a year. Apparently, by instituting a waste management and recycling of materials regime, they've saved - I think

End of sync.

Machines ploughing
and harvesting.
(Library footage)

Crop spraying by
plane and tractor.
(Library footage)

it was I read - between 1975 and 1987, 390 million dollars or something. So, you know, there's enormous potential - it's just that people have thought that it's a dotty thing to do. They've always thought it was just for people with sandals and long hair.

Industrialisation brought massive changes, not just to the cities but to the character and appearance of the countryside.

The labour that has always been essential to the care and conservation of the countryside has become expensive and scarce. Farmers have risen to the demand for increased production set by post-war governments - that is to say, us.

But now people are questioning the way we relentlessly pour chemical fertilizers and pesticides onto the soil, the way we remove trees and hedgerows to maximise production.

They are protesting about the destruction of wild life and traditional ways of life which even until quite recently had survived the impact of the Agricultural Revolution.

WS field with pylons.
Shots of idyllic countryside.
(Library footage)

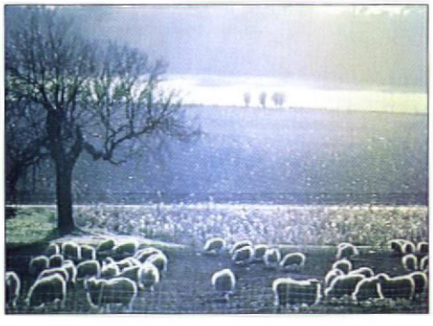
MUSIC: Handel
Concerto No. 1
in B Flat

The way a country looks is not a small thing. It can inspire a sense of identity between ourselves and the natural world.

Music starts.

The landscape is also a powerful link with our past - nothing speaks to us more eloquently of our history, or of our ancestors who helped to fashion it with their own hands.

Holkham Park - pan L to Hall.



For some considerable time now I've been interested in the historical context to the environmental debate. If we can understand a bit about how things happened, perhaps we can take sensible decisions about the future - which is why I am fascinated by this place.

Holkham Hall:
Coke's monument.

This is Holkham Hall in Norfolk. In the park is a rather eccentric monument to Coke of Norfolk - a key figure in the Agricultural Revolution.

Music ends.

Details of monument - HRH walks round it.

Coke was one of the first to apply scientific thinking to farming. He successfully developed new seeds, and new strains of sheep and cattle.

It all led, you might say, to 'agribusiness' and grain mountains. But we need the inventiveness of men like Coke as much as ever today. Only now

we can surely choose what we want from science and technology. We don't have to be dominated by it.

HRH walks towards house from monument.

Coke's monument was built about a hundred years after the original park had been laid out by Lord Leicester in the manner of great 18th century landowners.

Temple, obelisk, statues in grounds.

The house was built in the classical style. In those days having a Greek temple in the grounds meant you thought you were in tune with the ancient world. An obelisk suggested you were at least on nodding terms with the great figures of antiquity.

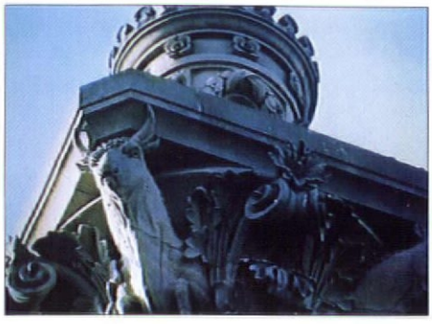
It was all pretty artificial. For - of course - the Greeks and Romans looked on nature in quite a different light to Lord Leicester. In their temples, and their landscapes, they believed the Gods really were alive. And about those Gods they told stories - myths which still touch and perplex us today.

HRH walks past house.

Details of dragon statue.

You can find, I believe, in some of these myths a recognition of our 'oneness' with nature; that when we tear recklessly away at nature we are tearing at something in ourselves.

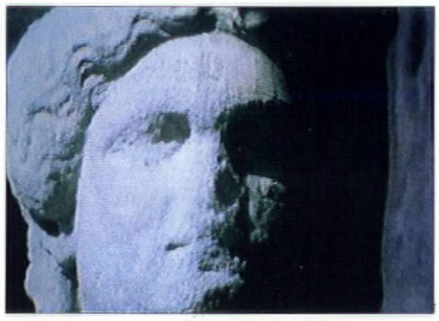
HRH sync by fountain - dragon statue in b/g.

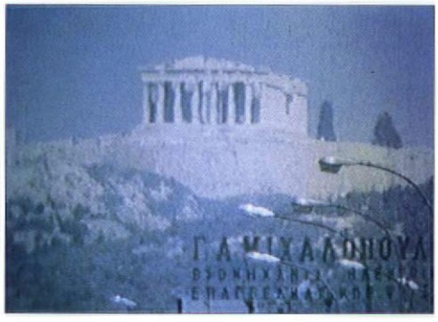


Take the story of how Prometheus stole fire from the Gods and gave it to man - and had to be punished. It warns us that man has assumed a God-like power over nature and is in danger of destroying the world with it. I wouldn't much like to live in a world without fire or the benefits of modern technology - but one does take the point.

The Greeks and Romans lived close to nature and saw the earth as a living organism; the historian Xenophon spoke of the earth as a divine being who rewarded those who protected her - and punished those who didn't.

But again, we mustn't be sentimental about the past. The Greeks and Romans cut down too many trees and over-grazed the land. Other great empires of antiquity crumbled into the deserts they, themselves, created, as they destroyed the vast forests of the Levant and Central Asia. North Africa, once the granary of Europe, became the Sahara Desert.
In those days, and even quite recently, there always seemed to be another wilderness that could be tamed, another forest that could be put to man's use.
Not anymore.





There's nothing new about ecological destruction - what's new is the awesome power that modern science and technology has put into man's hands. We really can move mountains and erase whole forests in the twinkling of an eye - but science and technology still can't put them back as they were. This has happened just at a time when we seem to have lost the ancient sense of kinship with nature which - not so long ago - was instinctive to us. That resulting imbalance has led, I believe, to a crisis of the spirit - or, perhaps, a 'loss of soul'.

End of sync.

WS Holkham Hall.

At about the time that Holkham was being built, Europe was going through a time of intellectual ferment which became known as the 'Enlightenment'.

Complicated 18th century clockwork. (Library footage)

MUSIC: Haydn
Piano Sonata in E Flat

The world was seen rather like a great clock; originally made by God, perhaps, but now man could tinker with it. If it went wrong he could fix it. Through science, at long last, the natural world - perhaps one day even the cosmos - could be dismantled, reordered, dominated and bent to man's will.

Music starts.

And with that grew a powerful

belief not only in scientific progress but in the idea of 'progress' as an end in itself.

Music ends.

Interior steel plant.
(Library footage)

That idea has transformed the world.

Rhine docklands.
(Library footage)

In just 200 years it has brought great benefits to millions of people. But - it turns out - there has been a price to be paid.

Music starts.

MUSIC: Beethoven
Ruins of Athens
Overture

How ironic that the genie let out of the bottle by the European enlightenment is now, through such things as acid rain and pollution, at work corroding the very fabric of Western culture.

Athens traffic - pan up to the Parthenon.
(Library footage)

Details of the Parthenon eaten away by pollution.
(Library footage)

In Athens the pollution eats into the stones of the Parthenon.

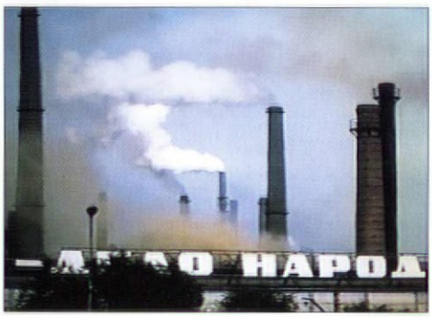
WSs Venice.
(Library footage)

Or look at Venice - one of the greatest of Western achievements. It is now critically undermined by subsidence - resulting from our interference with the water table.

Algae being drawn up from the water.
(Library footage)

Worse, it is threatened by the rise in sea level due to the greenhouse effect. And, as a final indignity, it has been visited by the noxious algae that flourish in the polluted waters.

The Med - polluted; the coast-line built over, the beaches submerged by tourists and industry.
(Library footage)



Ext. European Parliament building.
(Library footage)

Int. European Parliament in session.
(European Parliament footage)

Archive News Footage: Signing of the Treaty of Rome. (Pathe)

The Mediterranean Sea was the cradle of the civilisation that changed the world, but just look at parts of it now.

Music ends.

Tourism has brought badly needed money to Southern Europe but - if we're not careful - we really do destroy what we love most. In 1970 the Mediterranean was dying. Now, bad as things are, parts of it have a chance of recovery. But only thanks to unprecedented international cooperation.

European politicians have begun to respond to the dangers. Somewhat belatedly - the environment has forced its way onto Europe's political agenda.

European Community directives regulate the purity of water and the quality of air in Britain, as elsewhere in Europe. All the member states are now looking for common answers to environmental problems.

Things <u>are</u> beginning to improve through the actions of organisations which took up the challenge of international collaboration laid down here in 1957. This is the Capitoline Hill in Rome - where the representatives of six European nations met to sign the Treaty of Rome.

So began the Common Market which was a major step in the aim to turn Europe away from the divisions of centuries.

HRH sync in Palazzo dei Conservatori, Rome.

But other great changes in European affairs have recently been brought about - not by the signatures of statesmen in grand rooms like this but in the cellars, shipyards and squares of Berlin and Leipzig, Gdansk and Warsaw, Prague, Sofia, Bucharest and Timisoara.

End of sync.

Uprisings in Romania, Berlin Wall being taken down. (News footage)

Is it possible not to be moved and astonished by the events that are convulsing Europe now?

How hard it would be to withhold assistance as well as sympathy from countries like Czechoslovakia? It was President Havel who said recently: 'We have polluted our rivers and forests bequeathed to us by our ancestors and we have today the most contaminated environment in Europe.'

Havel on balcony talking to crowds. (News footage)

Eastern Europe pollution: factories and smoke. (Library footage)

MUSIC: Shostakovich Symphony No. 7

For the stark truth has emerged, that Eastern Europe has suffered a terrible environmental - as well as a political - catastrophe

Music starts.

We have looked almost with disbelief at the environmental consequences of central bureaucracy and the planned state. Of what happens when

People walking past factories.
(Library footage)

people are excluded from participating in their own affairs. It's not coincidence that the 'environment' was often one of the first rallying cries to the people of Eastern Europe, which led in turn to demands for political change. Environmental damage was one of the most inescapable proofs that the system itself just didn't work.

Music ends.

HRH to camera in Palazzo, Rome.

Now, surely, the least we can do is help restore their shattered, poisoned, blighted countries, their polluted rivers, their dead forests, and help care for their sick and dying children - poisoned by the very air they breathe and the water they drink.

This will challenge both our generosity of spirit and the firmness of our political will. As barriers and frontiers crumble under the pressure of events, we can at last acknowledge the extent to which environmental problems are shared problems. Pollution, global warming, acid rain, and ozone depletion, do not recognise national boundaries. They can only be tackled by unprecedented levels of cooperation on a global, international scale.

WS HRH opens window of Palazzo and walks onto balcony.

Sync continued:

The new Europe we are building contains so many dreams and aspirations, but it would be a sad day if we lost our unique regional differences - the unregulated haggis from Scotland, the unofficial olive press in Greece, the unstandardized apple, the pint as well as the litre. We need the wisdom that derives from local tradition as well as the international agreement and the global pact.

End of sync.

Traditional European farming.
(Library footage)

We lose something irreplaceable when - quite often through well-intentioned development projects - we encourage people like these to leave the land.

A sustainable way of life, sympathetic to local conditions, vanishes. Valuable traditions and knowledge are lost to us. Is this 'progress'? People like these have always been the traditional guardians and stewards of their land. Shouldn't we rather be providing them with incentives to stay on?

I believe there is, in Europe's past, an idea - often forgotten - that can be revitalised and put to work again - the idea of 'stewardship'.

Ext. Monastery of
Sacre Speco, Subiaco.

This is Subiaco in the hills behind Rome. It's where, in about the year 500, St. Benedict came to live as a hermit in the cave which is now his shrine. The saint believed that the life of prayer and scholarship would be strengthened if his monks also got their hands dirty working in the fields.

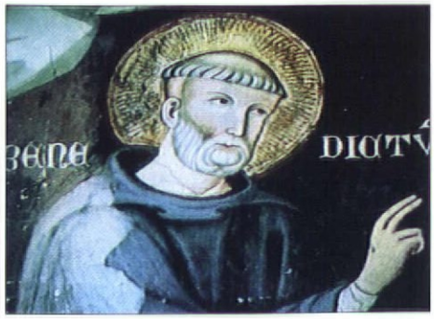
Frescoes of St. Benedict.

Int. Monastery.

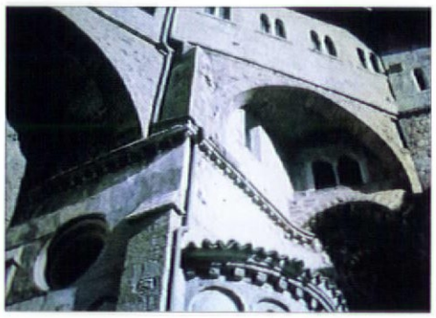
St. Benedict insisted that the monasteries of his order should be self-sufficient. And he seems to have set us an early example of the idea of 'sustainability': the monks had to pass on their lands in as fertile a state, if not more so, as when they found them.

HRH sync in monastery.

It is, perhaps, a hopeful sign of the times that Benedict has been made the Patron Saint of Europe. But some people have seen in Christianity, as inspired by the Old Testament, some of the origins of Western man's ruthless exploitation of Nature.



In Genesis God says to Adam: 'Be fruitful and multiply, and replenish the earth and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.' This must be one of the few of God's commandments



End of sync.

Exts. monastery.

HRH sync outside monastery.

that man has obeyed too energetically! But I prefer another Christian tradition - also in Genesis - when God, after the Flood gives a new covenant between Himself '...and you and every living creature with you.' This is at the heart of the idea of stewardship - a recognition that all things on earth depend upon each other. In this sense, Genesis is not a licence for men to do as they please with the earth but an invitation to act as stewards for God, as for future generations - in harmony with nature.

The Benedictines chose remote and wild places for their monasteries as being somehow appropriate for the worship of God. But they also believed it was their duty to cultivate the land - as partners of God. Reverence for nature obliges us to accept responsibility for the creative stewardship of the earth.

The Hindu monk, the Buddhist, the quieter followers of the Koran, show a similar concern and respect for nature. In North America the Hopi Indians cultivated the land bearing in mind the interests of the seventh unborn generation yet to come.

End of sync.

INDONESIA

Rainforest:
mist over forest canopy,
gibbons (Library),
vegetation, flowers
and insects etc.

For many people St. Francis of Assisi, with his almost ecstatic veneration of nature, seems the Christian figure most identifiable with our environmental concerns. But St. Benedict with his view of stewardship seems to me perhaps the more relevant of the two saints - if you can put it like that.

Nature, of course, isn't there just to be venerated. We change it and affect it whatever we do - the whole earth clearly can't be one enormous conservation area and we certainly can't go back to the wilderness, or for that matter, to the Garden of Eden.

Nature was never a garden and the Indonesian rainforest is certainly no Garden of Eden.

The tropical forests have always played a part in our imaginations. And now they have taken centre stage in the environmental debate; because from here to the Amazon they are under threat.

The rainforests are a vast treasure-chest of genetic diversity that has already brought us enormous benefits in terms of new foods, drugs and medicines. And yet, in

Tree felling sequence:
Men with chainsaws,
bulldozers, trees falling.
(Mix of Library and
specially shot footage)

Pan across landscape
of felled trees.

destroying the rainforests we are killing off entire species of plants and animals - denying their value to our children.

We haven't even got near classifying all the species in the Indonesian forests yet. Who knows what they contain? Who can be sure that somewhere in the forest there isn't - waiting to be unlocked - as some scientists believe - the key to the cure for cancer?

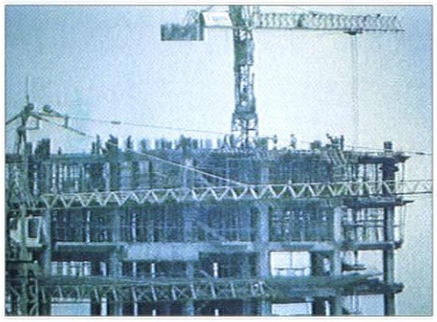
The peoples of the rainforest too have all but disappeared; the very people who were their 'stewards' for thousands of years - thriving on the innumerable products that can be harvested sustainably from the forests without destroying them.

Now we are painfully aware that these trees play a hugely important role in stabilising the world's climate - just by being there.

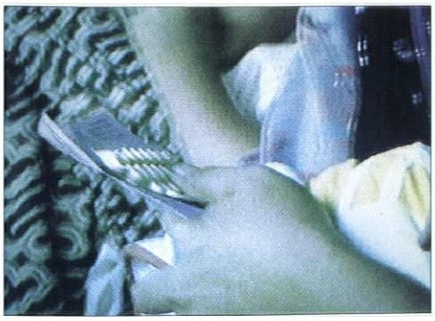
In fact they are disappearing so fast that we are literally the last generation that can save them.

Scientists may disagree about the degree of global warming but virtually none doubt its existence - or the value of the

Jakarta: traffic, high-rise blocks, 'development'.



Jakarta shanty town.



tropical forests in maintaining the natural balance of our planet.

The governments of countries like Indonesia know all this, of course. So what are the forces at work that keep them destroying one of their most valuable assets?

There's no such thing as a 'typical' developing nation - they're all different - and many resent the label anyway; but they do share many of the same hopes and many of the same problems.

This is Jakarta - Indonesia's capital. Its people have caught more than a glimpse of Western technology and affluence. Quite understandably, they want it too, which leaves the rainforests' future in a delicate balance. They are one of the country's greatest resources, they can provide capital which the future Indonesians want for themselves.

And why should these people hold back? After all, few Indonesians consume more than a fraction of the earth's resources per capita that we in the so-called 'developed' world do. Why shouldn't they - why shouldn't more than a billion

Chinese for that matter - all have refrigerators and motor cars?

Grogol: people washing and swimming in filthy water.

This is an area of Jakarta known as Grogol. Hundreds of thousands of people live around these canals. From them they draw the water they are often obliged to cook and wash with and, heaven help us, drink.

HRH visits Grogol.

We need to act imaginatively - finding ways of offering technology for sustainable projects. With, of course, proper auditing and accountability.

HRH switches on new water pump machine.

I was really impressed by this example of 'appropriate' technology. It's a fairly simple water pump and purifier - developed, as it happens, in Lancashire, by a firm called Dale Electric. It cost about 60,000 pounds to build and install.

HRH being shown round Dale Electric Plant.
(Library footage)

It's not too complicated - a local man can operate it with perhaps a day or two's training. It could make an enormous difference to life here.

WS Grogol canal.

Faced with the sheer scale of the problems, are schemes like this one much more than just a drop in the ocean? Isn't the real heart of the matter - as

People in the streets of Jakarta.

Jakarta traffic.

Babies in cots.

Outdoor Clinic in Grogol:
Women with children
being given contraception.

some people say - rapid
population growth?

There's no issue in the world
more sensitive. But by
the end of the year there will be
over 90 million more of us than
there were when it began.

It does seem to me that if the
population of the world goes on
growing at the pace it is, it
must be more difficult to
conserve our resources, keep
the wilderness intact, cut back
on pollution, ensure the future
of the world's civilisations - or
even for us just to survive.

'Go forth and multiply',
says the book of Genesis,
'and replenish the earth.'
But all the religions have had
to think again about
family planning.

In Indonesia local communities
have been convinced by government
officials of the importance of
lowering the birth rate.
In fact here, in Grogol as in
so many places, it's at this
local level that things really
can get done.

And that provides the security
and the context in which people
can exercise their own personal
responsibility.

Women seeing doctors, babies being weighed.

Children's faces.

School: Children having gym lesson.

People like these have always feared poverty in old age and looked for the support of a large family. Now they have been persuaded to forego that security. I pray they are not disappointed.

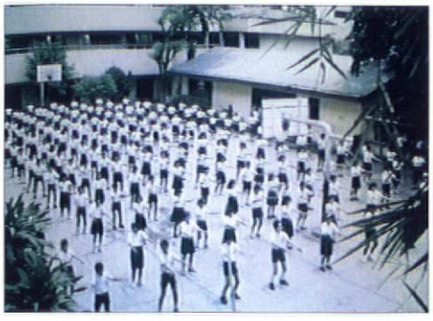
I'm sure that when people are better educated and have security and some hope for the future, the size of their families will go down - just as they did in the West. But that takes time.

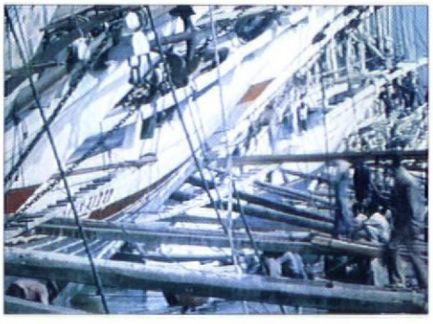
Population tends to be a taboo subject. It's the issue nobody wants to face. But unless an economic system develops which extends assistance more imaginatively, which actively promotes family planning, and which distributes the wealth of the world more fairly amongst the burgeoning populations of the Third World, the consequences are likely to be tragic.

We in the West have been having a pretty good party. Now all the others want to join in. It's no good saying to them that it's just become a business lunch - and they're not invited.

Happily it isn't just a question of material demands.

Maths lesson.





Track along piles of wood in port.

Wood being unloaded from boats.

Sumatra:
Transmigrant village and villagers.

Education will give these children a better opportunity to make choices about how to fulfil their aspirations.

Armed with new ideas as well as a knowledge of science and technology, they will grow impatient of old ways and old solutions.

They will want new roles for women. They will certainly want the prosperity they have been taught that industrialisation will bring them.

But will these children be able to find ways of living in harmony with their astonishing natural wealth, exploiting it sustainably and not spending it all at once.

The sad thing is that we in the developed countries sometimes behave in ways that encourage them to do just that - as if we don't want anything from them except their natural wealth. Just send us the wood - and if we pay enough, and it doesn't have to be much - they will.

And even before that, land-hungry people need somewhere to live.

For years Indonesia has had a policy of what is called 'transmigration'. That is a

Pan from house to tree stumps.

Workers in fields.

HRH with Emil Salim at Wanagama.

HRH sync to Salim:

Dr. Emil Salim, Minister of State for Population & Environment:

voluntary - and sometimes not so voluntary - movement of people from the over-crowded cities and exhausted parts of the countryside into the virgin forest.

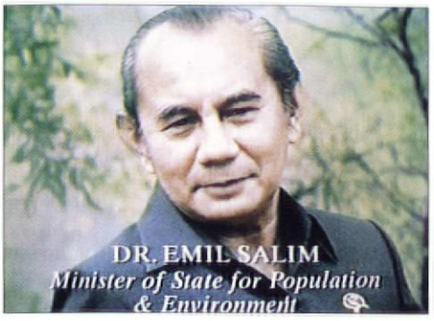
The transmigrants are given help - accommodation simple enough, but to my eye an improvement on what's available at Grogol - and seed, tools, some money.

But 'sustainability' isn't achieved overnight. The familiar problems arise; the trees are cleared, the soil - none too fertile at the best of times - is exposed to the rain and the weather. All too often it is washed away and the area becomes barren. The people have to move on again.

While I was in Indonesia I talked to their Minister for the Environment and Population - Dr. Emil Salim.

Do you feel sometimes that as far as developed countries are concerned, we sound hypocritical perhaps in our attitude towards these things?

Well, in a way, sometimes that is a kind of conflict in attitude. On the one side the developed countries like to see that the developing countries,



like in Indonesia, maintain the tropical forest, don't cut the trees and so on, and therefore in the developed countries even people are boycotting tropical forest product in order to enforce an opinion not to cut the tropical forest trees. But on the other hand is that really solving the problem? I see that the major idea, major goal, is how to get this nation to develop without really depending upon tropical forest. It means industrialisation, it means getting the people employment and opportunity outside the tropical forest.

HRH sync:

Do you feel that it is possible in terms of the future and all the pressures that exist to arrive at some sort of harmony or balance between man and nature and the natural surroundings?

Emil Salim sync:

You touched the exact key word in our long term development goal - harmony. The goal is to achieve the so-called total man, a man that lives in harmony with God, the Creator. Second is the man that lives in harmony - being an individual - but lives in harmony with a society. And the third is a man that lives in harmony with nature. So you develop the country, you develop the people, the human beings, in which there's harmony between his

End of sync.

Workers in tea plantation.

Women tilling ground.

Buffalo ploughing.

People working in rice fields.

Jakarta: Traffic and people in streets.

materialistic development and his spiritual development. So the key word is that of balance between the material and spiritual development, the man living in harmony and, in that context, living in harmony also with nature.

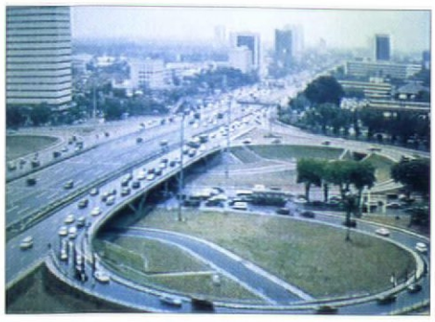
Countries like Indonesia have ancient and harmonious methods of agriculture that have served them for centuries.

At their best they're diverse: different methods working for different crops. These methods, with the way of life that they supported, were - until recently - scorned as inappropriate for the modern age - feudal, backward, 'unprogressive'.

But it isn't just nostalgia. What is happening here is what 'sustainability' is all about.

Sustainable life support systems like these are the natural foundations on which all our rather rickety human societies were built. No amount of technological wizardry will ever replace them.

The people of Indonesia still live with that fundamental truth every day of their lives.
In the West, that truth has been obscured by delusions of



U.S.A.
Washington D.C.,
The Capitol.

Senator Albert Gore.

'unsustainable' progress.
At last people are waking up to the fact that the environmental problems of the developing world are now the problems of the whole world.

But there still aren't enough politicians in the West who give environmental questions the priority they deserve. One of them who does is Senator Albert Gore. He almost succeeded in becoming the Democratic presidential candidate.

HRH interviews Gore:

Senator Gore sync:

The Third World is now paying a lot more in interest on its debt to the developed world than all of the foreign aid and all of the multilateral assistance put together. A friend of mine said it's like a blood transfusion from the sick to the healthy, and then we ask why they put stress on the rainforests, and why they degrade the environment.

HRH sync:

The difficulty, it seems to me, is how to achieve the kind of international co-operation that's necessary to tackle all these sort of problems, isn't it. Or are you hopeful about it?

Senator Gore sync:

It's a daunting task. We don't have much experience in putting together a global solution to a

End of sync.

Helicopter shots:
Miami high-rise blocks.

problem of this magnitude. In fact, we have no experience of this sort. But we have to do it anyway. The obstacles in our path sometimes seem immoveable but so did the Berlin Wall. The number of changes seem too numerous for the short time we have, but look at all of the changes in Eastern Europe which occurred in only 90 days. When people change their way of thinking, then substantive changes follow. The Berlin Wall was torn down in the minds of people in the Communist world before the first chisel hit the first stone. And then it collapsed. Minds are now changing about the importance of protecting, saving, preserving the earth's environment, and when enough minds have changed, then these daunting, political obstacles will be swept away and we <u>will</u> find the solutions.

America, and Europe, also have to set an example to the developing world. Our values become theirs - through advertising and our own massive financial power. But, of course, America faces colossal ecological problems of her own.

Take just one example, Florida. The population is increasing by 1,000 a day. The great cities like Miami grow, their suburbs sprawl, making huge demands on a limited water supply.

The Everglades.

Pelicans in tree-tops.

Traffic in Miami city.

Washington group meeting, at British Embassy.

Scarce fresh water is over-pumped. Key rivers a re diverted away from the Everglades - a unique wetland habitat.

Ever since the first settlers arrived here the sea has been rising, but if the surface of the oceans expands because of global warming, large parts of Florida will become inundated. And so while some parts of the Everglades are drying out, others are being flooded as the sea-water swills into them.

Many species are facing extinction. A whole ecosystem is facing destruction.

