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**SUSTAINABLE DEVELOPMENT -  
THE CHALLENGE FOR IRISH ECONOMIC POLICY-MAKERS**

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*"We have not inherited the Earth from our fathers, we are borrowing it from our children ..... for governments, engineering the transition to a sustainable society may become an all absorbing activity, one that will eclipse growth as the focus of economic policy making" (Brown, 1981).*

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**1. INTRODUCTION**

Sustainable development has become a key phrase during the last decade in development and environmental literature. Governments and international bodies have adopted the goal of sustainable development with surprising alacrity since the concept was brought to prominence in the early 1980s by the World Conservation Strategy. The concept became enshrined by the influential 1987 report of the World Commission on Environment and Development, or Brundtland Report as it is commonly known after its chairperson the Norwegian prime minister. That report provided a popular definition of sustainable development - "to ensure the needs of the present without compromising the ability of future generations to meet their own needs". A paper on sustainable development would then seem to be a topic that fits well with the original stipulations of the Barrington trust for a lecture that "relates to the conduct and duty of people to one another" (Black, 1947).

Defining sustainable development has proved problematic and there are a multitude of definitions, see Pezzey (1989). These definitions tend to have common features of three key

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concepts: *"environment, futurity and equity"* (Pearce *et al.*, 1989). With problems determining what sustainable development means, the task of actually operationalising the concept multiplies. This paper sets out some of the issues involved for the Irish economy in meeting the challenge of sustainable development. As Convery (1992) remarks "there is no way in which a discussion of sustainability can yield any kind of absolute truth. What it can do is highlight the issues, provide indications as to the prospects of sustainability - financial, economic, ecological and technological".

This paper is restricted to a subset of the economic issues involved. It investigates the challenge accepted by Irish policy makers in signing international agreements at the 1992 Earth Summit in Rio to achieve sustainable economic and environmentally sound development over the coming decades, see McCoy (1992). The objective of sustainable development requires the recognition that well-being depends not only upon the quantity of economic growth but also its quality. Policy makers can no longer ignore the environmental dimension of economic growth. The practical implications of the objective of sustainable development for the Irish economy is examined first from a historical perspective on the evolution of environmental objectives over the last two decades. The paper then provides a theoretical examination of the concept of sustainability and outlines the difficulties in identifying a working definition of sustainable development. The problems identifying the conditions for and then operationalising this concept are examined within a paradigm of sustainable development.

The paradigm is used to examine issues for Ireland's sustainable development objective. The important role the principle of subsidiarity will have for future Irish economic policy in protecting the environment is highlighted. This principle of vesting responsibility at the lowest level of political authority is critically evaluated on the grounds of effectiveness for environmental matters in the Irish context. The interdependence between the economy and the environment is also discussed. Focus is placed on the problems of pollution and natural resource depletion for measuring economic welfare and the paper draws on the experience of other countries to recommend practical national accounting measures to address these problems.

The Irish peat bog conservation programmes is used as a case study to highlight the interesting conflicts of public choice that can occur when protecting a natural resource. The theoretical solutions to these problems depend on the application of proper valuation techniques. The paper concludes with a summary of the main issues that policy makers will have to confront to achieve sustainable economic development.

## 2. HISTORICAL CONTEXT

The paper began with a quotation taken from Lester Brown's book *Building a Sustainable Society*, first published in 1981. Brown is the president of the Worldwatch Institute, an influential research group on global environmental problems based in Washington DC. The chronological phases of Brown's convictions reflect quite well the evolution of environmental concerns internationally over the last two decades. Brown came to prominence in the early 1970s with his estimates that the world's fish catch had begun to decline and that a new age of scarcity was about to be ushered in. This decline, however, turned out to be only temporary though fish catch did not keep pace with population growth. Broader environmental concern were also high on the global agenda at that time. However, similar to Brown's predictions on fish catch many of the predictions advanced on global environmental problems were couched in doomsday scenarios. Predictions of this era included the advent of the next ice age as the Earth cooled, exactly the opposite of the predicted phenomenon that perplexes policy makers in the 1990s. Pessimism for the Earth's future in the early 1970s abounded and the forerunner to the 1992 Earth Summit took place in Stockholm 20 years earlier. Both of these United Nations conferences on the environment as it transpired were characterised by conflicts over development and intragenerational equity between the industrialised and developing nations.

The debate at Stockholm was focused in terms of the familiar economic growth versus the environment arguments. The outcome of this debate was that there necessarily had to be a trade-off, that is more environmental quality meant less economic growth. This culminated in the publication of the Club of Rome's *Limits to Growth* strategy (Meadows *et al.*, 1972). This now notorious strategy was based on a large scale computer model constructed to simulate future outcomes for the world economy. It concluded that in the absence of major change in society's behaviour, non-renewable resources would be depleted within 100 years; that fragmented approaches to solving individual problems would not be successful and that disintegration could only be avoided by immediate limits on population and pollution and the cessation of economic growth. This Malthusian view of the Earth's prospects, not surprisingly, found little support among international governments and it seriously retarded the credibility of environmental economics over the remainder of the following decade.

A more optimistic view from that era was based on the ability of technical progress to push back the natural limits was presented by Herman Kahn and his associates (1976). Their view of how the Earth would evolve was defended more qualitatively than the Meadows' *et al.*, arguments but their thesis was that tampering with the growth process would consign the poorer members of society to lives of poverty. By the end of the 1970s environmentalism and "green" concerns were being pushed to the fringe as the world economies grappled with the stagflationary effects of the second OPEC oil price shocks. In general, the Green

movement was viewed with suspicion at the beginning of the 1980s. In this context Brown's quote at that time on borrowing the Earth from our children would have been perceived as yet another banal green slogan. Coupled with his supposition on the eclipse of growth by sustainability as the focus of economic policy making, Brown's comments would have been generally perceived as naive and outlandish.

Dramatically, events in the 1980s conspired to catapult environmental concerns back to the top of the global agenda. Mounting scientific evidence on the impact of industrialisation for the Earth's ozone layer and the prospect of global warming led to increasingly widespread public concern with global environmental issues. Concern was also heightening about transnational pollution problems like acid rain. In Ireland severe smog in the Dublin region in the late 1980s and well publicised fish kills as the result of water pollution increased public awareness on the environment. These concerns have been reflected both in the opinion polls and in the political process of most industrialised nations (European Commission, 1990).

In a survey carried out for the European Commission in the late 1980s, 56 per cent of the Irish saw environmental protection as an urgent problem requiring immediate action, along with France this was the lowest in the Community with 72 per cent being about average for Member States. When offered a choice of opinions with which they most agreed 21 per cent of the Irish survey responded in the affirmative that economic development should take priority over environmental issues, compared with 7 per cent as a European Community average; 26 per cent of the Irish felt it was sometimes necessary to chose between economic development and the protection of the environment in comparison with an EC average of 31 per cent; and 42 per cent of the Irish agreed that protecting the environment and preserving natural resources are essential to economic development compared with an EC average of 55 per cent (European Commission, 1988).

Brown's comments from 1981 begin to seem more enlightened as the decade progressed. The concept of sustainable development, as the Brundtland definition of it implies, involves intergenerational transfers of wealth. To appreciate the need for intergenerational equity involves a reassessment of the economic growth process. This traditionally has exploited a set of initial endowments in order to generate economic growth, usually measured in terms of real income per capita, which was in turn used as a proxy for welfare. In stressing that this generation is borrowing from the future generation rather inheriting from the previous generation, Brown succinctly captures the intergenerational equity aspect of sustainable development that is often absent in economic growth theory.

The term sustainable development became the catchphrase of most international organisations and governments since the Brundtland report. At the United Nations *Earth*

*Summit*, held in Rio de Janeiro in June 1992, the only concept that seemed to have universal acceptance was sustainable development and this probably amounted to the only non-contentious item in whole negotiating process. This is not too surprising given that it is a near impossible concept to be against it, particularly since it lacks a concise definition. As Pearce *et al.* (1989) comment "there is some truth in the criticism that it has come to mean whatever suits the particular advocacy of the individual concerned". Nearly every government of the industrialised world now professes to having sustainable development as their goal, "the concern today being as much with the quality of economic growth as with its absolute quantity" (OECD, 1990). In a dramatic shift of emphasis the OECD, which has long espoused the virtues of "the highest sustainable economic growth" within and among its members, has now adopted sustainable development as its guiding principle (OECD, 1991a). Continued economic growth however is still viewed as crucial, in the tradition of Kahn and associates, in order to free the necessary capital and technology to maintain environmental quality while improving the quality of life for all.

