The new millennium: An ecology and an economy of hope*

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As we enter the new millennium, our prospect is dominated by two prime points. First, we face unprecedented problems in the environment arena – those linked with issues of population, extremes of affluence and poverty, etc. Second, these problems invoke opportunities of parallel scope.

AS we stand on the cusp of a new millennium, the human enterprise is marked by a profound recognition of both ecological and economic types. We are more critically dependent than ever on the environmental resource base – the water, topsoil, vegetation, biodiversity, climate, etc. – that ultimately underpins all our economic activities. Yet we are depleting and degrading this environmental resource base at rates far surpassing any of the past, and to an extent that is leaving a severely impoverished planet. Coupled with this regrettable insight is a positive insight: that our environmental underpinnings are much more valuable in strictly economic terms than we had ever supposed. Because most environmental goods and services are not traded in the marketplace and hence have no price evaluations, they have been treated as not only priceless but worthless. For this reason they have been misused and overused as if with impunity. Fortunately a team of ecologists and economists working together has recently come up with a surrogate evaluation of all environmental goods and services – $33 trillion worldwide per year, and thus larger than the global economy of $29 trillion (1997 figures)[1]. In short, global natural product is more valuable than global national product. Now that we have a firm grasp of the economic value of our environmental supports, they are more likely to receive proper care.

Better news still – the clearer understanding of the vital role played by our environments means we may learn to benefit from them in ways that enhance our welfare in myriad ways, as this paper will demonstrate. Thus we can embark on a shift from an approach that has over-exploited and under-utilized our environments, to a strategy that derives full and sustainable benefit from our environments. In this sense, we can look forward to a new millennium that is marked by an ecology and an economy of hope without precedent. Are we not a superbly privileged generation to be poised at what may eventually be viewed as the greatest watershed in the human enterprise since we came out of our caves ten millennia ago?

Background

Consider some of the latest environmental news, both bad and better news.

The environmental bad news

Regrettably there is a plethora of bad news on the environmental front. In 1998,

- The southern ozone hole remained as large as ever; seven times the size of India.
- CO_2 emissions increased more than ever before. The United States emitted 23% of the global total, its output rising 11.8% during 1990–1998.
- The average global temperature rose by a record amount of 1.2%.
- Economic losses from freak weather reached $92 billion, up from $60 billion in 1996, and more than throughout the 1980s.
- An iceberg half the size of Tamil Nadu broke off from Antarctica. Much of the Greenland ice sheet has lost nearly one metre since 1993.
- The global grain harvest fell 2% from 1997 and 3% per person.
- 840 million people were hungry while 850 million were overweight.
- Traffic congestion in US cities cost a record $74 billion; in Bangkok $9 billion.
- More forest was burned than ever before in Amazonia, and Borneo, also Canada and Siberia.
- Two-thirds of the world's coral reefs, many of them in the Indian Ocean, revealed a terminal threat in the form of bleaching from rising temperatures.
- The world lost more species than ever, at least 40,000.

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The environmental better news

To counterbalance the bad news, there was quite a bit of better news. In 1998,

- World population grew by 'only' 78 million, down from 87 million in 1989.
- Bicycle production approached 100 million; car production fell to 38 million. Electric bike production jumped 16%, with Japan possessing more than one-quarter of global sales.
- More than 100,000 people in 230 cities participated in car sharing in Germany, Austria, Switzerland, Netherlands, UK and Italy.
- Sales of solar PV cells jumped 21 per cent. The world's largest producer being the United States with 54 MW, and next Japan with 49 MW.
- Wind power added 2100 MW, 35 per cent over 1997, sales of $2 billion; in Denmark, 8 per cent of electricity, in India 950 MW of installations.
- Fluorescent light bulb sales topped 1 billion, cutting electricity demand by the equivalent of 100 coal-fired power stations.
- Sales of cellular phones increased by 48 per cent to 2.4 million, saving on huge amounts of copper wire for conventional phone systems.
- Shell Oil announced plans to invest $500 million and British Petroleum $1 billion over ten years for research into solar energy and wind power.