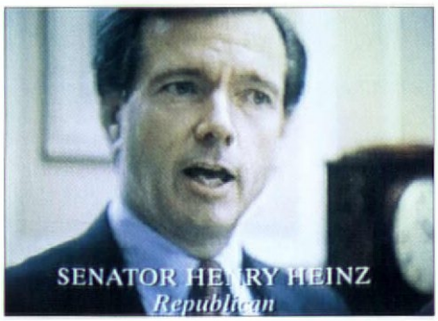
And yet the traffic still pours carbon dioxide into the heavens - adding to the greenhouse effect, raising the global temperature.

The fact is, if the whole world behaved like us towards the earth's resources, the result would be a cataclysmic disaster.

More and more people are recognising the problems but are they - are we - prepared to make the sacrifices necessary to solve them? Can we change the way of life we have come to take for granted?

I took the opportunity to talk to some concerned American politicians in Washington.

Senator Henry Heinz, Republican:



We have all kinds of signs of what is happening to our planet. The most conservative biologists, such as E L Wilson at Harvard, will tell you that within the next 50 years, 25% of all the species in the world will be extinct - a quarter of all the birds, of all the fish, of all the mammals, of all the primates - we're one of the primates. We have to get through to people that when we talk about any of these issues it could mean our demise - not just the lawn dying. Our problem as a society, I think, goes back to some British philosophers, Locke and Hume, the people who expounded the enlightenment and property rights, and it was man's right and duty to despoil the land in that that was what was alright. We still live with that.

Claudine Schneider, Republican Congresswoman:

The velocity of change that is taking place in the world right now is happening at such a speedy clip that we cannot wait to take action. And so we say yes, it's a global problem - it needs global solutions. But what concerns me is that each of us must provide some individual leadership. If you drive a fuel-efficient car, it is

HRH:

Senator Gore:

End of sync.

The Capitol and
White House.

fashionable then to drive a fuel-efficient car. So I think that there are two dynamics at work here - that we each have to take personal responsibility for our actions, and to make it fashionable to do such things.

What seems to me - is that deep down in most people's hearts there's a subconscious anxiety - there's something there which tells them that it's not right but it's how. It seems to me nowadays, in a contemporary sense, to appeal to that subconscious feeling.

The central philosophical error that we need to address and correct is the assertion for so long that we as human beings are separate from the earth - above it, apart from it, and entitled to do with it as we will. And a new philosophy is now emerging which places us back into creation as a part of the web of life, with a generalised recognition that what we do to the world, we do to ourselves. We face a crisis unprecedented in the entire history of the human race. We need the leadership to confront that crisis - we can.

In the 19th century an American President was addressed by an Indian Chief, Seattle - in words

that still echo down to us today.

Sunrise and sunset

MUSIC: Philip Glass
'Prophesies' from
Koyaanisqatsi

'Every part of this country is sacred to my people. Every hillside, every valley, every plain and grove is hallowed by the memory and experience of my tribe. Even the rocks and sea are charged with our memories.

Music start

The dust under your feet responds more lovingly to <u>our</u> footsteps than to <u>yours</u> ... for the soil is rich with the life of our people.

<u>Our</u> religion is the tradition of our ancestors and is written in the hearts of our people. <u>Your</u> religion was written on tablets of stone by the iron finger of an angry God.'

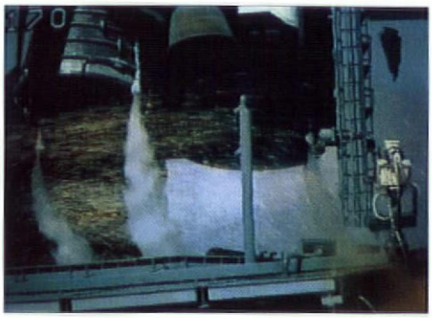
Music ends.

HRH sync at Kennedy Space Centre.

Such sentiments weren't likely to endear themselves to the dynamic, forward-looking spirit of 19th century America. An apparently inexhaustible continent was there to be opened up. The key to that was to be science and technology; just as today they are the keys to opening up the universe itself.

Florida was the home of the Seminole Indians. For the few members of the tribe that survive it still is. It's

HRH walks L to stand
with Launch Pad in b/g.



famous now as the home of NASA. This is the Kennedy Space Centre. The first successful moon landing was launched from over there in 1969.

Perhaps nowadays we tend to look at science in a more ambiguous light. Some see it as the great liberator from want and ignorance that promises us dominion over nature. Some think it has destroyed our sense of the sacred and condemned us to be prisoners of reason. Is it the agent of our destruction? Or the means of our salvation? And science has not only given us the means to measure and analyse the results of the risky experiments we have conducted on this earth; but it has also, if we are honest, revealed how little we know - how unknown is the territory into which we are now moving.

End of sync.

HRH inside Launch
Control Centre.

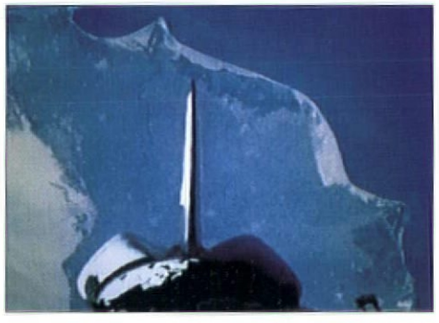
Space exploration enables us to see earth as a whole. It reveals that this earth is the only life support system we have - the one oasis in the vast desert of the universe.

Music starts.

MUSIC: Nielsen
Helios Overture

Shuttle launch &
shots of Earth from space.
(NASA footage)

The first pictures of earth from space were so beautiful and so moving that they made many of us rethink our views about the planet.



Many people say that earth moves through an indifferent universe; that life on earth has no moral meaning. That there is no purpose in our being here.

And that, surely, is part of the problem. It seems to me that we have denied the mystery of the universe, replacing it with cold logic and reason.

And cold logic - though necessary - isn't sufficient.

What I've been trying to say in this film is that we must restore a sense of balance between the two, between mystery and reason.

We should accept the limitations to some of our ambitions which the laws of the universe inevitably impose on us.

When we see earth from space through the brilliance of science, it confirms an age old instinct of man - which we have been made to feel almost ashamed to admit - that we are part of nature and should live in harmony with nature in the universe. Because if we don't we perish.

Sand blowing across Holkham Beach.

The sea.

HRH walking on the dunes.

HRH walking on Holkham Beach.

HRH sync on beach.

Our planet is very old. The shocks which it has been sustaining recently have been inflicted in what amounts to a very few moments in its history.

Nature <u>is</u> more resilient than we sometimes give her credit for. It seems we <u>may</u> have a breathing space to get things right. But we cannot be complacent.

Music ends.

It's surely sensible to take precautions - to take out insurance even if that means paying a premium.

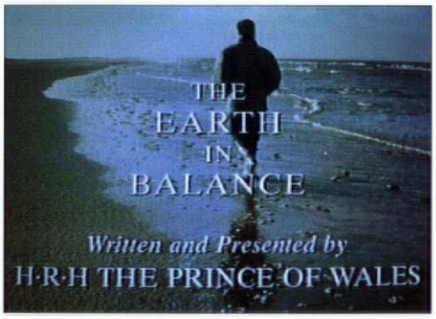
And, I believe, we don't have to be Nobel prize-winning scientists to understand and play a part in what must be done. The eye and the common-sense promptings of the human heart are pretty good guides.

We can all do very ordinary, practical things. We can save energy. We can avoid CFCs which damage the atmosphere. We can choose things like recycled paper. We can make our feelings known - forcefully and persistently - to governments, both local and national.

Do we not, most of us, feel a profound, almost unconscious unease at the course we have all been taking, almost as if we

were living on borrowed time? Desperately rushing, exploiting, doing, expecting others to come after us to clear up the mess; as if after a wild adolescent party which has gone terribly wrong.

It's a time of dramatic change. I know people feel daunted by the sheer size of the problem; and indeed the consequences to our children if we should fail are almost unimaginable. But there are encouraging signs that all over the world people are beginning to confront the issues. It's not going to be easy. But human ingenuity is remarkable. Faced with a real danger, necessity does become the mother of invention.



It is our generation which has to take the crucial decisions; the bold imaginative leap forward. It is a great challenge for Europe - and indeed the whole world. It is a challenge which we can all face together.

End of sync.
HRH walks away from camera down beach.

Music starts.

MUSIC: Nielsen
Helios Overture

CREDITS:

"THE EARTH IN BALANCE"
Written and Presented by
HRH THE PRINCE OF WALES

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Music ends.

THE PRINCE OF WALES
RECENT SPEECHES

AT THE EUROPEAN YEAR OF THE ENVIRONMENT EYECATCHER AWARDS, Merchant Taylor's Hall, London, 22nd March, 1988.

The European Year of the Environment has passed by extremely quickly. Too quickly, I would suggest. The subject we are concerned with is far too important and pressing, both nationally and internationally, to be confined in emphasis to just one year. I am old enough to remember the Countryside in 1970 Movement when I became Chairman of the Welsh Committee which organised that year's events. At the end of the year we were determined to continue the impetus that had been created and to increase awareness of the issues throughout Wales. Now, 18 years later, we still have The Prince of Wales's Committee operating in the Principality (thanks to some very dedicated and hard-working people). How then, are we going to maintain the impetus of EYE? How are we going to build on the remarkable achievement of EYE – which has been the strength of response it has drawn from ordinary people throughout the United Kingdom? The statistics on participation are impressive. More than 3,000 events were registered on the EYE computer. This probably underestimates the number of events which have actually taken place. Nearly 200 local authorities organised events, as did over 400 environmental groups, and 40,000 schools took an environmental education pack. The 'Eyecatcher' award scheme is but one of 40 such competitions and award schemes run during the European Year of the Environment.

This very high level of public participation reinforces the evidence from opinion polls, the media and the rapidly growing membership of environmental organisations (now standing at over three million, which is more than the combined membership of all Britain's political parties) that the British public is very concerned about its environment and, given the opportunity and inspiration, is willing to see this strength of feeling supported by practical action from those in authority. The trouble is that there is not enough evidence so far that those in politics or in industry believe that the British public is indeed ready to dip into its pocket to support environmental measures, even if the penalties are lower economic growth and higher prices. Despite all the efforts made during EYE; despite all the publicity – the eight television series and 30 television programmes – an article in the February issue of *Director* said that in a small survey of 70 manufacturing companies, made halfway through EYE, 57 per cent had not heard of the initiative. Of the 43 per cent who were aware of it only 4 per cent said that they had participated. Some big companies are seen on a corporate level as being environmentally sensitive – for instance Shell, ICI and BP – but in general the picture is fragmented and industry still too often waits for the threat of impending legislation rather than setting the pace. And yet the consumer is clearly concerned about the issues. When the magazine *Which?* surveyed a sample of the Consumer Association's one million strong membership in 1986, 90 per cent said they were worried about environmental issues, particularly pollution.

It would seem that there is still a prejudiced misconception in certain circles that people concerned about the environment, and what happens to this Earth, are bearded, be-sandalled, shaven-headed mystics who retreat every now and then to the Hebrides or the Kalahari desert to examine their navels and commune with the natives! But this is simply not true. There is a great ground swell of genuine concern about these issues, which are very much the issues of our day and age. There are many people who are now reacting against those who have held sway for too long and who have become completely out of balance with Nature. When you consider the built environment and what has taken place in the last 40 years you see what happens when the past is denied and its relevance is abandoned. The result is, literally, God-forsaken buildings, in many instances, which deny Man's place in Nature and which imply that the merely mechanical and utilitarian are what count most in our lives. This unbalanced trend in our own time, when we have armoured ourselves with such an arsenal of machines and chemicals to do what we like to Nature and to reshape the world, has led us to see ourselves as somehow separate from, and superior to, Nature. However, there is a major change in attitude taking place – a growing realisation that we are not separate from Nature, a subconscious feeling that we need to restore a feeling of harmony with Nature and a proper sense of respect and awe for the great mystery of the natural order of the universe, as we see it, and sense it, on this Earth. What we are being inexorably forced up against is the realisation that, in the end, our own long-term interests and those of all life on this planet are inextricably bound up with each other. We are beginning to realise that whatever we do to Nature, whether it is on the grandest scale or just in our own gardens, is ultimately something that we are doing to our own deepest selves. We have not been put on this planet to destroy it. Because so many more people are beginning to think like this, they are not prepared to tolerate the avoidable abuse of our environment – such as pollution for example, whether of rivers or the sea, by nitrate run-off and sewage effluent, or of the air in the form of emissions of sulphur dioxide and nitrogen oxides from power stations or our cars. These emissions are rising alarmingly, having been on a downward trend for many years. The governments of the member states of the European Community have succeeded in adopting one directive of real significance in EYE and that is on vehicle emissions, but it is widely regarded as setting inferior standards to those enforced in the United States and Japan for many years.

It is perhaps worth remembering that the Commission chose as its principle goal during EYE the task of raising public awareness about the environment. As I have said earlier, I am convinced the numbers of people only too aware and deeply concerned about the environment are far larger than politicians realise. The problem is how to translate this concern and awareness into effective action. That is the job of governments, local and public authorities, industries and other institutions. They are clearly lagging behind the public concern in this field. In 1980 the 'Global 2,000' report began with the words, 'If present trends continue, the world in 2,000 will be more crowded, more polluted, less stable ecologically and more vulnerable to disruption than the world we live in now'. EYE has seen the five billionth person born on this earth. In 40 years time, when a person starting a job today reaches retirement age, there will be ten billion people on the planet. Can we afford twice as much pollution or twice as much

environmental destruction? Isn't it the responsibility of today's parents to try to ensure that future generations inherit a world which provides them with hope, fulfilment and wonder rather than one which has been tested to destruction? We need to take preventive action *now* because otherwise the cure will inevitably come too late and it will have to be too drastic for people to take.

Many people are now aware of the problems and dangers, of the possibly catastrophic climatic changes through air pollution: of the mass extinction of species threatened by the loss of tropical forests and other essential habitats. When we read that over the next 60 years, if we go on as we are doing, something like a third of all the forms of life at present living on this planet may be extinct, can we feel anything but a kind of cosmic horror? This may sound like alarmism on a hysterical plane, but there is mounting evidence of a gigantic problem that won't go away. How, then, do we tackle these mammoth challenges? Many of the problems of the environment are inherently international, as the Chernobyl disaster so powerfully demonstrated, so therefore they require international co-operation on an unprecedented scale in order to solve them. The European Community is a unique mechanism for creating such co-operation. The environmental laws now adopted by the community have a direct effect in 12 countries and indirect effects in many more. The Single European Act which consolidated the treaties forming the European Community came into force during EYE. It insists that environmental priorities must be a component of all community policies, but this has to be more than just a pious hope – for all our sakes. What EYE shows is that the public support for a better environment is there. What is needed is for governments to move a lot faster.

In the United Kingdom we could do a lot more. As the Better Environment for Industry Awards showed, there is no shortage of ingenuity or inventiveness in this country. Surely now is the time for our industrialists and environmentalists to cease hoping that the other would go away and instead to sit down together to work out how our engineers and designers can help solve the problems? Surely local authorities and government departments could do more, for instance, to encourage recycling by using their purchasing power to encourage re-used materials? Is there not a role for our retailers to encourage 'green consumers', as they are known now, by identifying clearly those ordinary household goods which are better for the environment or are more energy efficient. It is surely extremely important that consumers should be properly informed on the package or bottle whether the product is harmful to the environment so that at least a choice can be made. We could also do more in this country to improve the situation with regard to forestry. The United Kingdom seems to be one of the few countries in the world where afforestation is treated with suspicion and sometimes outright opposition. This is hardly surprising when the large-scale planting up of heather moorlands and other valued areas with dense sitka spruce and lodgepole pine takes place. The future of forestry could be brighter, but will not happen when the Forestry Commission's remit is too narrow to allow it to assume the wider social, environmental and heritage role that woods and forests could play in our lives. Only by a fundamental review of the Forestry Commission's remit and of the future role of forestry, are we likely to see forests become a part of the cultural heritage of this country, as they are in Germany and other European nations, and not simply planted in interminable furrows to be harvested like fields of wheat.

In this country it is clear that we could follow more closely the example of other countries in the environmental field, several of whom have progressed further and considerably faster than we have in response to widely held public concern. But when all is said and done we are facing a serious and urgent challenge on a huge international scale. We have to realise that all these problems take place in a world that is becoming increasingly interdependent, but still too many political leaders give more attention to the obvious costs of action than to the concealed costs of inaction. It is an issue, however, that political leaders with a sense of vision can view as a chance to exercise creative collaboration on an unprecedented scale. This is becoming an absolute imperative, however difficult to achieve in practice, because we face an environmental situation where we shall all win together or we shall all lose together. I only pray that Europe can really show the way towards enlightened co-operation in this area and that we in this country will be able to play our full part in response to a widespread public concern which is *not* a figment of one or two environmentalists' imaginations.

AT THE EUROPEAN REGIONAL MEETING OF THE TRILATERAL COMMISSION, Savoy Hotel, London, 27th October, 1989.

I am delighted that an institution like the Trilateral Commission finds it timely to set up a Task-Force to work on the interdependence between the World's Economy and the Earth's Ecology. In the past 12 months, the protection of the environment has joined management of the global economy and national security in that rarefied zone where national leaders see themselves as the principal actors. We have witnessed the emergence of a green geopolitics.

But the time for fine words alone is over. There is already a risk of disenchantment that the concern for the environment expressed by Western industrialists and politicians remains unmatched by any specific commitment to assist in achieving a more sustainable form of development.

Earlier this year I was asked to speak at the International Ozone Conference here in London, and I warmly commended the Montreal Protocol as a precedent-setting, uniquely important international initiative. In June next year, here in London, the Montreal Protocol will be renegotiated. At that time, there will have to be specific, comprehensive and generous proposals from the developed world, not just to persuade Third World countries to sign up to the Protocol, but to persuade them to cut back far more dramatically than the Protocol currently stipulates.

I wonder how many of us, even now, really understand the gravity of this situation? The United States Environmental Protection Agency has calculated that even with 100 per cent compliance with the Protocol, chlorine levels will still increase in the upper atmosphere by a factor of three by the year 2075.

Grow we must, as the report of the Trilateral Commission says, but not at the expense of the finite limits of this planet, not without changing the inadequate way of measuring growth on which we currently depend. Growth is not wicked, as some green fundamentalists would have us believe. But economic growth surely is not an end in itself, rather a means to an end.

We must not adopt unobtainable targets for growth, uncritically, or we shall programme ourselves into failure while deluding ourselves that we have the blueprint for success. There is not much possibility of a five-to-ten-fold increase in growth on the pattern that is being pursued in the developed countries today. If we are to have an increase in growth it has to be of a new kind, and this will obviously impose immense strains of adaptation. Sustainable development means simply doing things in such a way that one can go on doing them infinitely.

The Trilateral Commission's Task Force rightly emphasises that we need new economic tools. The fact is that many of our existing ones are damaging to the environment, because of the way in which they place negligible value on the natural resources of the earth, and adopt discounting practices which imply that resources have no value 30 years or so from now. Both these assumptions are absurd. There are many examples of the very high, true economic value of what are commonly treated as 'free goods', and it is no less absurd to discount

economic values to zero in a few decades time.

I think we all now recognise, at least I hope so, that the logging of a tropical forest, for instance, leaving soils bare to erosion and hardening may produce yields of the order of $150 to perhaps $300 a hectare. But the sustainable use of such forests, extracting mature trees with care through local labour, harvesting nuts, other fruits and medicinal plants, and harvesting the protein that those forests support, can produce comparable yields, but on an *annual* rather than a once-and-for-all basis and which accrues to the benefit of those on the ground rather than distant concessionaries. There is no particular magic to this. It reflects the basic distinction between using up our capital and drawing the interest off that capital.

The same common sense should apply when dealing with the natural capital of this planet Earth as with any business enterprise.

The countries that became 'developed' soonest as a result of their industrial revolutions were surely responding with natural human excitement to the immense possibilities unleashed by the march of science and technology. The possibilities seemed unlimited in those days, the natural resources apparently infinite. Anybody, I would suggest, would have done the same, whichever part of the world they came from so there is no point in apportioning blame. However, now that we have discovered and finally accepted the wasteful and potentially dangerous consequences of the unchecked exploitation of our natural wealth, we in the developed world have, I think, a duty to use our ingenuity to help rectify the situation for others whose aspirations lie in further development.

That is the sort of real grass-roots economic issue we need to address, and I am glad to see that the Task Force recognises that the environmental crisis means that we have to transcend our traditional approach to problems. We can no longer isolate the issues one from another. Environmental questions in that sense are truly inter-sectorial within states and between states. Ministries of the Environment are obviously very welcome. Their establishment recognises the problems that have to be tackled.

But the problems now go well beyond the immediate purview of such ministries. Ministries of Industry, Transport, Energy and others are themselves also now the guardians of nations' 'natural capital'. Countries need to evaluate their overall development plans against the yardstick of the care of the country's natural capital, in the same way in which ministers review annually national economic plans. It is still unheard of, for instance, for an Environment Minister to present an annual environment budget, or for Environment Departments to have the authority to question the spending plans of all Departments of State because of their impact on the natural capital of the country and the long-term well-being of its inhabitants.

However, many people may begin to argue that is the only approach which will indeed produce a sounder pathway of sustainable development for the future.

But just as the problems recognise no boundaries, so too will the solutions require international co-operation on a scale not previously attained. I do not need to tell all of you that there is perhaps no other issue which has such an ability to mobilise our common efforts to a common purpose across all of the differences of wealth, belief, history or experience which divide us.

We are, however, not so much short of ideas for solutions as we are of the political will and international mechanisms for implementing them. This is where, it seems to me, the role of the Trilateral Commission is so important. You have to try to find an answer to the crucial question in your report – what is the nature of the global bargain that must be struck if the world is to achieve sustainable development? Whatever it is, it surely cannot be obtained at a cheap price – and that is the highly awkward question which must give politicians sleepless nights!

The composition of the Trilateral Commission also inevitably encourages me to refer to the debt problem. Third World leaders now look to us in Europe, the United States and Japan, to help find a lasting solution to the problem of international debt.

The continuing net flow of resources from South to North (brought about largely by debt repayments) causes deep anxiety to all concerned people in the North. In the South it causes untold economic hardship and also the progressive degradation of crucial life-support systems as many countries seek, with increasing desperation, to convert their natural wealth into export-oriented commodities to service their unrepayable debts.

But even a challenge as grave as this provides new opportunities for international co-operation. Surely it is not beyond the wit of bankers and politicians, as part of this new global bargain, to devise a scheme whereby debt relief is tied to the long-term protection and rehabilitation of the debtor country's natural wealth and assets.

This issue will no doubt arise at next May's gathering in Bergen to discuss the follow-up to the Brundtland report. This is when the rest of the world will look for signs of how seriously we actually take the environment.

If the industrial world does not appear willing to make significant changes itself to protect the global environment, then it is difficult to see why those in the developing countries should feel under any pressure at all to strike a global bargain. Therefore, a failure in Bergen would obviously be a bad omen.

Confronted by such problems it would be easy, and I certainly find it is sometimes, to relapse into inactive gloom. Western civilisation – the civilisation that was born in the Mediterranean and cradled in Europe – transformed the whole world. The irresistible power of its science and technology, the glamour of its ideas – have penetrated every corner of the earth.

The great genie that was let out of the bottle in the 18th century, which we call the European 'Enlightenment' (but which I sometimes think might more accurately be called the 'Endarkenment') unleashed on the world the idea that through science nature could not only be manipulated but also dominated. And the 'Enlightenment' brought to the world not only the promise of accelerating scientific progress but the idea of 'progress' itself as an ideal.

Man came to believe that nature was basically understandable and rational. The old primacy of the laws of God was abandoned in favour of a view of life that saw the world as a great machine that could be tinkered with and exploited at will. And man forgot, I think, that he too is part of nature; like the animals he was formed 'of the dust of the ground'. And furthermore, we ignored the reminder of the Epistle to the Corinthians that accounted us all 'stewards of the mysteries of God'.

It troubles me when I go to, say, the East and the Middle East and see how the legacy of the West has imposed upon ancient civilisations a monstrous and inappropriate superstructure which, technologically as well as culturally, is utterly inappropriate. If great towers of glass and concrete should be built anywhere, it should not be in temperatures of over 100 degrees Fahrenheit where colossal expenditure of natural resources is required to keep them cool.

Recognition, therefore, of our responsibility of stewardship, and I stress the word 'stewardship' – because I think it is important to review that concept again – for our natural inheritance, for those who come after us, extends beyond the management of natural resources.

We also need a radical change in our attitude to the responsibilities we have to the peoples of the world, in whom we, the West, awakened the desires and hungers we now may wish to deny.

It may still not be impossible to persuade the people of the Western, developed nations that in order to avoid environmental catastrophe, adjustments and changes should be made.

But try telling a subsistence farmer in Venezuela, Cambodia or Ethiopia that he has to consume less, eat and drink less, expect less, even than he and his family already have. We can hardly expect the poor of the earth to pay

much attention to our calls for population control and controlled use of resources when the citizens of the developed world consume on a scale of luxury that the aspiring millions can only glimpse in the advertising we beam at them.

If we ourselves now accept that new definitions of 'growth' and 'progress' are vital, they must include a willingness to learn from the traditional values of communities once despised as 'unprogressive'. The solutions to the problems created in the large part by the West will come, I believe, not just from the West. Such communities can certainly instruct 'us' on the road down which we now both have to travel.

It has just recently become fashionable to declare that 'history is over'. But in the challenge we confront today I look back to one 'enlightenment' idea – of which I think most people would approve – the conviction that problems *are* soluble. It is now for Europe to act with imagination, a firmness of political will, a generosity of understanding of what is fair and just on this earth, and with a reappraisal of those timeless values which have been rashly discarded in the rush for 'progress'. That presents European civilisation with what may be its greatest challenge yet.

THE RAINFOREST LECTURE, Royal Botanic Gardens, Kew, 6th February, 1990.

I must confess that in the course of preparing this lecture I have been overwhelmed by a powerful feeling that there is nothing new to be said about the tropical forests (of which the rainforests are the most rare and precious examples). So many people far wiser and more experienced than me seem to have said it all. Apart from that, the more carefully you examine the subject the more complex the issues become, and the more disturbing the ramifications. What brief experience – and it is very brief, I must say – I have had of a genuine tropical forest environment in Venezuela and, to a certain extent, in Indonesia has merely served to encourage me to do what little I can to draw further attention to their precarious state, and to the unimaginable loss to mankind in general if we are unable, or unwilling, to reach agreement on a series of reasonable measures needed to halt the inexorable destruction now taking place.

For those courageous and far-sighted people who have been trying to warn us about environmental problems for longer than we care to remember, one of the most heartening developments of recent years has been to find that rather a lot of people now think the same way. People who have never been lucky enough to experience for themselves the extraordinary beauty of the forest, with its unique sights, smells and noises, now care deeply about what is happening. Such is the power of the media when they switch their undivided attention to the 'latest issue'.

Now I suspect there are many different reasons for this powerful response. Those remarkable natural history films which reveal some of the mystery and vast diversity of the rainforest undoubtedly play an important part, but I suspect there is also a growing realisation that we are literally the last generation which can save the rainforest from total destruction. If we don't act now there certainly won't be much rainforest for our children to be concerned about, and unless we are remarkably insensitive, most of us, I think, *do* care a great deal about the kind of world that we bequeath to our children. The trouble is, I suspect, that most of us feel frustrated and powerless to affect the course of events.

Perhaps we should imagine the situation as being like one of those church spire appeals in reverse. Except that instead of the figures going up, the forests are coming down. Once a rainforest or a species living in it is gone, it is gone for ever. The phrase 'now or never' has never been used with more chilling accuracy than when applied to the task of saving the remaining rainforests.

Before starting to look at some of the interlocking factors which are leading to the current devastation of an irreplaceable natural resource, I believe it is important to recognise the legitimacy and even reasonableness of other points of view. Before we place the blame for environmental deterioration on developing countries, we must ask ourselves in how many cases the process of deterioration was started by the actions of individuals and companies from the industrialised nations of the world. We should also recognise the extent to which underdevelopment and poverty account for the inability of the developing countries to husband their natural resources, and to undertake environmental efforts and measures.

Eight years ago the then Vice President of Indonesia put the case with brutal clarity: 'How much land for the hungry of today? And how much for genetic resources to be preserved for tomorrow? In the past we have neither received a fair share of the benefits, nor have we received a fair share of assistance – other than inexpensive advice and even more inexpensive criticism – in our efforts to save the common global natural heritage. Unless such responsibilities are equally shared, all our good intentions will only lead to global environmental destruction.'