The European Community explicitly refers to sustainable development in the Maastricht Treaty. Sustainable development forms the core of the Community's Fifth Environment Action Programme entitled *Towards Sustainability* (European Commission, 1992). The Community has also amended the Treaty of Rome by the Single European Act in 1987 to ensure that environmental protection requirements shall be a component of other policies and for the recognition of the inextricable overlap between the completion of the internal market and the environment (European Commission, 1990). The EC outlined five essential principles for any new environmental policy mechanisms:

- precautionary principle to prevent irreversible damage to the environment;
- Polluter Pays Principle to internalise costs to ensure more efficient outcomes;
- subsidiarity principle to ensure decision making and responsibility rest with the lowest possible level of authority in the political hierarchy;
- principle of economic efficiency and cost effectiveness to ensure the appropriate choice of incentives for environmental protection;
- principle of legal efficiency to ensure legal instruments are applicable and enforceable;

In addition to the above the European Community, in a decision known as the Dublin Declaration, taken during Ireland's "green" presidency of the Community in 1990, has committed itself to use its "moral, economic and political authority to encourage more intensive international efforts to solve global environmental problems". As a participating member of the Community, Ireland is bound to take account of these principles in pursuing its policies.

Sustainability has not yet eclipsed growth as the main focus of economic policy but as Brown (1992) reports "that although no government has an environmentally sustainable development strategy, some are starting to put the components of one into place". Most of the countries cited are industrial countries, mainly because developing countries are largely preoccupied with poverty issues than with global environmental concerns. The challenge to the international community according to Brown is "to build an environmentally sustainable future", in short he stresses the need for what he describes as an "Environmental Revolution to rank with the Agricultural and Industrial Revolutions as one of the great economic and social transformations in human history". It is this challenge that the paper examines in the Irish context.

### **3. WHAT IS SUSTAINABLE DEVELOPMENT?**

In order to operationalise the concept of sustainable development we need to agree on a working definition. Sustainability in this context is taken to mean "being capable of being maintained at a certain rate or level". The problem then becomes what is to be maintained and at what level? Development would imply change leading to improvement or progress. The traditional measures of society's welfare have focused on economic growth as measured by increasing real gross national product (GNP) per capita over time. However, GNP has been shown to be a deficient measure of welfare, particularly because it takes no account of the *bad*s resulting from the economic process, such as pollution or environmental degradation. See O'Connor (1977) for an assessment on Ireland in this context. Observation of an increasing real GNP per capita does not mean that the growth is sustainable. Economic growth is only sustainable if the increase is not threatened by feedbacks through pollution or resource scarcities.

GNP is an income measure rather than a stock measure and so in essence measures income consumption without alerting us to capital consumption. A nation that quickly uses up its natural resources is obviously not engaged in sustainable growth, yet in terms of GNP measurements it is developing. The prominence of the OPEC oil exporting countries at the top of the international league table in terms of real GNP per capita bears witness to this phenomenon (World Bank, 1992). "A reformation of the meaning of development requires a reformulation of the national accounts in terms in which development is defined" (Daly, 1988). Daly argues that GNP should be replaced by three types of accounts, firstly, a benefit account to measure the value of services yielded from capital accumulations; secondly, a cost account to measure the value of depletions and pollution; and thirdly, a capital account for an inventory of stocks both natural and man-made. As it stands GNP measures throughput and so its maximisation is consequently maximising the costs of depletion and pollution in addition to output.

Development embraces wider concerns about quality of life other than economic growth. Sustainable development could then be taken to mean that well-being in society is increasing over time. Well-being could be measured by a set of development indicators or desirable social objectives, such as increases in real income per capita, educational attainment, improving health and nutritional status, access to basic freedoms, access to resources and amenities and equitable income distribution. An obvious problem with this system is determining the weights that should be applied to each variable to get a representative indicator.

The OECD (1990) reported that there were at least 64 working definitions of sustainable development, Pezzey (1989) has even more. Pearce *et al.* (1989) described the three common features of these definitions. First, they place emphasis on the value on the environment, secondly, they extend the time horizons to include the long-term impacts on future generations, and thirdly, emphasis is placed on equity within generations and between generations. The theme is "that future generations should be compensated for reductions in the endowments of resources brought about by the actions of present generations" (Pearce *et al.*, 1989).

One problem with this definition is that it implies an infinite time horizon. We know that practical decision making requires a finite time horizon. Another limitation with this definition is that implies strong sustainability, in that the development indicators must be increasing in each and every period. This would be a very strong condition and again it may not be practical to expect an economy to be developing in every period, given the cyclical trends in economic performance characterised by business cycles. A weaker alternative would be to require that the rate of change in development over time be *generally* positive. The most practical way to work this definition then would be to measure the present value of the benefits and costs of development in a conventional cost-benefit analysis exercise. These techniques are not without their critics because to carry out a present value exercise there is a requirement that future benefits be discounted against initial costs. Discounting involves ascribing a lower weight to future consumption than for the present. This would seem to conflict with the sustainable development's explicit concern for the future. However, there is no unique relationship between high discount rates and environmental degradation, in fact in some instances higher interest rates will slow down the demand for natural resources by lowering investment.

Much of the debate on what sustainable development means revolves around the issue of whether the next generation should inherit a stock of wealth, no less than that inherited from the previous generation, comprising of man-made and natural assets or just the same stock of natural capital. The implication of these interpretations will lead to fundamentally different development paths. Taking a weak sustainability condition of non-declining or, an even a

more limiting case, constant wealth, then both man-made and natural capital are substitutable in that it is the overall aggregate of the two combined that matters. This interpretation would support the decline in natural wealth if it could be compensated for by offsetting increases in man-made capital. The alternative interpretation that it is non-declining natural wealth that should be transferred intergenerationally has more limiting consequences for the economic growth process as the use of depletable resources would need to be constrained. This interpretation would place a much higher emphasis on environmental conservation. Although no government or international organisation explicitly states which interpretation they have adopted, given the high priority now afforded environmental matters the objective seems to favour the constancy or improvement of the natural capital stock.

#### **4. CONDITIONS FOR SUSTAINABILITY**

Having attempted to define what is meant by sustainable development this section outlines some of the necessary conditions for its achievement. In discussing the sustainability of the natural capital stock we need to make a distinction between two types of natural resources; exhaustive or depletable resources and renewable resources. Consumption of exhaustible resources by today's generation will preclude their availability for the next generation. Obvious examples are natural energy sources like coal, oil and, in Ireland's case, peat. The optimal depletion of an exhaustible resource should be carried out such that a significant proportion of the economic rents of extraction are re-invested to compensate future generations for the loss of the resource. Economic rents are the payments in excess of the cost of extraction that accrue to the supplier of the resource. Examples of this notion include recommendations that the revenue from carbon taxes on exhaustible fossil fuels, as currently proposed by the EC, be earmarked for creating carbon sinks, like additional forest plantation, to offset the impact on global warming of burning these fuels. The irreversibility of decisions on exhaustive resources only add to problems in determining optimal depletion rates that have due regard for the interests of future generations. Krutilla and Fisher (1975) proposed that this valuation problem with irreversibilities could be overcome by including the forgone benefits of a resource as cost.

Renewable resources, like fisheries or forestry, should theoretically lend themselves more easily to meeting the sustainability condition but this is not always the case. The disappearance of ecosystems and the extinction of wildlife species confirm this fact. Fisheries and forestry are good examples of what can be described as interactive resources, where the size of the stock is determined by the actions of both nature and mankind. A catch level or harvest represents a sustainable yield when it just equals the growth rate of the population.



The maximum sustainable yield is defined as the population size which yields the maximum growth and hence the largest catch that can be perpetually sustained. However, the maximum sustainable yield is not synonymous with efficiency. In order to achieve efficiency it is the net benefits from using a resource that must be maximised. In order to evaluate net benefits the costs of harvesting must be included along with the benefits. The efficient level would thus be determined by the marginal benefits of additional effort being equal with the marginal costs. Effort is taken to be proportional to the size of catch or harvest. In order for the maximum sustainable yield to be efficient the marginal cost of additional effort must be zero (Tietenberg, 1988). This is an unlikely situation, so given a positive marginal cost the efficient level of effort would be less than that required for maximum sustainable yield, this then results in a higher population being maintained.

This is described as a static efficiency criterion, in that it takes no account of intertemporal allocative efficiency. Larger efforts than the efficient level would produce higher catches and benefits this period, but this would be more than offset by smaller catches in the future as the resource population declined. However, with a dynamic efficiency criterion, future catches or benefits are discounted in order to influence the size of catches in the present. The higher is the discount rate, that is giving lower weight to future catches, the greater is the increase in effort today and the lower the ultimate level of the resource population in the future. Valuations where there is too little caring for the future will not lead to sustainability because of too little asset transfer between generations (Howarth and Norgaard, 1992).

