
# A Changing Future For Paper

*A summary of the study "Towards a Sustainable Paper Cycle"*

- Its impact on society and environment
- How the paper industry can manage change
- Ways to make the paper cycle more sustainable

*An independent study on the sustainability of the pulp and paper industry*

Prepared for the World Business Council for Sustainable Development by the International Institute for Environment and Development

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# A Changing Future For Paper

*Summary of the study "Towards a Sustainable Paper Cycle"*

## Why the study was done

The paper and forestry industry generates 2% of world trade and demand for paper is rising. Paper still represents the primary medium of communication for the majority of people, especially in education, and it has wide commercial uses, including packaging and health care.

The paper industry has been criticised by environmental and consumer groups for creating pollution and mismanaging forests. Some of the criticism has been deserved but other comments have been based on outdated or limited information. At the same time, reporting by industry on its environmental and social performance has often lacked credibility. This has made it difficult to get a balanced analysis of the paper cycle, from forestry through to final disposal.

It was felt that credible information was needed with which the paper industry could plan for sustainability in conjunction with other stakeholders.

This is why the World Business Council for Sustainable Development (WBCSD) - advised by Erling Lorentzen, chairman of Aracruz Celulose and an advisory group- initiated a global study of the paper cycle and commissioned the London - based International Institute for Environment and Development to do the job.

Funding was provided by businesses based in five different continents, academic institutions, governments and international agencies, such as the International

Finance Corporation and the European Union. Members of the WBCSD and other businesses provided 62% of the research budget and 70% overall.

This study aims to provide a balanced analysis of the paper cycle from the perspective of sustainable development. It is intended to create a focal point for further debate and consultation at global and local levels.

## Towards a sustainable paper cycle

The world is agreed that our present way of life must change if we are to improve standards of living, especially for over half of the world's people who live in poverty, without compromising the welfare of future generations. It is acknowledged too that every part of society, industry included, will have to change.

Industry is trying to devise ways to further improve its practices, partly in response to pressure from governments, environmentalists and consumer groups. The methods it chooses will have to be socially desirable, economically viable, and ecologically sustainable.

Some industries, such as mining and oil, appear inherently unsustainable because the natural resources they exploit will eventually run out. The future of the paper industry appears more secure because its raw material -mainly trees- is renewable and its product is recyclable. On the other hand, the paper industry is a major consumer of energy (although it uses a higher proportion of renewable energy than other industries) and can pollute water and air. It has much room for further improvement.

This makes the paper industry an ideal candidate for a study to demonstrate what practices need to be modified and how stakeholders can make the changes happen.

Lessons learned from the study can be useful elsewhere because the paper industry is global in scale, contributes about 2% of world trade and its future is economically important for many developing nations.

If the paper industry is to become more sustainable then further changes will have to be made to industrial practices within each stage of the paper cycle - forest management, pulp and paper production, paper usage, recycling, energy recovery, and final disposal.

## How to use this publication

This is a summary of the main environmental and social concerns in the paper cycle and the key conclusions of the study on those topics. By necessity, much of the detail -and many of the qualifications- of the main report are excluded.

Please use the report, and not this publication, for quoting and reference.

## *Table: Essential facts about the paper*

- The paper industry accounts for about 2.5% of the world's industrial production. The total value of world sales in1993 was about US $260 billion and the industry 's total assets are estimated to be worth at least US $400 billion.
- The pulp and paper industry uses roughly one third of the global industrial wood harvest (excluding fuelwood) and this share is rising.
- Half of the wood used in the world is for fuel. Developing countries use 80% of local wood for fuel.
- About one third of the fibre used to make paper comes from waste paper; most of the rest is made from virgin wood pulp; about 5-10% is based on non-wood fibre (mainly used in China).