Things may be a little better today, but as we sit surrounded by the comfort and convenience of modern European life, perhaps our response to the problem of the tropical forests should be not so much, 'What can we do?' but, 'How can we help?'

For hundreds of years the industrialised nations of the world have exploited, some might say plundered, the tropical forests for their natural wealth. The time has now come to put something back, and as quickly as possible.

When we talk about the tropical forests we are speaking of the natural assets of other countries. Showing our anxiety about their problems must be done in a way which shows respect for their sovereignty, and an understanding of their needs. We must also examine our own consciences. We talk about the need to avoid irreversible damage to fragile habitats, and the requirement to guard shrinking non-renewable resources. But what about the wrong sort of afforestation in the Flow Country of Scotland, for instance, and large scale, highly mechanised peat extraction? If any exploitation is to be carried out at all then surely it should be done in a more traditional way, rather than utilising such utterly inappropriate methods.

It seems to me important that any discussion about the tropical forests should start by looking at the people who depend directly on them for their livelihood. This includes both indigenous people and relatively recent settlers, but the main focus of concern must be on the remaining tribal people for whom the tropical forest has been home for many generations. Their story has been told many times, and it is one of which we must all be profoundly ashamed.

Ever since the first explorers from Spain and Portugal set foot in South America, and the British visited the Caribbean, the people of the so-called 'developed world' have always treated tribal people as total savages, be it to enslave them, subdue them, 'civilise' them, or convert them to our way of religious thinking. The latter activity seems to be remarkably widespread and can cause unimaginable confusion and suffering. Even now, as the Penan in Sarawak are harassed and even imprisoned for defending their own tribal lands, and the Yanomami in Brazil are driven into extinction by measles, venereal disease or mercury poisoning, following the illegal invasion of their lands by gold prospectors – even now, that dreadful pattern of collective genocide continues.

It is not just those who depend directly on the tropical forests who suffer from deforestation, but the entire population of tropical forest countries. The forests assist in the regulation of local climate patterns, protecting watersheds, preventing floods, guaranteeing and controlling huge flows of life-giving water. Strip away the forests and there is, first, too much water (in the shape of uncontrollable flooding, as we have seen recently in Brazil and many other countries) and then too little. As the forests come

crashing down, an inexorable human tragedy is set in train.

It isn't even just the tropical forest countries which are affected by deforestation. The more we learn about our world the more we realise that events in one area can have enormous, and perhaps irreversible, consequences thousands of miles away.

It is not, I believe, an exaggeration to say that the whole of humanity will benefit if what is left of the tropical forests can be saved. Their role in controlling aspects of our climate is so great that they can truthfully be said to affect every single person alive today, let alone future generations. Scientists may disagree about the extent of the phenomenon known as 'global warming', but few now actually doubt its existence, or the role of the tropical forests in maintaining the natural balance of our planet.

At the same time, other scientists are stressing the value of the genetic potential locked up in the tropical forests. Pictures from further and further into space have made people wonder, rather more seriously than ever before, whether there really is somewhere else for us to go if we finally make a complete and utter mess of this planet. The genetic reservoir of the plant and animal life sharing our world provides us with the most perfect survival kit imaginable as we face the unknown challenges of the future. It is impossible to predict which parts of that survival kit might one day be needed, yet we allow its contents to be discarded with scarcely a thought or a backward glance.

The current loss of species is quite different from the usual (and more or less natural) pattern of extinctions, even since that pattern has been accelerated by humans over the last 200 years. To quote from the World Resources Institute's report on bio-diversity in October 1989: 'If we don't act immediately, extinctions in the coming decades may represent the most massive loss of species since the end of the Cretaceous Era, some 65 million years ago. And the single greatest cause of species extinction in the next half-century will be tropical deforestation. Scientists concur that roughly five to ten per cent of closed tropical forest species will become extinct *per decade* at current rates of tropical forest loss and disturbance. With more than 50 per cent of species in closed tropical forest, and a total of roughly ten million species on earth, this amounts to the phenomenal extinction rate of more than 100 species per day.'

Now it's almost impossible to hold such a figure in one's mind and to contemplate the consequences of such biological mayhem. Perhaps just two examples will help to illustrate the value to *our* species of the genetic potential available in the tropical forests, though I know that Professor Ghillean Prance and others who work in this field could provide many many more. A plant known as Jaborandi is found in eastern Amazonian Brazil. It contains the chemical pilocarpine, which is now used to treat glaucoma and has saved thousands of people from blindness. The Moreton Bay Chestnut, from the rainforests of Queensland, contains castanospermine, which is now being tested on humans for its positive action on Aids. Indeed the original research for this was carried out in the biochemistry department of this laboratory.

Thousands of plants have already been tested for their anti-cancer properties, but only an insignificant number have been systematically tested for a comprehensive range of other properties and benefits. By just testing for anti-cancer effects, important though they are, we may be missing a whole range of other benefits.

If we could invest more in plant screening now, there is no doubt that one day it would pay off. It isn't just a question of drugs. There is huge agricultural potential wrapped up in the forests. It is quite revealing that products which we take for granted, such as coffee, chocolate, citrus fruit, sugar, tomatoes, and even rice and potatoes, all originated in tropical countries. We now spend millions of pounds on 'improving' these foods – trying to make them sweeter, more colourful, or tastier. Perhaps that investment might be better applied to pursuing new products from the tropical forests? For instance, a profusion of tropical forest fruits holds out great hope for palates which have been progressively jaded by exposure to a monotonous diet, I hardly dare say it, of imported Golden Delicious!

Nor is it only for new, tastier, healthier foods that we should look to the tropical forests. Our current staple food crops are continuously bolstered and invigorated by genes from their wild relatives. Recently, genes from wild rice helped to combat a new disease which was threatening to wipe out much of Asia's rice crop. As it happened, that crop-saving plant was found in the Silent Valley forest in India, which itself was only saved by the intervention of the kind of environmental activists whose activities are so often derided by those who do not share their single-minded commitment.

It really does seem extraordinary that we should be destroying our genetic inheritance at precisely the time when we most need it, and at a time when advances in science and technology are providing incredibly precise and sophisticated tools to open up some of nature's secrets – to the benefit of medicine, nutrition and industry. What possible justification can there be for systematically stripping future generations of their options – in a way that defies even conventional economic logic?

I read the latest information on current levels of tropical forest destruction, be it from the Overseas Development Administration or Friends of the Earth, with a sinking heart. Have you noticed how people devise cheery little comparisons as to the acreages involved, which perhaps only serve to obscure the extent of the devastation: an area two thirds of the size of the United Kingdom is destroyed every year, which is, I'm reliably informed, equivalent to seven Hyde Parks every hour, or six football pitches every minute!

But of course, this is not some abstract statistical game. The latest report by Professor Norman Myers spells out very clearly what is actually happening: 'According to the latest estimates, Tropical Forests have lost 142,200 square kilometres of their expanse during 1989. This is 1.8 per cent of remaining forest.' He goes on to say: 'The current rate of 1.8 per cent per year does not mean that all remaining forests will disappear in another 38 years. Patterns and trends of deforestation are far from even. In South East Asia it is likely that little forest will remain in another 20 years' time outside of central Kalimantan and Irian Jaya in Indonesia, and Papua New Guinea. In West Africa, except for Cameroon, hardly any forests will survive by the end of the century, but in the Zaire Basin there is a prospect that a sizeable tract could persist for several more decades. In Latin America, it's difficult to see that much forest can last beyond another two decades except for an extensive block in western Brazilian Amazonia and one in the Guyana hinterland.'

The causes of this deforestation vary from region to region; but there is no doubt that the main cause is the poverty of people who live around the tropical forests in developing countries, together with the inexorable pressure of ever-growing human numbers. Over two billion people live in the tropical forest zone. Population is growing at over 2.5 per cent a year. For these people, the forest is a resource for exploitation in order to meet basic needs, above all land for agriculture.

While the commercial logger and the cattle rancher do cause much forest depletion, often with the encouragement of tax incentives or other government subsidies, their combined impact is only a part of that of the 'shifted' cultivator. He is the displaced peasant who finds himself squeezed out of traditional farmlands in areas often many horizons away from his country's forests, whereupon he feels obliged to pick up his machete and matchbox and head for the only unoccupied lands available, the forests.

Land clearance for agriculture is almost always carried out by the 'cut and burn' method which leads to much increased emissions of greenhouse gases. Dr Richard Houghton of the Woods Hole Research Centre in Massachusetts,

estimates that somewhere around 1.4 billion tons of carbon dioxide is released in this way each year. And when we add in other greenhouse gases emitted by tropical deforestation, such as methane and nitrous oxide, the overall contribution to global warming can be estimated to be around 18 or 19 per cent.

With deforestation now on every politician's lips, one would certainly like to think that we might have arrived at some solution already. Two new international organisations (the International Tropical Timber Organisation and the Tropical Forestry Action Plan) have been established in the past eight years to address forestry problems. But deforestation has actually increased massively during the time that these institutions have been at work.

The International Tropical Timber Organisation has a unique role in bringing together consumers and producers of tropical timber. It should have a key role in the development of agreed guidelines on how forests are to be used in a sustainable way, though I understand this is proving to be a formidable task. I am also amongst those people who find it disturbing that its Articles of Agreement make no mention of the rights and needs of indigenous forest dwellers.

Under the Tropical Forestry Action Plan, donors can help developing countries draw up a national plan of action, and then provide the technical and financial help needed to implement the plan. But to be properly effective, a national plan has to pay sufficient attention to the needs, the skills and the knowledge of local communities and forest people.

Clearly, we should deploy both these organisations to the full, and aim to make them as effective as possible, but they have not shown much inclination to look beyond the forestry sector. Since there are many situations in which the best use of forests may actually be for non-timber products, and since much of the pressure on the forests arises from social and agricultural policies way beyond the forests, there would seem to be an overwhelming case for a much broader, multi-disciplinary approach.

Perhaps, the time has come for an international agreement or convention on the world's tropical forests. We already have a series of conventions and protocols which protect the marine environment, the ozone layer and the atmosphere, with varying degrees of effectiveness, yet for our most precious common resource we have nothing.

Any such convention would have to start by recognising both the urgency of the situation, and the need for parallel action by the industrialised nations to reduce their carbon dioxide emissions from fossil fuel power stations and transport. Another talking shop will help no one, and participation could become an alternative to action. It seems to me that the goals of a separate Rainforest Convention would be as follows:

- to establish a rationale for sustainable use
- to maintain ecological and physical processes essential to the maintenance of local, regional and global climates
- to maintain maximum biological diversity
- to establish the fundamental rights of forest dwellers
- to set targets for re-afforestation
- to establish mechanisms of compensation for countries that suffer financial loss by controlling destruction of their forests
- to establish funding mechanisms to meet the cost of such compensation.

Now this is clearly a massive challenge, but it seems to me that we cannot simply go on talking about the need to protect the world's tropical forests, and not create the kind of institutions and mechanisms which will actually make that possible. It is obvious that nothing we currently have at our disposal is going to fulfil that task. The sands of time in the tropical hourglass are running out fast, and we can't turn it upside down and watch the sand run out all over again.

Even to start addressing the issues involved will mean harnessing the economic muscle of the developed world. To demonstrate the scale of the problem it would be useful to look at the prospects for stemming the flow of shifted cultivators towards the forests, since their activities are the principal cause of deforestation. Sadly, all the indications are that, far from stemming the flow, three factors are likely to lead to a considerable increase. Firstly, tropical forest countries will provide the bulk of population growth in the foreseeable future. At current rates that is an extra three billion people in the next 40 years. Secondly, alternative forms of livelihood for the landless peasant are becoming still more limited by unemployment. Developing countries need to generate 600 million jobs (or as many as all the jobs in the developed world today) during the next 20 years in order to accommodate all new entrants into the work force. Thirdly, there is a diminishing prospect of tropical forest countries directing enough capital investment into job-producing sectors as long as the net flow of North-South funds remains as it is. In 1989 the South paid $52 billion more to the North in the way of debt servicing than it received in the form of foreign aid and other payments. It is problems on this immense scale which any new institution would have to tackle.

Many of us care about the tropical forests simply for their intrinsic value and their long-term importance to mankind, but the situation looks very different when seen from the point of view of a developing country grappling with the problems of poverty, unemployment and the remorseless pressure to meet interest payments on loans from the developed world. It is not surprising that their overriding requirement is to derive income from their forests.

We hear much these days about the need for 'sustainable development', but its many different uses still seem to cover a multitude of ecological sins! Fritz Schumacher seemed to explain a difficult concept best by simply extending the widely understood distinction between one's capital and the interest one draws on that capital, in a financial or banking context, to the natural world. The distinction between a forest cleared in a once-and-for-all way for timber or for cattle grazing, and a forest harvested sustainably for a variety of non-timber products, can then be calculated down to the last dollar.

Once the forests are thought to hold a greater hope for human welfare and economic development if conserved, rather than felled, then it clearly becomes possible to reconcile environmental protection and development. It's not a question of promoting some pastoralist ideal as opposed to unfettered economic progress; but of trying to cope as best we can with the age-old conflict between our human needs and the finite wealth of this particular planet.

Now that's easily said, but as I discovered on a recent visit to Indonesia, forestry management practices, as introduced and institutionalised by European colonists, were focused only on forest exploitation (often based on government monopolies). This was also reflected in the type of forestry training that was provided in those days. Many developing countries still have no developed traditions of forestry management other than obtaining the maximum income in the shortest time.

The majority of developing countries first obtained a level of economic viability as suppliers of natural products for immediate consumption (such as fruit, coffee and tea) and for raw material for European industries (such as rubber). This level was adequate for the pre-independence, colonial period with its slow rate of growth, slow development and emancipation. These products require little or no processing and in their exploitation very little 'added value' can be generated. Moreover, such products are so-called 'soft products' and very sensitive to price fluctuations on markets which, in any case, are controlled by the richer, purchasing countries.

Developing countries would be considerably helped if such price fluctuations could be stabilised as much as possible. They would be helped even more if they could process – fully or partially – their natural products. In this way, a given and sustainable level of forest exploitation could yield the needed income.

The determination of what constitutes a sustainable level of forest exploitation requires good science and a thorough understanding of the social and economic context. This country has a long experience and exceptional expertise in tropical forestry. I believe that we have a valuable contribution to make. There is a role for everybody, from government agencies to universities, schools, the NGOs who work in developing countries, and the technical organisations like the Royal Botanic Gardens. From this point of view we need to harbour the skilled human resources in our long-standing and world-renounced research organisation.

In the autumn of 1988 the government decided to provide more help to developing countries with their forestry projects. An initiative was launched under the aid programme run by the Overseas Development Administration. The aims included helping developing countries maximise the social and economic benefits they get from their forests in the long-term; tackling the causes of deforestation and promoting reforestation, especially on degraded lands; increasing the productivity of forests through research; and helping conserve the vast bank of plant and animal species that are housed in forests.

At the end of 1988, the ODA was supporting about 80 forestry projects, with a total value of about £45 million. Now there are about 115 projects, with another 50 in preparation, worth in total over £150 million.

As part of the forestry initiative, the ODA has signed a special agreement for technical co-operation with Brazil. Under that agreement, eight projects are now being worked up, including one for the establishment of a biological reserve in Cachiuna national forest, and one researching the relationship between rainforest and local climate. The projects involve collaboration between British Centres of Excellence, including Kew Gardens, and their Brazilian counterparts. It seems to me that this sort of partnership provides an excellent model of the kind of co-operation that is needed between developed and developing countries.

What discussions I have been able to have, albeit very briefly, with forestry experts in Indonesia and elsewhere have inevitably led to the conclusion that timber extraction is almost always unsustainable, so great is the damage done even when the logging is carried out as selectively and sensitively as possible. That has been confirmed by the International Tropical Timber Organisation itself, as well as by the International Institute for Environment and Development's fascinating but depressing study on the true extent of sustainable management being carried out in different parts of the world.

But are we not in a position to take that conclusion even further these days? Even if countries were able to implement management systems which did not irreversibly reduce the potential of the forest to produce marketable timber on a sustainable basis, that might still not be the best use of the forest. The highest yielding systems of sustainable timber production still require quite drastic modifications of a forest's ecology, eventually reducing the forest to a shadow of its former richness and diversity. We're really talking about plantations by any other name.

At this stage, with the tropical forests at such risk, it would seem to me to be eminently sensible to work towards the restriction of timber extraction to secondary forest – to those forests which have already been logged over. We could then look towards future timber needs being met from hardwood plantations established on the vast area of already degraded land.

The potential here is huge, and one need look no further than to the threat of global warming to provide the incentive. It is already apparent that one of the best ways of countering the build up of carbon dioxide in the atmosphere is through reforestation. By far the best place, surely, to grow trees is in the humid tropics, with their year-round warmth and moisture, and it surely has to be in the interests of both the tropical forest countries and the developed world to promote such reforestation schemes as enthusiastically as possible.

But in a world so remorselessly driven by monetary values, one has to be able to demonstrate that sustainable harvesting produces a better financial return than a once-and-for-all clear fell. I have seen various studies demonstrating that fruit and latex harvesting come out well ahead of clear felling for timber purposes or cattle ranching, and I believe that this financial advantage would be further reinforced if the potential market for medicinal plants and other non-timber forest products was to be increased. The work of the Royal Botanic Gardens, Kew in this respect is enormously important.

From all this reading, I am afraid I emerge somewhat baffled as to why so many politicians and economists seem to find it difficult to see the wood for the trees! If conventional economics, let alone common sense or even native wit, bears out the hypothesis that sustainable utilisation makes more sense than outright destruction, what further objections could possibly be raised?

One problem is the different markets towards which the different products are directed. The demand for tropical hardwoods is international, earning valuable foreign exchange, whereas the demand for non-timber products is often more regional and local, and thus less important in national economic accounting.

In trying to assess what is possible, and, more importantly, what is sensible in the tropical forests, we need to find out what Nature will allow, and work within those limitations. The story of Henry Ford's 'Fordlandia' in Brazil is cautionary, I think. Here the single-minded energy of American industry, aided by a welter of concessions from the Brazilian government, was unable to establish a viable rubber plantation, because of an oversight concerning some very basic laws of nature.

In 1927, Ford took control of what was described as 'a fertile rolling plateau, forested with tall and lovely trees'. By 1929 he had cleared nearly 1,500 acres, but the project failed because the seedlings would not thrive. The main problem was that the Hevea brasiliensis, whose sap provides the raw material for rubber, was attacked by a leaf rust fungus. This is not a serious problem when the trees are grown singly in the jungle, but spreads with devastating effect when they are planted as a monoculture.

This story underlines what I believe to be a crucial factor in our approach to the rainforests or, indeed, to the many environmental challenges the world faces. And that is the importance of working with indigenous tribal peoples, and respecting them for their all-embracing knowledge and experience of the forest. Generations of observation and bodily trial and error have honed their judgement in a process as rigorous as any laboratory testing. As a result, local people often have keener insights into the intricately balanced harmony of the forests, and how simultaneously to exploit and sustain that harmony, than do the peripatetic experts. Yet local communities have too often been ignored. We must systematically, I would suggest, bring them into efforts to safeguard the forest, right from the start of the planning process. Quite apart from their knowledge of their environment, forestry is critically dependent on the goodwill of local people. Who else is to plant the trees, and then keep the goats, or whatever, away from the seedlings?

Studies of Indian communities in Brazil and Venezuela show that they make use of up to 78 per cent of the tree species in the forests concerned – and with as many as 300 species of trees in an area a quarter of the size of a football pitch, this is no mean feat. To the Shuar Indians of Ecuador, the forest is a natural pharmacy – they know of 250 separate medicinal plants. The same kind of astonishingly diverse use of tropical forest species can be seen in their agricultural practices, even when dealing with varieties of staple crops such as manioc. The idea of one tribe (the Tukano Indians of the Upper Rio Negro in the Amazon) having access to no fewer than 140 varieties of manioc makes our dependence on a mere handful of staple

crops look extremely primitive by comparison!

These people are accomplished environmental scientists, and for *us* to call *them* 'primitive' is both perverse and patronising.

Professor Prance and his colleagues have done much to point out both the importance and the value of the astonishing diversity within the tropical forests. The evolutionary idiocy of eliminating that diversity, and replacing it with short-lived monocultures of cash crops or grassland, exemplifies the arrogance of the West in its dealings with the natural world. But how encouraging that botanists and biologists are now in the forefront of international efforts to promote the idea of extractive reserves.

It will, of course, be a major challenge to scientists, foresters and governments to stimulate the marketing and development of these non-destructive, renewable resources. It must be done in such a way that the benefits and profits accrue fairly to the local forest communities, and to the producer country economies. Commercialisation of non-timber products could all too easily lead to pressure to over-exploit the extractive reserves, and to disruption and intrusion on local cultures and land rights.

But there are good signs that this *can* be made to work. In Brazil, rubber tappers and Indians have overcome their history of conflict to recognise their common interests, and have signed a pact called the Forest Peoples' Alliance which focuses on defending the forests and the land rights of forest peoples. Extending the Forest Peoples' Alliance, to other forest groups and rural communities may well be the greatest hope for the rainforests of the Amazon.

Such initiatives will have a much harder time of it unless they are supported by their governments. I have recently seen the fascinating report by Peter Bunyard on the policies of the Colombian Government for the protection of its indigenous peoples, and see this as an encouraging beacon of hope and light in an otherwise rather gloomy scene.

The Colombian Government has had the courage to recognise that the Indian model of managing the forests has ensured the conservation of those eco-systems for many hundreds of years. It has therefore initiated a systematic programme of legal recognition of land rights for all the indigenous communities in the Amazon. To date, more than 12 million hectares have been handed back to 156,000 indigenous people of the Colombian Amazon. The land is held as the collective property of the Indians, and is inalienable. Another six million hectares are now under consideration, which would bring the total area to something larger than the United Kingdom. They have also created national parks in the Amazon Region totalling more than five million hectares.

The Colombian Government is deserving, I would have said, of considerable international recognition for this bold step, together with our hopes and prayers that these policies will be continued.

On a smaller scale, but no less welcome in principle, the Brazilian Government has just decided to establish its first 'extractive reserve'. This sets aside 2,000 square miles for 'sustainable exploitation by the traditional inhabitants'. As the most ambitious project of this type yet conceived for the Brazilian Amazon, and the first to carry legal recognition, this is obviously a very significant step in the right direction, particularly since the area concerned is one of Amazonia's greatest centres of biological diversity.

If the process of setting up national parks, ecological reserves and other conservation areas is to continue it will be essential for the governments concerned to know which areas are most in need of protection. A meeting called 'Workshop 90', held in the Amazon city of Manaus, Brazil, last month contributed significantly to this process. Almost 100 biologists, physical scientists, ecologists and conservation planners (of whom more than half came from the nine Amazon countries) spent ten days pooling their knowledge and drawing up maps and back-up material. The final map produced covered about 60 per cent of the Amazon region, and it is encouraging to know that most of the areas of maximum biological diversity are still largely intact, though the need for rapid action is underlined by the fact that many are under threat.

I would like to add a few thoughts on what we can perhaps do to help the tropical forest countries to pursue policies that will achieve the ends that I think most of us seek.

In this country we can avoid purchasing tropical hardwood products unless we are satisfied that they come from 'sustainably managed forests' – but how exactly we can be satisfied on that score without a proper labelling scheme, I simply can't imagine! The UK Government has, of course, accepted the logic of this, and backed such a proposal at the last meeting of the ITTO. Failing such a scheme, a cautious consumer is almost certainly going to be more inclined to avoid tropical hardwoods altogether rather than risk contributing to their unnecessary demise. As far as I am concerned, I believe in taking as long-term a view as possible and have in fact begun to plant a few hardwood plantations here, consisting of trees that will provide suitable timber for furniture-making in around 70 years' time.

The obligations for planners, architects and local authorities are particularly important in this respect. It is clear that with a little ingenuity, in terms of the materials specified for any contract, the built environment can be designed to minimise the use of tropical hardwoods by using suitable alternatives – at least until a proper labelling system for sustainably grown wood has been implemented.

Most important of all, we have to find a way of doing something about the burden of international debt. I really don't see how developing countries can be expected to achieve sustainable development and at the same time meet huge debt repayments. Equally, when the nations of the developed world do provide aid, they have a right to expect proper auditing and monitoring procedures, to ensure that the money is spent wisely.

It is clear that the political and economic challenge of protecting the world's remaining tropical forest is enormous, but I suspect it goes even further than that, for the intellectual tools we are using, and the blueprints we are drawing up, may still be flawed and corrupted by the kind of arrogance to which I have already referred.

There is more – far more – to be learned from the indigenous forest-dwellers than how to make use of 140 varieties of manioc! At one level, sustainable management of this kind fits very easily with today's prevailing utilitarian ethic; as such, it implies little more than simply learning how to manage our natural resources more efficiently and cost-effectively.

But that is very different from the spirit in which the tribal Indians 'manage' their natural world. It is important neither to patronise nor romanticise tribal people, but the intimacy, respect and reverence which characterise their relationships with the tropical forests, mark out their concept of stewardship as being quite different from ours. Environmentalists today tend to talk of sustainable development and stewardship as if they were one and the same thing, but the degree of similarity depends entirely on the frame of mind of the stewards involved!

I fear that we will fail this particular challenge if we are not prepared to accept that sustainable development demands not just a range of different management techniques and funding mechanisms, but a different attitude to the Earth and a less arrogant, Man-centred philosophy. We need to develop a reverence for the natural world. One can imagine the situation in which some might be inclined just to hoover up the scientific knowledge of the Rainforest Indians, reduce that knowledge to our own money-making utilitarian calculus, create scores of new exotic products (such as 140 varieties of manioc muesli!), develop thrusting new profit centres out of the tropical forest genetic treasure chest, and then simply move on in the same old empty, mindless way.

Perhaps we should try to emulate the North American Indian Communities who have always

planned their actions, concerning the use of Nature, plantings and land use, by giving thought to the effect they will have on the seventh unborn generation. What a difference it would make if we thought about the effect our actions would have on the welfare of our great-great-great-great-great-grandchildren!

I believe the tropical forests, and the tropical rainforests in particular, are the final frontier for humankind in more ways than one. Our efforts to protect them will not only determine the quality of life and economic security of future generations, but will test to the limit our readiness to cast off the kind of arrogance that has caused such devastating damage to the global environment, and to become the genuine stewards of *all* life on Earth, not just the human bit of it.

FILMED FOR THE LAUNCH OF THE ROYAL SOCIETY FOR NATURE CONSERVATION'S REPORT 'NATURE CONSERVATION: THE HEALTH OF THE UK', 25th October, 1990.

In the last couple of years there has been, I believe, a dramatic increase in the number of people who genuinely accept the ancient concept that mankind has a responsibility for the stewardship of the Earth, and must carry out this duty with an eye to the welfare of future generations, as well as our own. For those of us who have been endlessly trying to emphasise this point for the last 20 years or so, this is a most welcome development, but the challenge now is to accept that the first battle has been won and turn our minds to the next, rather different, challenge, which is to turn this new consensus into positive and rapid action.

The trouble is that there are so many areas in need of attention. Where do we start?

The funds and expertise available are not unlimited, and in some cases time appears to be running out. What are our priorities?

Many of the problems are complex and require a multi-disciplinary approach. Where do we turn for advice?

Of course, a great many of the so-called 'green groups' have plenty of ideas, and are expert at getting their arguments across – vigorously, and with great lobbying skill. But today it is the turn of the Royal Society for Nature Conservation – The Wildlife Trusts Partnership (to give it its full, if slightly unwieldy, title) to make what I believe to be a most significant contribution to the debate. Their report looks at all the various environmental threats – and it is a daunting list – from the specific viewpoint of their impact on our wildlife heritage. The central argument is that Nature is the pulse of the environment; that the ultimate test of our stewardship is the state of the natural world. We have all become perhaps rather too adept at applying this test to other countries without always recognising that some of them have problems, to which we have contributed, on a scale that we can scarcely contemplate. This report makes us face up to the state of our own, rather special, piece of the natural world – here and now – and I do commend it to everyone who cares, or has a duty to care.

There are just three points that I would like to draw out from the report, and a further one that I would like to add.

