Caring for the Earth

A Strategy for Sustainable Living



Published in partnership by

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Summary

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Gland, Switzerland, October 1991

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A message to the world

Humanity must live within the carrying capacity of the Earth. There is no other rational option in the longer term. Unless we use the resources of the Earth sustainably and prudently, we deny people their future. We must adopt life styles and development paths that respect and work within nature's limits. We can do this without rejecting the many benefits that modern technology has brought, provided that technology itself works within those limits.

Because of the way we live today, our civilizations are at risk. The 5.3 billion people alive now, especially the 1 billion in the best-off countries, are mis-using natural resources and seriously over-stressing the Earth's ecosystems. World population may double in 60 years, but the Earth will be unable to support everyone unless there is less waste and extravagance, and a more open and equitable alliance between rich and poor. Even then the likelihood of a satisfactory life for all is remote unless present rates of population increase are drastically reduced.

Our new approach must meet two fundamental requirements. One is to secure a widespread and deeply-held commitment to a new ethic, the ethic for sustainable living, and to translate its principles into practice. The other is to integrate conservation and development: conservation to keep our actions within the Earth's capacity, and development to enable people everywhere to enjoy long, healthy and fulfilling lives.

A new strategy of care

In the past 20 years, the world has been deluged with reports, action plans, and other prescriptions to cure our environmental ills. International conferences, ministerial declarations, government policy documents, political manifestos, campaigns by "green" groups, and sombre scientific pronouncements have all pointed in the same direction. So — what's new about *Caring for the Earth?* Two points may be made: it is founded on an ethic of care for nature and for people; and it is a strategy of mutually reinforcing actions at individual, local, national and international levels.

Caring for the Earth is both an analysis and a plan of action. It is intended as a broadlyoriented but practical guide to the policies we must adopt and the actions we must undertake. It is divided into three parts.

Part I defines the principles of a sustainable society and recommends 60 actions. The principles are: respect and care for the community of life, improve the quality of human life, conserve the Earth's vitality and diversity, minimize the depletion of non-renewable resources, keep within the Earth's carrying capacity, change personal attitudes and practices, enable communities to care for their own environments, provide a national framework for integrating development and conservation, and create a global alliance.

Part II describes 62 additional actions required to apply the principles set out in Part I to the more familiar sectors of environment and policy. These are energy; business, industry and commerce; human settlements; farm and range lands; forest lands; fresh waters; and oceans and coastal areas.

Part III deals with implementation and follow-up.

Who should use the strategy?

This Strategy is aimed at everybody. But its particular targets are those who will decide on the next essential steps. We address national leaders, ministers of government departments, heads of national agencies and intergovernmental organizations. Because the powers of governments, while indispensable are not unlimited, we also address leaders of business and industry and the great range of local, national and international non-governmental bodies. This Strategy will have a chance of success only if caring and thinking people read it, understand its message, demand action — and opt for sustainable living.

We urge every reader to measure his or her personal behaviour and life style against these actions, and to assess the policies and practices of the citizens' groups, communities, firms and nations to which he or she belongs. Where the need for change is clear, everyone should work toward it.

The principles, additional actions and recommendations for implementation are summarized below.

Sustainability: a question of definition

Caring for the Earth uses the word "sustainable" in several combinations, such as "sustainable development", "sustainable economy", "sustainable society", and "sustainable use". It is important for an understanding of the Strategy to know what we mean by these terms.

If an activity is sustainable, for all practical purposes it can continue forever.

When people define an activity as sustainable, however, it is on the basis of what they know at the time. There can be no long-term guarantee of sustainability, because many factors remain unknown or unpredictable. The moral we draw from this is: be conservative in actions that could affect the environment, study the effects of such actions carefully, and learn from your mistakes quickly.

The World Commission on Environment and Development (WCED) defined "sustainable development" as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

The term has been criticized as ambiguous and open to a wide range of interpretations, many of which are contradictory. The confusion has been caused because "sustainable development", "sustainable growth" and "sustainable use" have been used interchangeably, as if their meanings were the same. They are not. "Sustainable growth" is a contradiction in terms: nothing physical can grow indefinitely. "Sustainable use" is applicable only to renewable resources: it means using them at rates within their capacity for renewal.

"Sustainable development" is used in this Strategy to mean: improving the quality of human life while living within the carrying capacity of supporting ecosystems.

A "sustainable economy" is the product of sustainable development. It maintains its natural resource base. It can continue to develop by adapting, and through improvements in knowledge, organization, technical efficiency, and wisdom.

A "sustainable society" lives by the nine principles outlined here.

Part I

Principles for Sustainable Living

Respect and care for the community of life

An ethic based on respect and care for each other and the Earth is the foundation for sustainable living. Development ought not to be at the expense of other groups or later generations, nor threaten the survival of other species.

The benefits and costs of resource use and environmental conservation should be shared fairly among different communities, among people who are poor and those who are affluent and between our generation and those who will come after us.

All life on earth, with soil, water and air, constitutes a great, interdependent system — the biosphere. Disturbing one component can affect the whole. Our survival depends on the use of other species, but it is a matter of ethics, as well as practicality, that we ensure their survival and safeguard their habitats.

Four actions are needed to implement this principle:

- the ethic for sustainable living should be developed by a dialogue between religious leaders, thinkers, leaders of society, citizens' groups and all caring people. The groups concerned should be linked in national coalitions and an international network. The product of the action should be a clear and universally accepted statement of the principles of human conduct within the world of nature;
- States should adopt a Universal Declaration and Covenant on Sustainability that commits them to the world ethic, and should incorporate its principles into their national constitutions and legislation;
- people in all walks of life should incorporate the ethic into codes of personal behaviour and professional conduct;
- a new world organization should be established to watch over the implementation of the world ethic and draw public attention to major breaches of it. This organization would have a role in relation to world sustainability like that of Amnesty International in relation to human rights.