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## *Table: Comparative size of the paper industry*

Market value of companies on the world's main capital markets, US $ billions, 1995

| | |
|---|---|
| **Aerospace** | **86.7** |
| **Steel** | **98.5** |
| **Forest and paper** | **109.7** |
| **Automobiles** | **253.2** |
| **Telecommunications** | **464.4** |

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## *Table: What forests provide wood for paper?*

- 1% Tropical rain forests.
- 1% Original temperate hardwood forests. Found in temperate regions of the world and have never been commercially exploited
- 15% Original boreal forests. Located in the high latitudes of the northern hemisphere and are untouched by human intervention.
- 17% Unmanaged natural regeneration forest. Those that are exploited and left to regenerate without human help.
- 29% Plantations. Forests that have been planted and managed in the same way as agricultural crops.
- 37% Managed natural regeneration forest. Used and then encouraged to grow again by natural means, such as seeding.

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## What the NGO's say

Environmental campaign groups and other non-governmental organisations (NGO's) from around the world took part in workshops where they gave their views on the paper cycle. This is a summary of the differing opinions offered.

They are concerned about:

- Loss of biodiversity
- Replacement of natural forests by plantations
- Insufficient use of non-wood fibres and waste paper
- Dominance of large-scale mills and the disproportionate political influence enjoyed by corporations
- Continued use of chlorine gas as a bleach
- Insufficient research into alternative small-scale or cleaner technologies for making pulp and paper
- Unsustainable levels of paper consumption in rich countries
- Western-style waste-paper collection systems (and exports) harming the livelihoods of waste paper collectors in poorer countries
- Trade in waste paper increasing the amount of transport in the paper cycle
- Wood fibres benefiting from hidden subsidies, to the detriment of alternative fibres.

They want:

- An increase in recycled content in paper products
- Reduction of waste through reduced consumption as well as recycling
- Research into the driving forces behind paper consumption
- Independent certification of forests
- Stricter controls on land use and definitions of degraded land to reduce the conversion of natural forests to plantations
- More local participation in land use and investment decisions
- Elimination of the use of chlorine in bleaching.

# Forestry

## Sustainable forest management & forest stewardship

Governments and forest managers used to consider forests from narrow point of view, seeing, for example, their value only in terms of wood or land for agriculture. Now, with the increased emphasis on environmental and social issues, it is acknowledged that these perspectives -and therefore the way that forests are valued and managed- are changing and must continue to do so.

Sustainable Forest Management (SFM) is a way of managing forests that considers a broad range of issues: environmental, social and economic. SFM is still developing and there are at least 17 different international initiatives to define it.

All agree on three essential elements:

- Goods and services must be sustained. Included here are wood products; non-wood products (e.g. nuts, fish, recreation); protection of soil and water; maintenance of ecosystems, forests health and vitality; contributions to local weather and global climate.
- Biological diversity must be conserved. Includes landscapes, ecosystems, species and genetics.
- Social and economic impacts must be positive. Indigenous people, employees and local communities must benefit, as must the local and national economies.

Clearly it is difficult and costly to achieve all these objectives quickly. Processes that gradually adapt to change are necessary to move towards a sustainable form of management.

This is why some initiatives acknowledge that time is needed to achieve SFM and to adopt management actions and attitudes that move towards SFM.

This could lead to sustainability after at least two crop rotations. The process is known as Forest Stewardship.

### What the study finds

- Governments must develop policy frameworks that cover all forest goods and services and all stakeholders must have an opportunity to participate in the development and application of forest stewardship principles.
- Forest stewardship is the best way forward to ensure the continued provision of goods and services supplied by forests. This is why stakeholders need to agree forest stewardship principles which accommodate local differences. Initiatives by the International Standard Organisation (ISO) and the Forest Stewardship Council (FSC) are good starting points.
- Industry leaders should be more active in promoting the idea of forest stewardship globally and should subject themselves to independent assessments. Governments should help by providing incentives, such as procurement policies that favour certified forest products.
- Industry should remove incentives that undervalue natural forests.
- Those who manage forests well need to be better co-ordinated globally so that they can be effective leaders for the whole industry. But they must take care not to dominate local initiatives because local owners and/or small-scale forestry are important part of the drive towards sustainable management.
- Applying SFM will usually cost more than current forestry practices, at least initially, with some estimates of 10-20% increased costs in temperate and boreal regions.

## Certification: Making markets work for the environment

Many people think governments and industry have failed to improve the management of forests. Some argue that the market can do the job and want mechanisms which rely on market pressures from environmentally conscious consumers.