Firstly, there is now widespread recognition of the need to consult environmental groups in advance of any proposed development, and I know that the various members of the Wildlife Trusts Partnership put a tremendous amount of time and effort into this important work. This process allows alternative routes or sites or practices to be suggested, together with all sorts of other measures to reduce the potential impact of whatever is planned. This is fine as far as it goes (though many of us may argue with some of the decisions which are made in the face of such advice). But in looking at individual cases it is all too easy to fail to spot the cumulative impact of our actions. One pond drained, one new road through one small corner of an ancient woodland, might not in itself be a disaster, but the destruction of a whole network of sites, by a whole catalogue of changes, can destroy the viability of entire communities of wildlife. Those who murmur 'never mind, the birds will find somewhere else to go' and similar soothing platitudes, really should look at the bigger picture and start listening to some of the people who understand just how delicate and fragile the balance is that Nature has created.

Those who prefer statistics may wish to reflect that between 1984 and 1988 (Government figures) no less than 687 sites of Special Scientific Interest – that is 14 per cent of the total – have been lost or damaged; or that a recent study by the Wildlife Trusts shows that proposed road-building plans in the south-east will damage or destroy at least 372 sites of special scientific importance; or that in Shropshire, over the last ten years, one per cent of the county's important wildlife sites have been lost each year.

Now we can go on nibbling away at the corners of our remaining unspoilt, valuable habitats, justifying our actions on the basis of economic necessity, or even just personal convenience, but what will the overall picture be like in ten years' time, 20 years' time . . . 50 years' time? Or is that looking too far ahead? I don't think our children will think so, 50 years from now. History is full of cases where the younger generation have berated their parents' generation for taking the short-term view.

I believe that this same inability, or unwillingness, to look at the cumulative effect of our actions is endangering a very special part of our natural heritage. We are extraordinarily fortunate that with so many of us living on this small island we still have areas of truly wild land. These remaining wilderness areas are important both for the wildlife they support and for their ability to refresh the jaded human spirit. But to keep these areas as they are becomes more and more difficult. New designations are much discussed in Scotland at the moment, but may I suggest that the acid test of any new arrangements would be how well they safeguard the integrity of the few remaining areas where the hand of modern man is nowhere to be seen?

The second point I was struck by in the report is the extent to which it is changes to traditional practices which are causing havoc to our wildlife and countryside. Traditional ways of farming and working in the country involve an acceptance of Nature's limitations and an understanding that ever-increasing returns actually cannot be achieved. With our unstoppable obsession with 'progress', this sort of approach is often derided as backward-looking or sentimental, but with up to two million hectares of farmland reported likely to become surplus to agricultural requirements, I find those criticisms very difficult to accept indeed.

A more balanced approach seems to me to be better in every way, in the long run, and I look forward to seeing what follows from the recent statement that the Government is working to integrate agricultural and environmental objectives across the whole range of its policies. There is certainly much that can be done in this area which will have an immediate, positive effect on our wildlife. But it involves the acceptance and awareness – in our hearts and not just in our heads – of the timeless cycles and rhythms of Nature (concepts which invariably seem alien to our contemporary society) which transcend fashionable notions of progress, cost-effectiveness or profit.

The third point is the extent to which the changes we are inflicting on our natural heritage are, in practical terms, irreversible. More than 95 per cent of our lowland peat bogs for instance, have been completely destroyed – mainly for horticulture – and yet I, and many other gardeners, have now discovered that perfectly satisfactory alternatives to peat are already available. Those who try to convince us that peat bogs will regenerate when extraction stops and the water table is raised, do not generally take the trouble to explain that peat is laid down at an approximate rate of one millimetre per year which, by my calculations means that it takes about 100 years to create four inches of peat. With ancient woodland, chalk downland and water meadows the problems are similar.

Planting even the right sort of trees in one area will never compensate for the loss of ancient woodland in another. In 50 or 100 years the effect may appear to produce the right result, but ask a botanist or a zoologist to compare the species present and there is no comparison.

The moral of all this, I think, is that we simply have to take the long-term view and understand that we are not the only generation to occupy this planet. The only solution it seems to me, is to recall the principles on which, for instance, the Hopi Indians of North America based their existence – which was that whatever they did should be with a view to the effect on the seventh unborn generation.

The last point which I feel bound to mention is that in all my dealings with the RSNC Wildlife Trusts Partnership I have been enormously struck by the extent to which their members (often working together with other similar organisations) are actually prepared to get down to work, looking after the places that matter – whether this involves clearing self-sown pines and birch on the Surrey heaths or coppicing ancient woodland in Dyfed.

Much of our 'natural' landscape is actually man-made, and needs to be maintained and managed, if it is not to degenerate and lose much of its wildlife. With ever-increasing labour costs, landowners cannot be expected to do everything. Landowners may be able to 'enjoy' the countryside, but this involves an obligation to care for and maintain that countryside.

Of course this involves a cost, and it is right that we should look to the private and public sectors alike to pay more for the expertise and energy of nature conservationists. But the simple truth is that those who care sufficiently about the look of the land and the health of its wildlife – all those environmentalists, conservationists, 'greens' and other lobbyists – are going to have to be encouraged to volunteer their own time and labour to help with the essential maintenance of the fabric of the countryside. This is a vital point in the whole equation. Without movement on this front, it is likely that we will get nowhere.

Finally, just because the majority of this report concerns issues relating to this country, and to its wildlife, I would not want anyone to think that the big international issues are being ignored, or that people are less important than wildlife. But the issues are inextricably linked.

Global warming is perhaps the most frightening prospect. Limiting it will take huge amounts of time and effort, as well as investment and ingenuity. We have to decide pretty rapidly, how much we are prepared to pay to safeguard the things that matter in the long run. Ultimately, this is a decision involving the prompting of our hearts and not a decision taken through cool, intellectual calculation.

We really do have to start asking which methods of transport, for instance, move the largest numbers of people and goods at the lowest environmental cost. Low energy technologies, energy conservation and renewable energy resources will need much more priority than they have received until very recently.

However, at the same time if we can accept the idea and commitment of stewardship, there are many things that we can all do, without excessive cost, in the field of nature conservation.

Putting our own house in order will enable us to set an example to Europe, and indeed to the rest of the world, in how to protect wildlife and unspoilt, natural habitats.

ROYAL AGRICULTURAL SOCIETY OF ENGLAND ANNUAL LECTURE, Royal Commonwealth Society, London, 14th March, 1991.

I'm not sure that I can remember a time when one section or another of the farming community was not experiencing financial problems. There has tended to be a natural cycle of good and bad times, just as we experience good and bad growing seasons – and farmers, being phlegmatic sorts of people, learn to take both in their stride. Today things are very different. *All* sections of the farming community are in serious economic difficulty, and there is no immediate prospect of things getting any better.

Last year, farm debt reached seven billion pounds and 6,000 British farmers stopped farming. Those who carried on were forecast to earn, overall, real incomes only fractionally over half the average level achieved between 1979 and 1984. To this, we now have to add the uncertainty created by the volatile state of the GATT negotiations, a massive CAP budget overrun, and ideas which would place an unreasonable burden on British farmers.

There is, of course, a terrible irony in much of the current situation because the majority of the problems are due to farmers' success in responding to government and EC policies and pricing signals over the last 40 years. There is no doubt that the whole situation has become incredibly complicated, and some of the issues now are far removed from real farming. Farmers have ensured that the people of Europe are well fed. Now they are successful they are being blamed for the surpluses – and I have to say I both understand and share the general feeling of injustice which is in the air at the moment.

As if an economic crisis was not enough, I believe we also have to face up to the fact that there is a separate crisis – a cultural crisis – facing us. It concerns the very identity of farming itself, and it has arisen largely because we have not made clear our dual role of providing food *and* looking after the countryside. This may seem an obvious point, but I fear it is not fully understood in the country at large and perhaps we haven't paid enough attention to that dual role ourselves in recent years. The vast majority of the population now lives in towns and cities, and even many of those who live in the country follow what can only be described as urban lifestyles. Many people are now four or more generations removed from anyone who actually worked on the land – and it shows in their attitudes. They don't know what farming is or does, and they are increasingly suspicious of it.

I believe this cultural crisis has been exacerbated by the fashionable concept that farming is 'just another business', which is wrong-headed and thoroughly unhelpful. Farming is *not* like any other business. It is, or should be, a rather special way of life, and I believe most farmers recognise this, even if they don't always recognise the benefits of not having to commute, being one's own boss and having room to breathe. That is not to say that it should not bring proper financial rewards and security, but what makes farming different is the element of long-term stewardship of a precious natural resource – and I don't think there is anything soft, romantic or otherwise unrealistic about such an interpretation. In my estimation a steward is someone who cares for, or manages, the property or estate of someone else and who has to account for the condition of that property at the end of the day, either to the owner or to God.

Any long-lasting solution to farming's problems will have to address both the economic and cultural issues. We need to get away from a sterile debate in which farmers accuse environmentalists (which in this context seems to me to include just about everyone who is not a farmer) of nostalgic hankering after the past, while environmentalists accuse farmers of a technocratic obsession with profit at all costs. It would be much more constructive to acknowledge that there can be no going back technologically and that one must take pride in the advances made possible by modern science, while confessing that technology doesn't have *all* the answers and that we need to retrieve some of the wisdom of the past, in terms of both values and husbandry skills. Happily, there are increasing signs that environmentalists and farmers are seeing that the future lies in co-operation not confrontation.

It seems to me that some kind of consensus (I hardly dare use that word!) along these lines may be starting to emerge. If so, it is a timely development, because we are clearly at a watershed period for British agriculture. When historians look back on the last 40 years, I

believe they will see them as an aberration; a time when guaranteed output-related subsidies came to dominate agricultural decision-making in a way which they had never done before, and are unlikely to do again.

There are some important similarities between today's situation and the events that led to the 1947 Agriculture Act – though no doubt there are some important differences too. Then, consensus was achieved on the need to invest in our farming industry to deliver what society needed – large quantities of relatively cheap, high quality food. Although today's debate is infinitely more complex, I believe a similar kind of consensus is emerging today – this time for a farming enterprise which is economically viable, responsive to the needs of consumers, socially acceptable, environmentally friendly and moving towards genuine sustainability. The essence of this consensus should be policies which enable our farmers to look after the land and produce the food that we need. We cannot allow any significant part of the 80 per cent of Britain which is now farmed, to be lost permanently to agriculture, and farming must be sufficiently rewarding to allow our farmers to continue to care for it.

Whether or not this emerging consensus can be turned into action is a matter for conjecture. But it is clear to me that it will certainly not happen without positive, decisive leadership and encouragement. It does seem that we may at last be getting away from the attitude that there isn't much wrong that a few financial tweaks and green twiddles can't put right, and moving towards a recognition that much more wholesale reform is necessary. However, there is still a long way to go.

Any attempt to balance the two key issues of economic viability and environmental friendliness must start with the recognition that the countryside needs its own thriving economy, responsive to consumer needs. Neglect of this basic marketing principle has brought the Common Agricultural Policy into disrepute in this country and around the world. The guaranteed payments of the last 20 years have led to farmers being too remote from their consumers. In the process, some have failed to develop the marketing orientation which modern markets require and are only now discovering the importance of providing food which consumers want to buy. In the Duchy of Cornwall we are working on a proposal with 'Food from Britain', for a quality assurance scheme to go from conception to the consumer, which may use the Duchy's coat of arms as the mark of approval.

One of the achievements of the CAP has been to ensure that the bulk of Europe's food is now supplied by Europe's farmers. However, within Europe there is clear evidence that Britain is losing the competitive war. Last year we had a food and drink trade gap of over £5 billion, making this sector the largest contributor to our current account deficit. We imported over £11 billion worth of food and drink products – a rate of £10 per week per household. And we cannot blame our British climate for this because over half of that deficit arises from the five Northern European Countries which have similar, or worse, climates than our own. Our food exports to those five countries have been static over the last ten years, while their exports to us have grown by a quarter. They now total £4 billion per year – equal to one third of the value of our entire agricultural output.

Before placing some of the blame on farmers for this state of affairs (which I am just about to do!) it is important to recognise that other countries do put more resources into their export effort. The French and German equivalents of 'Food from Britain', for example, each have budgets over seven times as large as the one within which 'Food from Britain' has to operate.

In contrast, British farmers are hamstrung by an inadequate concept of competition. We still see the farmer down the road as our competitor. However, in reality our competition is throughout Europe and the world. To be successful, we must learn to work closely with our local farming neighbours in new cooperative systems that are able to provide the quality, consistency and continuity of supply that are required by modern, professional buyers in supermarkets or export markets. There are many ways of organising such cooperative ventures and they do not have to be very large to succeed. There are already a number of people producing speciality crops who have joined together to market their produce very successfully. Whatever the nature of the co-operation, I am sure that this is one of the biggest cultural changes which our industry must face. The problem, of course, is that Britain's yeoman farmers do not have a history of collaborating; rather they have a proud history of independence. We are often reminded that British farms are on average five times the size of their continental counterparts, due to our different inheritance systems. This may seem to be an advantage, but one of the consequences is that historically the smaller continental farms have required much more sharing between themselves, even of production resources, and this has produced a much more cooperative mentality which now gives them real strength in their marketing.

One of the aims of the CAP was to create a level playing field, which is a key component of any genuinely free market, within Europe. Sadly it failed, as it has done in so many important ways. But we must be sure we don't dig up what is left of the playing field in trying to level it. I therefore applaud the strong line which the Government is taking against proposals which would place our farmers at a disadvantage and our countryside under further threat, purely as a result of the greater size of farms in this country. But to oppose the current EC proposals is not enough. Reform is now necessary and inevitable – the question is how it is to be achieved.

One of the most widely reported consequences of the CAP has been the surpluses it has produced – they will not go away without major changes somewhere in the system.

Two options which are frequently discussed are based on production quotas (which have so many undesirable features that I do not propose to mention them again), and on reducing one of the two key inputs – land and fertiliser.

Reduction of land in production has been attempted by the set-aside scheme, but the results so far have been thoroughly unsatisfactory, both in the amount and quality of land set-aside and, more importantly, in its highly damaging environmental and psychological effects. Paying farmers not to farm, and perpetuating the notion that we have surplus land rather than surplus food is not the answer. Even if it were, the price for set-aside is clearly too low to tempt many farmers into what amounts to a denial of their existence.

Encouragingly, more positive and creative options, such as encouraging reversion to permanent pasture by allowing a grazing regime, and the Farm Woodlands scheme are now being tried, with the result that we in this country are increasingly the pioneers in Europe of making set-aside an environmental asset.

Another possible control is on fertiliser use, and specifically nitrogen. I am aware that this is a highly contentious idea, and no doubt the agro-chemical lobby are preparing their powerful defences against any such proposal, but I hope the possibilities will be examined with great care. Advocates of such a policy point out that nitrogen is the most important single factor affecting the quality of food produced on a given area of land. A reduction in nitrogen, through some sort of quota, or even tradeable permits, would solve the production problem. It would also help reduce both the amount of pesticide needed to safeguard over-lush crops and the levels of nitrate in our drinking water.

The other way of reducing surpluses is through cutting the CAP's high support prices. This may seem an obvious answer, but immediate reductions to the level needed to remove surpluses would literally drive many farmers out of business. I also believe (although other people may not) that price pressure can lead, as can set-aside, to intensification, as farmers struggle to maintain their incomes.

It has to be said that none of these alternatives

of set-aside, nitrogen quotas and price pressure is in the least bit welcome to farmers, because all three promise a reduction in real incomes. But in each case the proposals can be made acceptable, and the threat of intensification reduced, by introducing direct payments to farmers for environmental services – whether it be for enhancements to set-aside or more specific habitat creation and re-creation proposals. The crisis of the CAP obviously has to be faced, and the cycle of intensification has to be broken. The challenge is to substitute something meaningful in its place. We know what the public want – sensible quantities of food, and an attractive environment. Personally I don't believe that is an impossible task.

Having just touched on the environmental issues, I would now like to look at them in a little more detail. Much the most encouraging development is the establishment of the Environmentally Sensitive Areas scheme – a British idea, pioneered in Europe by the then Minister, Michael Jopling. This genuinely broke new ground, in those areas which have been designated. Farmers in the scheme do not need to plan their next capital investment or intensification, and their income is assured – at least for the duration of the scheme. This scheme does deliver genuine environmental benefits, but in national terms it touches less than the tip of the iceberg. The ESA budget in the UK is only a minuscule half of one per cent of the UK's agriculture budget, and the ESAs themselves cover less than five per cent of our land area. There is immense scope for other schemes along these lines, with the ultimate aim of recognising that the entire countryside is environmentally sensitive. I believe every farm has, or could have, features of real interest – green lanes, wildlife corridors along riverbanks, rare arable plants in cornfield margins, or even just an expanding colony of orchids.

An environmental approach to the land must still take into account the need to produce what consumers want to buy, and indeed it opens up new opportunities. As CAP support declines and as governments become more careful about approving fertilisers and other chemical usage, the sheer output orientation of farmers should reduce. As at the Duchy of Cornwall Home Farm at Highgrove, many farms may revert back from the one product crop to the mixed stock and crop methods which British farmers operated for centuries. Balanced mixed farming methods using rotational systems can maintain and improve soil fertility and structure, and make maximum use of by-products. Both mechanisation and larger farm sizes make mixed farms more easily organised.

There is no doubt that the guaranteed payments for individual products under the CAP scheme have resulted in a most unhealthy degree of intensification and specialisation. This has meant, for instance, that in some parts of the country the disposal of straw has become a real problem, and yet in other areas, valuable muck and slurry is now seen only as a potential pollutant. This sort of imbalance has been caused by farmers not having to worry about the risk of only producing one product, because the payment for that product was guaranteed by the government. In the new world of lower support prices and more market orientation, that imbalance must surely begin to change so we can once again farm each area in a more diverse and sustainable manner, regaining empathy with soil, plants and weather.

In this new situation, many farmers will find that it actually pays them to produce organic or Conservation Grade foods, 'real' meat and local specialities. These are all options which increase consumer choice and provide for higher standards. A greater marketing orientation by farmers is an essential element in all of this, but it is equally important that the produce offered to the consumer is a real improvement on the standard item and achieves what it claims it does. There is ample scope for confusion in this area and plenty of evidence that the confused consumer quickly becomes both disillusioned and highly resistant to further approaches of this sort.

Personally, I am encouraged by the number of farmers who have already gone beyond these 'halfway houses' by choosing to farm organically. But I remain astonished at just how many other farmers still look at organic farming as some kind of drop-out option for superannuated hippies. Since, as one of those superannuated hippies, I have just taken the decision to farm the whole of the Highgrove Home Farm organically, I hope I may be excused the luxury of injecting a short commercial at this point. The level of ignorance about both the principles and practice of organic farming does disturb me, and it would be remiss of me not to mention something in which I believe so strongly.

The first thing to say about organic farming is that it will not provide an economic means of feeding the entire nation, at least not while we maintain our current dietary preferences. There are simply too many of us on this small island. Nor is it something which every farmer can embrace, for it requires a strong degree of personal commitment and belief in the principles behind it.

To me, organic farming combines the traditional wisdom of sound rotational farming practice with much of the best that modern technology can provide. There are, I believe, greater advantages in improved soil management, maintaining a diversified flora and fauna, reduced pollution and increased energy self-reliance than many commentators have so far been prepared to acknowledge. And you only have to see the faces of some of the people who come to look at some of our organic farming operations at Highgrove, to see that sometimes the scepticism finishes.

Most of us who farm organically do so because we want to produce food in a natural and sustainable way; to work with, rather than against, nature and to rear and keep our animals economically in an extensive rather than an intensive manner. Experience at Highgrove has included re-learning a lot of traditional skills and, yes, of course there have been mistakes along the way. But there is also an economic aspect and, so far, our organic farming is doing well. With 60 per cent of this country's organic produce coming from abroad there is clearly substantial scope for other farmers in this area.

There are just two main impediments to success. Firstly, the high prices charged for organic produce continue to put it beyond the reach of many consumers. Better marketing and liaison with retailers should eventually lead to an increased market share and therefore to reduced premiums. Secondly, the conversion period has to be regarded as an investment, and few farmers have anything left to invest. Bearing in mind the role of organic farming in reducing both over-production and environmental pollution, and the potential for reducing imports, I hope the Government will soon be able to carry out a long-standing promise to find more and better ways of helping potential organic farmers. I am told this particular path is blocked in Brussels. If so, I hope it will soon be unblocked.

Of course, there are a number of schemes which already recognise environmental and social factors, rather than the pure output considerations which have dominated the CAP. I have already mentioned the Farm Woodlands scheme, and special help has been provided for many years to upland farmers. But I am concerned that although these and other similar schemes are good initiatives, they are somewhat arbitrary and not sufficiently well coordinated or targeted. For instance, the Hill Livestock Compensatory Allowance has encouraged farmers to overstock, leading to overgrazing and the undesirable 'improvement' of ecologically valuable semi-natural habitats. The British initiative to 'green' the HLCAs, which has gained Community agreement, should make it possible to avoid these disadvantages and produce a scheme which will give support in the hills without damaging the environment through overgrazing. Many of us would be pleased were such a scheme to tackle the increasing problem of heather loss in our upland areas.

There does seem to me to be enormous

potential for overhauling all the existing grant schemes, bringing them together in a much more coordinated package with a real sense of direction and adequate funding and, above all, making them available to all farmers, wherever they are. Such a policy would be a clear acknowledgement that although the market does indeed provide the best discipline for food-production aspects of farming, there are other functions, to do with the long-term care and appearance of the countryside, which cannot be resolved through the operation of the market. Those stewardship and environmental functions are in great demand as far as the public is concerned and need to be properly rewarded.

Providing the resources for direct environmental payments will undoubtedly mean a re-direction of agricultural support. The money, in global terms, is certainly there; last year the CAP budget was £20 billion, but nevertheless, farmers in Britain face declining incomes. Partly this is because a good deal of the money is not paid to farmers at all. If only we could redirect our expenditure so that it supported environmentally friendly farming and the proper conservation of the land.

One of the most remarkable – and encouraging – developments in this area recently has been the way in which the environmental organisations, once fierce and largely indiscriminate critics of farming, have turned their increasingly professional hands to articulating positive alternatives to agricultural policy. I can think of half a dozen well written and carefully argued documents which all acknowledge the needs and problems of farmers, and their proposals deserve to be taken seriously, not least because they represent the environmentally concerned public, whose support for farming is vital.

Sadly, where the general public's attitude to farming is concerned we have a public relations problem. All the health scare issues have not helped and agriculture is, regrettably, not often seen as a friendly environmental influence. Images persist of wealthy farmers riding around the countryside, destroying wildlife habitats and living off a generous tax-payer, as do reports of butter mountains, cereal stores and wine lakes. Set-aside is easily (and not unfairly) portrayed as paying farmers for doing nothing. In a slightly muddled but well meaning way, the public has a series of notions about what it wants from the countryside, in addition to reliable supplies of good food. I believe it is up to us to translate those notions into practical action.

Farmers themselves must accept the responsibility of reducing the alienation which now exists between farmers and the bulk of the population. It is essential that farmers become better understood. The RASE plays its part through the Royal Show, and in other ways, but far more needs to be done. Education is the first essential. I know that there are some splendid schemes in operation, such as 'Farmers Adopt a School' run by the South of England Agricultural Society and Brighton Polytechnic, and anything of this sort is tremendously helpful. Of course, such activities take up precious time, but they are, quite literally, an investment in the future. Processors and retailers can also do much to help by ensuring that the production of food has a strong positive image with consumers.

It is now an inescapable fact that public concern about animal welfare is growing all the time. Farmers are having to realise that although the majority of people do still like eating meat, they are not prepared to put up with unjustifiable cruelty and poor husbandry practices. In the debate on Sir Richard Body's Private Member's Bill to outlaw the use of all stalls and tethers in pig rearing systems in this country, David Maclean, the Junior Minister at the Ministry of Agriculture, Farming and Fisheries, informed the house that as an MP, he had received more mail about this issue than on the crisis in the Gulf – and even that, I suspect, is but the tip of the iceberg of humanitarian concern for the welfare of farm animals in this country.

I understand only too well the problem for UK pig farmers of being placed at an economic disadvantage if their European counterparts are able to continue with indisputably cruel practices – as I believe has been the result of the UK banning the use of veal crates while the rest of Europe carried on as before. It was therefore good to see that Mr Gummer has decided to pursue these concerns with his EC colleagues, many of whom face far less vociferous lobbying from environmental and animal rights activists than he does!

I don't think it is necessarily all that helpful if many of those with the interests of the farming community at heart continue to dismiss public concerns about the welfare of farm animals as irrelevant or irrational. In this respect, it may not be productive any longer to claim that 'the experts always know best'. The crisis engendered by Bovine Spongiform Encephalopathy (BSE) seriously undermined the credibility of such patronising expertise, and the livestock industry in this country is only just recovering from the experience.

There were many farmers, even in the early 80s, who felt very strongly that it wasn't right to be feeding herbivores with the rendered remains of other herbivores. There may well have been no specific scientific evidence to demonstrate the dangers of such an approach, but 'natural wisdom' was enough to deter them. Others simply accepted the practice because it was legal.

Farmers would of course argue that they have little influence – let alone control – over the animal feed industry. But choices can still be made by individual farmers. Post-BSE, I suspect that they will be. But for responsible choices to be made, there has to be proper freedom of information about the specific contents of different feed brands. I gather that labelling rules are now a matter for the European Community, in which case I can only say that it has taken an extraordinarily long time for them to produce sensible and proper rules, and I profoundly hope that Professor Lamming's enquiry into the practices of the animal feed industry will ensure that customers have all the information necessary for them to make proper decisions.

Given the huge issue of consumer confidence which is at stake, it is hard to believe that if very competitive food manufacturers can label adequately their products, then feed merchants cannot equally well label their products for farmers. Accountability to the public requires a much more positive role from farmers themselves in defence of the public good. That is the only way in which the farming community will restore confidence in itself and in which the image of modern farming will be transformed.

Many of the environmental issues I have mentioned so far, could be addressed in the short term to provide rapid and reassuring results, and I hope they will be. Even the maddeningly slow process of planting broad-leaved trees will produce evidence of growth after a few years. But arguably the most important environmental concern, sustainability, cannot be seen, only deduced – or its absence detected. It's a concept which is much discussed, and has come to mean many things to many people (often closely approximating to what they would each like it to mean). To me it means that everything is done with one eye kept on the needs of future generations as well as our own. It is the acid test of our stewardship of the natural resources which someone else will need one day, perhaps more than we do.

Historically, farmers have been very conscious of preceding generations and even more conscious of the land and fertility store they were leaving for their families. In medieval times the importance of sustainability was recognised in a whole series of local regulations to prevent long-term damage to village resources. Replacement trees were to be planted every year, and no manure was to be sold off the manor. Even the expression 'by hook or by crook' derives from the way that wood could be collected from trees – only by knocking or pulling down the dead branches with a hook or crook, and not by felling.

The concept of sustainability is something we have tended to lose sight of under the pressures

of output subsidies. Instead, we hear a great deal about efficient farming. But should we not stop and ask ourselves 'efficient for whom, and over what period'? Is it really efficient to produce more wheat than we need, at four or more tons per acre, at three times the real world price, and then dump the surplus on the world market, thereby depressing the price even further – to the great disadvantage of Third World producers? I need hardly add that the huge amounts of nitrogen fertiliser required in such 'efficient' farming are synthesised using vast amounts of power, most of which comes from non-renewable fossil fuels – with the release of equally vast amounts of carbon dioxide.

Is traditional mixed farming, using animal manure and the nitrogen-fixing ability of clover and other leguminous plants to build soil fertility, any less efficient in the long run? It is certainly infinitely more sustainable. I suggest that it may also allow a more flexible response (therefore greater security) in times of hardship. Of course, sustainability is not only important in a physical context, it also has cultural aspects and the human and social dimension must be considered when looking at the impact of our policies.

Sustainability and stewardship are not new objectives in farming; they are thoroughly traditional objectives, and well tried and tested in the process. We *can* still attain them today, but only if they are made absolutely central to farming policy. Bolt-on extras, whether for greenery, food quality or other social responsibilities simply won't work.

Food production and stewardship of the land *can* be re-integrated, but this will require fundamental reform of agricultural policy as we know it. Flows of money will have to be re-directed, so that less is wasted on surpluses and more reaches the pockets of farmers, in ways that will encourage them to farm with a greater sensitivity to the environment and the concerns of the consumer. To do this we will have to get away from using the output of farms as the sole measure of the extent to which farmers should be rewarded. We will also have to reject absolutely, the suggestion that we should have a two-tier agricultural system with some areas designated for full-blown intensive production, and others for conservation only, with farmers as fully paid-up park keepers. This idea, you may have noticed, is usually propounded by those who farm large areas of good land, and cheered to the echo by the agro-chemical lobby. Now, it may well be that we will one day need some high input/high output farming to feed ourselves and others, and it is comforting to know that we can do it if we have to, but the fact is that at a time of massive over-production we don't need to do it – and nor should we, because the consequences for those on the poorer land, who frequently tend to be the smaller farmers, and their communities would be disastrous. Can we not accept that we need to keep the *whole* countryside working and accept that it is *all* environmentally sensitive?