The network linking national groups, and the new world organization, should be established by 1993. By 1995 national statements upholding the world ethic should have been adopted in 50 countries, and there should be national coalitions to promote it in 50 countries. By 2000 the number of national coalitions should have risen to 100 and 50% of countries should have adopted the Universal Declaration and Covenant.

Improve the quality of human life

The aim of development is to improve the quality of human life. It should enable people to realize their potential and lead lives of dignity and fulfilment. Economic growth is part of development, but it cannot be a goal in itself; it cannot go on indefinitely. Although people differ in the goals they would set for development, some are virtually universal. These include a long and healthy life, education, access to the resources needed for a decent standard of living, political freedom,

guaranteed human rights and freedom from violence. Development is real only if it makes our lives better in all these respects.

In lower-income countries, economic growth is needed urgently to improve the quality of life. In upper-income countries the need is to reduce resource consumption, energy use and environmental impact while extending an acceptable quality of life to all.

Health standards need to be raised worldwide but especially in the lower-income countries, to cut the number of deaths due to infections and malnutrition. Safe water is vital: over half the illness in some countries is carried through contaminated supplies.

Universal education is the most important development target of all, because it can unleash the potential of so many people. Finally, improved security against natural disasters and war would do much to enhance quality of life.

By 2000, there should be a 2% to 3% increase in earnings per head in the lowerincome countries. All children should be immunized against the main childhood diseases, and malnutrition and childhood mortality should be halved. Everyone should have access to safe water, and nearly everyone should have sanitation. All children should be enrolled at school, and should actually go there rather than drop out as so many do today. Military expenditure should be cut back, and resources redirected to environmental and social priorities.

Conserve the Earth's vitality and diversity

Development must be conservation-based: it must protect the structure, functions and diversity of the world's natural systems, on which our species depends. To this end we need to:

- conserve life-support systems. These are the ecological processes that keep the planet fit for life. They shape climate, cleanse air and water, regulate water flow, recycle essential elements, create and regenerate soil and enable ecosystems to renew themselves;
- conserve biodiversity. This includes all species of plants, animals and other organisms; the range of genetic stocks within each species, and the variety of ecosystems;
- ensure that the use of renewable resources is sustainable. These resources include soil, wild and domesticated organisms, forests, rangelands, cultivated land, and the marine and freshwater ecosystems that support fisheries. A use is sustainable if it is within the resource's capacity for regeneration.

The actions that must be taken fall into four broad categories.

First, pollution must be prevented. All Governments should adopt the Precautionary Principle. This means minimizing, and where possible preventing, discharges of substances that could be harmful. The best approach is to make the protection of land, air, rivers and the sea the concern of a single agency. Both economic incentives and regulations should be used. Municipalities, public utilities, industry and farmers must all contribute.

Emissions of sulphur dioxide, nitrogen oxides, carbon monoxide and hydrocarbons must be reduced steeply in the upper-income countries, where they cause acid rain and photochemical smog. In the industrializing countries such problems must be prevented from arising. Greenhouse gas emissions must be reduced and the lower-income countries helped to minimize emissions from new sources. Because some climate change is inevitable, all countries should assess how it might affect them and plan how to minimize the effects. The second area of action is to maintain the integrity of the Earth's ecosystems. An integrated approach is needed, often using river drainage basins as units for land use planning and management. Where possible natural ecosystems should be maintained; modified ecosystems should be used sustainably. The pressure can be taken off natural ecosystems by protecting the best farmland and managing it efficiently. While some deforestation is inevitable in certain areas, it should be offset by new plantations or natural re-growth so that the total area of forest in the world is maintained. Old-growth forests are especially precious and larger areas of them should be preserved.

The third action is the conservation of biological diversity. This is done by the establishment and maintenance of protected areas, protection of species and genetic stocks, and strategies that combine economic use and conservation over broad areas. The management of existing protected areas needs improvement, scientific understanding of species and ecosystems must be enhanced, and action in the wild and in zoos and botanic gardens should be combined. Reintroduction to the wild should be the ultimate objective of all captive breeding programmes.

The fourth action is to use biological resources sustainably. Harvests should be regulated on the basis of careful study of the stocks concerned, and monitored so that any over-use can be swiftly corrected. Local communities must have a part in the management of wild resources in their areas, and should benefit from the economic returns.

By the end of this century all governments should have adopted the Precautionary Principle. High-income countries should have reduced their sulphur dioxide emissions to 10% of 1980 levels, and cut their nitrogen oxide emissions by 75% from 1985 levels. Chlorofluorocarbon (CFC) manufacture and use should have ceased in the higher-income countries and be declining rapidly elsewhere. Some 10% of the area of each of the main ecological regions should be safeguarded in one or other of the various categories of protected area. Net global forest depletion should have ceased. All countries should have adopted comprehensive strategies to safeguard their biological diversity. By 2005 carbon dioxide emissions from higher-income countries should have been cut by 20% from 1990 levels. By 2010 CFC manufacture and use should have stopped. A comprehensive genetic conservation system should be in place.

Minimize the depletion of non-renewable resources

The depletion of non-renewable resources like minerals, oil, gas and coal must be minimized. While these cannot be used sustainably, their "life" can be extended, for example by recycling, by using less of a resource to make a particular product, or by switching to renewable substitutes where possible. These practices are essential if the Earth is to sustain billions more people in future, and give everyone a life of decent quality.