This is the reasoning behind the idea of certification, the process whereby forest managers can apply for approval from independent certifiers who verify that agreed standards of forest stewardship have been met. The aim is that buyers will the use certified forest products where possible and begin to avoid the rest. This market demand will, it is hoped, encourage good forest stewardship.

Developments in forest certification are relative new and there are no clear indications yet of its potential to expand beyond a small niche market. At present there is only one global, independent certification initiative based on performance standards, organised by the Forest Stewardship Council (FSC).

It is backed mainly by environmental and social justice organisations, most notably the World Wide Fund for Nature, and has support from some large retailers of wood and paper products.

A parallel approach is to develop forest management standards based on quality management and environmental standards, for example those of the International Standards Organisation (ISO). These emphasise process standards and encourage continuos improvement.

### What the study finds

- Industry leaders should be more active in spearheading forest stewardship globally by, for example, setting good examples and organising codes of conduct for the industry.
- Both the ISO and FSC approaches are useful and should be seen as complementary. The ISO approach is familiar to the industry and the market, encourages the use of environmental management systems and is more likely to conform to world trade regulations (GATT/WTO).
- Voluntary certification programmes (region/national and state level) should be established, based on the ISO process approach to achieving forest stewardship but with performance standards based on those devised, for instance, by the FSC.
- Mechanisms that help small producers to join together through associations will reduce the cost and contribute to a wider take-up of independent certification.

## Encouraging social forestry

Social forestry is a short-hand term used by the study to describe small-scale, non-industrial forms of forestry. It includes private farm forestry (where small growers supply wood on the open market); community-run forest projects; and partnerships between small growers and industry (known as outgrower schemes).

Sixty per cent of the largest forestry companies buy some of their wood from small outgrowers. The relationship between buyer and seller differs according to company and country, but some include the provision of finance, seedlings and advice supplied by the large company.

The schemes can be good for the company, the local community and the environment. For example, farmers get an income from their land and the

company ensures a regular supply of wood without having to buy more land. It can also discourage the cutting of native forests for fuel and other uses.

In many major pulp producing countries most forest land is under private ownership, often in very small holdings. For example, over half the forest in Sweden is controlled by small private owners, as is part of the pulp and paper industry itself. Paper companies in the US buy a large proportion of their wood from private landowners, most of whom own plots less than 50 hectares.

### What the study finds

- Social forestry schemes can provide many benefits and should be encouraged.
- Few pulp and paper companies buy more than 20% of their requirements specifically from outgrower schemes and most dominate the relationship with their suppliers.
- Social forestry schemes will only work in the long run if certain conditions are in place. For the farmers these include secure land tenure; access to financial support while the trees mature; higher returns from trees than from alternative crops and livestock; and secure markets for wood (but not tied to one buyer).
- There is further potential for small growers to form co-operatives to improve their bargaining power with large companies.

## What is best practice in the forest?

Improved forest management practices have begun to ease concern about the way forests are treated. But many are still worried about practices that are purely exploitative -taking from the forests and local people without giving anything back.

Exploitation has led to loss of biodiversity; soil erosion; destabilised watersheds; reduced access to the forests for people who live nearby; displacement of rural communities; and plantations that create aesthetic uniformity (ranks of identical trees).

Four issues remain highly contentious:

1. Clear cuts. This is when all the trees in a large section of a forest are felled. The practice is still common in the tropics ( to clear land for agriculture) and in forestry in the northern hemisphere.
2. Conservation of natural forests. Arguments are about how much natural forest need to be preserved in order to conserve biodiversity and maintain amenity and recreational values.
3. "Forest mining". Certain companies seek out countries with low standards or weak enforcement to remove great quantities of trees from original-growth forests without adequate attention to forest regeneration. This has been linked to mining.
4. Plantations. The main concerns are the growing of vast areas of trees of the same species, commonly introduced from another country. Objections are made to the intensive use of chemicals and water, the effect on wildlife habitats and the uniform appearance of the trees.