It would be encouraging if some of this thinking could inform the continuing debate in Brussels about the future of the CAP. There are clearly both external and internal pressures on the Community to make substantial changes in current practices. This could give Europe the same opportunity to set a positive direction for the next decade as was given by the introduction of the 1947 Agriculture Act in the UK.

The overwhelming impression one gets from the current debate is that all the balls are still in the air, but there is no way of knowing whether all – or any – of them will be caught. Farmers are, rightly, dismayed by their own circumstances and what they perceive as a lack of leadership, bewildered by events internationally and in Europe. And they are angry about the repeated batterings they receive from all sides. But some of the clouds around us do, perhaps, have silver linings. The potential for creative alliances between farmers, environmentalists and consumers has certainly never been greater. The challenge is to turn this latent goodwill into something more tangible, and then to convince policy makers that there are some real, convincing and workable alternatives.

TO THE OBSERVER-IIED CONFERENCE, Queen Elizabeth II Conference Centre, Westminster, March 19th, 1991.

There may still be people who are under the illusion that the world we face in the future will be more comfortable than the one we have now; that we can go on as we are, predicting confidently that 'progress' will continue indefinitely, and that technology will find the answers to all our problems. They may be right, and people like me who point to alarming signs of environmental and social stress may just be alarmist and pessimistic cranks, but I suggest the evidence does need careful examination.

Right now, up to 15 million people are at risk in the drylands of Africa. They suffer from an apparently unbreakable cycle of environmental degradation and drought leading to poverty and hunger and yet more environmental stress. Tragic and disgraceful though it is, death seems to be the only obvious way out at present for these unfortunate people.

Elsewhere, millions more are already suffering from the pollution and shortage of water. Last year's Children's Summit revealed that nine million children die prematurely from water-borne disease every year. In urban areas of the Third World, millions of people have no secure shelter, and little or no protection from atmospheric and water-borne pollution. In rural areas, whole ecosystems are under threat from the hunger for land for growing food and the search for fuel. In the forests, in the range lands and in the upland areas, people struggle to live directly from what is left of nature's wealth. Four fifths of the human family still rely on wood as their primary fuel. Population pressures and unsustainable agriculture lead to soil erosion which threatens future livelihoods as well as biological diversity.

The possibility (some would say probability) of serious climate change makes future prospects worse. Altogether it is a sad and depressing scenario.

Now, although it may sound gloomy to say so, it is my belief that until more people concentrate on development which meets basic human needs, combined with enlightened stewardship of nature's capital, human and environmental tragedies will continue to unfold. All the evidence suggests that population numbers will continue to rise from 5.4 billion now to 8.4 billion by 2025. One result will be an ever-growing proportion of young people. Already, for example, 50 per cent of Brazil's population is under 25. By the year 2000 it is estimated that in Africa 44 per cent of the population will be under the age of 14, compared to just 20 per cent here, but I don't need to tell all of you that. All the signs indicate that many of them will live in urban and rural poverty with no prospects of a secure livelihood – that is unless human tragedy on a massive scale comes first. But surely it is crazy to wait for ecological and human catastrophes before we tackle the root causes of them, even though the lessons of history are not always very encouraging in this particular regard. We can act *now* to change the outlook.

I believe that there is really no alternative to striving for sustainable development. There are two reasons for this conclusion. First and foremost is the moral or humanitarian imperative. Second is the global insecurity that poverty and environmental destruction will create for all of us. It was the President of that sensible and far-sighted organisation, the International Institute for Environment and Development, Sir Crispin Tickell, who observed that we can expect to see a rapid rise in the number of environmental refugees, driven from their homes by mounting environmental stress occasioned by possible climate changes, continued overuse of natural resources and exacerbated by disputes over what remains of scarce resources, such as water. In other words the frightening scenario of millions of people on the move, literally in search of survival, leading to entirely new threats to global security.

Naturally, the problems are always someone

else's fault. People point to the greed of the North, the corruption of the South, the short-term outlook of industry, the equally short-term outlook of politicians and the overstatements of environmentalists. You name it and someone somewhere will 'pass the buck'. It seems to me that we have all got used to the idea that the only way to face these great difficulties is to point to someone else. The press has tended to encourage this spirit of confrontation. After all, reporting good news does not sell newspapers.

It has to be said that the job of finding solutions would be a great deal easier if governments would openly declare what needs to be done. But in the case of the Third World we will first have to create incentives for people to be honest about their difficulties, without fear of imposed solutions. That will involve building a mutual trust and understanding because Third World countries need to be confident that a frank dialogue will not be rewarded with a new set of conditions imposed on them from outside. That would not only be an affront to their sovereign rights, but also a certain way of closing down all dialogue for the future. Without this basic respect for the other person's point of view, the incentives to co-operate are just not there. Bitterness and confrontation grow and solutions become even more remote.

But this must be a two way process. The taxpayers of the North understandably want assurance that money spent on aid flows is not going to be wasted or stolen by mismanagement and corruption. They need to be confident that everything possible is being done to ensure sound governance for the future. That seems a perfectly fair and reasonable approach to take.

The Group of 7 Summit meeting in 1990, for instance, led to a close dialogue between the World Bank, the European Community and Brazil to define a pilot programme for Amazonia. I understand that this is a broad programme put forward by Brazil, including many problems that might seem to have nothing to do with deforestation. First among them, in my view, is the job of assuring a viable standard of living for the communities now resident in the Amazonian region. This must be based upon sustained management of that great natural asset, and will include reserve areas as well as new models of harvesting the forest's resources.

The reason why I have such an interest in this community approach is that it is, in my experience, at the community level that most is being done to protect the environment. We can all too hastily get caught up in global negotiations whilst forgetting that people need to be free to pursue sustainable development for themselves. The reconciliation of environmental protection with economic advance comes down to a mass of local problems. These all add up to global issues, but providing the right conditions for solutions at the *local* level is the challenge for governments.

The local approach seems to me to be common sense. When people have a right to participate in defining what happens around them, when they have secure tenure to land and when they have a source of credit that is short of usury, they *do* invest in the long term. All communities contain individuals who are naturally entrepreneurial. They organise, cooperate and trade. The result is that they improve their housing, their sanitation systems, their schools and their environments. This happens equally in our own cities as well as those of Africa, China, India and Latin America. In each case the secret is to find the people who really make things happen – the natural leaders – and *enable* them, even if that does mean taking a controlled risk with taxpayers' money. Because with the right support and training they are far more effective at getting things done in their own communities than leaving it up to officials and 'experts', operating from the large metropolitan centres, however well-intentioned they may be. Empowering communities is one of the most important keys to fostering a sense of stewardship and community-based environmental care.

The non-governmental community know this all too well. If you ask our NGOs what they have to show for their efforts, they will often point to local examples carried out despite the difficulties imposed by authorities. People who want a secure future for their children, just as we all do, have to be encouraged to find solutions to problems they have themselves identified – which is what participation implies; and from which they will benefit – as equity implies.

My final point concerns the private or industrial sector, because I believe we are being naive if we think we can achieve a sustainable future without harnessing the best of the corporate world to those ends. Fortunately, there is a growing recognition by people at the top of the most successful businesses of the need for what I can best describe as 'good corporate citizenship'. Society in the 1990s has high expectations of businesses – not just expectations of their financial performance, but of the whole ethos of their relations with individual communities, wherever they are based or happen to trade.

I would have thought tackling poverty, hunger, homelessness, illiteracy and environmental degradation, wherever it is found in the world, is a true test of a civilised society. No effort to resolve these issues can be truly successful without business playing its part in partnership with government and local communities. Equally, business is able to bring unique skills, resources, technological know-how, determination and, even more importantly, lobbying power to these issues. It is my personal belief that businesses which ignore the need for action of this kind will not secure their future markets, their customers or their employees.

AT LAUNCH OF NATURE CONSERVANCY COUNCIL FOR SCOTLAND'S NORTH-EAST REGION, Glen Tanar House, 19th April, 1991.

In the course of the recent debate about their future operations, staff of the Nature Conservancy Council have had to face some harsh and, at times, intemperate criticism – mostly reflecting the extremely difficult circumstances under which they have had to work for the last ten years. The critics forget the pressure applied from all sides, and not least from above, to complete the task of notifying Sites of Special Scientific Interest. This was never going to be a universally popular task, but it had to be done. Despite the well publicised problems that have inevitably occurred, I hope that no one doubts the overall sincerity, commitment, knowledge or skill of the NCC staff, or that the vast majority of their work has been sensitively conducted and entirely free of controversy.

There is a widely accepted need for the new NCC organisation to take account of local views, and I trust that the decision to devolve decision-making in Scotland to the four regions will help this process. At the same time the NCC has always taken pride in ensuring that its judgement is founded on objective scientific principles and evidence. These needs must of course be reconciled, but neither of them should be compromised. The science must be as near as possible to 100 per cent reliable, but for conservation to be effective it depends on people – owners, managers, decision makers and the public – to respect, to care and to make things happen. I have heard it said that 'conservation is 90 per cent people and 10 per cent science'. It is certainly true that delivered wrongly, even the most perfect scientific judgement can do more harm than good. Delivered well, it doesn't just protect bits of our natural heritage; it inspires, informs, multiplies and – above all – changes attitudes. I believe this process works best when negotiations take place face-to-face, on the ground, and with a willingness at least to listen to the other person's point of view. I do hope the new body will make it one of its aims to do business in this fashion.

If conservationists face a new challenge to humanise their science, then it is also true that those with direct responsibilities for our precious natural heritage – those who own parts of it and make decisions daily on its fate are likewise

facing a new challenge to treat conservation as a basic principle of good management, rather than as an expendable option. More and more, we have it in our power to protect our natural inheritance, to restore it to its former sustainable glory through enlightened investment in the future, or to jeopardise it for short-term gain. We have never had more ground to make up, fewer excuses for ignorance, nor more support for wise choices.

There have always been plenty of landowners who have taken a positive, long-term view of conservation. My great-great-great grandmother, Queen Victoria, was far-sighted enough to recognise the importance of one of the last remaining areas of old Caledonian pine forest near Balmoral. She bought this area from a former laird of Invercauld and, shortly after doing so, she was driving through the forest in her carriage when she heard the sound of axes. Sending someone to investigate, she was told the laird was cutting the trees down to sell to a timber merchant in Aberdeen. Incensed, she wrote to the laird who replied that Her Majesty might have bought the land, but not the trees! Her Majesty was genuinely not amused, but without her intervention all that forest would have vanished for ever.

In recent years there have been the inevitable examples of less enlightened ownership, occasionally on the part of public agencies, and sometimes resulting in well-publicised conflicts with conservationists. But I think it is worth pointing out that there aren't that many ways of producing income from a Highland estate and the result is often the dreaded blanket afforestation. This rather soulless phenomenon, marching like dark green fields of wheat across the hillsides, is detested by many people who love the wide, flowing, Highland landscape. It also tends to cause damage to rivers and fisheries by efficiently capturing acid rain, and destroys wildlife sites – some of international importance.

It is often argued that it would be so much better if forestry were not subsidised – and it is certainly true that generous subsidies do give forestry, and some other agricultural activities, an unfair advantage over other forms of land use – but those subsidies are important in keeping communities together and maintaining the now threadbare fabric of rural life. The answer, it seems to me, is not to abolish the subsidies, but to target them much more carefully. Can we not put our money into more natural, indigenous forms of forestry which actually enhance the landscape, encourage wildlife and bring happiness into people's lives?

I know that there has been some movement in this direction recently, but there is still a very long way to go before we reach the kind of situation that has been common elsewhere in Europe for generations. Proper encouragement of uneven age-group planting, and even natural regeneration, would be a real step towards long-term sustainability, do wonders for both landscape and nature conservation, and produce an annual income from an increasingly valuable capital asset. I hope this is one of the issues that Scottish Natural Heritage will be able to address in due course – but that is for the future.

For the time being, the priority is to get the Nature Conservancy Council for Scotland up and running, and a little bit of goodwill and forbearance will be a great help. Now is the time to bury the hatchet, look forward, turn over a new leaf, apply some creative thinking and build new opportunities. In particular, we must nurture a mood of conciliation and optimism and get away from a sterile, polarised debate in which those with whom one disagrees are automatically labelled as reactionary, unrealistic, anti-progress or just politically motivated.

In my experience, this country has a record of nature conservation which is the envy of the rest of Europe. A great many people have played a part in this state of affairs, including landowners, pressure groups and members of the public, but the Nature Conservancy Council has provided much of the backbone. I very much hope that this state of affairs will continue under new management – and nowhere more so than in North-East Scotland.

AT THE EUROPEAN COMMUNITY CONFERENCE ON THE URBAN ENVIRONMENT, Madrid, 30th April, 1991.

There is a great deal to be learnt from simply looking, and I think that in order to bring the city into the 21st century we need to exercise our eyes as well as our mouths.

Madrid is, of course, the city of Goya ,who used *his* eyes wonderfully well. Who could forget his splendid view of it shimmering on a hill, the city and the landscape in perfect harmony. I doubt any city was ever really so perfect as Madrid through his eyes, but such images remind us of what a city once tried to be – a place in which people could take pride, giving substance and definition to their lives. In refreshing our minds, such visions renew our determination to do something about the cities we live in today.

Many of our cities today remind me of a quite different picture by Goya: that of Saturn devouring his own children. One generation devouring the next – an appropriate image for a world where planners and architects have seemed unable to envisage the effects their grand schemes might have on their children, and where we are all so wedded to the benefits of personal mobility that we have come to ignore the effects we are having on the world in which our children will live.

The time has surely come to take stock and ask what our cities are for. Founded on co-operation and growing through a network of interdependence, the city once defined what was meant by a civilised and well-mannered existence. I now get a feeling that our cities are doing quite the opposite, actually preventing, or at best inhibiting, the continuance of civilised life among their inhabitants. And the cities now consume not only their own inhabitants, but all of us, by concentrating within themselves all the major causes of environmental pollution.

Is it not time to attempt to redefine the purposes of a city in the light of this reality? Can we not aim towards the creation of opportunities for rewarding work and sustainable economic activity in a way that minimises our impact on the environment and maximises the elusive elements of community and convivial existence? Sustainability and conviviality could provide the basis for a new approach to city planning that would then allow us to rediscover some very old virtues.

Cities today are not self-contained, but are dependent on an agricultural and industrial hinterland that reaches way out into other regions and other countries. It is now becoming increasingly impossible for us to close the city gates behind us, become wrapped up in our urban lives, and forget that there is a larger world beyond the walls, and one on which city dwellers depend. This is the mentality which gave us the taller smokestack as a cure for urban pollution – a solution which, of course, only succeeds in shifting the problem onto someone else. The dream of a city sustained by the machine and completely independent of the natural world is rapidly becoming a nightmare.

The way we manage our waste is a good test of how serious we are about the concept of 'sustainability' in our cities. Surely we have to get away from the idea of waste *disposal*, with all its connotations of 'out of sight and out of mind', and work towards a concept of waste *management* in which our refuse can be properly regarded as an alternative source of raw materials. Recycling of domestic refuse ought surely to be a high priority, and it is encouraging that experiments in this field have shown that figures of 30 to 50 per cent can be achieved. But we also need to look at recycling such potentially beneficial materials as sewage sludge. I have seen some highly successful, innovative methods of doing this, but I have also been exposed to a great many arguments about the alleged benefits of incineration. These benefits are usually based on grounds of convenience,

reliability and a small amount of power generation. But do these factors really outweigh the long-term advantages of turning waste into wealth; of returning beneficial nutrients to the land, either as compost or by direct application – not to mention the problems of the gaseous emissions and ash caused by incineration?

We are beginning to realise that all our cities are cities without walls, and they need to be sustainable in the long term for the good of the whole world. That is the pre-eminent challenge city authorities and town-planners face today. It will inevitably require a far more rigorous approach to integrated, long-term planning, creating patterns of urban life that positively promote energy saving, waste minimisation, public transport and economic self-reliance.

The debate about housing density, for instance, must clearly be re-opened in response to the challenge of sustainability. In city after city, especially in Britain, soulless high-rise blocks have brutalised communities, reinforcing alienation, encouraging crime. However, high density does not necessarily mean high rise; I have seen a number of new housing schemes that not only promote the sustainability factors referred to before, but are specifically designed to rebuild the spirit of community, encouraging face-to-face interactions, ensuring the delicate balance between private space and shared or communal space.

If we don't do something soon, and find the means to tackle these challenges, then I suspect we will see our quality of life ebb further and further away. Soon all that cities will be able to provide for us will be a few questionable material benefits to compensate for the loss of those intangible qualities and values which form the very essence of civilised existence.

Some of the planners and architects we need for the future are 'out there'. It is surprising how many architects are currently engaged across Europe in designing new communities where life can be lived in the traditional full manner. I have a Summer School of Architecture of my own where the students are brought face to face with some of the most pressing architectural problems of our day – how to design a street that has life and meaning, how to work with craftsmen, how to bring back a sense of spirit and celebration after a long exile. I hear there is another Summer School being set up in Prague, dedicated to similar aims.

With all this in the air, I read the EC Green Paper with much interest, and was hugely encouraged by the obvious enthusiasm for the cause it espouses. I was delighted to read that the objective of urban environmental policy was 'the creation, or re-creation, of towns and cities which provide an attractive environment for their inhabitants, and the reduction of the city's contribution to global pollution', but it then continues: 'however Utopian this target may appear . . . !' Now, I'm sorry, but I have to say that if even this modest set of aims is thought to be Utopian, I might just as well leave this conference now! What can we have descended to if we cannot see that the creation of an attractive environment and the preservation of the world's atmosphere are basic necessities, upon which we might build something finer? This is not demanding Utopia, surely, but pure common sense.

One of the trends that has so degraded our cities is that the communal values upon which cities were founded are now being overturned by the unthinking actions of individuals who feel no obligation to those communal values. There often seems to be a refusal to accept responsibility for our own actions – a refusal to recognise that each of our actions bears a cost. One example is litter. Don't you feel a particular sadness to see the amount of litter in our cities, not just because of the social and economic costs involved in clearing up the beastly stuff, but because of what it says about the attitude of those who contribute to the general mess? I don't believe we have a hope in hell of protecting the global environment if we can't first persuade ourselves to respect and enhance our local surroundings.

Perhaps one of the most awkward problems we are going to have to face is provided by that most useful of objects, the car, which has tended to disfigure our cities more than anything else since the Second World War. It is staggering to think that in Europe we have two and a half times as many cars now as we had in 1970. Isn't it time to ask ourselves how we are physically going to cope with what is rapidly becoming a monster of our own making? Have we not planned our cities in a way that gives succour to such an extraordinarily voracious beast? The EC Green Paper certainly suggests that we have.

At a time when road transport is the fastest growing source of carbon dioxide, which is the main greenhouse gas (to which I fully admit I contribute a certain amount myself!), I do think it is particularly important to look carefully at exactly which transport needs can be met by the motor car and which can only be met by other strategies. In London, for instance, 40 per cent of households, and over 50 per cent of old people, do not have access to a car. The prime cause of traffic congestion in central London is car-borne commuters, yet only 14 per cent of those working in central London travel by car.

A crucial question to ask ourselves is how much of a price are we prepared to pay for the apparent advantages and convenience of the existing situation? I was thrilled, therefore, to see in the Green Paper, alongside the résumé of the technological and economic measures which can be taken to reduce the impact of the car, a readiness to plan for a comprehensive range of alternatives to the car. However congested the streets, however frustrating the journey, however great the awareness of the pollution caused, we will always be reluctant to get out of our cars until the alternatives really work. However, they can be made to work, and it is difficult not to be impressed by the way in which countries like Switzerland and the Netherlands have put such policies into practice.

One of the most interesting implications of this is the challenge it poses to what many people have come to see as the tyranny of zoning – the compartmentalisation of people's lives into separate functions – working, playing, sleeping, shopping, eating – all in different places. It may give planners and local authorities a sense of order, hygiene and control, but it must surely be a less than natural order, and an illusory control. It was apparently decided after the war that the most 'efficient' way of running a city was to dissect the body politic and put all the vital organs in different specimen jars! It would seem that what is required now is a little alternative medicine . . .

I was delighted to read things in the Green Paper which are in harmony with many of the feelings I have had for several years and which, in a very small way, I have been trying to carry out in England through various organisations and agencies with which I am connected. It is crucial, I believe, to try to design new towns or quarters, or to restructure existing cities, so that the necessities of life – or some of them, at least – are close at hand; so that people can, if they choose, live and work in the same area; and so they can have access to necessary things without being forced to increase their mobility and their use of the car. I believe we could actually renew the life of our cities by renewing the life of our streets. The more that people can get where they want to be – safely and conveniently – on foot, or on a bicycle, or by efficient mass transit systems – the greater the chance of resuscitating our moribund cities.

With the opening up next year of the European Market, the competition between cities will become international. I see no reason why this should not be a force for good. There has always been competition between cities – which can have the tallest cathedral, the finest town hall, the most outspoken mayor, and so on. In the past, such competition meant producing something that benefited the whole city. It is only in recent years that competition has been reduced to an abstract no-man's-land of statistics – a land where it is considered laudable to have finished more 'housing units' than your neighbour without regard to their

quality, their design, let alone their capacity to create more sustainable living patterns. As we enter this period of European competition, I hope it will never be forgotten that an environment that is both clean and endowed with that elusive quality of 'character' is likely to be the greatest incentive to business investment. 'Adding character value' is one of the most important things that cities can now do, and such factors will doubtless loom larger and larger when firms are considering relocation.

Bringing aspects of the natural world back into our cities will be a tremendous achievement – green spaces, wildlife parks and corridors, city farms, city forests, communal gardens and parks, allotments for food production: we don't need to see these as marginal extras; as green beauty spots on the somewhat raddled countenances of our decaying cities, as it were, but as an integral part of the whole, with a potential for healing the stresses and strains to which we are all subject.

In the book I produced a few years ago, *A Vision of Britain*, I tried to lay out a simple set of principles which, it seemed to me, might provide the foundations for a more sensitive approach to architecture; one more respectful of those enduring and evocative aspects of the city fabric and landscape. My love of that particularly wonderful Italian town of Siena provided me with the basis of a belief that the production of local design guides or 'codes' could have some value in converting the general principles outlined in the Green Paper into specific practice. As I said at the beginning, we have to exercise our eyes as well as our mouths, and local codes are a very good way, I would have thought, of putting to use the experiences of those who actually live in European cities. Such codes needn't merely be about urban design, they can just as well be about energy use and waste disposal. They can set out the need for proper consultation, and the type of environmental impact assessment to be employed. These codes could be very powerful in once again creating that consensus of views upon which cities were founded in the first place.

It used to be accepted that when you crossed through the city gate you became bound by the customs of the citizens of that place. And yet it was still felt that 'Stadtluft macht frei' – the air of the city makes you free. I am sure we would all agree that all the freedoms we prize as citizens, and wish to see endure, require some framework within which to grow. What we need, I suggest, is to look again at the effectiveness of sensitive, practical codes which will give citizens once again a collective voice about their future.

We are often told that the city of the future will be nothing like the city of the past, or of the present for that matter. The Italian Futurists urged every generation to build its own city – to tear down the city of its fathers and to rebuild the city in its own image. They seemed to think that we could simply take a new identity off the peg every generation. But what would the cultural and creative heritage of such a generation be, surrounded by the rubble of past lives, with no clue as to how those lives were lived? Should we not be cherishing the best of what we have inherited, grateful for what it tells us about our history, and conscious that in many respects the principles which govern the quality of life in a city remain essentially the same from one generation to the next? I have said before that the paradox we face is that the 'Spirit of the Age' seems sadly to be that of an 'Age without Spirit'.

I believe, then, that this European Community initiative is much to be welcomed, and that both national and local initiatives must now be encouraged to rise to the challenge it poses. In just a few generations the city has become a metaphor for all that is decaying and degraded, but it was the city which first defined the kind of civilisation from which so many benefits have flowed, and it can surely do so again if we can only re-invest our material considerations with those civilising and ageless values which lie at the very core of man's universal spirit.

TO THE WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (The Brundtland Commission), Claridges Hotel, London, 22nd April, 1992.

We live in dangerous times, and I think it worth listening carefully to all those intelligent observers of the natural environment who are speaking increasingly with one, agitated voice. The difficulty, of course, is that to the vast majority of lay observers everything seems to function perfectly happily in our immediate environment. On the whole, we cannot smell, feel, hear or sense anything particularly wrong with the world about us. We have only the scientists' word to go by – and, people will say: they have got it wrong in the past, haven't they? And anyway, when all is said and done, Nature's capacity to heal itself is infinite and we must not be panicked into hasty action.

Unlike the obvious threat of a nuclear holocaust, the environmental threats we face are far from clear, and they are only too real.

There is little doubt that the report by the World Commission on Environment and Development in 1987 was the single most important document of the decade on this subject, bringing the phrase 'sustainable development' into our vocabularies.

There have certainly been some welcome changes in the last five years. Industry has begun to realise that more and more people not only care about their environment but will put their money where their principles are. This has led to the realisation (at long last!) that using energy and raw materials results less profligately in increased profitability as well as a cleaner world. Equally, more and more businesses are, to their credit, coming to recognise the crucial role they must play in the progress towards sustainable development. Instead of being seen purely as generators of environmental problems, they are beginning to see themselves, correctly, as essential participants in generating solutions.

Economists have started (at long last!) to grapple with the concept of sustainability and to question the way in which our national accounts are assessed, in order to value our natural resources and to contemplate new market instruments to encourage changes in human behaviour.

At the same time, there has been a huge surge in public concern about the environment, often expressed in support for non-governmental organisations, not just in the rich industrialised countries, but also in Eastern Europe and the Third World.

In turn, this has helped to put pressure on the politicians, nearly all of whom seem to have turned a greener shade of pale since 1987! Many still have a long way to go in realising exactly what genuinely sustainable development will eventually mean in economic and political terms, but we can all welcome the acceleration in the use of development aid and international agreements (such as the Montreal Protocol) to give substance to sustainable development and help protect the Earth's natural life-support systems.

The commission also pointed out the crucial importance of democracy and individual participation in achieving a more sustainable world. Since 1987, we have seen momentous changes in the shift towards selected and accountable government elsewhere in Africa, Latin America and in South-East Asia.

Of course, there are those who are inclined to compare developments with an earlier phase of environmental awareness in the late 60s and early 70s (with the cynical implication that today's will be equally short lived!), I would remind them of one overwhelmingly important difference: the scientific case underpinning the Environment Movement 20 years ago was decidedly patchy and invariably controversial, resting as much on bold hypothesis as on hard-nosed empirical evidence. Now, I happen to be a firm believer in the precautionary principle – recognising that the systems which keep our Earth habitable are extremely complex and may operate in ways beyond human understanding.

But the last 20 years have seen a welcome reduction in the margins of uncertainty. There is now almost total consensus within the international scientific community, as represented by the Intergovernmental Panel on Climate Change, that emissions of greenhouse gases are changing our climate. The ozone hole is a proven fact. The best biologists in the world agree that the world's biological riches – biodiversity, to use today's phrase – are being eroded at an unprecedented and alarming rate. Misuse of the land is threatening local climate, water flow and ecological stability over large areas and wasting irreplaceable assets of soil. We are undoubtedly in the midst of an ecological crisis, even though there is uncertainty about the precise way in which it will develop and the speed of that development.

It is, of course, as I said earlier, difficult to accept the existence of problems which we cannot see. Equally, it is easy to suggest that the threat is somehow being exaggerated, but the gravity of the situation was spelt out in the recent report of the Royal Society and the US National Academy of Sciences – the first issued jointly by the two leading scientific societies of the English-speaking world – which stated: 'The future of our planet is in the balance. Sustainable development can be achieved, but only if irreversible degradation of the environment can be halted in time.' They set out with great cogency their reasons for thinking this way: 'Unrestrained resource consumption for energy production and other uses, especially if the developing world strives to achieve living standards based on the same levels of consumption as the developed world, could lead to catastrophic outcomes for the global environment'. What could be clearer or more authoritative than that?