Keep within the Earth's carrying capacity

There are finite limits to the "carrying capacity" of the Earth's ecosystems to the impacts that they and the biosphere can withstand without dangerous deterioration. The limits vary from region to region, and the impacts depend on how many people there are, and how much food, water, energy and raw material each person uses and wastes. Policies that bring human numbers and life styles into balance with the

Earth's carrying capacity must be complemented by technologies that enhance that capacity by careful management.

Besides ensuring that use of renewable resources is sustainable, three other actions are needed.

First, population growth and resource consumption must be addressed in an integrated and realistic way, in national development policies and planning. The need to stabilize both must be widely understood.

Second, new methods to conserve resources and avoid waste must be developed, tested and applied. Economic incentives and taxes can encourage economy in the use of energy and raw materials. "Green" consumer movements can help to sell the goods and processes that do least harm to the environment.

Third, action to stabilize population must be based on understanding of the many factors that act together to determine family size. Family planning services should be doubled, and linked with improved care of mothers and children and reduced infant mortality.

Countries with per capita energy consumption above 80 gigajoules* (e.g. USA, 280; United Kingdom, 150) should reduce their consumption towards that level by 1% per annum until 2000 and 2% per annum thereafter. Those with consumption around (e.g. Israel, 82; Venezuela, 58) or below (e.g. China, 22; Bangladesh, 2) that level should ensure that they do not exceed it. All countries should take steps that will bring their Total Fertility Rates to 2.1 (stable replacement level) as rapidly as practicable, with most countries attaining this goal by 2010 at the latest.

Change personal attitudes and practices

To adopt the ethic for living sustainably, people must re-examine their values and alter their behaviour. Society must promote values that support the ethic and discourage those that are incompatible with a sustainable way of life. Information must be disseminated through formal and informal education so that needed actions are widely understood.

Changing people's attitudes and practices will require an information campaign, encouraged by Governments and led by the non-governmental movement. Plans to motivate, educate and equip individuals to lead sustainable lives should be prepared in all countries. All communication media could help in carrying out the plans.

Formal environmental education for children and adults should be extended and integrated in education at all levels. Curricula and teaching approaches, as well as the materials available to teachers, will need re-examination.

More support should be given to training for sustainable development. Extension workers and trainers are badly needed to help farmers, fisherfolk, forest workers, artisans, the urban and rural poor and many other groups within society to use natural resources more productively and sustainably. Development assistance agencies should give high priority to this.

By the end of the century, development assistance agencies should have doubled their support for environmental education and training from 1990. All countries should have incorporated environmental teaching in school curricula, and adopted national plans to promote sustainable living.

^{*} gigajoule = 10⁹ joules.

Some facts and figures about human population and resource consumption

Commercial energy consumption per person is a useful measure of environmental impact. This is because it is energy that enables people to take renewable and nonrenewable resources from ecosystems, to transform them into products and consume them, and eventually to return them to ecosystems as waste. The more polluting the energy source, the bigger the impact.

The 42 countries with high and medium-high levels of energy consumption per person contain a quarter of the world's population but account for four-fifths of its use of commercial energy (see Annex 5 of the full report).

The 128 countries with low and medium-low levels of energy consumption per person contain three-quarters of the world's population but account for only a fifth of commercial energy consumption.

On average, someone in a "high consumption" country consumes 18 times the commercial energy used by a person in a "low consumption" country, and causes much more pollution: a North American causes the emission of twice as much carbon dioxide as a South American, and ten times as much as someone living in South Asia or East Asia (excluding Japan).

A citizen of the lower-income countries consumes on average 2,380 calories per day, mostly from plants. A citizen of the upper-income countries consumes 3,380 calories, a considerable amount from meat.

Most high-income countries have near-stable populations. But their resource consumption continues to rise.

Most of the low-consumption countries have high and medium-high total fertility rates, and their populations are expanding fast. Most already have great difficulty meeting their needs for food, water, health care, sanitation, housing, jobs, energy, and productive land. Rapid population growth adds to these difficulties and undermines prospects for sustainable development, because governments must draw on scarce financial reserves or add to their foreign debt to meet basic needs. This in turn often prompts them to increase demands on their shrinking stocks of timber, fish, petroleum, or other resources.

For each 1% of population growth, at least 3% of GNP is needed as "demographic investment" to expand the stock of buildings and machines for the new workers.

Enable communities to care for their own environments

Communities and local groups provide the easiest channels for people to express their concerns and take action to create securely-based sustainable societies. However, such communities need the authority, power and knowledge to act. People who organize themselves to work for sustainability in their own communities can be an effective force whether their community is rich, poor, urban, suburban or rural.

Three kinds of action are needed.

First, communities need effective control over their own affairs, including secure access to resources and an equitable share in managing them; the right to participate in decisions; and

education and training. Land tenure, other property rights, and the power to decide within the community on allocation of shared resources are crucial.

Communities must be able to meet their essential needs sustainably while conserving their environment. Improved exchange of information, skills and technologies is one ingredient in this process. So is making local governments, communities, businesses and other interest groups full partners with central government in decisions on policies, programmes and projects that directly affect them, their environments, and the resources on which they depend.

A third need is to empower and enable local governments and communities to discharge their role in environmental care. National economic strategy and policy should favour community action to care for the environment.

By 1995, development assistance agencies should have committed themselves to support community action plans and programmes. By 2000 all countries should have reviewed the ability of communities to care for their own environments. Handbooks drawing on the results of local action and illustrating the techniques that succeed should have been prepared.

Provide a national framework for integrating development and conservation

All societies need a foundation of information and knowledge, a framework of law and institutions, and consistent economic and social policies if they are to advance in a rational way. A national programme for achieving sustainability should involve all interests and seek to identify and prevent problems before they arise. It must be adaptive, continually re-directing its course in response to experience and to new needs.