### What the study finds

- Clearcuts may be acceptable in principle in some forests that are well adapted to fire, wind and flood, because the felling mimics key ecological processes. But those stakeholders who think clearcuts look ugly have a legitimate complaint and should be asked to help decide where and how to clearcut.
- Conserving specific parts of forests is essential for diversity of landscape and ecosystems, and for the preservation of rare species. The issue has to be considered within the process of agreeing a plan for a nation's forests: what to conserve, what to convert into farm land and what to use for forest products.
- Forest mining should be stopped.
- Plantations are often an acceptable way to grow trees for paper making especially when other forests are available to provide further goods and services. New plantations will be needed to meet growing demand for paper, especially if forest mining is stopped.
- Plantations should be designed and managed in an environmentally and socially acceptable way.
- Trees that come from other continents -known as exotic species -are not a problem is their seeding into the local countryside is closely controlled.

## Making paper from crop

Paper is made from a variety of materials, including non-wood fibres such as especially grown crops (e.g. grass, hemp and kenaf) and agricultural wastes (cotton, straw, and sugar cane residue called bagasse). These fibres make up over half the virgin pulp production in some developing countries, such as China and India.

Declining farm incomes, food surpluses and bans on straw burning have revived interest in non- wood fibres in developed countries. But pulp and paper companies show little interest in this alternative source of fibre. This is because wood can be bought and stored all year round from well established suppliers and the pulp can be sold easily. In contrast, non-wood fibres are only available at certain times of the year, are difficult to store and generally more complex to manage. Furthermore, there is little demand for paper made from non-wood fibre.

### What the study finds

- There are advantages and disadvantages in using non-wood fibres for paper production: it can support smaller mills which can be important for rural livelihoods; but production is more expensive and more polluting than for wood-based paper.
- The use of non-wood fibre is particularly appropriate for areas with few wood resources and excess agricultural land or residues (e.g. straw). The wood pulp industry could support local initiatives by investigating the installation of non-wood pulping lines and industry in the North.
- Cleaner manufacturing processes are needed for the non-wood pulp and paper industry. Funding for research and development should be sought from government and industry in the North.

- Countries which want to promote the non-wood fibre industry should consider encouraging procurement policies that favour non-wood paper (because this has been shown to work for recycled paper).

# Fibre Supply

## Is there enough fibre for the future?

It is impossible to predict the future but you can make educated guesses to help in forward planning. Forecasting has become much more accurate with the use of computers running economic models -mathematical equations that embody the relationships within the economy.

Projections of the trends in demand, supply and price of pulp in this study were made using the specially commissioned Pulpwood Supply Model. It was designed to answer a series of questions on whether, in the long term, there would be enough wood to make paper and other products.

The questions were asked under various assumptions about the growth in demand for paper and the extent and cost of forest resources available to meet that demand, until the year 2045.

Land needed to satisfy our paper needs:

In theory, the world's current total demand for wood fibre for pulp could be supplied by an industrial plantation area of 40 million hectares, or roughly the size of Paraguay or Sweden. This area is less than four times that taken up by high-yielding plantations that exist now.

### What the study finds

- The demand for pulpwood will continue to grow but a declining rate, leading to an estimated doubling of consumption over the coming 50 years.
- There is enough wood fibre to meet anticipated growth in demand, with some increase in real prices. This assumes that no additional environmental constrains are imposed on supply. It also assumes continued development of new pulpwood plantations in the tropics and sub-tropics, which will increasingly dominate the supply of wood for pulp because of good growing conditions.
- A fibre shortage can be expected only if extensive forest set-asides are introduced or some restriction placed on plantation development.
- Upward pressure on pulpwood prices will stimulate increased investments in forest regeneration and afforestation, as well as increased efficiency in processing.
- Environmental constrains on forestry in one region can lead to more costly production or environmental destructive practices in other regions (e.g. Pacific North Western set-asides can stimulate logging in Asia and Siberia).

# Pulp and paper making

## How paper is made

Modern paper making has two distinct stages. First, a porridge-like pulp is made from wood (other materials such as kemp, straw, and waste paper are also used). Second, the pulp is fed into a paper making machine which removes the water to produce rolls of paper.

Most pulp mills also produce paper. But sometimes the two operations are separate, with paper, especially specialist grades, being produced nearer the markets. Bulk pulp is traded and shipped around the globe in dried blocks.