Going on to address the underlying problem of population growth, the report's authors point out that the percentage of global population that will live in the Third World will increase from 77 per cent today, to 84 per cent in 2020. Similarly, the World Health Organisation has recently stated that the most immediate problems relate to ill health and death caused by biological agents in water, food, air and soil. They point out that millions, mostly children, die every year as a direct result of a contaminated or polluted environment.

None of these bodies is known for its tendency to exaggerate, rather the reverse. This makes it all the more amazing that so many people still prefer to turn their backs on the signs of planetary stress that are by now indisputable. The issues raised are never going to be comfortable subjects for polite conversation. But I think we have to ask ourselves, firstly, whether we can continue to ignore the prospect of a virtual doubling of the world's population – to somewhere approaching ten billion – by 2050? Secondly, can we look forward to any kind of real security as the global gap between rich and poor continues to widen? If we compare the wealth *per capita* of Europe with China or India, the ratio in 1890 was 2:1. By 1940, that ratio was 40:1, today it is 70:1. With these statistics in mind, is it any wonder that the South approached the Rio conference event with open economic demands? For them, it was essentially a conference about development and justice.

I do not want to add to the controversy over cause and effect with respect to the Third World's problems. Suffice it to say that I don't, in all logic, see how any society can hope to improve its lot when population growth regularly exceeds economic growth. The factors which will reduce population are by now easily identified: a standard of health care that makes family planning viable, increased female literacy, reduced infant mortality and improved access to clean water. Achieving them is, of course, more difficult, but perhaps two simple truths need to be writ large over the portals of every international gathering about the environment: we will not slow the birth rate much until we find ways of addressing poverty. And we will not protect the environment until we address the issues of population growth and poverty in the same breath.

I can well understand why your report called for huge increases in the rates of economic growth in the Third World. But the rigour that informed your analysis of just how *unsustainable* the world economy is today, seemed, if I may say so, rather to desert you in your prescriptions for finding an appropriate way out of this all-encompassing dilemma. Is it really wise to call for such rapid growth until we can be certain that the growth which emerges will serve the people most in need and (in your much used and much abused words) 'not compromise the rights of future generations to meet *their own* needs'?

It is now widely accepted by economists that Gross National Product is merely a reasonably good indicator of the overall level of a nation's economic activity. It is a thoroughly misleading indicator of national well-being, let alone sustainability. We clearly need some measure of 'green GNP', which calculates the nation's output after deducting the depreciation on nature's capital. No business can afford to operate by eating into its capital, and in this respect nations are no different. It is encouraging that several countries are now proposing 'green GNP' measures, or some other alternative indicators. But much more effort is needed in evaluating and promoting such concepts.

All the evidence from the environmental disasters of previous generations shows that the problems were often identified at a relatively early stage, but that nothing was actually done until the economic interests of a nation state were adversely affected in a visible and incontrovertible way. Quite simply, to trigger earlier action we need to show politicians that the environment matters not just for itself, but in economic terms. We can show the effects of soil erosion by looking at the value of the lost crops resulting from the erosion. We can look at the costs of preventing floods from sea level rise. We can look at air pollution damage to buildings, crops and forests. When we do these things, the results are often startling. Mexico may be losing as much as 15 per cent of its GNP through pollution and resource degradation. Even Germany could be losing four per cent of its GNP, amounting to many billions of dollars, simply because of pollution. But the hardest thing in political terms is to persuade people that paying attention to the long-term capital assets of our natural environment is worthwhile, or possible, or even necessary, during a recession, or when you are faced with famine and grinding poverty. It takes vision and, above all, courage to speak the truth.

It seems that there are at least three strands which we need to recognise. The first is that politicians and scientists of the developed world have been preaching 'environmentalism' for over 20 years, yet the world environment has continued to deteriorate overall, especially because of the pollution generated by those same countries. We are primarily responsible for the ozone hole and the greenhouse effect, and for much of the contamination of the world's oceans. The developing countries know this, and they expect us to show that we mean what we now say by abating our own pollution, and especially that which goes beyond our own locality and becomes an international problem. Secondly, they expect that we will at least remove the barriers in the world economic and trading system that make sustainable development in the Third World more difficult. They expect us to reverse the net flow of wealth which, contrary to popular opinion, has been going from South to North for most of the past decade. They expect more liberal trading relationships that will allow products with added value to come from the developing world to the developed countries, and they seek an end to over-subsidisation, particularly of agriculture, so that their own products have more chance of competing in the world market. Thirdly, they expect us to share the best technology, so that the world really works together to achieve environmentally sound development.

In passing, I do just wonder why, in the challenges we face, we can't get away from unhelpful accusations and sensitivity over what

is referred to as 'eco-colonialism' and 'neo imperialism' and recognise each other's strengths and weaknesses? Why can't we pool our resources and tackle the unfolding crisis together? Can't we accept, at this crucial stage in the world's history, that we need to deploy the best talents from wherever they are located to where they are so urgently needed? The North has accumulated managerial and technological experience and skills which could and should be utilised in the South. At the same time, our poverty of spirit in the North needs renewing and enriching from the great reserves of insight and understanding in the South. Can we not also accept that the South has considerable justification for seeking to extract the best possible price for a commitment to the conservation and sustainable use of its own natural resources?

UNCED is but a step in the process of confronting the major challenge of our age, namely, how our growing numbers and technological power can live in harmony with the natural world. Intertwined in this great debate are a number of difficult issues of management, government and science. The East-West agenda has happily changed. The North-South agenda has replaced it in importance. All governments have to come to terms with this. Progress will only come from a combination of resources and political will.

For what it's worth, I have argued for many years the importance of the concept of stewardship in resolving some of our ecological dilemmas. For me, stewardship operates at two levels. Firstly, at the level of good housekeeping: living thriftily, saving energy, repairing, re-using and recycling, not wanting by not wasting, accepting personal responsibility, and so on. Secondly, it operates at a level which recognises that we are as much a part of the living world as it is part of us. Good stewardship celebrates the beauty and diversity of the natural world. We should not, I believe, just be 'managing the Earth's resources more efficiently' (relying on a traditional utilitarian ethic) but seeking to live in balance with the rest of creation, even if we cannot discern any direct and immediate material benefit to ourselves in that process.

This, of course, points to the need for a fundamental shift in attitudes. We have all been taught to think in a linear way; with a beginning, a middle and an end. Linearity is the concept we use to devise industrial processes in terms of inputs, processes and outputs, with waste and pollution as unintended (and until recently little considered) outputs. The solution to pollution is still, all too often, dilution. Our linear way of thinking has been a triumph in the relative short term. But now, with the doubling of world population in retrospect, with increasing demands for a higher and higher material standard of living, and with the added need to strive for sustainability, we must surely start to think again.

We must in fact get back to Nature – not in any romanticised, drop-out, 'Under the Greenwood Tree' sort of way, but through the application of both science and philosophy. From very different perspectives, both disciplines teach us that the reality of the natural world within which we live is not linear, but essentially circular. There is no such thing as 'waste' or even 'pollution' in the natural interaction of different species within their own ecosystems. This is still understood – indeed, lived out in practice – by those whom we describe, so patronisingly, as 'primitive'. As we thrash around with various theoretical definitions of the sustainability of today's economic orthodoxy – and some alternative (as yet undefined) models of progress – it remains a sobering experience to encounter sustainability in action amongst tribal people, without any great fanfares or the assistance of voluminous reports.

I am not advocating any kind of mass return to a 'hunter-gatherer' society. The real challenge is to find the right blend of dynamic Western systems, in all their purposeful linearity, with the closed loop circularity of the natural world. In effect, to combine modern science with traditional wisdom.

The quiet revolution in photovoltaic solar cell technology may provide a good model of what can be achieved. Village communities in the semi-arid tropics – some of the most fragile environments on earth – can now be provided with a non-polluting source of electricity to drive the five great liberators of development (cooking stoves, refrigerators, water pumps, radios and electric lights). They release villagers, especially women, from the tragic necessity to mortgage their future, for example, by destroying the soil, gathering fuel wood, and by running ever greater hazards of disease for themselves and their children in their search for surface water. We must also get away from the idea that this is somehow a second-best option in comparison to the Northern model.

There are huge benefits to be gained by making the best of advanced technologies – particularly in using resources more efficiently – not just in the developing world but in the developed world too. In the United Kingdom it is estimated that energy demand could be reduced by at least 20 per cent immediately, simply through the application of existing technologies, and that efficiency improvements of 30 per cent could be achieved over the next 20 years from new technology in areas such as lighting, heating and transport.

There is now a pressing need to encourage the developing countries to introduce the right kinds of industrial structures and processes, and seek to deploy the technical wisdom of the private sector in meeting these challenges. We must also recognise that much of the wealth that will fund these developments in the Third World will inevitably come from the private sector.

Governments can provide the right atmosphere, infrastructure and economic incentives, and the security that a firm needs if it is to invest. Creating the right incentive is perhaps the most important of these factors. Once they are in place, a new and creative energy is released. Positive incentives are important in enabling those companies which find the best environmental solutions to prosper in the market place, but so too are the disincentives which can be brought into effect through determined application of the 'polluter pays' principle against those who squander environmental assets or create pollution.

No speech about business and the environment would be complete without the now statutory reference to the proverbial 'level playing field'. In today's shrinking world, this is something that can only be created by governments, working together. My concern is that the levelness of the playing field sometimes seems to be given more consideration than the level at which the field itself is situated: to be effective the levelling must be upwards, not downwards! And all the factors need to be considered when setting standards, or we run the risk of solving one problem at the expense of creating or increasing another elsewhere.

Tragically, too many so-called solutions to environmental problems miss their mark because they fail to recognise the nature of the societies which have to put them into effect. Unless there is a really critical analysis of the roles of the different components of these societies – women as well is men, and young as well as old – there is every risk that the proposals will be on the wrong scale, and the communities will be left with inappropriate, imposed technology that they cannot operate. The simple formula of meeting basic needs, empowering communities, safe-guarding the environment – Primary Environmental Care – not only works; it is where the solution to everything else starts. Environment, much like charity, begins at home.

Things may be starting to improve, but the world is already littered with corroding bulldozers and mechanised farm implements, paid for by development aid, yet unworkable under the circumstances of life in rural communities. Starting with people, analysing their needs, taking account of their culture and traditional practices, making certain that the roles of all sectors of the community are understood and, above all, asking people to frame their own local

environmental goals are all prerequisites to satisfactory solutions. This is not an approach which makes headlines, or reputations – quite the reverse in fact – but it does provide the long-term gains which are the very essence of sustainability. It also undermines bureaucratic and, if we are honest, sometimes corrupt, power bases which have benefited so much from the 'top down' approach.

Establishing people as stake-holders in their own future sounds simple, but millions still have no such stakes, nor the responsibility that flows from the conferring of them. To have a stake in one's environment is to have an incentive or reason to protect it. I hope that the UNCED Declaration of Principles will make these points quite explicitly.

Of course, nothing in life is ever straightforward. Simple formulae hide complex conflicts. Somehow, a balance has to be struck between the opposite faces of the coin – between advantage and disadvantage. In the industrialised North we shall have to come to terms with the fact that there is much that can be done by improving access to markets, ensuring fairer pricing for commodities, and facilitating the flow of new capital and sophisticated technology to the South through private enterprise. But that is unlikely to be sufficient in itself. 'Justice' is the cry rising up from the South, not charity, let alone aid for aid's sake. If we insulate ourselves from that cry, we cut ourselves off from the reality of life for a very significant proportion of humanity. But justice, in fairness, also requires greater accountability and improved independent management in the South – and that is something which the southern half of the world will have to come to terms with – or we shall get nowhere.

Such open-mindedness cuts both ways. Rightly, I believe, the British Government has taken the lead in making a much more explicit linkage between aid flows and the establishment and maintenance of democracy, as well as compliance with international conventions on human rights. Here there is encouraging news. As I said earlier, democracy is starting to flower in previously barren lands. This is not, as such, a triumph of capitalism over communism, but rather a triumph of those who live with incentives over those who have had precious few. Of itself, the market system is not always enough, for markets do not in themselves result in equity. They have failings that governments sometimes have to intervene to address, working both alone and together. However unless the human spirit is first unshackled, environmental protection and development will remain just a dream for many of the world's people.

We all know that there are reciprocal obligations and expectations, North and South, that should be set against each other. What we have not yet comprehended is that sustainability can only be achieved by all of us working together, and that the noble but always rather forlorn humanitarian rhetoric about 'one world' has now become an inexorable ecological reality. Hard though it may be to grasp, there is today a thin line between apparent altruism and *realpolitik*.

I offer these thoughts precisely because I know how hard it is for politicians in office to utter them! There will certainly be both winners and losers. But so many of the things that need to be done are, ultimately, components of a virtuous circle, in which everyone wins, that I think all but the most short-sighted have good reasons for wanting to be involved in the process.

THE MEANING OF AN EARTH CHARTER

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The idea of an Earth Charter arose during the preparations for the 1992 UN Conference on Environment and Development in Rio de Janeiro, Brazil. There is much argument over what any Earth Charter should look like and what influence it should have. The view expressed here is that it should be short, simple, universal and a declaration of principle concerning the shared stewardship of the earth. To get such a Charter to work will be the great challenge. The reasons why it will be so difficult to do this, and yet why such a Charter is so desperately needed, forms the basis of this essay.

On the crucial issues of sharing the assimilative capacity of the Earth's absorptive biosphere – its oceans, its plant and animal life, and its atmosphere, all of which has the ability to absorb wastes and reconstitute the basis of new life – there is simply no agreement. The rich nations want to usurp more than their history of environmental predation and population proportions warrant. Why should the US, for example, with four per cent of the world's population, be allowed to produce over a fifth of man-caused total carbon dioxide addition to the biosphere, snatching effectively five times its share of the capability of the earth's natural systems to assimilate its excess carbon dioxide emissions? Why should impoverished nations, whose development prospects have in the past long been hampered by economic and political policies of the rich North, find that their scope for social advance and economic well-being is constrained by limits, not set by the earth, but determined on behalf of the earth, by the very powerful, who have disproportionately contributed to the narrowing of 'ecological space' in which all of humanity finds itself? The other issue on which no agreement has been reached is that of sharing the fruits of development – in the shape of 'know how' technology, management skills and basic economic support – provided through 'green cross' payments to all needy countries in order to allow nationally appropriate sustainable development to take place. Environmental charity is certainly not beginning in the rich North.

Of course the blame does not by any means lie entirely with the wealthy nations. All developing countries have created tax regimes that allow their wealthy few to exploit their precious natural resources in a wasteful and environmentally destructive manner, with devastating consequences for their own people as well as the biological richness of the planet. Similarly, all countries, again noticeably in the developing world, have allowed, or failed to control, community-level structures of exploitation and corruption that force the very poor into greater penury and even more desperate measures of environmental suicide for their own survival. Of the great global scourges of resource mismanagement – over-exploitation and widespread pollution of water, the removal of temperate and tropical forest cover, the massive disruption of coastal ecosystems, and the destruction of coral reefs and inshore fisheries – much can be laid at the door of millions of perverse decisions by desperate people whose families are destitute or dying and are trapped in a cycle of exploitation and fundamental abuse of their civil rights.

It is now possible not only to provide an assessment of the state of scientific knowledge, but also to look at the wider aspects of environment and development as they impinge on ethics, civil and ecological rights, the prospects for cooperative evolution with appropriate sanctions for those who do not abide by collective agreements. Above all, it is important to devise the means to shift political values and social behaviour to an extent that it is to be hoped will turn mankind from being a colonising and occupying species into a co-evolutionary companion within the majesty of creation. This is the true meaning of the Earth Charter, and this is probably the most important message underlying the words of Prince Charles.

Towards a global audit

In the preparations for the UN Conference the international science community tried to prepare a state of knowledge on the health of the earth. This was the result of two conferences, one held in Bergen in 1990, and a major follow-up held in Vienna in late 1991. What emerged from this state of health report was sobering but not devastating. Here is a very brief summary:

(i) The earth is amazingly resilient to change. Over the past five billion years it has transformed its entire operational chemistry and the totality of its biosphere from one dominated by carbon dioxide and methane to one rich in nitrogen and oxygen, flushed through by the great cycles of water, carbon, sulphur, nitrogen and phosphorus.

(ii) In terms of species composition the earth has taken a number of shocks, possibly as many as a dozen, when major losses of species composition took place. This can be deduced from the fossil record and from geological indicators, and suggests that a catastrophic component to evolution is part of the earth's heritage. Loss of species is therefore a natural event but at present we are causing species extinction on a time scale of decades, and humanity has little spare capacity to adjust to the consequences of a biologically impoverished earth without losing much of its own numbers.

(iii) The capacity of the earth to absorb and assimilate chemical and material change is enormous. This is the essence of the biosphere and its fluxes of chemicals and energy. But we do not know how rapidly this assimilation can take place, we have no idea of precisely how the biosphere works, and indeed may never do so in the foreseeable future. So we are playing into a mechanism whose tolerance is unknown.

(iv) The key danger areas lie in the disruption of life-support regimes amongst societies whose capabilities to respond to the threat of survival are overwhelmed. These are the final critical environmental zones – of loss of fertile land, inadequate energy supply, insufficient clean water and no means of sustainable livelihood – when innate human adjustment mechanisms are beyond self help. Needless to say there are also the zones where population growth is still rapid, for in part children are a vital source of labour to maintain the essence of family survival and to earn remittance payments. So the tragic dilemma of population growth and resource abuse interlocks.

(v) The loss of surface cover, especially in the tropics, will have important implications for climate. Forests worldwide absorb and re-emit carbon dioxide and largely account for the annual flux of this gas. Current rates of removal of forests accounts for about 20 per cent of excess carbon dioxide, so their further disappearance will contribute to global warming. Over the past century forest removal has contributed 125 million tons to the atmosphere compared to an increase of 200 billion tons from industrial

sources. More significantly, tropical forests act as a vital regulator of the regional water cycle, their removal will lead to a drying out of surrounding climates with potentially devastating implications for their impoverished peoples. The whole of the 'global heat engine' could be affected. In this way critical environmental zones will spread in a cascading manner.

(vi) The population growth issue is serious not, only because of the obvious implications for global change. Any measure to reduce population will result inevitably in a noticeable 'age-shift' in future populations. This is already serious for the developed countries and for the economics of dependency. But in developing countries the consequences of successfully rapid birth reduction could be economically devastating. Societies will have to prepare themselves for a radically different approach towards social welfare, health care, pension schemes and the character of labour markets. The practicalities of self-help and household-level care schemes will become ever more pressing. This is why the concept of sustainability is so powerful.

(vii) The major resource 'scares' lie in forests, water and soil. In every case the cost of exploitation is much higher than the value of those resources in the commodities exchanged. A typical tropical forest could be sustainably managed and produce more revenue per hectare from its products and its environmental service functions of water cycling, soil stability and flood retention, than by short-term selling of its timber on the international hardwood market. Similarly, clean water in a river or in the ground is worth more than what customers presently pay for it from the tap. This means that ecologically based economics must become the basis for valuing natural resources. To achieve this will require a marriage of science, community participation and ethics. This outreach into a form of public friendly or vernacular science will become one of the most testing challenges for the scientific community in the years ahead.

(viii) One unanswered question is the long-term implications of severe environmental criticality for peace and security of the globe. Already there are some 27 million ecological refugees, forced out of their homelands by starvation and ecological destitution. This number could swell significantly. Many are resourceful and proud people who are truly capable of finding their feet given any chance at all. Some will seek to emigrate to what they regard as richer pastures. This is already causing political difficulty in a number of European countries, and may well lead to ethnic conflict in some regions. There is no easy solution to this problem, though it is important to try to retain people, by choice, in the lands of their natural heritage.

(ix) Recent studies have shown that there is a connection between civil war and environmental destruction, and that one creates the other. This is evidently the case in the Sudan and Sahelian countries of sub-Saharan Africa. A study by the International Union for the Conservation of Nature suggests that following the 1981-82 drought in Ethiopia, over 1.5 million people were forcibly moved to more fertile valleys in the west and south. Of this group, 600,000 were placed in areas where they had no folk knowledge of the climate or soils and were exposed to malaria, sleeping sickness and yellow fever. The fact that the government was in conflict with an insurgent north contributed to the crisis. The link between environmental well-being and civil rights is becoming ever more obvious.

Prospects for an Earth Charter

The scientific consensus, therefore, is that there is still time to adjust, that the earth is robust but only on its terms and time scales, and that the threshold of environmental criticality has been crossed in a number of areas and is spreading fast. There is also a widespread consensus in favour of sharing, to enable peace to gain a toehold – for transforming military budgets and personnel into environmentally sustaining projects and resource managers – and that appropriate pricing of resource use, to reflect natural as well as human rights to coexist, can combine to provide the funds, the technology and the know how (much of which exists in the traditional cultures of many of the world's peoples) to permit the earth to remain habitable. The difficulty, as always, is how we get from here to there. This does present a fundamental dilemma. Humanity is both good and evil: it destroys but can recreate and restore. Humans have rational minds and emotional souls. Alone amongst all living things, humans have a conscience, so can judge right and wrong and comprehend the relationship between isolated individual behaviour and collective long-term well-being. Throughout history all human communities have brought themselves to the edge of self-destruction through environmental abuse. In everyone's heart the echoes of the very beginning of creation still faintly sound. An Earth Charter is vital to recreate this echo and to fill the balance in favour of salvation for life on earth. A general declaration of earth rights must be translated into national constitutions, codes of law and binding international commitments. Such a charter must pave the way for internationally supported projects in sustainable levels of development, based as far as possible on self-reliance, where the cycling of natural functions are awarded proper economic value and respect. In this objective, the environmental movement is becoming part of a much more fundamental process of social, ethical and political transformation that is just beginning to sweep the globe.

However, one must not be too optimistic. There is still little political will to accept the consequences of this transformation, and powerful interests, backed by apathy and greed, are not easily dismantled. Tragically, only even more serious crises, sufficiently widespread in their economic and military repercussions manifestly to affect the interests of the wealthy, will be necessary before a proper Earth Charter comes into force.

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SUSTAINABILITY IN AGRICULTURE

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Director of the Council for the Protection of Rural England

When the Prince of Wales addressed the Council of the Royal Agricultural Society of England in March 1991, he must have known that he risked stirring strong emotions; but it is unlikely he could have predicted the debate that followed, which has rocked the agricultural establishment in the UK and left a fundamentally important issue – sustainability in agriculture – as elusive as ever.

For UK environmentalists, agricultural policy is one of the most important issues with which we have to grapple. 80 per cent of our land surface is farmed, and the pattern of land use and farming type reflects the diversity of geology, topography, history and culture that is a feature of the British Isles. From an environmental point of view, the way the land is farmed can either enhance or wreak great damage on the wildlife, landscape and resource value of the land. It is widely accepted that over the last 40 or 50 years the impact of changes in agricultural policy and practice on the physical environment has been largely negative. Intensification and mechanisation fuelled by high guaranteed prices have contributed to the loss of many semi-natural habitats, landscape degradation, the widespread and increasingly intensive application of artificial fertilisers and pesticides, and in some locations to a decline in soil quality and structure itself. Agriculture's recent decline has brought another set of pressures, as farmers have been forced to respond in whatever way they can (often by damaging diversification) to falling real incomes and land value.

If agricultural protectionism had many environmental disadvantages, it also brought some benefits. The value attached to the productive capability of agricultural land immediately after the second world war provided a strong presumption against the loss of agricultural land to development. This played a key role in the success of the post-war planning system in maintaining a clear division between town and country, resisting urban sprawl into the countryside and minimising the green-field sites taken by housing and other development. When in 1987 the Government decided that such special safeguards given to agricultural land for its productive value could not longer be justified, it was only persuaded under pressure to replace this emphasis by references to the need to protect the countryside 'for its own sake' – the first explicit and vital recognition that the countryside is of value for its inherent qualities.

This philosophy lies at the heart of debate into which the Prince of Wales has entered. For agricultural policy now stands at a threshold. Negotiations at international and EC levels for the inclusion of agriculture in the General Agreement on Tariffs and Trade and reform of the Common Agricultural Policy offer the prospect of radical reform. There is a consensus that only radical reform will allow the problems of the sheer cost of a highly interventionist agricultural policy, the waste and cost of food surpluses and the consequential environmental and social damage they cause to be addressed. But there the consensus ends. There is no shortage of reform options on offer; all have their supporters and opponents. However, few of the leading figures in the debate appear to have asked the question, 'What is agricultural policy, and thereby the countryside for?'

The Prince of Wales struck at the very heart of the question when he asked RASE to examine the scope for re-orienting agricultural policy in ways that would allow the establishment of a sound and sustainable relationship with the land. It is perhaps inevitable, given the producer emphasis that has dominated post-war agricultural policy and the huge vested interests at stake in all parts of the food chain, not least within RASE, that the question appeared simply to ask, 'Can we have our cake and eat it too?'

RASE's response to the Prince of Wales, in a report of a working party chaired by Sir Derek Barber, did not mince its words in answering, basically, 'yes'. Sir Derek's report said, in essence, that sustainability could be found, provided agriculture was profitable. To be profitable, it argued, requires the assiduous application of contemporary skills, the effective operation of the market, and the minimum of controls. The report also stated that this can be achieved without damage to the environment.

The breathtaking briskness with which legitimate public concerns about the environmental implications of contemporary farming were dismissed, was the cause of one set of angry responses to the report. The market solution advocated – the phased but dramatic reduction of price support – was the other; resisted strongly by powerful sections of the farming community but advocated (with conditions) by many environmental groups. The report received a resounding raspberry from most commentators, although for very different reasons. It is clear that the RASE report does not address the issue of sustainability on the terms set out by the Prince of Wales. Yet perhaps it was expecting too much to hope that the elusive concept of sustainability could be pinned down so neatly. The range of issues to be addressed by a truly sustainable approach to agriculture is indeed formidable: environmental and social implications are central; but so too is the whole energy cycle of agriculture and the food chain; the terms and conditions of financial support, trade and market operation; animal welfare and the use of artificial additives to both soil and agricultural products.

What might a genuinely sustainable approach to agricultural policy involve? The first prerequisite for the debate is a recognition that much current agricultural practice is unsustainable. Large parts of the farming community have yet to face this unpalatable truth – but the prospects for effective reform are minimal unless this nettle is grasped. Second, is the need for the agricultural policy reform debate to be conducted on terms that recognise the fundamental requirements of sustainability. The parameters will be broad, but such an approach would rule out the worst excesses of an untargeted set-aside policy or the maintenance of artificially high guaranteed prices. Third, must come a more detailed analysis of the ways in which the physical, human and cultural resources of agriculture can be integrated and used sustainably – that is, in ways that meet the needs of the present without compromising the ability of future generations to meet their own needs.

The Prince of Wales has put his finger on an issue that arouses enormous public interest and is central to the environmental debate. He has asked difficult questions which are proving difficult to answer: crucial issues about what we want from our countryside, and what obligations we have to preserve it for future generations. Sustainability as an issue in agriculture will not go away – the debate has only just begun.

Opposite: Views of agricultural England

THE PRINCE AND THE PLANET

GEOFFREY LEAN
Environment Correspondent

John Galsworthy had it right: 'Public opinion's always in advance of the law'. But even he might be a bit puzzled by the gap in today's Britain, between government and the people over environmental issues. Great public awareness of their importance is only matched by the size of the political failure to get to grips with them. The days are long gone when the environment was a minority interest – except, that is, at the top.

By and large the so-called decision makers and opinion formers trail far behind the rest of the country in their perception of the importance of sustainable development – growth that respects the environment and does not compromise the needs of future generations, 'economics', as EF Schumacher put it in the subtitle to *Small is Beautiful*, 'as if people mattered'. Prince Charles is a notable, and sometimes lonely, exception. As one of only a handful of public figures who has been promoting this green revolution for the last 20 years, he can claim to have been ahead not just of the law, but of popular wisdom as well.

If the law was closely following public opinion Britain would indeed be a green, and more pleasant, land. Opinion polls may not be infallible, but they do appear to depict an extraordinary consensus stretching across all ages, classes and political affiliations – and a wide variety of issues. Different surveys reveal 84 per cent of Britons stating that more should be done to protect the countryside, 79 per cent calling for stronger action to combat global warming, another 79 per cent wanting stricter controls on the disposal of nuclear waste, 77 per cent favouring tougher regulations on the use of fertilisers and pesticides, and so on, down most of the environmental catechism.

Other polls indicate that the environment remains consistently high in public concern. Respondents named the environment as the most important issue facing the country in the summers of 1989 and 1990. The Gulf War and the worsening recession predictably pushed it down the rank order; but even at its lowest, respondents representing some one and a half million people still put it in the top two. By the time of the General Election in April 1992 this had risen to two and a half million people – curiously enough about the same number as voted Green in the European elections three years before.