National action should have four components:

First, there must be institutions capable of an integrated, forward-looking, cross-sectoral approach to decisions. Governments should establish cross-sectoral capability, preferably in the form of a coordinating unit for conservation and development at the highest level, e.g., attached to the Cabinet Office or Finance Ministry. All sectoral departments and agencies should have sustainability in their mandates. Strategies for sustainability should be developed and implemented directly and through regional or local plans. All development projects, programmes and policies should be subject to environmental impact assessment, linked with economic appraisal.

Second, all countries should have comprehensive systems of environmental law that safeguard human rights, the interests of future generations, and the productivity and diversity of the Earth. The principles of a sustainable society should be incorporated in the constitution or other fundamental definition of a nation's governance and policy. Existing legal and administrative controls should be reviewed, and weaknesses (including those of implementation and enforcement) corrected. The legitimacy of local approaches should be recognized within the overall structure.

The third need is for economic policies and improved technology to increase the benefits from available resources and maintain natural wealth. Economic policies should be used to achieve sustainability, for example through implementation of the Polluter Pays Principle and the User Pays Principle and by the careful use of taxes, subsidies and other incentives. Governments need to ensure that environmental quality and natural resources are properly valued in national accounting. National policies, development plans, budgets and decisions on investments should take full account of their effects on the environment.

The fourth requirement is for knowledge, based on research and monitoring. Without it, policies for sustainability will lack foundation and credibility. Action is needed to sustain and strengthen national research capacities and to maintain a comprehensive monitoring system.

By the end of the century, national laws should have been reviewed everywhere with the aim of re-shaping them towards sustainable living, and, with the same aim, reviews of economic policies and administrative approaches should have been completed in higher-income countries. Scientific information that will help communities choose sustainable approaches should be readily available. An integrated global system to monitor sustainability, including an environmental early warning mechanism, should be in place. By 2010 the economic and administrative reviews should have been extended to all countries.

Create a global alliance

Global sustainability will depend upon a firm alliance among all countries. But levels of development in the world are unequal, and the lower-income countries must be helped to develop sustainably and to protect their environments. Global and shared resources, especially the atmosphere, oceans and shared ecosystems, can be managed only on the basis of common purpose and resolve. The ethic of care applies at the international as well as the national and individual levels. No nation is self-sufficient. All stand to gain from worldwide sustainability — and all are threatened if we fail to attain it.

A global alliance requires every nation to accept its responsibilities and to take as much action as its means permit. The alliance will also require properly funded international institutions, both non-governmental and intergovernmental.

A major need is to strengthen international law. Existing international agreements on conservation and environmental management need to be more widely supported. New agreements are needed on the conservation of biological diversity, climate change, the safeguarding of the world forests, and the conservation of Antarctica. The UN Convention on the Law of the Sea needs to be brought into force. A Universal Declaration and Covenant on Sustainability should be adopted as the international expression of the world ethic for living sustainably.

A second area of action is to help lower-income countries address environmental priorities. Many now have to direct their limited resources towards more immediate concerns. Their official debt should be written off, and enough commercial debt retired to restore economic progress. Non-environmental trade barriers to exports should be removed, commodity prices stabilized, and investment encouraged. This will involve action in higher-income countries, for example to reduce agricultural subsidies.

The third need is to turn north-south financial flows around. Resources are now being siphoned out of the lower-income countries to the higher-income ones. Development assistance needs to be increased and aimed at helping countries improve their knowledge, skills and institutions. More support should be given to programmes of action rather than individual projects, especially those resulting in major environmental change.

A fourth requirement is to strengthen international commitment and capacity to achieve sustainability. One dimension should be better understanding of what can be done by the nongovernmental community. Another need is to strengthen and streamline the capacity of the United Nations system to work towards sustainability. By the end of the century all these actions should have led to tangible results. A comprehensive conservation regime for Antarctica should be in force. Conventions on natural resources — like the CITES, Ramsar and Bonn Conventions — should have worldwide membership. New conventions on the conservation of biological diversity, climate change and forests should have been adopted and UNCLOS should be in force. The UN machinery should have been reviewed following the UN Conference on Environment and Development in 1992 and be operating effectively. And the adjustment of financial flows between higher-income and lower-income countries should have stimulated economic growth in the latter, and advanced progress towards sustainability.

Elements in a campaign for a sustainable society

Everyone is a participant in the quest for a sustainable society. There is no "audience" or campaign "target". Therefore, the campaign should encourage a two-way flow of information, enabling people to contribute as well as receive ideas and information.

The methods used will inevitably vary with country, cultural tradition, religion and stage of development. But the following "toolbox" of guidelines and methods covers the spectrum.

- Involve everyone and encourage their ideas. Use local languages.
- Use all available media (print, radio, television, film, videotapes, theatre, street theatre, dance, song, traditional storytelling) according to audience. Face-to-face and audiovisual means of communication should be used in areas of low literacy. Traditional methods can work very well. Poster campaigns and environmental literacy programmes can give useful backing.
- Relate national and global issues to local situations, using familiar examples and experiences.
- Get people to interact and discuss their vision for their areas. Explain how that future may be threatened by current global and local trends and what the solutions are.
- Give people summaries and syntheses of the facts, in appropriate form. Encourage development of syntheses for teachers, labour unions, business groups, government officials and politicians. Include case studies of what has and has not worked in the past.
- Make sure people have access to clear, comprehensible information. Show people how
 to change their practices. Help them with advice and practical support to implement
 schemes they devise for themselves. Training in techniques and access to credit, land
 or other resources may be needed. People get frustrated by, and eventually ignore,
 proposals that they cannot turn into action.
- Involve volunteers, especially children, in projects in their areas, for example to restore degraded land, create "green belts", and plant trees.
- Use information centres and exhibits, both within local communities close to home and in places people visit like museums, zoos, botanic gardens and national parks. These are especially effective because people choose to go to them and expect to learn.