In addition to the rate of time preference, as reflected in the discount rate, the initial level of environmental quality is also a significant factor in determining the optimal choice between sustainable and unsustainable growth. Low initial level of environmental quality often forces resource users to discount the future heavily. "With low initial environmental quality and a high rate of social discount, environmentally unsustainable economic growth may be an optimal strategy as the benefits of increased consumption occur in the present whereas environmental degradation and collapse is a future problem" (Barbier and Markandya, 1989). This is a particular problem for Third World countries but is it a particular obstacle for Ireland achieving sustainable development?

## **5. A SUSTAINABLE DEVELOPMENT PARADIGM**

It has often proved impossible in practice to operationalise the sustainability criterion even under controlled conditions, such as for a planted forest, due to a multitude of factors, see Convery (1992). However, to help formalise the concept the OECD (1990) recommend avoiding spending time on the definition but rather focus on "a sustainable development paradigm by addressing a variety of key elements that everyone would agree are central to achieving a sustainable future". The elements put forward included:

- controlling population growth;
- promoting technology change toward clean growth;
- pricing resources to reflect scarcity;
- reform institutions to ensure complementarity of environment and development;
- upgrade the stock of factors contributing toward well-being, such as education and training;
- modify production/consumption patterns to maintain the stock of scarce resources;
- rationalising the degree of desirable substitutability between natural and man-made capital.

Convery (1992) states that when "addressing the issue of sustainability, it is necessary to specify the scale or perspective from which it is being viewed". He suggests that this perspective can be global, national, regional or local. For the remainder of this paper the focus is on the challenge for Irish economic policy so the perspective will be national. The OECD paradigm is international in orientation but this paper will use it to examine the Irish case.

Controlling population growth is probably of much greater global significance in achieving sustainability than for the Irish case. Although an argument can readily be entertained that a country with the emigration patterns of Ireland and with an unemployment rate among the highest in the industrialised world is not even sustaining its current population size. The population in the Republic, as of 1991, is just over 3.5 million. The average annual growth of population has declined over the last decade from 1.2 to 0.2 per cent. The total fertility rate has dropped to approximately the replacement rate of 2.1 and is forecast to remain at this level over the coming decade, such that the Irish population has effectively stabilised (World Bank, 1992). The United Nations (1992) *Human Development Report* suggest that since 1960 countries where the richest 20 per cent of the world's people live increased their share of gross world product from 70.2 per cent to 82.7 per cent, to make those people 60 times better off than the poorest 20 per cent. The latest UN long range population forecasts estimate that world population will be multiplied by 4.6 between the years 1950 to 2150 growing from 2.5 billion people to 11.5 billion. Current world population is about 5.3 billion, 70 per cent of whom live in the developing regions. By 2150 these regions will account for 90 per cent of the world population. This is the scale of the problem at a global level.

The population density in Ireland is low by international standards at 50 persons per square kilometre, 57 per cent of the population living in urban areas. A relatively stable population should be a condition favourable to achieving sustainability in the use of resources. However, Irish migration patterns have been relatively unpredictable (as has the world

business cycle that drives it in part) and are sufficiently large to alter the size of the labour force. This migration factor can influence the short-term goals of a national sustainable development strategy.

In the absence of an absolute measure on the well-being of a country's citizens, comparative measures relative to other countries are normally employed to indicate a level of welfare. Factors attributed to well-being include income per capita and its distribution, life expectancy, adult literacy, infant mortality, daily calorie supply, educational attainment and equality of opportunity (see Table 1). Other important natural environment indicators include access to natural amenities and pollution levels. Given the comparative nature of the assessment national well-being is relative to the particular reference group used. Ireland is classified as a high income group by international bodies and so it compares very favourable on most indicators relative to middle and lower income countries. However, through the combination of demonstration effects and development aspirations it is probably more insightful to compare Ireland's well-being against high income countries. These include most of the other 22 OECD countries (with the exception of Portugal), some OPEC nations, Israel, Hong Kong, Singapore and some small island nations. The criteria for being in this group is a 1990 GNP per capita of \$7,620 or more.

Ireland has often been dubbed "one of the poorest of the rich" and in terms of GNP per capita in the *1992 World Development Report* this is borne out. Ireland has less than half the high income economies average, but still has double the world average. In comparison to our European Community partners, Ireland has less than two-thirds the average, hence the need for the proposed EC Cohesion Fund to bring the Member States closer together in terms of economic performance. Income distribution in Ireland is skewed in a similar manner to the other high income economies with 45.1 per cent of income in the highest quintile and 4.9 per cent in the lowest (CSO, 1989).

Life expectancy at birth in Ireland is 74 years compared with a world average of 66. Adult literacy is high if we can infer from educational enrolment at secondary level. Infant mortality rates have declined dramatically over the last three decades and the Irish rate of 7 per 1000 births compares well with an average of 8 in high income countries and 52 as a world average. Health and nutrition indicators for Ireland are also favourable in comparison internationally. Female enrolment at secondary education in comparison with that of males is used a proxy for equality of opportunity. In Ireland this would seem to firmly indicate equality of opportunity. The inadequacies of such indicators as measures of wellbeing are obvious and are easily open to criticism. This highlights just one of the problems in operationalising the concept of sustainable development, in this case the lack of an adequate measure of performance.

The same problems of measurement apply when trying to derive indicators of environmental performance. A high quality environment can be an important factor for determining the traditional measure of national performance. As the EC survey cited above indicated that

**Table 1: International Development Indicators**

Indicator	Ireland	Low Income Economies	High Income Economies	World
GNP per capita 1990 US\$	9,550	350	19,590	4,200
Life Expectancy at Birth	74	62	77	66
Adult Illiteracy (per cent)	..	67	4	35
Total Fertility Rate (1990)	2.2	3.8	1.7	3.4
Infant Mortality Rate (per 1,000 life births 1990)	7	69	8	52
Daily Calorie Supply (per capita, 1989)	3,778	2,406	3,409	2,711
Education Enrolment in 1989 (Percentage of Age Group)				
Primary	101	105	105	105
Secondary	97	38	95	52
Tertiary	26	..	42	16
Urbanization in 1990 (per cent of Total Population)	57	38	77	50
Equality of Opportunity (Secondary Education of females per 100 males)	101	64	100	76

Source: World Bank (1992).

42 per cent of the Irish polled felt that it was necessary to aid economic development by protecting the natural environment. Convery (1992) presented what he describes as "crude" but conservative estimate that 2.2 per cent of total GDP could be attributed to a high quality environment. That is to say that 2.2 per cent of GDP would disappear if environmental quality diminished significantly. The main sectors that depended directly on the maintenance of a high quality environment included tourism, food processing and high-tech industries. The latter sector depending on a quality of life to attract scarce managerial and technical skills. The food-processing sector depended on a good environment for marketing purposes. Of course, these losses to GDP might be offset or even reversed if Ireland suddenly

became a haven for high polluting industries, which is unlikely to improve national well-being given that GDP is rather imperfect measure. The Irish public have shown a measure of their rejection of this latter philosophy in cases such as Merrell Dow, Sandoz or Du Pont, see Collins (1992).

The perception has been to view Ireland as a green country, cleaner in comparison with other industrialised nations. In many of the indicators provided in Table 2 this is not readily apparent.

Many of these indicators are either poor or partial measures of environmental quality. For example, with the emissions of sulphur dioxide it is where these are deposited not emitted that matters in terms of the impact of acid rain on the environment. The European Commission (1992a) recognise the "serious lack of base-line data, statistics, indicators and other quantitative and qualitative material required to assess environmental conditions". This lack of compatibility and comparability in environmental data would make impossible the task of assessing whether the natural capital stock is being maintained at sustainable levels. The collection of reliable and authoritative data is one critical first step in the pursuit of sustainable development. This fact has been acknowledged at both international and national levels. In Ireland the new Environmental Protection Agency (EPA) will be "required to prepare, publish and implement programmes for the monitoring of environmental quality" (Harney, 1992).