Consumption

The long-established problems of environment and population are now being joined by a third, consumption, with all this implies for an ecology and an economy of hope. In many respects, consumption could prove to be the least tractable of the three interlinked problems, since consumption patterns and expectations are deeply entrenched in most societies and cultures. But change will come, whether by design or by default. Present consumption – or rather, excessive and wasteful consumption – on the part of affluent communities cannot be sustained for environmental reasons alone, as exemplified by the fossil fuel/CO_2 connection to global warming. In more general terms, there is much evidence that the Earth's carrying capacity is already being exceeded by the present six billion people and their lifestyles[2–6]. Humans now account for 55 per cent of all available water runoff, and they co-opt almost 50 per cent of all plant growth. More nitrogen and phosphorus are mobilized by humans in the form of crop fertilizer than is mobilized by natural processes. The bodies of many people in the world contain measurable amounts of at least 500 industrial chemicals that have been released into the environment after only marginal testing to determine their impacts on human physiology. What when there are two billion more people as is projected for a time only 25 years hence? Can the biosphere and its inhabitants, both human and non-human, sustain such unprecedented pressures?

Of course most of these pressures reflect the lifestyles of a minority of humankind, viz. the affluent and industrialized nations. Equally to the point, present consumption in developing nations – meagre as these levels are for the three billion people (out of a 4.8 billion total) who account for only five per cent of the global economy – cannot climb to levels desired by many of their citizens (exemplified by 'the American dream') if only because of the sheer numbers of potential consumers. For an illustrative example, see Box 1 on China with its 1.2 billion people. Fortunately there are many opportunities to relieve consumption pressures, whether through shifts in lifestyles or enhanced technologies, both of which can be promoted by a range of policy initiatives as will be discussed later in the article.

Briefly stated, the often extravagant and wasteful consumption of affluent communities constitutes an environmental constraint that is ever-more constraining for rich and poor alike. Furthermore, the skewed consumption patterns between rich and poor may well mean the point is being approached when – contrary to much past experience – the poor are poor in part because the rich are rich. Worse, the rich/poor gap is growing. In 1970 it was 30:1, today it is 78:1 (ref. 7). To this extent, the consumption problem is not only environmental but ethical as well[8,9].

During 1999 the 730 million people of Europe will emit some six billion tonnes of CO_2 to the global atmosphere, being 26 per cent of worldwide emissions (CO_2 is the gas that generates roughly half of the global warming processes). Europe's contribution is double that of China's 1.2 billion people. All nations will be affected by global warming, whether they are major or minor sources of CO_2. Industrialized nations' citizens as a whole generate three-quarters of other wide-ranging pollutants, also toxic chemicals and hazardous wastes. Much the same applies to depletion of the world's non-renewable natural resources[10–12]. To cite but a single instance – especially significant because it relates to the capacity to provide food – over one-fifth of the world's topsoil has been eroded away and nearly one-third of croplands have been lost in just the last 40 years, leading to a net decline in per-capita croplands[6,13].

Thus the meta-problem centres on the way people live and hence the amounts and kinds of resources they consume, whether directly or indirectly, plus the pollution and other wastes they generate. Since the middle of this century, humankind has consumed more natural resources (and caused more pollution and waste) than in all previous

human history. This consumption outburst can be illustrated by a few examples that also demonstrate the roles of the affluent sectors of the global community:

- Since 1950 the global economy has quintupled. Consumption of grain, beef and mutton has tripled, and the same for water, while paper consumption has risen six times. Burning of fossil fuels has grown nearly four-fold, carbon emissions likewise[14].
- The top one-fifth of the world's population owns 86 per cent of the world's wealth, controls 82 per cent of the world's markets, 68 per cent of foreign investment, and 74 per cent of phone lines. The bottom one-fifth scores just one per cent in each of the categories.
- Since 1950 the richest one-fifth of humankind has doubled its per-capita consumption of energy, meat, timber, steel and copper, and quadrupled its car ownership, while the poorest one-fifth of humankind has hardly increased its all-round per-capita consumption[15]. Today the richest one-fifth consumes 45 per cent of all meat and fish, the poorest one-fifth 5 per cent; 58 per cent of all energy versus 4 per cent; and 84 per cent of all paper, versus 1.1 per cent. The richest one-fifth owns 87 per cent of the world's vehicles versus 1 per cent. As for CO_2 emissions, the developing countries emit 37% of the total[16].
- With less than five per cent of the world's population, the United States utilizes nearly 30 per cent of the earth's resources[17]. Yet the 'American dream' – the lifestyles of other affluent nations too – are becoming a model for new consumers in China, India, Brazil, Mexico, Turkey and Russia among several other leading nations. Indeed these new consumers already total 800 million, or as many as the long-established consumers in rich nations[18,19].