Part II

Additional Actions for Sustainable Living

The traditional approach to the management of the environment has been sectoral, dealing with agriculture, forestry, fisheries, nature conservation, pollution prevention, energy use and conservation, human settlements planning and other components of the world system as if they were independent entities. Indeed, too much sectoralism within the machinery of government is responsible for many of the problems of today. This Strategy advocates a different approach, particularly for policy making and planning. But a sectoral approach to management will prevail in many fields, and this does not matter so long as the interlinkages are appreciated, and actions in one area are fully evaluated for their impacts in another. Part II of the Strategy therefore looks in detail at the issues arising in a number of sectors, and the actions that should be taken.

Energy

Commercial energy is essential for development. But commercial energy production and use can cause serious impacts on the environment. There is much waste in the commercial energy industry and in the use of its products.

The needed actions are:

- long-term energy strategies for all countries;
- increased efficiency in energy generation from fossil fuels, and increased use of alternative, particularly renewable, energy sources;
- increased efficiency in the distribution of energy;
- reduced energy use per person in all sectors, and major increases in efficiency of use in the home, industry, business and transport.

By the end of the century, all countries should have national energy strategies aimed at achieving energy use targets mentioned earlier (see para. 5 page 8). They should also be publishing annual reports on implementation of the strategies and should have ratified the Conventions on Early Notification of a Nuclear Accident and on Assistance in the case of a Nuclear Accident.

Business, industry and commerce

The lower-income countries must develop their industry to escape from acute poverty and achieve sustainability. But this development must not be the kind that blighted the environment and imposed heavy social costs in many areas of the highincome countries.

We must adopt practices that build concern for the Earth into the structure of business, industry and commerce. We need to introduce processes that minimize the use of raw materials and energy, reduce waste and prevent pollution. And we need products that do not damage people or the Earth.

These needs will be met only if we establish a new relationship between business and industry and other groups working towards sustainable societies. Action is needed to:

- bring governments, business, and the environmental movement into a new dialogue;
- commit business to sustainability and environmental excellence, expressed in high performance standards and advanced by economic incentives;
- build confidence in industry by discussion of objectives, processes and practices and open disclosure of the results of monitoring.

By the end of the century all countries should have adopted the Polluter Pays and User Pays principles as well as the Precautionary principle and have ratified the Basel Convention on Transboundary Movement of Hazardous Wastes. At least 75% of major and multinational companies should have published corporate environmental policies.

Human settlements

Although villages are still the commonest human settlement, the movement of people from rural to urban areas is swelling the cities of the lower-income countries. Cities generate and accumulate wealth, and are centres for education, new jobs, innovation, culture and greater economic opportunity. But they are immense consumers of natural resources. They sprawl over and sterilize land; require enormous quantities of water, energy, foodstuffs and raw materials; and generate enormous pollution.

In all countries, changes in city design, transport systems, and resource use will be essential if sustainability is to be assured. The poverty suffered by the minority of urban dwellers in richer nations and the majority in poorer nations can be drastically reduced without a large expansion in consumption. In both instances, more effective and representative local governments and more far-sighted national governments are required.

The immediate need is for action that will:

- implement an ecological approach to human settlements planning;
- develop more effective and representative local governments, committed to caring for their environments;
- develop an efficient and sustainable urban transport policy;
- make cities clean, green, and efficient.

By the year 2000 all countries should have prepared national strategies for shelter incorporating an ecological approach to settlements planning. A majority of cities of over 1 million should have improved their transport systems and reduced ambient air pollution by 50%.

Farm and range lands

More people are hungry now than ever before, and their numbers are growing. Large areas are affected by land degradation resulting from mis-use. Much unused land has little agricultural potential and is best used to maintain life-support systems and provide timber, bushmeat, fuelwood and other wild resources. The increased food required to meet the needs of twice as many people must come largely from better use of the land already farmed.

In all countries progress toward sustainable agriculture will require:

• strategies and plans to use agricultural land optimally;

- control of the use of fertilizers and pesticides;
- conservation of genetic resources;
- use of economic incentives.

National strategies should protect the best farmland against conversion to non-agricultural uses. Soil and water must be conserved though proper land husbandry. The impact of agriculture on marginal lands should be reduced; integrated crop and livestock farming systems promoted; and, in dryland areas, the productivity and sustainability of rain-fed farming improved.

Other key steps are to adopt integrated pest management, and to use regulations and economic incentives that will lead to less wasteful and hazardous use of agricultural chemicals. International and national action to conserve crop varieties and livestock breeds and their wild relatives is essential. Adjustments in the economic framework for agriculture could help farmers adopt a sustainable approach.

By the end of the century, all countries that need to adjust their capacity for food production should have begun to implement national strategies for sustainability and be using regional land use plans for land use adjustment. Good husbandry practices should be widely adopted and the use of fertilizers, pesticides and herbicides should have decreased by 25% per unit of production.

Forest lands

Forests, and closed and open woodlands still cover 40% of the Earth's land surface. They are part of the planet's life-support system and a priceless natural resource.

Each country needs to:

- prepare an inventory of its forest resources, and a strategy for their management;
- protect areas of natural forest including "old growth", maintain modified forests and use them sustainably, and establish plantations for intensive production;
- involve local communities in forest management.

International action is needed to create markets for the products of sustainably managed forests, and help lower-income countries to derive maximum benefits from their use.