Even as the relative importance of the issue fluctuated, the public's commitment to it seemed to increase. MORI surveys the practical actions people take out of concern for the environment, including giving money to environment or development charities, joining pressure groups, using lead-free or buying particular goods for environmental reasons; it lists 11 such activities and classes those who carry out five or more as 'environmental activists'. By the summer of 1991, it found one third of Britons met this criteria; twice as many as two years before, when green issues dominated the political agenda. Mintel, surveying green consumerism at around the same time, classed four out of ten Britons as 'Dark Greens', always buying environmentally friendly products when possible; a further 20 per cent were 'Pale Greens', tending to buy such products when they came across them. And ICM has found year after year that a consistent 80 per cent of people believe that 'government should give a higher priority to environmental policy even if this means higher prices for some goods'.

Of course, such polls should be taken with a pinch of additive-free sea salt. The gap between awareness and action can apply here too; just as people do not always vote as they tell the pollsters they will, so good intentions do not necessarily survive an encounter with reality. 11 years ago, at the height of the lead-in-petrol controversy, 89 per cent of respondents told one poll that they would willingly pay more for lead-free fuel; today less than half of Britain's motorists actually do.

Even allowing for a measure of benign hypocrisy, the figures are extraordinary. Yet few politicians have made a serious attempt to mobilise this potential force. At one stage it seemed as if Mrs Thatcher, with her phenomenal instinct for a popular issue, was going to grasp the opportunity in her celebrated 'green conversion' in September 1988. But, despite becoming aware of the importance of the issues she shied away from taking action: her Government's White Paper, published two years later, contained virtually no new initiatives whatsoever. Britain's Government has become greener, but very gradually, and much of the impetus – on cleaning up beaches and drinking water, car exhausts and power stations – has come from Brussels and Strasbourg rather than Whitehall and Westminster.

The Labour Party, although also greener than a few years ago, has not seized the opportunity either. Indeed, the two main parties have confirmed each other in the palest of greenery: because there has not been much to choose between them, there has been no pressure on either to do more. The environment featured little in the battle between the two biggest parties in the 1992 election campaign. Labour's lack of interest in green issues typified its failures to appeal to a sense of vision in its campaign, to capture a significant majority among young voters, and indeed, to provide positive reasons for its election.

The Liberal Democrats did place the environment at the centre of their platform in 1990, adopting a series of policies that would bring it to the very heart of national decision-making. Perhaps it is no coincidence that the revival of the Liberal Democrats, from the depths that followed the break-up of the Alliance – and at a time when the centre was being squeezed – dates from then. And yet they, too, failed to make it an issue during the election; although surveys measuring voter reactions to party political broadcasts showed that approval rates soared whenever they mentioned the environment.

The huge vote for the Greens in 1989 may have been a surprise, but it was no freak: more than six months earlier, a MORI poll had shown that more than half of those likely to vote in the European elections had said that environmental policies would be 'crucial' or 'very important' in determining who they supported. The rapid decline in Green support, as the anarchic character and frequently zany policies of the party became better known, may have led the two main parties to dismiss it as a flash in the pan – but the voters have remained available, though largely ignored.

Why has there been so little effort to translate environmental awareness into policy, when green issues attract such widespread support and when a large minority of voters are ready to let them determine who they support? Part of the answer is the cynical belief that people pay more attention to their pocket books when voting than to the hearts that beat an inch or two beneath them – a belief that the election has tended to reinforce. But this is more an illustration of the problem than an explanation. Great movements of opinion are inspired by more than money; where there is no vision, to adapt *Proverbs*, politicians as well as the people ultimately perish.

I suspect that the main problem is that most senior politicians have not been able to get their

heads around the issues, partly because of the structure of our democracy. The issue of sustainable development does not fit neatly into the confrontational matrix of British politics. It cuts across the political parties; its friends – and enemies – are to be found on both sides of Parliament. It is a relatively new issue, not current when most senior politicians were forming their personal sets of beliefs; thus there is a distinct generational fault line – generally speaking, younger politicians are greener. And by its very nature it concerns the long term, while politics are increasingly concerned with the short; there are few environmental problems that respond to action within the lifetime of parliament, and some measures, such as those to tackle global warming or the destruction of the ozone layer, will not take full effect for decades.

My own profession, journalism, has been even slower to get to the point. Fleet Street, as it used be, has always been a conservative institution, surprisingly slow to catch up with new movements of opinion. The first economics correspondent on a national newspaper, Andrew Schonfield at *The Observer*, was only appointed in 1958. I have been lucky to be on the same paper and to specialise in environmental issues there, and on the *Yorkshire Post* for over 20 years. No other national paper has had continuous specialist coverage further back than six or seven years. Newspapermen, like politicians, have tended not to see the importance of issues that are not the stuff of routine Parliamentary confrontation. For many, too, the environment has been a new subject, arriving after they originally formed their news values; and, yet, because of the brief flare of interest in the early 70s it was, paradoxically, also often thought to be passé. Above all, perhaps, they find it hard to get to grips with a subject which is about processes, while newspapers concern themselves with events. In the election the media paid even less attention to the environment than the politicians; the parties at last went though the motions of showing concern, but went largely unreported in doing so.

Fleet Street, Westminster and Whitehall reflect each others' priorities, even when these are at variance with those of the rest of the country. The environment illustrates the point. All the evidence – the polls, the increase in the membership of environmental groups, the surveys we ourselves have done at *The Observer* – suggests a steady growth in importance among the public at large for at least a decade. Yet the establishment and the chattering classes of a few square miles in the heart of the capital seemed detached from this development. Until three or four years ago they ignored it, but since then they have swung wildly with the fashion, apparently out of kilter with a much steadier mood in country as a whole.

By contrast, Prince Charles, at the apex of the establishment, has proved to be in touch with the public mood. Often portrayed, in some newspapers, as a mildly eccentric figure obsessed with greenery and set apart from ordinary life, he has proved to represent the views of their readers more accurately in this area than they do. His interest in the environment stretches back some 20 years, and lately, he has turned out to be one of the most effective greens in Britain.

Firstly, he reaches the parts other communicators can't reach. Perhaps arrogantly, I was disappointed by the BBC film, whose script is published in this issue; it seemed to me to cover old ground and say little that was new. But I found that it convinced people who I had been trying, in vain, to persuade for many years. Secondly, he often acts as a catalyst, bridging the gap between awareness and action. The most famous example is in architecture where his 'monstrous carbuncle' speech undoubtedly articulated widespread, and frustrated, public feeling. It led to changes, and not merely in the design of the Sainsbury Wing of the National Gallery. But there are other less well known and more important instances to my mind.

One such occurred at his opening speech at the North Sea Conference in London in November 1987. Several countries, and the environmental groups, were pressing for recognition of the so called 'precautionary principle', that measures should be taken to prevent damage even when it was not proven conclusively that they were needed. The British Government opposed this vigorously, arguing against precipitate action until more was known, and saying even then it should be 'cost-effective'. The Prince, instead of confining himself to the banal courtesies usually expected in opening speeches, attacked this position head on:

'Some argue', he said, 'that we do not have enough proof of danger to justify stricter controls on dumping to warrant the extra expenditure involved. They say we must wait for science to provide that proof. If science has taught us anything, however, it is that the environment is full of uncertainty. It makes no sense to test it to destruction. While we wait for the doctor's diagnosis, the patient may die. We are right, I believe, to take the precautionary line.' And, he added that the people of Europe wanted a healthy environment, even if there was a price to pay. Pre-empted by its future monarch, Britain conceded the 'precautionary principle' and much else besides, and the conference saw the beginning of a practical programme to clean up the North Sea.

In April 1991 Prince Charles organised a seminar on board the *Britannia* in the Amazon, which drew together key figures preparing for the 1992 Earth Summit in Rio. Similar seminars have been held at home, including one at Sandringham in April 1992 on the controversial future of nature conservation in Scotland, which saw the beginnings of a rapprochement among old adversaries. He has taken British businessmen to Germany and the Netherlands to learn about new technologies to combat pollution, and raises environmental issues with governments from India to Brazil.

It may be that before long the opinion formers and decision makers begin to catch up with the people and the prince. Thatcherism is fading, and the General Election has done little to hinder its eclipse. Despite the late green pronouncements by its founder, it embodied an emphasis on short term profit, a distrust of internationalism, and a dislike of regulation. I believe it was a diversion which cost the world its best chance to meet the growing environment and development crisis. In the mid 70s, as the limitations of narrow Keynsianism were becoming evident and as the reverberations of the 1974 oil shock were underlining the world's interdependence, there was a window of opportunity. The great Barbara Ward used to emphasise the choice between a new Marshall Plan, that would economically enfranchise the world's poor, and the '1930s'. But monetarism, at first a necessary discipline, became an overarching dogma that swept Britain first, then the world. We got the 30s. Twice.

Now the egotistical 80s are giving way to the nervous 90s, a decade of confident materialism to an era of anxiety. Undermined by the twin depressions of the 80s, unsettled by the rise of nationalism, unprepared for growing ecological instability, people are becoming uneasy about the future. The concern could well turn further inwards, fostering more concentration on sectional advantage; the self-interest sanctioned, even sanctified, during the 80s will not easily diminish.

Yet there is a countercurrent, towards greater internationalism and a more unselfish relationship with nature and the rest of the world. The concept of sustainable development articulated in the initially unpromising Brundtland report is steadily gaining ground. I would hazard a guess that eventually it becomes the new orthodoxy. The growing seriousness of the environment and development crisis, the underlying strength of public support, and – above all – the commitment of the young is likely to initiate this.

I am less optimistic that this will happen in time. The 90s appear to be a crucial decade: the last real chance to minimise global warming, to control ozone depletion, to conserve much of the world's precious topsoil and save its remaining forests, to reverse the downward spiral of poverty in the Third World. Governments will eventually address these crises; but they may well come to them too late. The best hope lies not with the powerful, but with the growing weight of public opinion for which Prince Charles speaks. It is the only force potent enough to bring about the change. For as Mark Twain's collaborator Charles Dudley Warner, put it: 'Public opinion is stronger than the legislator – and nearly as strong as the Ten Commandments.'

THE ENVIRONMENT: A CHRISTIAN VIEW

MICHAEL MANN
Former Dean of Windsor

When the Christian views with concern some of the environmental issues facing humanity, he finds himself at something of a disadvantage. Traditionally, in coming to a judgement, Christians have been taught to rely on three main sources of authority. Firstly, the authority and wisdom of the Scriptures; secondly the weight of 2,000 years of Christian experience, and its distillation by the Church; and thirdly, the guidance of the Holy Spirit speaking both individually and collectively. Each of these three sources used to check and counterbalance the other two in varying degrees, with various traditions within the Christian family giving more or less importance to particular strands.

But today humanity is faced with two major threats to the environment, which were unknown to the writers of the Bible, or, indeed, to past generations. The highly successful economic strategy of the wealthier nations, backed as it is by technological innovation, has speeded up the pace of change in a way that is entirely new. Christians bear their share of responsibility for this acceleration, for it has been the Christian insistence upon the search for truth, wherever that may lead, that has, in the past, given through education and research, the impetus for the acquisition of more and more knowledge. The second challenge comes from the increasing pace in the growth of the world's population. More and more people put more and more pressure upon land, they demand more housing, more industry, more water and more materials of all sorts. What used to be seen as the unlimited bounty of the earth's resources, now presents a very different picture, and increasing prosperity merely accelerates the pressures upon available finite resources. I went to Nigeria in 1946 when the population was estimated to be 27 million; today, 46 years later, it is well over 100 million. The earth cannot be made to grow, and we are using its resources faster than many can be generated. So an ever-growing human flock makes increasing demands upon finite resources.

The scale of these pressures was beyond the experience of the writers of the books of the Bible, and was largely unknown to earlier generations. There had been disasters, and the very success of many Biblical civilisations resulted in the exploitation of natural resources to satisfy the demand of a growing population needing food, building materials and fuel. Some of the most fertile areas of former times are the deserts of today, but these still tended to be local problems, and there was still room to move elsewhere. The Bible is full of references to the right use of the natural order, but it was for an environment that still seemed timeless and stable. That stability is no longer with us.

A number of core themes run through the books of the Old Testament. Firstly, God is a Creator god who makes everything, and sees that it is very good. God gives man dominion over the natural order but this dominion is never meant to be a licence to exploit selfishly solely for his own benefit. The dominion accorded to mankind is derived from man being made in the image of God. The authority given to man is to co-operate in the ongoing work of creation, and it is a trust to be shared with God.

But if we accept God as Creator, then we have to accept that he is responsible for some of the dangerous and unpleasant aspects of his creation as well as the good things. Predation and cruelty are a part of the natural order, as are some of the circumstances that cause 'natural disasters'. It is not sufficient for Christians to adopt simplistic approaches to the complexities of a natural order, which has always posed difficult moral dilemmas of cost and advantage. Secondly, the story of the Fall is fundamental, for it speaks of the human relationship to the natural environment. It warns that rebellion against the purposes of God has the effect of disrupting relationships between humans, and between humans and nature. God made the earth to be fruitful, and we ought to see ourselves as God's agents in maintaining and enjoying that fruitfulness. We need to respect the fact that we ourselves are limited by God's design, and that we therefore reach the created order at our own peril. If we believe that we are responsible to a God, who made us and all things, then we ourselves have a duty and responsibility to all those created things. The third great theme which runs through the Old Testament is that of 'wisdom and justice': 'And God gave Solomon wisdom and understanding beyond measure. He spoke of trees, from the cedar that is in Lebanon to the hyssop that grows out of the wall; He spoke also of beasts and of birds and of reptiles and of fish.' Isaiah says, 'Judgement shall dwell in the wilderness, and righteousness shall abide in the fruitful field'. The Prophets speak of a growing awareness of the need to enhance the quality of life. Then the wisdom literature points out the difference between knowledge and wisdom. In our society, where culture is dominated by the disciplines of scientific endeavour based upon knowledge, it is salutary to remember that knowledge needs to be applied with wisdom, and with understanding of both the short and long-term consequences.

Throughout the New Testament, the harmony established by Jesus with nature is apparent, as is Jesus' sensitivity towards the natural order. Obedience to the will of God results in harmony between God and man, and between man and nature. It is a contradiction for us to hope to live in sympathy and harmony with our fellow men, when we exploit and neglect the needs of the natural order.

Jesus also showed us the folly of trying to establish what today are loosely termed our 'rights'. The modern preoccupation with 'rights' eventually ends up by reducing them. To try to define 'rights' inevitably leads to a limitation of one's own responsibilities. When the lawyer asked Jesus, 'Who is my neighbour?' Jesus turned the question around by asking 'Who proved to be neighbour to the Samaritan?' The more that responsibility is confined within conditions and limits, the more the rights of others are diminished. Accountability is a legal term with legally defined limits, but Jesus taught us that responsibility is a moral term and that it has no limits. Man's responsibility to his fellow men, and to that environment of which he is a part, has no limits.

But the greatest message of the New Testament is that God is love. Humanity is too often motivated by fear – fear of our fellow men, or even fear of survival. But the highest motivation springs from a love of God, and thereby of all God's works, including man and the natural order. But because of our human limitations man has to be humbly aware of his ability to do harm, as well as good, to God's creation. The natural order lays down a law of cause and effect. What in the short term may seem desirable, may have damaging long term consequences. Transgressing the natural law can produce its own

nemesis, and it is sad that so often humans only learn this truth the hard way. We cannot accuse God of vindictiveness when man deliberately breaks the laws of nature. Certain actions do produce certain results; if you stick your hand into the fire, you are liable to be burnt.

If the language of the Bible describes a Creator god in terms of a stable and ordered world, today the face of the earth is changing so rapidly that even people of middle age are aware of the changes that are taking place in their own lifetime; pollution, population growth, global warming, the disappearance of natural forests, the extinction of animals and plants, have all become matters of concern within very recent human experience. The Church is being asked to address new problems and many of these raise grave issues of human need and justice. When the writers of *Genesis* made God say 'Be fruitful and multiply', it was to an environment that was able to cope with expansion – this is no longer the situation. And so we are posed with some cruel dilemmas; all those who are concerned with the environment are rightly alarmed at the destruction of the rainforests, for instance. However, Brazilian peasants and ranchers trying to eke out a living by clearing the Amazon jungle do not see it that way, any more than the West African farmer extracting timber from the Equatorial rainforests. These people have some justice when they feel that although it may seem acceptable for people of affluent countries to criticise their habits, they, in their poverty, are struggling to keep alive.

Such difficulties are exacerbated by the fact that the highest rates of population growth occur in the very areas least able to sustain such growth, and where the overall standards of living are at their lowest. The fact that we seem reluctant to face is that the world's population is growing at a rate faster than the natural system is likely to be able to support, the pace of the increase is exponential.

From the earliest days, Christians have had to cope with change, and they have themselves been agents of that change. The twin problems of unlimited economic growth in the wealthier countries, combined with the exponential growth of population in the poorer areas, raise multiple issues of justice, and indeed, of survival. Sustainable justice is probably still just within our grasp, especially if the brilliance of science and technology can be applied unselfishly to address these two challenges. What has to be said is that at present the political will to achieve that justice seems to be lacking. Political sights are set too often upon short-term selfish aims, which will give answers of quantity, where there is too little concern for the quality of life for all.

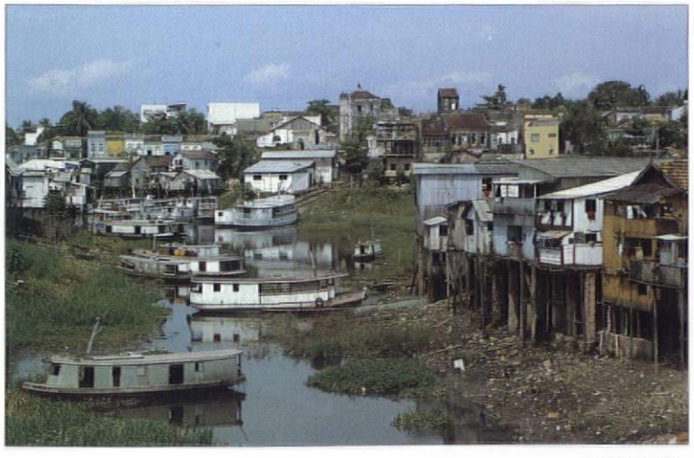
We just do not know what the effects of the cumulative strains we are placing upon the world's systems are likely to be. We cannot tell whether things are running down, or whether there is a breaking point, and if there is, when or where it will be.

Bishop John Taylor has made the point that in all our varied and manifold responses towards nature, we have a means of hope. For it is the function of a kaleidoscope to convert chaos into symmetry, and to make a pattern out of confusion. We need to approach each issue and question from many angles, for truth is multi-faceted. The Psalmist has said that 'Without vision, the people perish'. It is that vision, inspired by the love of God, and of all aspects of his creation, that is needed so urgently.

We are stewards of God's creation. A steward does not exploit, neglect or seek to avoid his responsibility. As a trustee he has a responsibility not only to the present, but also to the future. We are trustees of the natural order, and responsible for it, and that responsibility includes seeking to leave our inheritance in at least as good an order as we found it. If possible, we should seek to enhance our inheritance. We may even look upon ourselves as companions with the natural order, of which we are a part, and with which we are mutually interdependent. We co-exist and share our world together, rather than seeking to dominate, confront and control it.

There is a certain sadness in the fact that Western civilisation seems to have become locked into an economic system that demands constantly increasing material growth, whilst neglecting spiritual and moral growth. We seem addicted to wanting more and more things for more and more people, insisting upon quantity rather than quality, and thereby destroying the very quality that makes life worthwhile. The standard of living enjoyed by Japan, America and Western Europe is never likely to be achieved by the other 80 per cent of the world's population. Added to this, material advances in the richer countries will too often outstrip progress in the poorer areas, thus constantly widening the gap between the 'haves' and the 'have-nots'. Even solely in human terms, we are chasing an illusion, and one that takes little cognisance of justice.

Even those who are concerned with matters of environmental importance too often concentrate on this or that effect of human irresponsibility – this is merely to be blinded by the symptoms, rather than going for the causes. Until we address the two root causes of population explosion and economic greed, we shall be merely fiddling, whilst Rome continues to burn. We need to free ourselves from an ethos that always demands material answers, when the root causes of our difficulties are moral and spiritual. Time may not be on our side.



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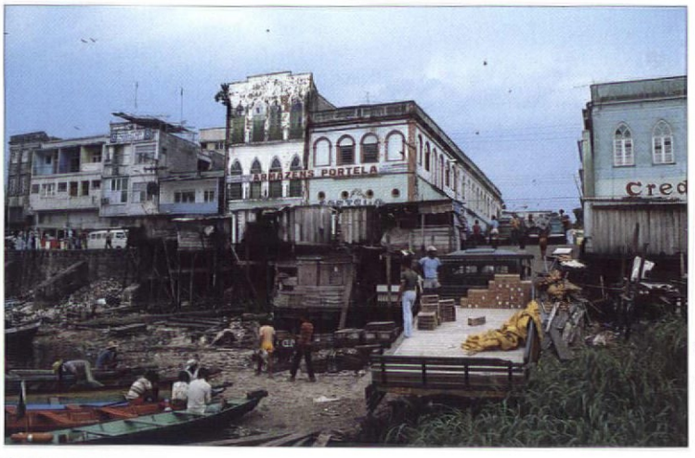

Andrea Bettella

MANAUS, THE AMAZON, BRAZIL

ECONOMICS AND GAIA

DAVID PEARCE
Professor of Economics

Until recently, economists have not been thought of as friends of the earth. In the popular view, economics has something to do with greed and avarice. It is the *cause* of environmental destruction, not the remedy. Things have changed. Now, if the need is for a sustainable solution to environmental problems, the environmental economist is one of the first to be called on. It isn't easy to say why this change has occurred. Environmental economics is still a young subject – perhaps 20 to 25 years old as an integrated body of thought. Like much economics, it has been fairly esoteric, understood by few and practised by fewer still. Perhaps the source of its recognition lies in an eventual closing of the logical circle: if economics is somehow to blame for environmental problems, shouldn't that mean that the cure for those problems must also lie in the economy? The idea that it does is at the heart of environmental economics.

The clue to demonstrating the role of economics in solving environmental problems lies not in economics itself, but in the laws of thermodynamics. Every schoolboy and schoolgirl is taught that we cannot create or destroy matter or energy. But any economy, however it is managed or mismanaged, can be thought of as a complex system for converting raw materials and energy from being useless to being useful for humankind. The bigger the economy grows, the more it is likely to use up more and more energy, more and more raw materials. The greater the level of economic activity, the more materials and energy tend to go through the system. This is what tends to happen, but it need not – an important point to be returned to.

Thermodynamics come in when we realise that all the materials and energy used in the economy must reappear somewhere. They cannot be spirited away. They end up as waste – solid waste that goes to landfill sites, gaseous emissions that go into the atmosphere, effluent that goes into the rivers and the sea. All economic actions, then, must have a counterpart effect on the environment. Resources are used up, waste is thrown away. That is the essential link between economy and environment. Economic activities that do not use up materials and energy are not easy to think of. Even if we pay to contemplate our navels, we shall need food at some stage or other.

While the link between economy and environment is immutable the *quantitative nature* of that link can be changed. Between 1970 and 1980 the UK economy *grew* by over 30 per cent. Yet its consumption of cement, energy, crude steel and the weight of freight transport actually *went down*. Sulphur oxide emissions fell by over 40 per cent. This means that economic activity can rise but the 'throughput' of energy and materials can fall. The annual 'insult' to the environment must be correspondingly less than it would have been without this 'de-linking' or 'de-coupling'. The example is chosen not to suggest that the UK's environment is somehow in an acceptable state. What matters is that we see that economic growth and environmental deterioration do not *have* to be linked. More to the point the reduced materials and energy use was achieved without there being very aggressive environmental policies in place. Imagine what could be achieved if governments set out *deliberately* to uncouple the economy from its environmental impacts.

How might this be done? Environmental economists tend to look for the causes of environmental destruction in the way the economy is managed. Find the cause and we have a good idea of the cure. A glance at Eastern Europe provides some clues. In all East European economies there has been no decoupling of economy and environment. As economies have grown, the environment has become worse. In large part, this is due to their stage of industrial development, relying heavily, as they do, on the industries that brought major pollution to Britain in the 19th century. As they develop we can expect the pollution insult to be lowered. In part, however, high environmental damage is due to incorrect policies. Pollution fines and charges, for example, exist but they are so small that no one has any incentive to take notice of them. Moreover, even if a fine has to be paid, it can be passed on to consumers in higher prices or simply recorded as a reduction in profit. Since the planning system operates by setting production targets, no one has much interest in profit levels either.

The Eastern European example suggests that centrally planned systems tend to fail the environment because no one has an *incentive* to care for it. Moralising, preaching, exhorting people to care for the environment are all understandable and worthy reactions to environmental degradation. They will achieve little or nothing without the creations of incentives. And the most powerful incentives are economic. Once people realise that the environment is not a free commodity, they will respect it in the same way they respect works of art or fine antiques. If polluters were obliged to pay a charge for every tonne of carbon dioxide they emit, or for every cubic metre of effluent discharged, they would soon look at the environment in a different way. Such 'pollution charges' would encourage the adoption of abatement technology to reduce emissions and hence reduce the pollution bill that has to be paid. Moreover, by introducing abatement technology, the link between emission and economic activity is broken – we achieve the decoupling we require. One of the major clues to environmental degradation lies in the fact that we pay very little for our use of the environment, and sometimes, as in the case of greenhouse gas pollutants, nothing at all. The examples are many. If irrigation water is under-priced, as it is in California, it will be over-used, with deleterious consequences for the environments containing the water resources. If we subsidise food production in such a way that the farmer gets more money the more acreage is put under crops – as is the case with the Common Agricultural Policy – then it should be no surprise that hedgerows will be removed and fertilisers used intensively. The answer should not be one of paying farmers not to grow crops, but of removing the subsidies that cause the problem in the first place.

The role of price as an incentive shows up just as strongly in developing countries, sometimes more so. Tropical deforestation is frequently encouraged by governments who actually subsidise the activities of those who clear the forest. In Brazil, until recently, large cattle ranches received subsidies of sufficient scale to overcome the inherently unprofitable nature of cattle ranching in many areas of the Amazon. Moreover, the subsidies were not given to small ranches, but to large ranches. The subsidies cost the Brazilian governments billions of dollars. Under international pressure, those

subsidies were removed for new ranchers a few years ago. Even well-meaning policies can contribute to deforestation. Some countries ban the export of whole logs because they want to capture the employment and income benefits of processing the logs in their own country. But if the processing industry is inefficient, as is often the case, more logs get used up to make a given product such as plywood. Many counties fail to tax forest concessionaries sensibly. Yet the lower the tax the more profit is left for the logger. The bigger the profit the more attractive it is for new loggers to come in, and expand the process of deforestation. The only gainers are the loggers.

Proper pricing and taxation will do much to save the global environment. Giving people title to their land also conserves soil and forests. Without title no one has any incentive to invest in long-term measures such as growing trees. Tomorrow someone else may take the land. Land tenure also enables access to credit and credit enables conservation measures to be undertaken. The examples are endless.

One other feature of the environmental economist's approach is distinctive, but it is controversial. Economists speak of 'valuing the environment', by which they mean translating the worth of environmental functions into money terms. In reality they do not 'value the environment' at all. They try to measure individuals' *preferences* for better environments or against worsening ones. What they are valuing, then, is human preference, not the object of that preference. Much misunderstood, partly because economists have not been very good at explaining what they do and partly because the critics do not invest time in finding out what they do, valuation can be a formidable ally in protecting the environment.

To see why, consider again the argument that the clue to explaining environmental destruction usually lies in the management of the economy. The supreme economic managers are the ministers of finance. They tend to be the senior ministry in all governments and prime ministers and presidents often lose arguments with their finance ministers. If there is to be salvation for the environment, finance ministers have to be persuaded that the environment matters. Yet the environment does not fit neatly into financial thinking, even though it should. One way to get the message across is to show just what damage is being done by environmental destruction *to the economy*. Monetary valuation studies of some 20 countries now show that in the rich world perhaps two to four per cent of gross national product is being lost every year because of pollution; in Eastern Europe the figure is in the range of four to eight per cent; in the developing world it is five to ten per cent; and in some developing countries it may be as high as 20 per cent.