Making paper consumes large amounts of energy and water. For example, in 1992 the US paper industry was the third largest consumer of energy after the petroleum and chemicals sectors.

But the paper industry differs from others in that it generates a significant proportion of its own energy needs by burning by-products (residues, bark, etc.). This is considered a renewable energy source and, unlike fossil fuels, does not contribute to a net increase in carbon dioxide emissions as it usually offset by forest regrowth. The US industry, for example, generates 55% of its energy needs; in this way and other countries are making increasing use of renewables.

Water is an essential ingredient in pulp and paper making. It is used to create the pulp and to flush away unwanted impurities. Emissions to water are one of the most significant environmental impacts of pulp and paper making.

## Emission control, cleaner production and closed mills

Pollution from pulp mills can be reduced significantly by treating effluent and/or by changing production processes.

Since the early 1970 some leading pulp mills have reduced their environmental impact by "closing" some of their processes, for example by recycling effluent water. At least 15 mills world-wide are now trying to achieve closed-cycle bleaching in Sweden, Canada, Finland, the US and South Africa. Expectations are that at least some will have totally closed bleaching systems by the end of the century.

Complete closure of processes is only possible for newer mills. Even then it is impossible to eradicate environmental impact, only minimise it.

### What the study finds

- There are significant differences in emissions levels for pulp and papermaking worldwide. About 15% of wood-based global pulp and paper capacity has no effluent treatment.
- It will be very expensive for the global industry to meet good emission standards. In some regions, such as the US, the costs involved are

comparable to the environmental investment that has been made over the last 12 years in the sector.
- Older and smaller mills are going to find it difficult to meet higher standards and many would be forced to close if such standards were to be imposed. However, other considerations may outweigh environmental concerns, notably the significant income and employment benefits provided by these mills.
- The industry has made good progress at reducing the amount of water used in its processes. In the USA, for example, the volume of water needed to make a ton of pulp has been reduced 70% during the past two decades.
- More study is needed on the non-cancer related effects on worker health of pulp and paper making, and the de-inking process.
- Companies should adopt a recognised environmental management system, with third-party verification and disclosure of performance.

## What is the best way to bleach paper?

Paper pulp is dirty brown colour and is often bleached to make it look better and to make it more useful (e.g. as writing paper).

Bleach is used in some processes to further break down the natural glue in wood (lignin). Chlorine gas was the main bleaching agent until the early 1980's when its use was linked with the creation of highly toxic chemicals, called dioxins. It is still used as a bleach in pulp mills, but to a far lesser extent.

There are two alternative bleaching processes. One uses chlorine dioxide (called elemental chlorine free -ECF). The other -called totally chlorine free (TCF)- uses non-chlorine bleaches, such as hydrogen peroxide, oxygen, ozone and enzymes.

### What the study finds

- There is no appreciable environmental difference between TCF and ECF.
- Leading companies, specially in western Europe are shifting to alternative bleaching techniques. Only a few mills in Africa and Asia, and increasing number in Latin America have so far switched to these new processes.
- Attention is now being focused on the impact of both bleached and unbleached effluents on their receiving waters because chronic toxicity effects have been observed on wild fish. It is thought that compounds in natural wood extracts are responsible, although more research is needed. Secondary treatment at mills seems to largely eliminate the toxicity.

## Impact of transport

Transport is a major cost in the production of pulp and paper. It has significant environmental impact but there is little data available.

The pulp and paper sector compares favourably with other industries because it only uses mainly ship and rail, which have lower environmental impacts than road and air.

### What the study finds

- In Europe, transport accounts for a significant proportion of total nitrogen oxides and volatile organic compounds emitted during the paper cycle.
- The environmental implications of transport in the paper cycle should be considered more systematically by all stakeholders.
- Companies should assess the environmental impact of their transport operations and publish the results in their environmental reports. They should investigate the possibilities of switching from road to rail and water transport.
- Policy makers need to consider the impact of transport in their recommendations, for example, when promoting recycling.
- Sitting of new manufacturing plants and plantations should take into account the environmental impact of transport.

# Paper use

## The many uses of paper

Paper is a common essential part of our lives, so much so that we take it for granted. We use it to store and communicate information (books, periodicals, business documents and letters), wrap and protect food (packaging), for our personal hygiene (tissues, diapers, etc.) and in medicine (swabs, hospital uses).