Accounting for the environment is important in developing a strategy on sustainable development. In Ireland, no inventory of natural capital is included in the national accounts. This limits their usefulness when pursuing an objective of sustainability. Attempts have been pursued in the past to take account of environmental issues in national accounts. Nordhaus and Tobin (1972) estimated a measure called Net Economic Welfare (NEW) using existing national accounts which adjusted USA GNP by deducting "bads" (like pollution), adding the value of non-market activities and including the value of leisure. The Norwegian government around 1974 began to develop balances for natural and environmental resources. Although separate from existing national accounts these formed a set of satellite accounts linking the environment with the economy. These environmental accounts are presented in physical units, similar to the manner that Irish energy balances are represented in a common energy units, such as tonnes of oil equivalent. The French and Canadian governments also opted for using these separate physical units accounts. The experience with these accounts have proved useful in improving the understanding of the links of the economy with the environment and for forecasting demands on resource bases. The physical accounts are also easily implemented in that they require no difficulties with economic valuation. Collection and maintenance of these accounts can be very expensive so it would be

**Table 2: Environmental Indicators**

<b>Indicator</b>	<b>Ireland</b>	<b>EC</b>	<b>OECD</b>	<b>World</b>
<b><u>Carbon Dioxide (CO<sub>2</sub>) Emissions</u></b>				
Million Tonnes of Carbon 1988	8	730	2793	6256
Change from 1971 (per cent)	31	..	15	43
Per Unit of GDP (kg/1000US\$)	392	332	286	635
Per Capita	2.2	2.2	3.4	1.2
<b><u>Greenhouse Gas Emissions</u></b>				
Million Tonnes of Carbon 1988	21	1476	5030	12800
Per Unit of GDP (kg/1000 US\$)	1037	648	516	662
Per Capita	5.9	4.4	6.1	2.5
<b><u>Sulphur Dioxide (SO<sub>2</sub>) Emissions</u></b>				
1000 Tonnes 1988	174	12830	39900	..
Change from 1980 (per cent)	-20	-39	-25	..
Per Unit of GDP (kg/1000 US\$)	..	..	4.1	..
Per Capita	49	37.5	48.3	..
<b><u>Nitrogen Oxide (NO<sub>x</sub>) Emissions</u></b>				
1000 Tonnes 1987	115	11300	36200	..
Change from 1970s (per cent)	91	..	12	..
Per Unit of GDP (kg/1000 US\$)	..	..	3.8	..
Per Capita	32	35	44.3	..
<b><u>Land Use Changes</u></b>				
Arable and Crop in 1988				
per cent of Land Area	14	30.3	13	11
per cent change since 1970	-15.7	40.1	2.0	4.3
Wooded Area in 1988				
per cent of Land Area	5	24.3	33	31
per cent change since 1970	38.4	7.0	1.4	-3.4
<b><u>Protected Areas</u></b>				
1000 KM <sup>2</sup> in 1989	0.2	148.1	2180.5	5290.8
Per cent of Land Area	0.4	6.7	7.1	4.0
<b><u>Use of Nitrogen Fertilisers</u></b>				
Use of Arable Land (Tonnes/KM <sup>2</sup> )	33.9	12.5	5.7	5.4
<b><u>Use of Forest Resources</u></b>				
Intensity of Use 1980-85 (Harvest/Growth)	0.32	0.63	0.52	..

**Table 2 (continued)**

<b>Indicator</b>	<b>Ireland</b>	<b>EC</b>	<b>OECD</b>	<b>World</b>
<b><u>Threatened Species</u></b>				
As a percentage of Known Species				
1989	16.1			
Mammals	23.7			
Birds	..			
Fish				
<b><u>Fish Catches</u></b>				
Per Unit of GDP 1988 (Tonnes/10,000 US\$)			3.2	4.4
Per Capita (Tonnes/1000 Persons)			38	17
<b><u>Waste Generation</u></b>				
Municipal (1000 Tonnes)	1100	10586	420000	
Industrial (1000 Tonnes)	1580	6	143000	
Nuclear (Tonnes of Heavy Metal)	..	25014	0	
		3	6990	
		..		
<b><u>Municipal Waste</u></b>				
Amount Per Capita(KG) 1988	313	325	513	
<b><u>Energy Intensity</u></b>				
TOE per 1000 US\$	0.48	0.39	0.41	0.41
Energy Use of TOE Per Capita	2.7	3.3	4.8	1.6
<b><u>Use of Renewable Energy</u></b>				
Percentage of Total Energy Requirement	2.8	4.2	6.4	6.1
<b><u>Transport Trends</u></b>				
Percentage Change from 1970-1989				
Road Traffic	114	..	93	..
Motorways	..	121	83	..
Passenger Cars in Use	800	101	96	993

Sources: OECD (1991b) and European Commission (1992b).

imperative that proper use be made of them in planning for sustainable development. As Pearce *et al.* (1991) state "the use to which these can be put, in terms of economic analysis that has policy relevance, is unclear".

Attempts have also been made to derive monetary valuations for the environment to link with the national accounts along the lines proposed by Nordhaus and Tobin. Japan and

Indonesia are countries that have attempted this exercise. Most of the problems with this monetary approach involve correcting measurement errors in welfare as presented in the standard national accounts. These include the treatment of what are described as defensive expenditures, that is expenditure to offset a negative externality. No net increase in welfare results but GNP would have increased as a result of these expenditures. Treatment of depreciation of natural resources in national accounts over-values current welfare by discounting future welfare and this requires adjustment. Proper valuation is crucial to successful integration of these accounts but also to operationalising sustainable use of all environmental resources, as is discussed in the next section.

The need to promote technology change towards cleaner growth as part of a sustainable development strategy is another critical factor. This need is most apparent when we examine the existing energy technologies worldwide in Table 3.

**Table 3: Energy Requirements in Percentage by Source in Late 1980s**

	Coal	Peat	Oil	Gas	Nuclear	Other	Total
Ireland	24.1	14.2	32.2	16.8	0	2.8	100
EC <sup>1</sup>	21.0	0 <sup>2</sup>	44.8	18.3	12.7	3.2	100
OECD	24.0	0 <sup>2</sup>	42.6	18.5	8.4	6.4	100
World	39.5	0 <sup>2</sup>	29.0	20.1	5.3	6.1	100

<sup>1</sup> The EC Member States excluding Ireland.

<sup>2</sup> Insignificant amounts close to zero.

Sources: OECD (1991b) and European Commission (1992b).

The vast majority of worldwide energy requirements depend upon technologies that involve the burning of fossil fuels. These are depletable natural resources and their use creates additional environmental problems, for example energy use accounts for 49 per cent of the total contributions to the greenhouse effect. Nuclear is an alternative to fossil fuels with regard to greenhouse gas emissions but carries with it many other threats for the environment, not least the problem of assimilating its hazardous wastes. The category "other" in Table 3 contains renewable forms of energy, such as hydroelectricity, solar, wind, wave and biomass. The low dependence of energy requirements on these renewable fuels is attributable either to the absence of alternative technologies or their uneconomic viability.



Both of these factors can stem from energy price distortions currently in place in many countries.

The coal industry has benefited from subsidies and price supports in many countries, including Japan and Germany (OECD, 1991c). In Ireland, peat benefits from subsidies in the form of agreed purchase contracts for use in electricity production. The impact of these subsidies, driven in most cases by concerns of intragenerational equity and socio-economic factors, is that they can discourage investment in alternative energy technologies. Inadequate pricing in reflecting the scarcity or value of a resource to future generations inevitably leads to the depletion of that resource. For instance, the pricing of Ireland's natural gas resources at too low prices to some sectors has led to inefficient use of a natural resource by speeding up its depletion (McCarthy, 1983). The non-transparency of the actions leading to these decisions certainly would not foster confidence in ensuring future generational concerns were adequately accounted for in the depletion levels.

The promotion of clean technology raises many practical difficulties for policy makers. Initially, international bodies were pushing for projects to include requirements of "Best Available Technology" (BAT), this has since been relaxed to call for "Best Available Technology Not Entailing Excessive Costs" (BATNEEC). BATNEEC makes it important for policy makers to determine when a technology contains "excessive" costs. The need for "a tightening up in the definition of the BATNEEC to clarify that primacy must be given to prevention of pollution over all options" (Harney, 1992) has been recognised in setting up the Irish EPA. The time-frame within which the costs are measured is certainly a crucial factor, the very short payback periods required by most commercial investments could be to the disadvantage of more sustainable technologies with high capital costs, such as wind energy. Ireland's first large scale wind farm at Bellacorick, Co. Mayo was started up in 1992.

The subsidisation of research on renewable technologies poses another problem for Ireland, equally applicable to other environmental matters, about the most appropriate level in which it should be undertaken. The levels could be local, regional, national or international. The EC have opted for the principle of subsidiarity to define its responsibilities with regard to Member States. This principle is broadly concerned with the limits to the rights and duties of public authority to intervene in social and economic affairs. The principle has been contained, for instance, in many Roman Catholic papal encyclicals whereby the central authority should have a subsidiary function, performing only those tasks which cannot be performed at a more immediate or local level. The implication of this principle would seem to suggest that given the economies of scale involved support for research on renewable technologies is best dealt with at a Community level. The EC has a number of specific measures for research and dissemination of technology such as the JOULE, THERMIE, ALTENER and SAVE programmes (European Commission, 1992a). The ALTENER

programme is for greater penetration of renewable energy sources, it has a budget of 40 MECU for the period 1993-1997, which in a sustainable development context pales to insignificance when compared with over 400 MECU spent each year on fusion research.