There is nothing intrinsically wrong with affluent communities consuming a large percentage of natural resources if those resources remain plentiful and can be recycled, as in the case of iron and steel (85 per cent of which is consumed by the top 20 per cent of people, and 55 per cent of which is recycled; the top 20 per cent do not thereby limit the consumption of poor people). Indeed, the affluent communities' conversion of natural resources into human capital often enhances human welfare all round. It is of scant consequence that the average American consumes 115 times as much paper as the average Indian provided the American recycles most of the paper (at present only 41 per cent). Much more significant is that the average American consumes 227 times as much gasoline as the average Indian[16]. The key question is whether consumption uses resources or uses them up.

All this occurs in a world with a population that has just topped six billion. This demographic landmark is hardly a cause for celebration. Of the six billion people, 830 million are hungry, 1.2 billion lack access to clean water, 2 billion do not have adequate sanitation, and nearly 1 billion adults are illiterate. Population pressures apply notably to India, which has reached its own one billion mark. Over half of Indian children are malnourished and underweight; and over half of the population is below the income poverty line of $1 a day. Thus the nation encompasses the largest concentration of impoverished people in the world – all protected by a nuclear arsenal. The nation's defense expenditures topped $10 billion in 1996 (2.8% of GDP) or $11 per capita. This defence outlay was equivalent to 65 per cent of the country's health and education expenditures combined.

The current decline of the natural resource base worldwide may well prove to be minor compared to what will likely ensue given exploitation pressures ahead. Cropland is projected to fall from today's meagre 0.27 hectares per capita to only half as much within 30 years[6,20]. Already over half of the available freshwater runoff is used, an amount that could rise to three-quarters by 2025 through projected population growth alone, i.e. without allowing for any increase in per-capita consumption[21]. Worse, the number of water-short people today, 500 million, may well soar to 3 billion by the year 2025 – an outcome that would be especially critical for the prospects of feeding humanity in light of agriculture's dependence on water[22,23]. Fourteen years ago humans were co-opting 40 per cent of the plant's net annual growth on land, leaving 60 per cent for the millions of other species[24]. What when human numbers increase and people demand more products from plants? Similarly, humans already harvest an amount of ocean fish that reflects 35 per cent of phytoplankton productivity in temperate continental shelves[25].

This all means that environmental degradation and resource shortages often increase at rates way above that for population growth. To this extent, a major variable is growing consumption per person plus in certain cases, environmentally harmful technology. In many instances, of course, technology can help to relieve environmental pressures though its capacity is distinctly limited thus far[4,26].

The case of energy

Consider a proxy indicator of consumption's impact: per-capita energy use which plays a primary part in virtually all human activities that are environmentally adverse. During the past 10,000 years, per-capita consumption of energy has increased roughly 1000 times, and human numbers the same. So total energy consumption has increased one million times. Rich nations consume 70 per cent of all commercial energy though developing nations' share of commercial energy consumption is expected to rise by 40 per cent during

the period 1993–2010 (ref. 27). We derive 85 per cent of our commercial energy from fossil fuels and 7 per cent from nuclear power[27,28]. Despite its many benefits commercial energy has great capacity to harm the environment through pollution impacts, manifested through, e.g. urban smog, acid rain and global warming, also through nuclear fuels with their radioactive wastes.