Inventories and strategies are required to ensure that land is used according to its ecological suitability and potential yield. Forest conservation and agricultural planning must proceed together. Substantial areas of natural forests need to be protected to conserve biological diversity and life-support systems, but protected areas should be part of a system including production forest and plantation forests. All categories must be managed sustainably, but for different primary purposes. Good management procedures, and skilled forest managers and workers, will be essential.

Communities should be involved in the management of the forests in their areas, and derive economic benefits from them. Lower-income countries need favourable terms of trade for their forest products, and help to introduce and maintain sustainable management. International agreements like the GATT and International Tropical Timber Agreement should favour trade in the products of sustainably managed forests.

By 2000, the international timber trade should be based on systems of forest management that sustain all forest values. A state of no net deforestation should be reached and a network of protected areas established to protect substantial samples of all types of old-growth forest.

Fresh waters

Life on Earth depends on water, but bad water management is reducing agricultural productivity, spreading disease, and endangering ecological balance.

Action is needed in four main areas:

- to improve the information base and promote public awareness of the water cycle and the need for better management;
- to provide for integrated management of water and land uses;
- to conserve aquatic species and ecosystems;
- to strengthen international cooperation.

In the first area, studies to assess the status of water resources, and to monitor trends in their condition and use are vital. Awareness campaigns and education should secure public support for protecting water against pollution and for using it efficiently. More training would help improve management of water and of aquatic ecosystems.

Water resources should be managed, using drainage basins as units. Economic instruments should be used to promote efficiency and economy. A cross-sectoral mechanism should coordinate all national agencies with responsibilities for water and land. Local communities should be involved in management of the water resources of their areas.

Water resource development needs to be integrated with the conservation of the ecosystems that play a key role in the water cycle. The value of natural wetlands as regulators of water flow and suppliers of food and other valuable resources is commonly neglected when developments are planned. The conservation of aquatic species has economic importance, besides being an essential element in planetary strategies to conserve biological diversity.

International action is often needed because 40% of the world's people live in river basins that are shared between several countries. Bilateral agreements and multi-national programmes should be adopted, and the Ramsar Convention should be acceded to by all States.

By 2000, all countries that experience water scarcity should have increased efficiency of water use by 20% from 1990. The majority of countries should have established cross-sectoral mechanisms for integrated water management based on drainage basins, and new agreements for the management of four major transboundary waters should have been concluded.

Oceans and coastal areas

The oceans cover more than two thirds of the planet's surface. They are sources of food and oil, and highways for the world's shipping. The coastal seas are the most productive ecosystems on Earth, supporting 80% of the world's fisheries and yielding mangrove and other important products. Natural barriers such as coral reefs, mangroves and salt marshes also protect densely populated coastal lands from storms. Yet the seas, especially the coastal zones, are increasingly polluted from the adjacent land, on a scale that threatens to impair ecological function and reduce their yield.

Action is needed in five areas:

- to make people more aware of the importance of the oceans and seas;
- to apply integrated approaches to coastal and ocean management;
- to involve local communities more in the management of marine resources;

- to conserve coastal and oceanic ecological processes;
- to strengthen regional and global cooperation.

Information campaigns and education are needed, to improve public awareness. National policies should be drawn up for the coastal zone and oceans. All uses of the coastal zone should be subject to control, based on a plan, and all proposed new development subject to environmental impact assessment. Management of marine resources should be guided by ecological studies and designed to safeguard the balance of ecosystems. Prevention of pollution should have high priority. Key ecosystems should be safeguarded through a network of marine protected areas. A special effort is needed to protect threatened marine species and gene pools.

Rights to use marine resources need to be allocated clearly, and particular weight given to the interests of local communities. International cooperation, especially regionally, should be strengthened. Collaborative research and exchanges of information are needed as a basis for the sustainable use of the oceans. The UN Convention on the Law of the Sea should be brought into force by the ratification of at least 15 additional states.

By 2010, all depleted fisheries should be recovering and no fishery should be overexploited. Marine pollution should have been reduced so that no fishery products are a health hazard because of contamination. There should be a global system of coastal and marine protected areas.

Ways of financing new investment in environmental care

Transfers from military budgets. Land degradation and soil erosion, deforestation, global warming, competition for water, human population growth, and movements of refugees pose major threats to national and regional security. Current world military expenditures of \$900 billion per year do nothing to protect countries from these threats. Tackling them in peaceful ways would be a legitimate use of military budgets, which could cover the entire cost of this Strategy and still be huge. For example, if the world military budget were cut by amounts to meet the estimates given in Annex 7, military expenditure would still be \$853 billion in 1991 (a reduction of 5%), and as high as \$739 billion (a reduction of 18%) at the end of the century.

Private sector investment services could generate private investments in conservation. The service would be similar to that of an investment bank, gathering long-term capital, spreading risks, arranging access to technology, and improving incentives for investments in sustainable development of biological resources.

Earthcare Bonds. These could be either redeemable or non-redeemable. Proceeds from their sale would be used to build up a capital fund for investment, the proceeds of which would be used to finance some of the actions described in the Strategy after providing modest returns to the bond holders. Aggressively marketed to individuals and organizations wishing to make an affordable contribution to conservation and human development, and managed by a reputable international organization, such a scheme could yield a significant and continuing flow of income.

Royalties. Patents and plant breeder's rights compensate the final developers of a biological product, but do not compensate — and may penalize — the interim developers of the product or the conservers of its germplasm. Interim developers include farmers, and breeders of lines that contributed to the patented product; and conservers of germplasm include people who have spent money or forgone immediate gain to conserve gene pools that have contributed to the product.