Subsidiarity needs to be evoked in dealing with most types of environmental protection problems. Pollution, from an environmental point of view, is always best dealt with at source so this would be the most effective level. However, this raises many practical difficulties with implementation to ensure the economic efficiency of policies aimed at protecting the environment. Invoking the polluter pays principle becomes difficult if the polluter and the regulator are the same entity. This is a classic "gamekeeper turned poacher" problem, which is often evident when both the government and local authorities are lax with regard to the environmental standards of their own activities. The new Irish EPA will be given the role of watchdog to ensure that public authorities live up to their environmental responsibilities. In order to ensure the principle of legal efficiency the EPA is being given strong enforcement powers; maximum penalties on summary convictions of 1000 and/or 6 months imprisonment and convictions on indictment of 10 million and/or imprisonment of 10 years (Harney, 1992).

In rationalising the degree of desirable substitutability between natural and man-made capital, policy makers, at least implicitly, must make decisions on the needs of the present generation against future generations. The optimal depletion path of a natural resource often will not coincide with the needs of the present generation. However, these resources in many instances are drawn down rapidly by society and the proceeds invested in human capital in order to increase national productivity. Attempts at a justification for such a strategy on the grounds of intergenerational equity tends to be based on the Kahn *et al.* belief that future generations will have benefited from technological progress in pushing back natural limits or they will have discovered alternative sources. Uncertainty about the future should make policy makers risk adverse, in the context of sustainable development, and lead to a more precautionary stance on the degree of substitutability between natural and man-made capital. However, in terms of the political process of decision making concerning the use of the environment and natural resources the present generation, due of their existence at the time of decision, exercise a more powerful influence than future generations. This results in strategies that are biased toward the present and so conflicts with the goal of sustainable development.

## **6. VALUING THE ENVIRONMENT - IRISH PEATLANDS**

Proper valuation of natural resources and the environment is crucial to ensure that sensible decisions are taken with respect to sustainable development. Pricing of environmental assets should reflect scarcity and society's preferences. The absence of markets for

environmental goods and services tend to result in their overuse or degradation. Sometimes environmentalists argue that some natural assets are "priceless" or "beyond value" and they object to monetary values being placed on them. However, the protection or conservation of these assets is not without its costs; scarce resources are allocated to these tasks and so are unavailable for other productive purposes. Monetary values, when correctly valued, allow direct comparisons between alternative use of funds so facilitating rational choice of strategies to achieve sustainability.

Irish peatlands offer a good case study on how valuation of a natural resource could proceed in order to ensure some of the requirements of sustainable development are met. Peatlands originally accounted for 17 per cent of the total land surface of the island of Ireland, this is higher than any European country with the exception of Finland. Exploitation of this resource as a fuel source or for forestry and agricultural purposes has dramatically reduced the concentration of peatlands in Western Europe. However, Ireland along with some of the Scandinavian countries managed to keep more than 80 per cent of the original peatlands in tact by the end of the 1970s. Peatlands are fragile and non-renewable resources and Irish examples are considered unique among the European peatlands. This has resulted in a strong international campaign to conserve the best of these examples (Doyle, 1983).

There are four types of bogs; fens, raised bogs, western blanket and mountain blanket, these would have accounted for 8, 24, 25 and 43 per cent respectively of original peatland in Ireland. Fens often contain many rare plants seldom found in other habitats. Raised bogs are predominantly found in the midlands of Ireland and they are generally deep allowing for extensive exploitation for fuel and peat moss. The blanket bogs are predominantly found on the western seaboard of the country and these contain vegetation and fauna of scientific value. Rapid exploitation of these bogs over the last few decades has led to forecasts that, at current utilisation levels, intact raised bogs of scientific interests lying east of the Shannon would have disappeared by 1993 and those to the west would be eradicated by 1997 (Cross, 1987).

The need to conserve a small number of representative peatland sites was recognised over 20 years ago. A number of exercises were carried out in the early 1980s by An Foras Forbartha and the National Peatland Conservation Council listing sites of outstanding conservation value. Since 1983 the total area of protected peatland bogs has increased from 3,887 hectares to 17,107 hectares by 1991 and these now include some raised bogs hitherto unprotected. The government's ideal requirement for peatland conservation is 10,000 hectares of raised bog and 40,000 hectares of blanket bog, current conservation of these types is 2,153 and 14,735 hectares respectively. Bord Na Mona, the State controlled peat board, agreed to avoid developing sites of conservation value and to transfer 20 sites

to the Wildlife Service. Private development schemes account for two-thirds of fuel cutting in raised bogs and these are not currently regulated. However, future peat extraction involving 50 hectares or more will be subject to environmental impact assessment.

A proper management plan on peatlands is needed that would include "exploitation for fuel, afforestation and grazing, but equally must consider both conservation for scientific and educational purposes, and preservation of particular areas for their amenity, recreational and aesthetic value" (Doyle, 1992). The Department of Energy (1991) produced a report which examined the future uses of Bord Na Mona's cutaway bogs, that is lands available after peat harvesting is completed. This report had as its objective the allocation of nearly 90,000 hectares of bog for forestry, grasslands, horticulture and amenity. The committee responsible for the report had the added responsibility "to ensure that in allocating the lands for other uses, every effort should be made to maximise economic activity in the areas concerned". This report recommended that the disposal and allocation be determined in the main by market forces but that "20 per cent of the total area should be consciously designated for amenity and/or environmental uses" (Department of Energy, 1991). The committee, in making what amounts to an arbitrary allocation of resources for environmental purposes, are recognising the fact that proper valuation for these uses would not occur if left purely to market forces.

Deciding to extract the peat for energy purposes first and then trying to sustainably develop the cutaway is not working to an objective of a constant natural stock, instead it is rationalising the substitutability of natural and man-made capital. In order to ensure sustainable development of peatlands there must be a serious attempt to value the alternative uses of these resources before the peat is extracted, otherwise it is tantamount to deciding how to make use of the stable door after the horse has bolted.

Environmental economics attempts to define total economic values as they relate to the natural environment. Market decisions on development projects compare costs of development against the future stream of benefits. In many cases there is no value ascribed to the loss of benefits that result from undertaking the project. Total economic value is a measure of these benefits of preserving a resource, such as the Irish peatlands. Pearce *et al.* (1991) distinguish between user values and "intrinsic" values in order to derive the total economic value of a resource. User values relate to the actual use of a resource without depleting it. These are the benefits received from the use of the peatlands for educational and scientific interests or as part of the scenic attractions of an area. There are also option values on future use of the peatlands to be considered. These option values could be in the form of bequest values in conserving a resource or protecting the environment for the use of future generation. Another element of the option value of peat could be as secure source

of domestic energy. Total user value is made up of the actual use value plus the option value.

The intrinsic values of resources are those unrelated to human existence. These are a much more nebulous concept. Peatlands can and do have value in themselves by being unique ecosystems. However, people can still derive non-use value from these resources. These are often referred to as existence values in that we can derive value in their very existence, totally separate from issues of use. Total economic value is equal to actual use value plus option value plus existence value. In addition, there are three important features to be considered in the context of peatland depletion. Depletion of the resource is *irreversible*, there is *uncertainty* about the future costs and benefits of depletion and finally this resource possesses *uniqueness*. Given these combination of attributes, economic theory would indicate that "preservation will be relatively more favoured in comparison to development" Pearce *et al.* (1991).

In terms of sustainable development, estimation of the total economic value of a resource is critical in addition to traditional cost-benefit analysis. There are a number of techniques available to estimate the components of total economic value, such as contingency valuation methods, but these are not without their difficulties and limitations (Cummings *et al.*, 1986). Most of these valuations find positive total economic values for environmental resources (Barde and Pearce, 1991). Despite the difficulties in determining precise values it is better to include estimates in the analysis rather than assign zero values to the future benefits forgone as is done at present.

Determination of the optimal level of peat conservation will inevitably give rise to some conflicts. Bord Na Mona, which controls less than 10 per cent of bogs, employs over 3,500 people at peak season. If conservation is viewed as a threat to these jobs, the government will have to make decisions as to the weighting it attaches to output growth and environmental protection in its sustainable development objective function. This weighting would depend upon the importance given to the present generation relative to the future and whether the objective is to have constant capital or constant natural capital stock. Only if after proper evaluation of the alternatives has been undertaken can a sustainable strategy be assured.