Paper has been a growth industry for the past 2000 years. While we continue to use it widely, there are alternatives and some of these are already undermining the dominance of paper. Alternatives include plastic (especially for packaging) and electronic media (telecommunications and digital storage devices such as CD-ROM).

Nobody yet knows if paper will become less important to the information and entertainment industries because of the development of electronic media.

## Making better use of paper

Excessive packaging was considered the single greatest source of wasteful or unnecessary use of paper, according to a public opinion survey in the UK in 1994. It was followed by unsolicited (junk) mail, photocopying in offices and newspaper supplements.

There are two radically opposing views on consumption. In general, business argues that paper use can be made environmentally efficient and there should be no limits set on its consumption.

Environmental and social groups, on the other hand, argue that such eco-efficiency can be helpful but this will not be sufficient to answer some of the moral demands for limited exploitation of the world's natural resources.

The electronic information revolution has yet to produce the promised paperless office. The spread of computers, printers and photocopiers has increased the use of paper.

Efforts are now being made to improve the efficiency of paper use and some companies have reduced paper consumption by using electronic mail and double-sided copying.

### What the study finds

- Packaging waste, while highly visible and accounting for up to half of household waste, makes up only one per cent of total waste.
- There is no agreement on the physical limits to paper consumption, therefore no accepted definition of "over" or "excessive" packaging or "wasteful" paper use.
- Most paper packaging is only used once before disposal. While market forces provide some incentives for minimising paper used for packaging, this is not enough to cut the amounts of packaging waste being generated.
- Changes made by companies and new government regulations have reduced paper packaging without a loss of performance for the consumer.

## Enough paper for all North and South

Most people (more than 80%) do not have access to enough paper needed for reading and writing. More than a billion adults are still illiterate and over 100 million children world-wide receive no primary education.

World paper production, says one estimate, would have to rise by about 70% simply for developing countries to reach the world's paper consumption rates at the beginning of this century.

This imbalance between the developed North and the developing South has led to two main demands:

1. Non-governmental organisations have called for reduced consumption of paper products in the North to encourage a fairer distribution of paper world-wide, without increased production.
2. Some environmental organisations in Asia have called for government action to discriminate between paper for printing and writing ("a necessity") and industrial paper for packaging and personal care ("a luxury").

The consequence is that paper has become a highly symbolic product demonstrating, for some, the North's "excessive" consumption of the world's natural resources.

The response has been two-fold:

1. Governments in the North are increasingly looking at the consumption phase of paper to intervene and reduce environmental impacts throughout the paper cycle.
2. Industry has continued to reduce the amount of paper used in products and packaging, which has lead to higher efficiencies.

### What the study finds

The paper industry should:

- Help devise robust methods of assessing consumer need and this information (on type and quality of paper) should be used when developing and marketing products.
- Move away from a volume approach (selling more paper) to one that seeks to meet or service the needs of people (packaging, personal care, communications), even if this means selling less paper.
- Respond to consumer concerns about waste and make more information available to critics who question the need for some disposable paper products, such as diapers and tissues.

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## *Table: How much paper we use*

Consumption is growing much faster in developing countries but the average consumption of paper in the developing world remains less than 10% of the developed countries' average of 152 kg per person, per year. (1993 figures).

Developed countries account for about 75% of total paper consumption but their rate of increase in consumption is declining.

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## Eco-labelling and buying practices

Two major policy initiatives -eco-labelling and procurement policies -have been used to influence the consumption of paper.

Eco-label schemes, which give environmental approval to products on the basis of a third-party assessment, now exist for paper and paper products in many countries. These aim to provide an alternative to the profusion of unverified claims made by manufacturers which have led to consumer confusion and cynicism.

The European Union (EU) scheme has aroused the most controversy, criticised by industry and others for the way it defines environmental acceptability. Many in the paper industry outside EU, view the label as a barrier to trade -as do some consumer groups.

Some industry groups want environmental management and audit schemes to be used instead of eco-labels.

Procurement standards, where a buyer specifies certain minimum standards, have emerged as a way of providing guidance to the consumers. Such policies usually promote a recycled fibre content and sometimes work in tandem with initiatives to reduce the use of paper.