During 1970–1990 the world's energy consumption increased at an annual average of 2.3 per cent. Extrapolated, this rate means that during the next half century there would be a four-fold increase to 50 TW or so followed by still greater increases thereafter[29]. If energy continues to derive primarily from fossil fuels, then for climatic reasons alone this would tax the ultimate limits of the earth to maintain environmental viability. Fortunately there is an alternative scenario, based on stringent but practicable measures of energy efficiency and conservation during the period 1990–2025. This would plausibly lead to a modest rise in per-capita energy use from 1 to 2 kW on the part of developing nations and a graduated decline from 7.5 to 3.8 kW for industrialized nations, with both parties converging on 3 kW late next century, thus closing the rich/poor gap in terms of energy. Factoring in population growth as well, this would result in global energy use of well under 20 TW in 2025 and around 30 TW in roughly 100 years based on a world with roughly 2.3 times its present level of economic activity as measured by energy use[29]. This scenario is eminently attainable provided there is an urgent and vigorous policy commitment to greatly reduce per-capita consumption by rich communities in particular, and to use more non-polluting and renewable sources of energy.

The energy problem is epitomized by cars. In 1950, 2.5 billion people owned 50 million cars. Today, with rather more than twice as many people, there are ten times as many cars. Within another 25 years and with 40 per cent more people, the car population may well double again to top one billion. Rich (OECD) nations with 16 per cent of the world's population, own 81 per cent of all cars (the United States, 35 per cent, and Europe, 37 per cent) and emit two-thirds of all CO_2 emissions from motor vehicles worldwide. But in 1997 as many cars were sold in Asia as in Western Europe and North America combined. Global energy use for transportation is predicted to rise by at least 50 per cent during the period 1993–2010, and by twice as much in developing countries (three times as much in Southern Asia)[27]. Were the world to match Americans' present car ownership by 2025, the global total would be 13 times greater than today's. Motor vehicles account for over 15 per cent of all CO_2 emissions (23 per cent in Britain and 25 per cent in the United States)[27,30,31].

Cars are becoming a prime problem in India. The country possessed 9,170,000 motor vehicles in 1986, a total soaring to almost 25,300,000 by 1995. Cars are growing by 19 per cent annually, two-wheelers by 11.5 per cent, and buses by 9 per cent. It is projected that by 2007 there will be 53 million two- and three-wheelers, together with 6.3 million four-wheelers. Today these vehicles contribute 30 per cent of air pollution in Calcutta, 52 per cent in Mumbai and 64 per cent in Delhi. Delhi's vehicles emit 1300 tonnes of pollutants every day, almost 50 per cent more than the 870 tonnes per day in 1987, making this the fourth most polluted city in the world with health costs amounting to $100–400 million per year. To carry the same number of people over the same distance, a car emits 90 times more carbon monoxide than a bus, a taxi 113 times more, a two-wheeler 49 times and a three-wheeler 60 times[32].

In place of non-existent traffic planning, India's cities need to promote mass transit systems. These include trains and electric trams, non-motorized forms of transport such as bicycles, restricting vehicles in congested areas, car pooling, phasing out of old vehicles, and making car drivers pay the full costs of their activity[33].

The case of grain

Next, consider grain, significant in that there is no more important activity for humans than feeding themselves (grain accounts for 75 per cent of food calories worldwide). With 20 per cent of the world's population, the developed nations consume almost 50 per cent of the world's grain, and this disproportionate consumption contributes to reduced consumption on the part of developing nations. Many of the three billion people in nations with a per-capita GNP of less than $725 have to spend more than half of their cash incomes on food[12]. This means that even a marginal increase in food prices can tip them over the edge into malnutrition if not starvation.

Nor can there be much relief ahead given recent agricultural trends. Since 1981 there has been a 6.6 per cent shrinkage in the world's grainlands, and since 1990 there has been only marginal growth in irrigation water supplies (critical because irrigated lands, comprising 17 per cent of all croplands produce 35 per cent of our food)[14]. Grain shortages are likely to keep on mounting, even though world population growth of 78 million people a year requires a parallel growth in grain production of 25 million tonnes, and more still to reflect enhanced nutrition and rising affluence.

As people become more affluent and move up the food chain, they consume more grain indirectly. Some 34 per cent of the world's grain is fed to livestock each year (over 50 per cent in Europe, 67 per cent in the United States). Just one quarter of this amount would be enough to meet the basic grain needs of the 840 million people with inadequate diets. Americans consume 800 kg of grain per year while Italians consume only

half as much, yet Italians live longer than Americans even though they spend much less on health care. If the 1998 grain harvest of almost 1.9 billion tonnes were evenly distributed worldwide, it would support 2.5 billion people at the American level of consumption, five billion at the Italian level, or ten billion at the Indian level of 200 kg per year. And if Americans were to cut their grain intake by just 16 per cent, this would save 35 million tonnes of grain a year[14] enough to make up the diets of 870 million people or more than the number inadequately fed today.