A surcharge on royalties from patented biological materials would be equitable and could be collected through existing mechanisms for royalty collection and distribution. A surcharge of 1% on current royalty payments would yield an estimated \$5 million per year. This sum could be paid into the fund administered under the International Undertaking on Plant Genetic Resources, which is intended to support conservation of germplasm, and thereby to compensate farmers, if only partially and indirectly. Alternatively, it could contribute to the proposed biodiversity fund.

Private, NGO, and corporate contributions. Private and non-governmental contributions to financing implementation of this Strategy should be sought, even though they will probably be relatively small.

But there is a rationale for greater commercial sponsorship of conservation. Corporations in 10 major industries — beverages, chemicals, clothing, food and confectionery, paper and wood products, pharmaceuticals, rubber and plastics, soaps and cosmetics, textiles, tobacco — depend wholly or partly on plants and animals for their raw materials. A significant proportion of these plants and animals is wild. The corporations benefit collectively from conservation of flora and fauna, but do not pay for it. Hence it would be appropriate for them to contribute directly to the costs of establishing and managing protected areas and other measures to maintain the wild gene pools, species, and habitats that form the biological resource base of their industry.

Lotteries and other fund raising schemes could raise substantial sums from individuals for some of the priority actions proposed in this Strategy. The schemes could include a tax on tickets at big international and national events, such as the Olympic Games and World Fairs and Expositions; telethons and other fund raisers; and an international lottery.

Conclusions: The Way Ahead

Caring for the Earth defines broad lines of advance towards a world that lives sustainably, within the natural limits of the planet. What is important now is how people and communities respond to the Strategy: what they do to make the change to sustainable living and how fast they move.

The challenges we face cannot be solved overnight solely by some new vision on the part of world leadership. Action by governments and strengthened international institutions is of primary importance, but that too it is only part of the solution. The attitudes and practices of individuals — the action on the ground — count just as much. And governments and national leaders will do their share only if they are supported and pressed to action by individuals and citizens' groups.

Caring for the Earth is addressed to the whole world community. The world leaders who will meet at the United Nations Conference on Environment and Development in Brazil in June 1992 are an important audience, and so are non-governmental organizations and professional groups; religious leaders and educators; business people, farmers and fisherfolk — all those who find in its statements an echo of their own concerns and convictions. It is not necessary that they agree with every statement in the Strategy. It is essential that they take the actions which they believe to be right and timely, and that they do so with a sense of urgency. The world is running out of space and time.

The Strategy lists 132 specific actions to establish a sustainable society. Targets are set, as a means both of focussing the action towards concrete ends and of evaluating the results.

Individuals and groups should act now:

- to study the lists of actions and targets, and determine which are of highest priority for them as individuals and as members of communities;
- to review the changes they should make in their own approach to life, and in the policies of the groups to which they belong;
- to promote the Strategy within their local groups, communities and governments;
- to begin actions based on the Strategy;
- to work for the reorientation of national and international policies and institutions to implement the Strategy.

Action through local communities, governments and the global alliance of nations is crucial. Governments should also study the actions and targets, and consider how best they can respond to the Strategy in their countries and internationally. In many cases the preparation of a strategy for sustainability, or updating a National Conservation Strategy, will be an appropriate first response.

Action will need funding. It is calculated that many of the actions set out in the Strategy will pay for themselves: that is, they will increase social efficiency and prosperity, while costing no more than more wasteful current practices. But some actions will require more money, estimated at a total of \$77 billion a year in 1991, rising to \$161 billion in 2000, a total of \$1288 billion over the present decade. This sum could come by redeployment within existing budgets, for example by reducing military expenditure (currently \$900 billion a year) by 5% in 1991 and by 20% by the end of the century and redeploying the funds saved to more constructive development.

The partners publishing this Strategy will assist in its implementation. They will monitor and evaluate progress. They will review, update and amend the proposed targets. They intend to publish an annual Implementation Report, with indicators of sustainability, data on progress, and new targets.

The partners commend the Strategy in hope, and urge all who receive it to accept the need for change: for new styles of human living, and for care for the Earth as the first essential for all human futures.

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Annex. Indicators of sustainability

A sustainable society enables its members to achieve a high quality of life in ways that are ecologically sustainable. To measure progress toward a sustainable society, we need indicators of quality of life and of ecological sustainability.

Requirements of indicators

The concepts of quality of life and of ecological sustainability are broader than their measurement. By definition, indicators can measure only components of either. The search for reliable and efficient indicators of sustainability is just beginning. The indicators should be quantitative and some at least should be convertible to a monetary value so that they can be related to the national accounts. They should not be too difficult or expensive to measure. The following list of possible indicators is by no means comprehensive. Some do not meet these criteria.

Quality of life

The United Nations Development Programme has adopted two indices to measure human development or the quality of human life: a Human Development Index (HDI) and a Human Freedom Index (HFI).

HDI has three components:

- Longevity, measured by life expectancy at birth. Long life is valued because it increases the opportunity for a person to pursue goals and develop abilities and is associated with good health and adequate nutrition.
- Knowledge, or educational attainment, measured by adult literacy and mean years of schooling. This helps people to realize their potential and take advantage of opportunities.
- Income, measured by per capita Gross Domestic Product, adjusted to account for national differences in purchasing power and the distorting effect of official exchange rates (real GDP), and adjusted further to reflect diminishing returns from income.

HFI is a modification of Charles Humana's World Human Rights Guide, which uses 40 indicators to measure freedom. A "one" is assigned to each right or freedom that is protected and a "zero" to each right or freedom that is violated.

Ecological sustainability

A society is ecologically sustainable when it:

- conserves ecological life-support systems and biodiversity;
- ensures that uses of renewable resources are sustainable and minimizes the depletion of nonrenewable resources;
- keeps within the carrying capacity of supporting ecosystems.