## 7. CONCLUDING COMMENTS

Irish policy makers have accepted a formidable challenge in adopting sustainable development as the future objective of economic policy. Operationalising this objective, as this paper has described, is no simple matter. The first step required in developing a sustainable development strategy is to clearly define what is required. Policy makers need

to decide if the objective is to sustain the level of capital stock, both man-made and natural, for future generations or to maintain a constant stock of natural assets. The choice of objective revolves around the acceptance of whether man-made capital is substitutable with natural capital. This may require policy makers identifying a set of development indicators to measure the welfare of its society. These indicators could include changes in real income per capita, educational attainment, health and nutritional status, access to basic freedoms, access to resources and amenities, equitable income distribution and the standard of environmental quality. Such indicators would require the collection of reliable, authoritative and comparable data. These measures would force policy makers to apply a system of weights to each variable, relative to the importance attached to each, in order to get a representative indicator. This would force decisions on whether economic growth was more important than environmental preservation or equality of income distribution for example. One solution around such a stark choice would be the adaption of the system of national accounts to take account of the capital consumption of natural resources and the degradation of the environment.

Intergenerational equity is another important element of sustainable development so policy makers will have to take into consideration the needs and aspirations of future generations. This is a difficult task since there is uncertainty about the exact needs of the future generations. This may lead to the adoption of a precautionary principle towards the use of resources and towards the environment whereby irreversible damage is avoided in most instances. Taking account of future interests requires policy makers to determine how many generations to take account of in planning for the use of natural resources. An infinite time horizon does not aid conventional decision making techniques so decisions on time frames will be required. One aid would be to distinguish between depletable and renewable resources in determining a sustainability strategy. Deciding on what weights to accord to the future is yet another complexity to deal with, whether to discount future benefits or to attach more value to them will determine valuations of strategies.

Proper valuation of natural resources and environmental assets is another crucial step in operationalising sustainable development. This valuation requires that all the costs and benefits of any action are fully internalised in making decisions. This would require determining the total economic value of future benefits forgone as consequence of any action. Pricing of resources to reflect their scarcity and usefulness to future generations is also important and in most cases where practical to insure that the polluter pays for the costs of their pollution. Sustainable development can be aided by the principle of subsidiarity if environmental protection takes place at the most effective immediate level subject to efficiency of cost and legal enforcement. Policy makers can improve the prospects of sustainable development by either establishing or improving on the mechanisms available to implement proper valuations and to enforce cost effective protection.

Ireland and the international community have taken important first steps towards achieving sustainable development over the last decade. There is now a better understanding that we have not inherited the Earth from our fathers but are rather borrowing it from our children. There is indeed a long road to travel before sustainability eclipses growth as the focus of economic policy making, but it may indeed be the only way to ensure a sustainable development for future generations.

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## DISCUSSION

**Richard Douthwaite:** In moving the vote of thanks to Mr McCoy I would first of all like to thank the Society for inviting me here. However, I have to say that I accepted the invitation uneasily. I knew of our speaker from his ESRI work on carbon taxes but had never met him personally and had no idea whether he wore a black hat or a white one, at least as far as my views were concerned. At that time I had not, of course, read a draft of the paper and, as I told this Society's Honorary Secretary, I did not want to find myself damning it with faint praise in order to be polite or having to pretend that a paper with whose arguments I could not agree was important and worth while.

I need not have worried. Mr McCoy is very much a white hat and the paper we have just heard will probably be considered in future to have marked an important turning point in economic thought in Ireland. His last sentence is one of the most important of all: "There is indeed a long road to travel before sustainability eclipses growth as the focus of economic policy making; but it may be the only way to ensure a sustainable development for future generations."

The significance of those words for me is that here we have a mainstream, conventional economist saying something that only the mavericks of the profession - Ed Mishan, Herman Daly and Kenneth Boulding - would have dared utter a few years ago. Economists in general - even those who label themselves Green - have been very slow to accept that GNP growth is a most unsatisfactory indicator by which to assess a country's progress in anything other than a very limited area of its national life and should not therefore be accepted as a suitable target in policy making. Yet, in the paper we have just heard, Mr McCoy made two points very strongly. One was that GNP is deficient as a proxy or measure of human welfare and that as "development embraces wider concerns about quality of life than economic growth", we need to use a whole set of indicators, of which increases in real income per capita would be only one, to be able to tell whether our policies are, in fact, moving us in the right direction. The other indicators he suggested we use were: educational attainment, health and nutritional status, access to basic freedoms, access to resources and amenities and, finally, the degree of equality of income distribution.

One speaker immediately went on to point out that the problem with using a set of indicators is the selection of a system of weights so that they may be combined into a single representative figure. I accept this point, but would argue that the problem only arises if each indicator measures progress towards a target which is desirable as an objective in itself, and not as a facet of some overall yet tacit objective. We would not be too worried about, say, inequalities in income distribution, if those inequalities did not mean that the people with the lowest incomes had significantly worse mental and physical health, poorer

physiques and higher death rates than groups with better incomes and we also knew that those health differences tend to disappear when relative incomes converge. In other words, I am arguing that income equality is not important as a goal in itself but largely because unequal incomes damage people's lives in ways which are reflected in their health. Consequently, if we set the greatest happiness of the greatest number as our national goal and then leap to the position that happy people are healthy people (or at least that unhappy people rapidly get sick) and use the level of health in its widest sense as an indicator of happiness and make health in its broadest sense the focus of policy making, we would find that we had only one indicator to worry about. During my research into the effects of the single-minded pursuit of economic growth in Britain between 1955 and 1988 I was surprised by the extent to which the growth path chosen by the market had damaged people's health, as shown by such indicators as the number of prescriptions issued and the number of days taken off work through illness and the number of hospital admissions. But that was a digression, not a quibble. It shows how a paper like Mr McCoy's can get the reader or listener excited, spark off ideas and get people speculating on their own.

The second point our speaker made strongly was that the type of growth the world is getting - or should I say was getting since expansion has almost entirely died away - might not be sustainable because it measures income but ignores what is happening to the natural resource stock. He also pointed out that, since GNP measures throughput, its maximisation consequently maximises the costs of natural resource depletion and pollution. In other words, the higher that GNP soars, the less sustainable it is likely to get. The threat of global warming certainly indicates that we have already exceeded a sustainable level of throughput and resource use for the world as a whole.

One fascinating part of the paper for me was its discussion of the problems involved in achieving a balance between the claims of this generation and those of future ones. Mr McCoy made it clear that the use of cost benefit analysis in this context was controversial because discounting involves ascribing a lower weight to future consumption than consumption in the present, which, as he said, would seem to conflict with sustainable development's explicit concern for the future. I entirely agree, and would argue that discounting should never be used for calculating the benefit to society - as opposed to the benefit to the individual investor - from some development project. This is because society - we hope - will go on for ever, while the individual investor is mortal, and since we can no longer assume that future societies will be better off than we are today - my bet is that they will be significantly worse off - we cannot say that future benefits from the project will be less important for people in the future than they would be if they occurred for us today. The British Government uses a 6 per cent discount rate in assessing public projects, which means that a benefit occurring in 50 years is valued at only 3 per cent of the value it would have if it happened today. In my view, that is entirely wrong, and I suspect Mr McCoy

shares that position. After all, he quotes a marvellous piece from Barbier and Markandya: "With low initial environmental quality and a high rate of social discount, environmentally unsustainable growth may be an optimal strategy as the benefits of increased consumption occur in the present whereas environmental degradation and collapse is a future problem."

On the other hand, if one simply adds future benefits without limit, this would throw the balance too far the other way. At present, then, we are adopting much too short a time horizon and virtually ignoring the needs of future generations. We don't want to go to the other extreme and give so much weight to the future that we can do nothing at all. How far into the future would represent a satisfactory time horizon: 200 years - the minimum length of time needed to grow a sizeable oak tree? 500 years - the period since Columbus's discovery of the Americas? There is no answer. All we have to do is to use our judgement, our common sense. Too often in the past cost-benefit analysis has been a way of hiding from the hard decisions, of letting the economic calculating machine take over and settle things for us in a "scientific" way. We would have done better to have tossed a coin. The results have been uniformly disastrous.

Then there is the problem of whether an increase in man-made capital should be allowed to compensate or a depletion in natural resource capital. Mr McCoy is undoubtedly right when he says that allowing such a substitution is very much the soft option. I hope he is also right when he interprets the lack of a clear statement on the issue by governments and international organisations as meaning they favour keeping the natural stock constant or even improving it. My guess is that they are hoping that the need for a decision will go away.