This is where China's rising consumption of meat becomes crucial for the world. During just the two years 1993–1994, the soaring preference for meat on the part of middle-class Chinese transformed the nation from a net grain exporter of eight million tonnes a year to a net importer of 16 million tonnes (ref. 34). The knock-on effects for the global grain economy have been momentous. China's overnight emergence as an importer of grain, second only to Japan, has helped to drive up world grain prices for all nations and citizens. The combination of increasing consumer demand and tightening grain markets in early 1996 caused grain prices to rise roughly one-half for each of the three main staples wheat, rice and maize[35]. This translated into inflationary price rises for bread, pasta and breakfast cereals, plus livestock products such as meat, milk and eggs. It hit particularly hard at poorer nations competing in global grain markets for the roughly 200 million tonnes of grain traded each year. Sub-Saharan Africa (excluding South Africa) now imports fully one-third of its grain, and tries to do so with economies that collectively are no larger than Belgium's. Nor can the poorest nations count on food aid, which has dropped from an all-time high of 15.2 million tonnes of grain in 1993 to 7.2 million tonnes in 1998.

The future prospect could be even more difficult. If recent production and consumption trends persist until 2030, China alone with its fast-rising affluence could be seeking more than 200 million tonnes of grain from overseas (when compared with a 1995 total of 200 million tonnes for more than 100 grain-importing countries). This will drive up grain prices to altogether unprecedented levels for those developing nations looking for another 190 million tonnes of grain[34]. Not all analysts concur with this assessment, e.g. Huang *et al.*[34] and Pinstrup-Andersen and Garrett[37] though they agree that China will become an ever-greater importer of grain seeking perhaps 40 million tonnes as early as 2000. For an indication of how far China's consumption patterns have become unsustainable, see Box 1.

These tightening patterns and trends apply to several other basic factors of agriculture. During the period 1950–1989, per-capita croplands declined by around 50 per cent, and during 1990–2010 they are expected to decline by another 21 per cent. During 1950–1978, per-capita irrigated lands, which supply one-third of our food from one-sixth of our croplands expanded by 5 per cent, but during 1979–1989 they contracted by 5 per cent and during 1990–2010 they are expected to shrink by a further 12 per cent. During 1950–1989, per-capita production of fish more than doubled whereas during 1990–2010 it is projected to drop by 10 per cent[14,22]. Increasingly, poor people will be in direct and tightening competition in the marketplace with rich people expanding in both numbers and per-capita demands. Already the industrialized nations consume 45 per cent of the world's grain and fish and 60 per cent of its fertilizer[15].

What can be done?

There is a host of policy initiatives available to ease our way toward an ecology and economy of hope. There is a premium on urgent and incisive action to resolve those environmental problems that impact heavily on the economy. In India, the annual costs of environmental degradation amount to $10–14 billion per year or 4.5–6.0 per cent of GDP (1992 figures). Just poor water supplies cost $5.7 billion a year in health costs; soil erosion and deforestation levy costs of $2.5 billion per year; and urban air pollution $1.3 billion per year[38]. As an illustration of policy responses available, certain governments are seeking to devise more accurate measures of our economic well-being, by replacing GDP with Net National Product or with an Index of Sustainable Welfare. Certain economic sectors are engaging in 'full

Box 1. China unsustainable

- If each of China's 1.2 billion people were to consume one extra chicken per year and if that chicken were to be raised primarily on grain, this would account for as much grain as all the grain exports of Canada, the second largest exporter.
- If per-capita consumption of beef, currently only 4 kg per year, were to match the US's 45 kg and if the additional beef were produced mainly in feedlots, this would take grain equivalent to the entire US harvest, less than one-third of which is exported.
- If China were to consume seafood at Japan's per-capita rate, it would need 100 million tons more than today's total catch.
- If China were to match the US for per-capita car ownership and oil consumption, it would need more than today's global output of oil, and its cars would emit roughly as much CO_2 as from all the world's transportation today.
- If the Chinese were to consume wood products at the Japanese rate, their demand would exceed Japan's nine times over.
- China's economic growth rate has long averaged around 10 per cent per year. But environmental problems are taking 8–15 per cent off GDP.