### What the study finds

- There is a need to improve the credibility and quality of environmental claims on paper products. Eco-labelling is one way of doing this but will have to become more flexible to take account of differences in environmental priorities and conditions between consuming and producing countries.
- Other approaches, such as report cards which provide independently verified information or scores on a number of environmental attributes rather than an overall seal of approval, may meet with less resistance and prove more effective.
- Governments should address the adverse impact of trade from eco-labelling, for example by working towards mutual recognition of different schemes and the inclusion of environmental management standards in eco-labelling.
- More work is needed -by industry and governmentsto develop procurement policies that are sensitive to the whole paper cycle and not just recycled content. Such policies should start from an analysis of the needs which paper serve.

## Impact of converting

Businesses that turn basic paper and board into other products, such as magazines, packaging and specialist papers, are referred to as converters. The converting industry often uses toxic chemicals and generates significant emissions and waste. Most notable among these are volatile organic compounds (VOC's -mainly from solvents in glues and printing inks) and glue.

The solvents are implicated in city smogs and glues (from bindings and stickers) can make recycling difficult. Some inks and some printing methods make recycling paper easier. Considerable progress is being made to develop alternative inks and glues that overcome some of the environmental problems.

### What the study finds

- Alternative inks (such as those based on water and/or those that use vegetable oils) tend to be harder to remove and make the de-inking process more difficult and/or costly. However, their use cuts VOC emissions during printing.
- Glue, whether water-based or not, complicates re-pulping. Water-based glues are, on balance, better for the environment and should be encouraged.

# Disposal

## Paper and greenhouse gases

It is suspected that the world is getting warmer because an increase in the concentration of certain gases, such as carbon dioxide (CO2) and methane, is trapping more of the sun's heat in the atmosphere.

Very small changes in the average temperature of the planet could lead to shifts in global climate. This could alter local water patterns and cause damaging droughts, floods and storms.

Concern over the possible consequences of global warming has led to the signing by most countries of a Framework Convention on Climate Change. Industrialised nations aim to stabilise their emissions of greenhouse gases at 1990 levels, by the year 2000.

The paper and pulp industry differs from others because its activities both emit and remove carbon dioxide, the main greenhouse gas. Trees, the main raw material used to make paper, take up carbon dioxide (and emit oxygen) in the growing process. Paper, on the other hand, emits methane (25-times more potent than CO2) when it rots in landfills and CO2 when it is converted to compost or burned.

Some have argued that growing many trees in plantations will help to reduce the concentration of CO2 in the atmosphere and thereby help avoid the consequences of global warming.

The total impact of the paper industry on the concentration of greenhouse gases (emissions minus the removal of carbon by growing trees) is important when considering ways in which the global industry could become more sustainable.

### What the study finds

- Paper production, use and disposal contributes to a net increase in greenhouse gases.
- The pulp and paper industry is a major emitter of greenhouse gases, although it is ranked a distant third when compared with the steel industry (second) and the chemicals industry (first).
- It is impractical to suggest that enough trees could be planted to remove all the carbon dioxide emitted to the atmosphere. The area now covered by every kind of plantation would have to more than double to remove current emissions of carbon dioxide.
- The paper and pulp industry will have to make changes at virtually every stage in the paper cycle if it tends to balance its take up of carbon with its emissions of greenhouse gases.
- Improvements in energy efficiency and reduced disposal of paper in landfills will significantly help to reduce emissions of greenhouse gases.

## What should be done with waste paper?

Increased environmental awareness has led to a greater demand for recycled papers and pressure to recycle paper after it has been used by the public (post-consumer waste) rather than dump it in landfills.

Another option is to burn the paper in incinerators and use the heat it generates to provide hot water for district heating and/or steam to make electricity. This is known as incineration with energy recovery, a practice encouraged by some governments.

Incineration is generally disliked by the public because of fears about emissions and the belief that paper should be re-used if possible, rather than destroyed.

### *Recycling*

Waste paper can be re-pulped and re-used several times but on each cycle 15-20% of the fibres become to small to use. The paper industry has always recycled its own scrap and that collected from paper converters, such as packaging manufacturers and printers.