Conserving life-support systems and biodiversity

Conserving life-support systems needs a combination of preventing pollution, restoring and maintaining the integrity of the Earth's ecosystems, and developing a comprehensive system of protected areas. Conserving biodiversity requires these measures plus action to restore and maintain species and genetic stocks.

Primary indicators measure the condition of the ecosystem or species concerned. Secondary indicators measure human impacts. Tertiary indicators measure actions to reduce impacts. Whether the indicator is primary, secondary or tertiary is shown by a number in brackets.

1. Progress in preventing pollution

Annual emissions of carbon dioxide, methane, CFCs, sulphur oxides, nitrogen oxides: total, per capita, and per unit of GDP. [2]

River quality: dissolved oxygen; nitrate concentration. [1]

Wastewater treatment: percentage of population served by wastewater treatment plants (primary, secondary and tertiary). [3]

Industrial accidents: number, number of deaths, per unit of GDP. [2]

2. Progress in restoring and maintaining the integrity of ecosystems

Percentages of land area that are natural, modified, cultivated, built, degraded. [1]

A subset of the above would be percentage of land under forest, and percentages of forest land that are natural (old growth), modified, planted, degraded. [1]

Percent of natural and modified ecosystems or vegetation types in fragments greater than 10,000 hectares. [1]

3. Progress in developing a comprehensive system of protected areas

Percentage of each ecological region that is covered by protected areas. [3]

4. Progress in restoring and maintaining species and genetic stocks

Number of species, and percent threatened with extinction, percent threatened with extirpation, percent with stable or increasing populations, and percent with significantly declining populations. [1]

Number of endemic species, and percent threatened with extinction [1], and percent in protected areas. [3]

Percent of threatened species with viable populations in ex situ facilities. [3]

Domesticated species diversity index (number of crop and livestock species raised in a region as percent of number grown 10 or 50 years previously). [1]

Domesticated varietal index (number of varieties of each crop and breeds of each livestock species raised in a region as percent of number 10 or 50 years previously). [1]

Crop and livestock uniformity index (relatedness of crop varieties and livestock breeds). [1]

Percent traditional varieties in ex situ collections. [3]

Genebank status index (percent of collection regenerated within past 15 years). [3]

Ensuring uses of renewable resources are sustainable and minimizing the depletion of nonrenewable resources

1. Importance of the sector for income (value added) and employment

Determining the total value-added contributed by the sector provides a basis for calculating the dollar value of changes in the status of the sector's resources and ecological infrastructure (see below).

2. Status of the sector's resources

A sector's resources are the natural assets that it uses directly: trees in the case of the timber sector; and hydro, oil, natural gas, coal, and wood in the case of the energy sector. Two sets of data are needed: the size of the current stock; and flow data (changes in production, consumption, and the size of the stock).

3. Status of the sector's ecological infrastructure

A sector's ecological infrastructure consists of the ecological processes and biological diversity that support it: for example, soil, water, and the genetic diversity of crops and livestock in the case of the agriculture sector. For living-resource sectors (timber, fisheries and aquaculture, other harvesting, agriculture and horticulture, tourism and recreation, and some of the energy sector), measures are needed of the status of the hydrological cycle (quality, quantity and reliability of water supply); soil structure and fertility; air quality and climate; and the ecosystem, species, and within-species diversity required for long-term production. For nonliving-resource sectors (mining and most of the energy sector), measures are needed of the quality, quantity and reliability of the water supply, and on air quality and changes in the reliability of climate.

4. The sector's compatibilities and conflicts with the sustainability of other sectors

Items 2 and 3 above measure what might be called the sector's internal sustainability. We also need to assess its external sustainability — its impacts on other resource sectors, on the businesses outside the resource sectors, on human health and infrastructure, and on the integrity of the biosphere or planetary ecosystem.

5. Main socioeconomic influences on the sector's sustainability

Several factors make it easier or more difficult for a sector to be sustainable. The chief ones are:

- The ratio of benefits to a given stock of resources. One of the ways of achieving sustainability is to increase the benefits from a given stock of resources. Conversely, a decline in benefits from a stock of resources is a sign of unsustainability. Two benefits that should be looked at are jobs and total income (corporate, personal, municipal, provincial). Indicators include trends in earnings and production, the ratio of jobs and income to production, and changes in value added per unit of resource.
- The extent to which the resource users pay the full costs to society of their decisions. Indicators include the proportions of development and conservation costs paid by the industry, government, and other parties (including future generations); and the net charge (tax) paid or subsidy received by the sector, once the total amount of taxes has been subtracted from the total amount of subsidies.
- Effective participation of communities and interest groups in the decisions that most affect them. Do the communities and interests that depend on the sector have an effective say in how the sector's conservation and development are planned and managed?
- Adoption of an approach to decision making that tries to foresee and and prevent problems. How well are the compatibilities and conflicts with other sectors and interests being anticipated and managed?

Keeping within the carrying capacity of supporting ecosystems

The following indicators would measure the effectiveness of action to reduce consumption and stabilize population:

- per capita consumption of food, water, timber, minerals.
- per capita use of energy.
- energy use per unit of GDP.
- generation of municipal waste, per capita, and per unit of GDP.
- generation of industrial waste, per capita, and per unit of GDP.
- generation of nuclear waste, per capita, per unit of GDP, and per unit of energy.
- population trend.
- Total Fertility Rate.
- population density.

The logo for *Caring for the Earth* is based on the symbol used for the first World Conservation Strategy. The circle symbolizes the biosphere — the thin covering of the planet that contains and sustains life. The three interlocking, overlapping arrows symbolize the three objectives of conservation:

- maintenance of essential ecological processes and life-support systems;

- preservation of genetic diversity;

- sustainable utilization of species and ecosystems.

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