Sources: Brown *et al.*[46]; Smil[47].

cost pricing' in order to internalize environmental externalities. There is much scope to reform the tax system so that we no longer penalize productive activities such as individual work and business profits, but shift the tax burden to negative activities such as over-use of key natural resources or generation of pollutants among other wastes. All these initiatives help to safeguard our environments and to make our economies more sustainably productive and efficient. Let us consider two further policy initiatives in detail.

Eco-technologies

Much can be done to promote eco-technologies for energy efficiency, recycling, closed-loop systems of manufacturing, and zero-emissions industry. Note the huge potential for clean and renewable sources of energy. Wind power has become a $3 billion per year industry that serves as a cornerstone of a new solar economy to replace fossil fuels. Denmark generates 8 per cent of its electricity through wind power. It is partly due to the rise of wind power among other clean and renewables that oil and natural gas consumption has increased by only 2 per cent during the 1990s, while coal consumption has not increased at all[3]. Wind power – and the same for photovoltaic cells, both being climate-benign energy sources – have been expanding by 22 per cent and 16 per cent a year, respectively. To its credit, India aims by 2012 to provide 10 per cent of its electricity from renewables[3]. With 950 megawatts of generating capacity, India is the leader in the developing world for its potential in wind power.

Perverse subsidies

Governments worldwide subsidise many activities that are harmful to both our environments and our economies. As such, these subsidies can be termed 'perverse'. They apply especially to the water sector, fostering over-use and mis-use of water supplies, even though these are becoming ever-more scarce in many regions and notably in parts of India with respect to irrigation agriculture. These perverse subsidies should be reduced or eliminated forthwith[49].

Over-pumping of aquifers in just certain regions of the world now totals at least 160 billion tonnes of water per year. Some 1000 tonnes of water are needed to produce one tonne of grain. So if over-pumping were to be stopped, world grain production would decline by at least 160 million tonnes or enough to provide the grain needs of 600 million people[3]. While India's population has tripled since 1950, water demand has climbed to where it may now be double the sustainable yield of the country's aquifers. As a result, water tables are falling by as much as two metres per year in much of the country (especially Tamil Nadu), and wells are running dry in tens of thousands of villages[39]. As further result, there will eventually be reduced supplies of irrigation water on a scale to reduce the grain harvest by as much as one-quarter[3]. In a country where more than half of all children are underweight, and a country that takes on-board an additional 18 million people each year, a shrinking harvest could likely increase hunger-related mortality.

Some 93 per cent of India's water use is for agriculture, mostly for irrigation. Revenues from irrigation farmers cover only 7.5 per cent of the cost of operating and maintaining irrigation systems, while subsidies were costing Indian taxpayers $735 million in 1991 (refs 40–42). Yet there is not enough public money even to repair and desilt irrigation canals, so the whole canal network is deteriorating.

There are further water subsidies at work in India, this time indirect ones. State electricity boards supply electricity for irrigation pumps at a 1992 cost of around $1.5 billion a year, yet farmers pay an average of only one-eighth of the cost (in three southern states, the power is supplied free)[40,42]. Ironically, farmers could cut back on irrigation water use by 15 per cent without reducing crop yields, simply by eliminating over-watering[43]. Since water charges are typically a mere 2–5 per cent of the harvest's value, they have very little impact on the farmers' financial planning.

The two figures of $735 million and $1.5 billion add up to $2.2 billion. They date from 1992 and 1991, and since then the subsidies have been increasing. Allowing for recent expansion of the subsidies (and not counting other subsidies, notably the many indirect and otherwise concealed items), we can suppose a realistic minimum estimate for India's irrigation subsidies in 1996 was $2.5 billion – the same as was alternatively estimated for 1992 (ref. 44).

Clearly the country's agriculture, also its economy and its environments would benefit from an urgent cutback in these perverse subsidies.

Success stories

To hearten us on our way as we seek to live in better accord with our environments and with each other, let us note some recent success stories from various parts of the world.