The great achievement of the 1972 Stockholm Environment Conference was the creation of ministries of the environment all over the world. The greatest achievement of the 1992 Earth Summit would be the establishment of an environment minister in every treasury and every ministry of finance.

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CLIMATE AND LIFE: CHANGE AND DIVERSITY

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As we look out on the world, we see not only colours, shapes, and objects, but also a frame in which to place them. The picture seems real and convincing, yet the frame is more important than the picture.

If we could remember our frame of ten years ago, we would be startled by the difference between then and now. How much greater is the difference between generations, and between generations over centuries. I remember a conversation with a monk on Mount Athos. For him the world began 4,000 or so years ago, and the hands of God and the Devil could be seen manipulating the events of daily life. After a few moments, the talk on all but trivialities became meaningless. Yet I suspect that for many of us, bits of that monk's frame of things lie uneasily juxtaposed with those of Darwin, Freud, or Marx; or last week's book; or yesterday's television programme; or today's press headlines. Such frames have also been called paradigms or models. Philosophies have been made from them. William Whewell once said, 'There is a mask of theory over the whole face of nature'.

Today I want to examine the masks of theory, the changing succession of masks, when we look at two features of the face of nature: climate, or more precisely the behaviour of the thin composition of gases enveloping the surface of the planet; and life, delightfully defined in the *Concise Oxford Dictionary* as 'a state of ceaseless change and functional activity peculiar to organised matter, and especially to the portion of it constituting an animal or plant before death'. There is an intimate relation between climate and life. Life as we know it, dependent on climate, but climate as we know it, is almost equally dependent on life.

My monk on Mount Athos almost certainly saw climate as static. For him, weather patterns came and went, but always within familiar limits. Lest anyone think this view eccentric, I assure you it is shared by most people today. Even now, few regard climate as a variable which needs to be taken into account in projections of the future. Of course people know that there have been different climates in the past, and that the relics of recent ice ages are still evident, but the rhythms of change seem so slow that they rarely enter into human calculation.

My monk saw life as equally static. His vision was the same as that of 300 years ago in the West. God created the world and gave mankind dominion over it, as laid down in *Genesis*. There were twin misfortunes: the Fall of Man, which led to deterioration of the planetary condition; and the Flood, which washed away delinquent humans and most other species, whose fossils survived to tell the dreadful tale.

A few people exist, notably and noisily in the United States, who share at least some of this view. But most of us find it almost impossible – as I did on Mount Athos – to see the world as it looked before Darwin. Even so, many believe, almost unconsciously, that the world was created for the convenience of mankind, and that with God's authority and – presumably co-operation – we can rule it as we will.

So much for the monk. Let's peer at a different mask over the face of nature. Here is the one I see today. Climate is invariable only in its variability. No one can be sure of the climates of the earth in its first two and a half billion years of history; there must have been a lot of ammonia and carbon dioxide. Creation of the atmospheric chemistry was almost certainly the product of tiny living creatures who emitted oxygen and eventually established, and maintained, the current balance – roughly 21 per cent oxygen, seven per cent nitrogen, and certain key trace elements, including carbon dioxide.

Over geological time there were major changes – hotter, colder, wetter or drier – responding to external and internal factors: among them changing radiation from the sun; shock of collision with asteroids and meteorites (the loose cannon of the solar system); the changing relationship of the earth with the sun (the so-called wobble, tilt, and spin of its elliptical orbit); the configuration of land and sea as tectonic plates moved together and apart; emissions from volcanoes; the rise and fall of mountain ranges, diverting winds and ocean currents; and not least the influence of life itself.

At present we are in the intermission of an ice age. The current ice ages have so far lasted about two and a half million years. Within them there seems to be a broad pattern of 100,000 years of cold, followed by 10,000 to 15,000 years of warm. The major glaciers receded about 10,000 years ago, so we are clearly moving into a period of risk. But be reassured: the glaciers are unlikely to return for another 4,000 years or so. Within our little warm patch of 10,000 years there have been many fluctuations. Most recently there was the medieval warming which saw the Norsemen in Iceland and Greenland with their crops of wheat; and the cooling of the 15th, 16th and 17th centuries, when economies on the northern marches of Europe collapsed, and annual fairs were held on the frozen Thames. We are now warming up. Indeed, 1991 was the warmest year since records began.

There is greater knowledge of physical changes to the climate than of the contribution living things have made to it. Until recently, there was curious but stubborn resistance to the idea that living things could play a role at all. Somehow they were thought to be players on a stage constructed by blind chance and physics rather than makers of the stage themselves.

The complexities of the interaction between the inorganic and the organic defy description. So do those, of the interaction between organisms themselves. But the relative steadiness of the circumstances in which life has flourished for so long must be more than a coincidence. The use of the word Gaia for the sum of the interlocking balancing mechanisms by which organisms perpetuate circumstances favourable to themselves, has been considered romantic. Personally, I can think of few more worthy goddesses or objects of veneration.

The switch to an oxygenated atmosphere two billion years ago is perhaps the most drastic example of the role of organisms in climate. Although, the greenhouse effect, better described as the global heat trap, is perhaps a more familiar example. The gas which, apart from water vapour, contributes most to holding in the world's heat is carbon dioxide. Without it the world would be some 33°C colder than its current average temperature of around 17°C. A fall to -16°C would be enough to plunge it into deep freeze. Yet the quantity of carbon dioxide in the atmosphere is partly determined by the quantity absorbed and emitted by organisms, from seasonal blooms of plankton in the ocean to plants and trees on land. Whether ice ages begin and end because of changes in atmospheric carbon dioxide, or whether changes in atmospheric carbon dioxide follow and amplify

rises and falls of temperature, remains unclear. But the intimate connection between them is certain.

The influence of climate on life scarcely needs stating. Changing temperatures and conditions produce changing ecosystems and habitats and species. Usually, such changes take place at a rate slow enough to permit animals, plants and other forms of life to adapt or migrate. Few of us would recognise the living conditions of the Thames valley 1,000 years ago when the ice sheet lay only a few miles to the north; and still less those of 100,000 years earlier when hippopotamuses enjoyed the swamps of what is now Trafalgar Square.

In climate as in life, much is, and always will be, beyond reach of explanation by simple cause and effect. In my view, the chaos theory is wrongly named. It deals not so much with chaos as with unpredictability. But it is a useful intellectual tool. The complexity of interaction is such that the flap of a butterfly's wings in Manhattan can indeed lead to a storm over Windsor; and male rivalry joined to female caprice can indeed lead to the evolution of the top-heavy horns of the Irish elk. Variations of climate, like variations of organisms, may not be predictable or even imaginable in advance.

What Stephen Jay Gould recently wrote of life is equally true of climate: 'Life is a copiously branching bush, continually pruned by the grim reaper of extinction, not a ladder of predictable progress . . .The divine tape-player holds a million scenarios, each perfectly sensible. Little quirks at the outset, occurring for no particular reason, unleash cascades of consequences that make a particular future seem inevitable in retrospect. But the slightest early nudge contacts a different groove, and history veers into another possible channel, diverging continually from its original pathway.'

We are used now to a view of life – a mask of theory – which can be summarised as evolution by natural selection and genetic mutation. For most people that has meant competition, sometimes of a violent kind, between organisms, whereby those who breed best and most are the winners in generations to come. The slogan of survival of the fittest sounds convincing, but in so far as it means anything, it is misleading.

Another vital element is co-operation between organisms. Indeed the very first nucleated cells were probably the result of non-nucleated cells coming together to their common advantage. The mitochondria (which enable us to turn oxygen into energy), the chloroplasts (which help plants photosynthesise solar energy), and even the undulipodia (which involve or attract movement), may well have begun as independent organisms. As Darwin himself wrote, 'We cannot fathom the marvellous complexity of an organic being. But . . . each living creature must be looked at as a microcosm – a little universe, formed of a host of self-propagating organisms, inconceivably minute, and as numerous as the stars in heaven.' A good example is ourselves – unable to live without bacteria, which account for ten per cent of our dry body weight. Indeed, someone has said that we are really space suits for bacteria.

Let me carry this thought further. If organic beings are assemblages of other organisms, so organic beings constitute the assemblage which is the life system of the earth. Mutual dependence is fundamental, but its degree in each case is often unknown until we tamper with it. The ecosystem is obviously more important than individual species within it, and some species are more important than others. The extinction of the Irish elk after the end of the last glaciation made little difference to other species in the ecosystem. But a drastic decline in the number of Californian sea otters, as a result of overhunting for their skins, caused wide spread havoc. The sea urchins on which the otters lived vastly multiplied. For their part the sea urchins consumed more kelp, which had been the habitat of thousands of coastal fish species. The consequent decline in fish species changed the character of off-shore waters and damaged fishing along the Pacific coast.

Many other cases exist, most arising from the thoughtless activities of our own species. Certain species of fig tree in Amazonia can only be pollinated by certain species of wasp. Remove the wasps in the holocaust of deforestation, and the fig trees can no longer reproduce. But the fig trees are a vital food source for animals in the dry season. Thus, if there are no figs, there can be no spider monkeys, no peccaries, no toucans and so on, up and down the chain. The last revenge of the dodo on the island of Mauritius was only recently appreciated. No one could understand why a local hardwood tree had not propagated for hundreds of years. The answer seems to be that the dodo used to eat its seeds, soften them in its stomach, and then scatter them. With the dodo extinct, the process was interrupted. People have now been trying to get the turkey to take over dodo responsibilities, apparently with some success.

In general, mutual dependence has created a pretty robust life system. Species can be extinguished and ecosystems destroyed, but over the years – millions of years – new species will evolve and new ecosystems will be formed. Catastrophes greater than any Flood have struck the earth from time to time. Perhaps the worst was at the end of the Permian period 250 million years ago when 90 per cent of marine species perished. Another more famous one was on the boundary between the Cretaceous and Tertiary periods some 65 million years ago. Lively controversy continues, but it seems likely that an asteroid some 15 kilometres in diameter struck the earth, possibly in the Yucatan peninsula of Mexico, with dramatic effects on the climate. The dinosaurs disappeared. But the mostly nocturnal creatures we call mammals, who had hitherto kept their heads down, gradually evolved to take their place. Without that unfriendly – or rather friendly – asteroid, you and I would not be here today.

Of course, life itself is not in danger. The threat is to particular ecosystems and to particular species, which brings me to our own species, the Johnny-come-lately of the animal world. Many species try to change their environment, but none with more success than ourselves. I doubt if human activity had much effect on local climate until 2,000 or 3,000 years ago. Deforestation and exhaustion of resources then affected the environment in grain-growing areas and around cities, and may have changed certain rainfall patterns, for example around the Mediterranean basin. But the great changes have taken place in our own time, notably since the industrial revolution some 250 years ago. The world has since been transformed.

The results are well known. Human population has increased at a dizzy rate. When I was born in 1930, it stood at two billion. Now it is around five and a half billion, and rising by 87 million a year. This multiplication of our kind affects every aspect of the environment. There is clear degradation of the land surface of the earth. Last year the Worldwatch Institute calculated that some 35 per cent of existing cropland was subject to a degree of desertification. Demand for fresh water doubled between 1940 and 1980, and may double again by the end of the century. Pollution of both fresh and sea water, particularly off shore, is another serious problem.

In the atmosphere three main hazards have developed. The first is the local problem of acidification downwind of industry. With political will it can be solved. Next is the damage done to the ozone layer by chlorofluorocarbons and halons. Over time – a long time – it too can be put right, and the signs are encouraging. Third, is the prospect of climate change, in the form of warming, brought about by a steady increase in greenhouse gases: carbon dioxide, methane, chlorofluorocarbons, and nitrous oxide.

Overall, on land, in the sea, and in the air, there has already been cumulative species extinction as our species has appropriated more and more of the earth's resources. We now use – or waste – some 40 per cent of the earth's total net photosynthetic production. Yet most of us have the utmost difficulty in understanding what is happening. Is there a point at which we could irremediably foul the nest? Or a point at which

our dependence on other organisms, starved of resources, could do us real harm? No one can yet tell. Our sense of time scarcely extends over more than two or three human generations, and our sense of distance is similarly constrained. Politicians are elected for three, four or five years, and in the past their horizons have not reached much further. We should be agreeably surprised by how far ahead some are now prepared to look.

Perhaps the most hobbling factor of all is the world view we inherited from the past. I am afraid that the organised religions carry a major responsibility. I recall my monk from Mount Athos. The notion of human dominion still runs. We flatter ourselves that man was created in God's image (although it can be more plausibly argued that God was created in man's). 300 years ago we saw ourselves as midway between beasts and angels, and Descartes even believed that animals were automata without feelings or consciousness. Common sense arising from daily experience must have seeped through from time to time, but those thoughts still linger with us today.

They emerge with particular clarity in the crypto – I will not say pseudo – science of economics. For most economists since Adam Smith, the earth, its resources and products, are ours: the only problem is how to develop, exploit and divide up the spoils. Of course there were such heretics as Robert Malthus. But I speak with experience when I say that economists believe generally that just as we have solved resource problems in the past, so we shall solve them in the future; that anything which cannot be quantified or given value in terms of current methodology has little or no quantity or value; and that in discounting the future we must think primarily of the present, recalling Keynes' remark that in the long term we are all dead. To solve these problems of attitude, method, and even vocabulary, we need new intellectual tools.

Once again the frame is flawed. But this time there is widespread awareness of it. People may not fully understand what is happening, but they know something has gone wrong. The last 20 years have seen mounting anxiety. Milestones were the Club of Rome report in 1970; the United Nations Conference on the Environment of 1972, followed by the creation of the United Nations Environment Programme; the First World Climate Conference in 1979; the Vienna Convention on ozone depletion in 1985; and most important in terms of world opinion, the Brundtland Commission Report on Environment and Development in 1987.

Since then, the pace has quickened with successive declarations from the Economic Summit of the seven main industrial countries, the Commonwealth, and the Non-aligned Movement; debates in the United Nations General Assembly; the reports of the Intergovernmental Panel on Climate Change and a Panel of the US National Academy of Sciences; the Second World Climate Conference of last autumn; and now the countdown to the World Conference on Environment and Development in Brazil in June 1992.

Work has begun on conventions to set frameworks for codes of international conduct, following the valuable precedent set by the Convention and subsequent Protocols on ozone depletion. Although there is broad scientific consensus on the nature of the problems and what should be done about them, the bridge between science and politics, between thought and action, has rarely looked more fragile. This is not only because of the intrinsic difficulties which are indeed immense. It is also because we are still not thinking in the right terms. Discomfort with our view of present and past has not yet produced that seismic shudder which produces a new view of the future. Thus negotiations on the two conventions are bedevilled with procedural problems, jockeying for supposed national advantage, personal and institutional rivalries, introduction of extraneous issues, and genuine confusion. It was ever thus at the beginning. Yet the underlying issues are pretty clear. The uncertainties remain, but they are essentially at the margin.

If we continue as we are, the world average temperature could rise by about 0.3°C a decade, in short an increase of 1.0°C by 2025, and 3.09°C before the end of the next century. Lest you should think that a rise of around 1.5°C above that prevailing in pre-industrial times is small, I point out that the average temperature was only about 4.0°C less during the last ice age, and that in a world covered by water, the land will warm up more than the sea. There would be wide regional variations with changes in patterns of rainfall, more here and less there. There would also be a rise in sea levels, caused partly by thermal expansion and partly by melting ice and snow at the Poles. The rise could be around 6 cm a decade, or 20 cm by 2030, and up to 65 cm by the end of the century. These predictions are at best guesses. The figures could be less, and they could be a lot more. Change rarely goes in straight lines.

Predictions on loss of species, ecosystems and habitats are much less clear. Most of the current losses are a product of the destruction of moist tropical forest, and on a much smaller scale, coral reefs. Such forests cover only seven per cent of the earth's land surface, but they contain at least half of its species. So losses in the tropics, where the engines of life and evolution work quickest, are more serious than losses elsewhere, where there are fewer species but more individuals within each of them. Current calculations suggest that perhaps a quarter of the earth's total biological diversity is at serious risk in the next quarter century. It is possible that the rates of destruction are at last diminishing; but there is of course less left to destroy. At present, our ignorance creates a kind of helplessness. We cannot yet judge the significance of what is happening. Nor do we know how to resist the forces – social, economic and political – which are doing such damage, real and potential, to current patterns of life.

What then should be the model, paradigm or philosophy to guide us? What mask of theory can we lay over the face of suffering nature? In devising it no single element is more important than human population increase. This is the driving force behind both global warming and the destruction of biodiversity. Unless such increase can be brought under control and then put into reverse, all efforts to restore stability to our environment will be in vain. I fear that if we do not do the job ourselves, Nature may give us a helping hand, or worse do the job for us. There is not the slightest prospect that living standards world-wide could rise to those of industrial countries. In that event the carrying capacity of the earth would be around two and a half billion people.

As the population rises to eight, ten or even 14 billion in the next century, let's remember the fate – or perhaps the parable – of Easter Island in the Pacific over 1,000 years. A handful of people arrived by boat. They multiplied; cut down trees; cultivated the land; multiplied again; divided into little nations; fought each other over diminishing resources and deteriorating land; cut down what remained of the trees. Then they could not escape. They suffered a drastic decline in numbers and living standards. Finally, they achieved a miserable stability. By the time Captain Cook arrived at the end of the 18th century, he found the wreck of a society on an ecological ruin.

In general terms we know what to do about global warming, even if detail is still lacking, and we have not so far got the stomach to do it. We cannot prevent warming, although we can mitigate its effects and help adaptation to it. For these purposes we need major changes in the way we generate and use energy; major changes in the way we use land, whether for agriculture, forests or cities; and major changes in the way we exploit resources and add value to them through industry. This bill of action far exceeds the capacity of governments. But at least governments know or can find out what it is, and public opinion likewise. In its implications it amounts to a prescription for another kind of society. Dimly we can already see its outlines. To describe them would need another lecture.

The deliberate conservation of species, or rather of ecosystems within surroundings of forest or wilderness, is much more difficult. Responsibilities are diverse and divided. In suggesting new ways of looking at the problem I have two main groups in mind: those now dominant in society, in governments, administrations, business, universities – educated opinion generally ; and the people involved on the spot. No lasting model for thinking and action can be imagined without eventual stability in the human population. Most of those now dominant probably start somewhere near the views of economists. They favour a generalised concept of 'development' without knowing quite what it means. Their time horizons are relatively short. Certain points have obvious appeal:

– Forests and wilderness have some commercial value in the usual sense. From them come such products as plants, timber, meat, rubber and fish, which can be exchanged for cash. In an ideal world the cash value of such products can be compared with that which derives from land subject to cultivation. Here the time factor is of significance. If correctly harvested, these forest products can continue to have value over a long period, whilst those deriving from cleared land often suffer sharp decline as natural fertility falls.

– Forest and wilderness pave several kinds of potential commercial value. They harbour substances of economic, nutritional, medical or scientific interest which can later be exploited (we use only a tiny proportion of the 75,000 plants which could be cultivated as foodstuffs).

– They support varieties or species of animal and plant which constitute a kind of living gene bank. Strains of coffee, potato and cocoa have sometimes needed renewal or splicing from the wild to resist genetic exhaustion or disease. Nature may still be the best bio-engineer, but forests contain organisms essential to future human bio-engineering.

– Forests and wilderness can bring in substantial revenue from tourism. Natural parks and reserves can be a major commercial asset.

– Forests and wilderness have indirect value in that they protect benefits. Thus they prevent soil erosion, maintain hydrological systems, and help maintain existing patterns of rainfall. Their loss could cause widespread damage to the environment elsewhere.

– They are an option for use in a wide variety of circumstances and represent a kind of natural capital. For example, they can be used as an asset in debt-for-nature swaps to meet national obligations to external creditors.

– Their good health, and that of the ecosystems and species within, constitutes a good indicator of an area's environmental condition. Some are particularly sensitive and can play the role of the miners' canary. A good example is the effects of acid precipitation on temperate forests.

These essentially economic arguments within existing – human-oriented – value systems are of varying quality. We should not, for example, exaggerate the present or potential commercial value of many forest products for which substitutes can often be found if prices go high. There are other considerations, often political, which can affect governments under pressure from vested interests, including timber companies and landless peasants. Together they bring out an important point: before permitting or conniving at the destruction of real or potential assets, governments should at least know what they are. There is an urgent need for drawing up inventories of natural stock.

By contrast, the biological arguments relate less to individual governments or vested interests than to the world community as a whole. For that reason they score low points in current systems of value. The mechanisms for measuring biological value and the institutions for protecting it seem remote and ineffectual. In a longer view, most would probably accept that the diversity of organisms – in forests, wilderness or elsewhere – is a necessary condition of life, and that their mutual dependence means that we destroy ecosystems at our peril. They represent broad stability now and the capacity to adapt and achieve new stability in the future.

The problem is how to get this across. All leaders, even the most oppressive, feel some accountability to their own, or world, public opinion. They are proud of their countries' natural assets. The national image is vital in politics; and history, culture and environment are part of it. It is linked to instincts of affinity with the natural world. Hence there is general readiness to attach ethical and aesthetic value to forests, parks, countryside, oases of greenery, wilderness and the like. Sometimes this is most evident in those living among bricks and mortar, but a sense of participation in the natural order is deeply rooted almost everywhere.

Leaders of society have an accompanying sense of responsibility for the future. Just as we inherit from the family and pass on to the family, so we inherit an environment, and pass it on to the next generation. Naturally, governments in poor countries under pressure feel justified in asking for help from those whom they blame for creating the problem. They argue that directly or indirectly the industrial countries have changed the planetary environment. Without them there would be no explosion in human numbers, nor prospect of global warming, nor threat to the diversities of life. So they and others in the world community should pay to conserve the global environment, preferably through international arrangements without taint of colonialism or nanny-knows-best.

This clutch of arguments may help make the transition from the crudities of current economic thinking, to a more sustainable system of values. To make a real impact, we shall need much stronger and more responsive international institutions, both public and private. Next year's World Conference on Environment and Development will represent something of a test. But such arguments do not necessarily appeal to those directly involved on the spot, who are subject to pressures and needs of their own. These people fall into two categories. In the first are the invaders and destroyers of forests and wildernesses, driven by forces they scarcely control or understand. A few may simply be doing what they and their ancestors have always done. But many more come from far away (for example the government-sponsored schemes for land exploitation in West Irian and Amazonia). They are cut off from their origins and familiar surroundings. Food tomorrow and next year are their priorities. Some are agents of commercial interests, from cattle ranchers to timber companies. Some are attempting to make their fortunes, for example out of gold. The common aim is exploitation rather than sustainable use of resources. We should, of course, remember two things. Others, including our own ancestors, behaved likewise; and most are victims of circumstance. In devising new systems of value, we should look primarily at those behind them: governments with mega schemes of development or population transfer, with the usual apparatus of subsidies and inducements; and landlords, cattle ranchers corporations and the rest with short-term commercial interests.

In the other category are the current inhabitants of forests and wildernesses. Their environment is their life. Not surprisingly their system of values is based on respect for it. Neither tropical rainforest nor wilderness is as wild and untouched as most people think. The Amazon forests have, for example, been cultivated over thousands of years; but the system of cultivation is long term, covers wide areas, and is geared to relatively small and stable populations. The products of the forest are designed to maintain a particular form of society and not to produce a real surplus. For that reason it is hard to attach commercial value to the products of the forest, most of which are consumed on the spot.

Of course the people of the forests and wildernesses feel the pull as well as the push of agricultural, industrial and other society on the marches of their land. There is a risk that they will lose the knowledge they have, and join the ranks of the majority out of touch with their natural environment. For that reason, those outside as well as those within should learn to respect traditional values. Much of what passes

for good sense in aid policy goes back to systems of knowledge and cultivation established in the past: for example, the distribution of trees in and around human settlements in India, the return to old systems of potato growing and irrigation in the high Andes, and respect for semi-nomadic pasturalism in Africa. These are all systems which work, provided that pressure of human numbers does not disrupt them.

Obviously, respect for traditional values and methods is not sufficient. The peoples of forests and wildernesses need more than encouragement and goodwill. It is hard to see how they can come to terms with the rest of society without two essential things: security of land tenure and local autonomy. In this way, they can know and manage what is theirs, and work now, as in the past, not only for themselves but for their descendants. Security of land tenure and local autonomy mean that governments, landlords, corporations and the rest, must not interfere or abuse their power in the thousands of ways they have done in the recent past.

A system to protect the commercial value of their assets, current and potential, is also difficult. It is too easy for people to pirate natural substances, and for pharmaceutical and other companies elsewhere to develop them (and later create substitutes for them). At the same time, some recognition of intellectual property rights in such substances is essential.

The current value of the world market for medicines derived from plants used by indigenous peoples, has been estimated at over $40 billion. The potential value of the next generation of insect repellents, soaps, oils, food colourings and cosmetics from the same sources could be still greater. Yet none of this comes back to those who have selected, nurtured, improved and developed the varieties in question over hundreds, if not thousands, of years. Obviously this is an issue for governments to deal with on an international basis. If the industrial countries insist, as they do in the current GATT negotiations, on the need for protection of their own intellectual property rights, they must help find means for protecting those of others.

Another requirement in any world system of values is for those who live in forests and wildernesses to be treated as full citizens of the world. They should not be expelled or induced to leave their reserves, which are the products of care over thousands of years; nor be regarded as inhabitants of a kind of human zoo. We need not only to respect their traditions, but also to cherish the human diversity they represent.

At the same time, we should help them to understand our ways of thought. Indigenous knowledge has value in itself, but it has limited application. It can enrich and be enriched through marriage with modern knowledge. I add that without a base of indigenous knowledge, and science, technology transfer of the kind frequently discussed at international gatherings is usually useless.

The price of sticking to our present systems of value and not adapting to new ones is intolerably high. So far, all past human civilisations have crashed. None over time has reached a well regulated, steady state with population in balance with natural resources. There is no reason to believe that ours is any different. Indeed, current signs are to the contrary.

For biologists a familiar experiment is that of the Petri plate. Petri plates are round dishes with transparent food on them disposed to allow the investigator to see colonies of microbes with the naked eye. From small beginnings the microbes multiply at an accelerating rate. They are at their most prolific as they reach the edge of the plate. Then the food runs out, the microbes die in their multi-billions, and extinction takes place.

We are not microbes, and we do not live on Petri plates. For us, unlike the microbes, there is still a chance. But it is clear enough that accelerating changes to the environment, particularly in changing climate and in limiting the diversity of life, could do profound damage to ourselves: how people live, where they live, whether they live.

I conclude with extracts from a letter written in the middle of the last century by Chief Seattle of the Dwamish, Suquamish and allied Indian tribes to the President of the United States who had been trying to buy Indian lands:

'How can you buy or sell the sky, the warmth of the land? The idea is strange to us. If we do not own the freshness of the air and the sparkle of the water, how can you buy them?

Every shining pine needle, every sandy shore, every mist in the dark woods, every clearing and humming insect is holy in the memory and experience of my people. The sap which courses through the trees carried the memories of the red man.

The white man's dead forget the country of their birth when they go to walk among the stars. Our dead never forget this beautiful earth, for it is the mother of the red man. We are part of the earth and it is part of us. The perfumed flowers are our sisters; the deer, the horse, the great eagle, these are our brothers. The rocky crests, the juices in the meadows, the body heat of the pony, and man: all belong to the same family . . .

We know that the white man does not understand our ways. One portion of the land is the same to him as the next, for he is a stranger who comes in the night and takes from the land whatever he needs. The earth is not his brother, but his enemy, and when he has conquered it, he moves on. He leaves his father's graves behind, and he does not care. He kidnaps the earth from his children, and he does not care. His father's grave and his children's birthright are forgotten. He treats his mother, the earth, and his brother, the sky, as things to be bought, plundered, sold like sheep or bright beads. His appetite will devour the earth and leave behind only a desert . . .

Whatever befalls the earth befalls the sons of the earth. Man did not weave the web of life: he is merely a strand in it. Whatever he does to the web, he does to himself. Even the white man, whose God walks and talks with him as friend to friend, cannot be exempt from the common destiny . . .

One thing we know, which the white man may one day discover: our God is the same God. You may think now that you own Him as you wish to own our land, but you cannot. He is the God of man, and His compassion is equal for the red man and the white. This earth is precious to Him, and to harm the earth is to heap contempt on its Creator . . .

Where is the thicket? Gone.

Where is the eagle? Gone.

The end of living and the beginning of survival.'

We need to live as well as to survive, and the rest of the world with us. That is our truest frame of reference.

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