I liked Mr McCoy's proposal that Ireland should adopt a system of physical unit accounting to supplement the national income accounts. We badly need to know just how things are changing, and for that information to be presented in an accessible form which shows not just the changes over the past 10 years, but the last 50 or 100 years. It is very difficult indeed to find long-run statistics in most areas because, even if the data exist, and in many cases they do, only specialists know where to find them and are able to correct for changes in the methods of collection or in the units used so that they can be converted into a consistent form. As a result, we lack a long-run historical perspective on what we are doing and our decision making is consequently flawed. I also like the proposal for correcting Irish GNP figures to allow for the depletion of natural resources because, even though I have grave reservations about the use of GNP totals for almost any purpose at all, believing them to be misleading in almost every respect, other people are going to want to use them for the foreseeable future and they should therefore be made as correct as possible. Indeed, instead of just tinkering in this area, perhaps we should convert GNP data into Nordhaus

and Tobin's Measure of Economic Welfare or, better still, its successor, Daly and Cobb's Index of Economic Welfare.

But perhaps the most urgent call the paper makes is that the distortions produced in the economy by improper energy pricing should be tackled. These distortions have corrupted the whole course of economic change because they have required the excessive replacement of human and animal labour by machines and because they have made it artificially cheap to transport goods from place to place and have thus undermined local economies. If it was announced that these distortions were to be progressively corrected over the next 20 years - and, so great are they, with so far-reaching effects, I doubt it would be wise or prudent to try to remove them sooner - an exciting new development path would open up, particularly for Ireland, whose endowments in renewable energy sources must be among the richest in the world. On Monday this week, I was in fact at the official opening of the Bellacorick wind farm which Mr McCoy mentioned, and the idea that this country could become an exporter of wind-generated electrical power along the proposed Britain-Ireland interconnector was being seriously discussed at my table at the lunch afterwards by representatives of a wind-turbine manufacturer and an Irish wind energy expert who is attempting to put a major project in place. We also have excellent potential in biomass production, wave power and low-temperature geothermal energy to work heat pumps as is done at Trinity College.

Finally, the paper makes some very important points about the differences which can arise between the benefits from a project which accrue to the individuals sponsoring it and the benefits which that project brings to society as a whole. Only in exceptional circumstances will these benefits be the same. This means that, if we allow entrepreneurs to make the key decisions about the types of project which go ahead, society will benefit by less - and in some cases will even suffer a serious loss - as a result of their actions, even though GNP may be increased thereby. Mr McCoy pointed out that individual entrepreneurs rarely took the loss of benefits from the existing uses of the resources they were planning to employ into account when assessing a project and if these benefits were widely spread amongst many people, particularly if they were largely non-monetary in character, society's loss could well be considerably more than the entrepreneur's gain. Society therefore needs to control all sectors of the economy much more closely than it has been politically respectable to do in the recent past. Otherwise, as has happened, the great majority of the population will suffer while the few gain.

I would take issue with Mr McCoy on only two points, both of them trivial. One is his statement that Irish policy makers have accepted a formidable challenge in adopting a sustainable development policy. I fear that if, by policy makers, he means politicians, all that has happened is that they have adopted a fashionable form of words which they have not

thought through and therefore to which they have no allegiance. I fear they will therefore shed sustainability as a target as soon as its difficulties become apparent, particularly as politicians have a rate of social discount measured in weeks or months, never in years.

The other trivial point is his statement that "there is uncertainty about the needs of future generations". In fact, the needs of future generations will be exactly the same as our own. The only area about which there can be uncertainty is over the scale of their wants.

So, I would like to move that we thank Mr McCoy for providing a stimulating paper which ought to get many people, particularly those with responsibilities in the planning area, thinking along new lines and starting to question whether the achievement of rapid rates of undirected market-led growth - growth with no regard for long-term sustainability because, as we know, markets take a very short-term view - is the correct policy for this country to follow. If his paper sets off such a bout of questioning, it could turn out to be very important indeed and shorten the long road he mentioned we had to travel before sustainability eclipses growth as the focus of economic thought. May I move the vote of thanks?

**John Sweeney:** I have great pleasure in seconding the vote of thanks to Daniel McCoy on his thought-provoking paper which addresses a topic of growing importance in economic planning, one which has forced its way close to the top of the political agenda as an increasingly educated and sensitised public seeks to incorporate environmental considerations into areas which were hitherto subservient to technical and economic considerations.

It is particularly appropriate that Mr McCoy should urge economic policy makers to address the issue of sustainable development, since the Treaty on European Union, signed by all member states in February of this year, enshrines, as a central objective, the promotion of sustainable growth which respects environmental integrity. This marks an important milestone in two decades of Community activity which has produced over 200 pieces of legislation, four Community action programmes, and a dramatic change in emphasis from the original Treaty of Rome in which the environment never appears. This explicit recognition that economic expansion is not an end in itself, but should be accompanied by qualitative as well as quantitative improvements in well-being has come as the latest Community report on the State of the European Environment shows a slow but relentless deterioration in the general condition of the Community environment as a whole. A change in direction is obviously required, and is particularly necessary to deal with the increased competition and transnational movement of wastes which will accompany the completion of the Internal Market.

But it is in operationalising the concept of sustainable development that the difficulties arise. As Mr McCoy demonstrates so well, teasing out the nature of what is meant in practice by sustainable development is not easy. It seems to be all things to all people. Indeed, I might go so far as to suggest that the concept may be best considered a device for bringing people on board the environmental locomotive, rather than the engine which actually powers it.

Environmentalists generally fall into one of two camps. The *ecocentric* hankers after some long lost idyllic past where the problems of today have never arisen and where communion with nature, self reliance, smallness and participatory democracy are emphasised at the expense of materialism. Though such individuals tend to opt out of political activity, not wishing to involve themselves in what they see as a fundamentally flawed system, the ideals they espouse can be seen to have surfaced in some of the European Green Party manifestos of the last decade or so. The *technocentric*, on the other hand, seeks a utopia where the problems of today have been resolved. The technocentric is an unbridled optimist, particularly in the belief that a future technological fix can solve present day environmental problems; that such problems are best left in the hands of "experts"; and that economic growth can continue indefinitely, providing institutional safeguards for environmental quality, such as environmental impact assessment, are built in along the way. This thinking in less extreme form incorporates the environmental manager, the individual who believes in intervention and active management of the natural environment. In its more enlightened form the technocentric includes the more cautious reformers: those who advocate tinkering with economic incentives such as emission fees, resource depletion taxes and with institutional adjustments such as environmental impact assessment and environmental auditing. In this group are to be found the economists, engineers, planners and administrators who epitomise a more pragmatic response to managing economic and environmental conflicts.

The 64 working definitions of sustainable development referred to by Mr McCoy illustrate the nebulous nature of the concept. Perhaps it is neither possible nor desirable to define the concept explicitly since to do so would entail a rejection of one or other end of the spectrum of environmental philosophies just described. As it stands, the concept appeals to a broad church of people concerned with environmental quality, is intrinsically equitable to present and future generations, and capable of being used to underpin decision making. It is ultimately a philosophy of approach rather than a technique of implementation - a distinction which must be respected lest the ideal be corrupted. I argue thus principally because the ultimate difficulty with operationalising the concept stems from the need to evaluate organic resources, a problem alluded to in Section 4 of the paper.

Sustainable development is implicitly concerned with the management of natural resources. These may be characterised as depleting, or "stock" resources, and renewable, or "flow",



resources derived ultimately from photosynthetic channels. While the former lend themselves more easily to rational economic valuations they are not without their problems. These are principally concerned with the difficulties of determining optimal utilisation rates in order to preserve the rights of future generations to enjoy either the resource itself or benefits accrued by its previous utilisation. In this context, it may be argued that natural capital and human capital are not readily interchangeable. Indeed human created capital may not be in an appropriate form to benefit future generations or may become obsolete with the passage of time, conferring only the damage costs on future generations. Neither do renewable "organic" resources lend themselves to rational economics; their actual economic valuation is extremely difficult to pin down. Indeed, as will be demonstrated later with reference to Irish peatlands, the actual realisation and utilisation of most organic resources depends on supply and demand as determined by the prevailing socio-economic climate. It can be concluded therefore that organic resource values are relative and variable in time and are not amenable to quantification by economic or other criteria in isolation. In restricting this paper to a subset of the economic issues involved, Mr McCoy is wisely circumscribing the arguments to one set of criteria, the economic, but consequently is also restricting the applicability of sustainable development theory to the economic sphere, which is only one, albeit very important, facet of the concept.

I congratulate Mr McCoy for selecting Irish peatlands as his case study. This is a particularly courageous choice since it would have been so much easier to choose a more conventional organic resource such as forestry or fisheries. Peatlands epitomise the difficulties of unravelling the issues particularly well.