- In China, both good and bad environmental practices are publicized through a TV programme reaching tens of millions of viewers.
- In Brazil's Curitiba city, low-cost bus services have cut car traffic by 30% even while population has doubled.
- In Japan, the Green Purchasing Network with over 1000 companies, public agencies and citizen groups, promotes sustainable goods and services, e.g. copiers, printers, PCs, and refrigerators.

- In South Korea, the Waste Collection Charge has cut waste by 20% in three years and greatly reduced packaging.
- In Germany, the anti-packaging project has caused a 17% reduction while the Blue Angel Eco-Label has been awarded to almost 1000 manufacturers for 4100 products in 76 categories.
- In the United States, the Energy Star programme sets an energy efficiency standard met by two-thirds of computers and monitors and all laser printers. New criteria for TVs and videos will reduce by 75% the energy in standby, which currently costs more than $1 billion a year.
- In the United Kingdom, the Sustainable Timber Buyers' Group has 80 members ranging from general shops to DIY stores, with 18% of wood products.
- In Denmark, a waste tax doubles the cost of landfilling and incineration causing a 30% increase in reuse and recycling.
- In Colombia, new toilets cut water consumption by over half.

Most important of all is the effort by the Netherlands to come up with a grandscale blueprint for sustainable development. For details, see Box 2.

Against these success stories must be set some dismal factors. It is a sad commentary on our value systems – whether political, social or spiritual systems – that the number of people living in abject poverty today exceeds the entire human population of the world at the start of this century[45]. Equally to the point, the World Food Summit in 1997 urged the goal of reducing malnutrition worldwide by half by the year 2015. This would still leave at least 400 million people hungry. Is it not a gross lack of vision and even fellow feeling that the leading international food agency, the Food and Agriculture Organization, should dare to postulate 400 million people hungry as any sort of success story? Does it not betray an extreme poverty of those values that are needed in abundance for humankind to become 'human kind'? Note too that for the first time the number of people in the world who are malnourished and underweight is matched by the number who are overnourished and overweight. Americans are particularly sensitive to their weight problems: in 1998 400,000 of them underwent surgical liposuction procedures for fat removal.

A further reflection: If the world's richest 200 people were to give up just one per cent of their wealth each year, they could pay for every child in the world to enjoy free access to primary education. In similar vein: On the Internet 80 per cent of websites are written in English, a language understood at most by just 10 per cent of the world's population. The cost of a computer in the United States averages one month's pay, whereas in India it is the equivalent of eight years' salary.

Box 2. The Netherlands: A blueprint for sustainable development

The country plans to cut:

- CO_2 emissions from 12 tonnes per person per year to 4 tonnes in 2010 and 1.7 tonnes in 2030.
- Domestic freshwater use by 38 per cent.
- Aluminium consumption by 80 per cent.
- Timber use by over 60 per cent.
- Cropland use from 0.45 ha per person to 0.25 ha.
- Meat consumption by 70 per cent.

Conclusion

This paper demonstrates that as we enter the new millennium, our prospect is dominated by two prime points:

First, we face unprecedented problems in the environment arena writ large. These problems are closely interlinked with issues of population, extremes of affluence and poverty, and too much and too little consumption by various sectors of the global community. This all raises meta-questions of equity and justice. The whole reflects crucially on our outlook for sustainable development.

Second, these problems invoke opportunities of parallel *scope. There is much cause for hope* – the most precious and often the scarcest resource of all. Consider in particular that the costs of a paradigm shift to sustainable development need not be so costly at all. It will not cost the earth to save the earth, nor to safeguard our world and our global community. Some examples:

- Cost of supplying basic education to all children: $6 billion per year.
  Spent on cosmetics in just the United States: $8 billion per year.
- Cost of supplying water and sanitation for all: $9 billion per year.
  Spent on ice cream in Europe alone: $11 billion per year.
- Cost of basic health for all: $13 billion per year.
  Spent on pet food in Europe and USA: $17 billion per year.
- Cost of eliminating malnutrition in developing countries through improved agriculture: $40 billion per year.
  Spent on countering over-nutrition in developed countries through slimming aids: $40 billion per year.

The vital question is not 'How can we afford to do the necessary?' It is 'How can we afford not to do it?' The biggest cost will not be to our pocketbooks; it will be to our philosophies.

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