First, they illustrate that any organic resource can and often does have more than one type of use or value. To place an economic valuation on them depends on which attribute is deemed by society to be the most important at a particular time. For example, peatlands could be evaluated on biological criteria, i.e., the quantity of primary (plant) or secondary (animal) matter per unit area, or in stocking rates (livestock units per area per time). Such biomass productivity would vary with age, latitude, and altitude and could be considered a legitimate index of worth to an owner. Peatlands could also be valued solely on economic criteria. This might bear a strong relationship to their biological productivity, but might also be a reflection of other considerations such as location, uniqueness, depth of peat, etc. Indeed in many cases Irish peatlands were originally purchased from landowners by Bórd na Móna for less than £10 per hectare, a reflection of a viewpoint that they were not considered an economic resource at all before the technology to realise their potential was available. After half a century of exploitation the resource (and today it clearly has become an economic resource) could again be returned to the landowners concerned - but for approximately £1,000 per hectare! Such a transformation in economic value is due to the now widely recognised agricultural potential of cutaway bog! So how has this "wasting"

resource fitted into the sustainable development ideal? Clearly, not very well. Obviously this is a difficult example where a resource has appreciated as its exhaustion has occurred, making a mockery of any attempts at economic evaluations had they been based on the state of knowledge applying for the first 30 years of exploitation.

Many resources cannot be evaluated out of their spatial context. Such spatial considerations would be important in determining economic rents for utilising peatland resources for grouse shooting or sheep rearing or energy production or recreational amenity and would be a further complication to be incorporated in evaluation. Peatlands could also be valued on ecological grounds only in terms of the contribution made by their sphagnum dominated vegetation communities to regional/national/global ecosystems, again reflecting a geographical factor. The outside world might place an entirely different valuation on Irish peatlands than would domestic evaluators. The global supply of peatlands may be perceived to be low while a domestic evaluator might consider peatland ecosystems in much greater abundance. A similar argument could be made for a scientifically-based evaluation on the grounds that the best legacy development can bestow on successive generations is one based on knowledge and bestowing the options to change direction if necessary. Finally, in this discussion of multiple evaluation criteria, it could be suggested that Irish peatlands also could be evaluated as cultural resources. The late Estyn Evans contended that "bogs form an intimate part of the personality of Ireland". How can such criteria be omitted from any attempt at evaluating this resource in its broadest sense? It is clear that the sustainable development paradigm is even more difficult to operationalise than appears at first sight since the multiple resource value aspect of organic resources requires a social consensus based on a synthesis of sub-optimal utilisation strategies. Few academic disciplines can cope with the synthesis of conflicting criteria required.

Second, society's valuation of a resource is something which shifts erratically over time. Exploitation of the Irish boglands for fuel was a policy largely unchallenged from the 1940s to the early 1970s. It was only with the combination of declining fuel import costs, inflated farmland prices, imminent EC entry and, at the time, growing expectations of hydrocarbon discoveries off the south coast that the status quo was challenged. The revelation that these "sodden deserts" were potentially 30 times more productive agriculturally than for fuel sparked a shift in the social consensus. However, society's valuation of resources shifts dramatically, and not in a gradual or predictable way. Just as the Dublin smogs of the late 1980s acted as a catalyst to shift the social and political consensus as to what deterioration in atmospheric resources was commensurate with economic circumstances, so the relative merits of alternative resource uses change. Amenity and ecological values have now assumed much greater prominence, but who is to say that as the "issue attention cycle" changes, future generations will not stress other means of valuation.

Finally, we have to address the difficult question of time scales. As Mr McCoy emphasises, some limitation on the time horizon is necessary for practical decision making. Here again though, incompatibilities between economic and other criteria arise. The conflicts in the future uses of Irish peatlands between present employment in fuel extraction and potential future employment in agriculture exemplify this. Intergenerational equity may be the main casualty here. To maximise future value it is necessary to forgo present benefits and leave a metre or so of fuel behind. Given the individual's natural inclination to maximise personal gain at the expense of community good (a root cause of all environmental deterioration), it is difficult to see individuals forgoing present benefits willingly in some cases. For the 3,500 employed on boglands to forgo current employment to create a larger future agricultural surplus on 90,000 hectares is difficult to argue on economic grounds. It therefore implies that ultimately temporal choices in resource use may be made on grounds which reflect not the ideals of the environmentalist, the economist or the educator, but rather on grounds of political expediency. This is where the principle of subsidiarity falls down, when local vested interests can determine who benefits where and when from natural resource utilisation. In such circumstances, sustainable development ideals can become very blurred and the long term may indeed be the interval until the next general election, an appropriate concluding point to reflect upon this evening.

Again may I thank Daniel McCoy for a very interesting and well presented paper.

**Fr John Brady S J:** It does not appear to me that an objective of merely maintaining the environment is satisfactory. A country which has reached the level of wealth that Ireland has should have a policy of improving the environment in various ways, e.g., the planting of deciduous hardwood trees.

In discussion of sources of energy a world conservation viewpoint needs to be kept in mind. In this perspective the use of high grade fuels like oil and gas as bunker fuels is a very wasteful use of resources which are scarce in a long-term perspective. As far as possible low grade fuels should be used as a source of crude heat. The extensive use of Ireland's very limited resources of gas by the ESB in electricity generation ought to be a matter of public concern.

**Kieran Crilly:** Mr McCoy's paper was very important because it highlighted the problems of only using GAP per capita data as a measure of the increase in welfare. It also highlights the difficulty of getting people to give up consumption now to ensure larger future consumption.

I am pessimistic about the commitment of current Irish Governments to implement policies that will achieve this. My pessimism is based on a number of examples of which I am aware.

The setting up of the Environmental Protection Agency is cited as being positive. But it is argued by environmentalists in Cork (60 per cent of the chemical industries in Ireland is in the Cork region) that the EPA is more friendly to the needs of industry rather than to the environment.

It is put forward in the paper that an energy tax should be used to reduce carbon dioxide pollution. During the recent election the population in general voted for parties which promised no tax increases so it is unlikely that such taxes will be introduced in the foreseeable future.

On the issue of energy depletion the way Bord Gais sets its tariff encourages extra consumption. The 50/50 Cash Back scheme encourages consumers to use 550 therms per annum at 30p a therm. If you do not reach 550 therms you still have to pay for 550. So this encourages waste. It is also the same with the other domestic gas schemes. So the Government through Bord Gais is encouraging energy depletion. This is contrary to sustainable development. But the Government increases its revenue from this as the dividend from Bord Gais rises. There is a clear conflict between the present and the future.

On the issue of the current benefits from control of pollution versus the future benefits, different groups have different priorities. In the Sandoz case the local people and environmental groups (mainly middle class people) were opposed to the project but workers in the form of the Cork Council of Trade Unions were in favour. There is a trade off between different groups at present and the people who advocate sustainable development should be aware of this (on this issue).

The term sustainable development is now in vogue with governments but they do not seem to realise its implications. It reminds me of the development of all sorts of environmentally "friendly" products by multinationals in the late '80s. It is to be hoped that the commitment of Irish Governments to sustainable development is greater than the commitment to the environment shown by multinationals in the recent past.

**Reply by Daniel McCoy:** To begin with let me say how honoured I am to have been the recipient of the prestigious Barrington Prize for tonight's lecture. Having consulted the history of the SSISI, I find that I am the one hundred and fifth lecturer to have benefited from the Barrington Trust in one format or another. It is a distinguished list indeed and it is gratifying to be associated with it. I would like to thank the participants in the discussion for their appreciation of the paper. I particularly thank Richard Douthwaite and John Sweeney for their proposals of thanks.

I shall keep my responses short. I agree with John Sweeney on the point that the concept of sustainable development should be considered as "a philosophy of approach rather than a technique of implementation". However, the issue of operationalising this objective, whatever form it takes, has still to be addressed. Here I am more in accord with Richard Douthwaite's view that one practical step forward in the short term would be to account for the depletion of natural resources by converting the data to Daly's and Cobb's Index of Economic Welfare instead of "just tinkering" with GNP as currently used.

To paraphrase Frank Convery's quote in my paper: any discussion on sustainability is unlikely to achieve any kind of absolute truth. However, this should not dissuade us in our search for a sustainable development path, particularly those of us in the economics profession. As Lawrence Summers (1991) stated so forcefully that "serious economists who respond to questions about how today's policies will affect tomorrow's economy by taking refuge in technobabble... abdicate the field to those who are less timid. No small part of our current economic difficulties can be traced to ignorant zealots who gained influence by providing answers to questions that others labelled as meaningless or difficult."