Used paper and cardboard is collected, sorted and then mixed with water to turn it into pulp. Lower grade pulp is used to make paper board for cardboard boxes. The impurities and inks are removed from some of the higher grades to make recycled paper for writing and printing.

Recycled fibre is sometimes mixed with virgin pulps to make paper products that contain a percentage of recycled stock.

Recycling processes use less energy than virgin pulp based ones but generally rely more on fossil fuels with the result that greenhouse gas emissions can increase with higher levels of recycling.

### *Incineration*

Paper is burnt in municipal incinerators, usually mixed with other domestic waste. If modern technology is used the emissions are considered to be safe. The paper also helps the incineration process because it burns easily and reduces the need for supplementary fuel.

Building new incinerators is often difficult because communities generally don't want them. Incinerators also produce solid waste which is landfilled.

## What the study finds

- Recycling has environmental advantages over landfill but the comparison with incineration is less clearcut. Much depends on the transport requirements for waste paper, the nature of the manufacturing process and the extent to which fossil fuels are used to generate the electricity needed for production.
- Collecting and sorting waste paper often costs more than the combined value of the sale of the collected paper and the savings made from avoiding the cost of the disposal methods (e.g. landfill). The highly volatile price of waste paper is a complicating factor. Schemes which seem financially attractive at one price can be seriously undermined when prices decline.
- Recycling usually makes financial sense where waste paper is generated in large quantities and/or is clean. For mixed, dirty waste, incineration with energy recovery or composting can be more cost effective.
- Recycling and incineration do not necessarily conflict; the remaining waste can still burn effectively in incinerators.
- Greater public acceptance of waste-to-energy plants has to be encouraged with the help of governments. But the industry must accept that public concerns about incinerators are rational. Ultimately, the

priority should be to reduce the amount of waste through reduction in consumption or greater efficiency in the way paper is used.

- Recycling should be seen as part of a broader waste management plan that includes other options for certain types of paper as well as waste reduction.
- Making waste disposal more expensive, for example through taxes, creates incentives for both recycling of paper and waste reduction. Simply promoting recycling has no effect on volumes consumed.
- Governments should introduce "pay as you throw" schemes -charging for volume of household waste collected- and place a surcharge on disposal (e.g. on landfill to reflect the environmental costs of disposal).
- The paper industry and governments should demonstrate commitment to the idea of product stewardship by promoting the concept of producer responsibility and putting forward proposals for recovering paper after consumption. This should address both resource recovery and waste reduction at source.

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# Recommendations

The study makes many specific recommendations on what needs to be done by the paper industry, government, international agencies, consumers, non-governmental organisations (NGO's) and investors to move towards a sustainable paper cycle. Some of these are included in the study findings on previous pages. Here is a summary of the more general recommendations not covered elsewhere.

## Paper Industry

The paper and pulp industry should:

- Be more open and accountable to the public. For example, it should consider introducing the equivalent of the chemicals industry's initiative called Responsible Care. This would include sector-wide monitoring of performance and provide guidance to companies, which will build on management standards. The whole life cycle of paper products should be considered.
- Consider creating an international forum for paper and sustainable development, to act as a clearing house for research and policy for the world-wide industry. The forum would ensure the co-ordination of much-needed research in areas such as: chronic toxicity of non-chlorinated compounds; worker health in pulp, paper and de-inking processes, especially in non-cancer related effects, and development of cost effective clean production for small mills and the non-wood fibre sector.
- Help the worst performers improve.
- Demonstrate its support for global sustainable development by organising a Paper Aid fund, modelled on the UK water industry's Water Aid charity. A small levy could be charged on paper use in the North, not to discourage consumption but to raise revenue for primary education in the South.

## Governments

A policy framework covering all forest goods and services is needed to support forest stewardship and stakeholder participation. Some governments have introduced mechanisms that address these requirements. Others should follow their example and consider:

- Establishing a national Forest Stakeholders' Forum and an agenda for a dialogue on policy. This would provide the means to move forward on the basis of partnership with an agenda that focuses on stakeholders' main concerns.
- Designating a national Permanent Forest Estate that sets out the kinds of forests that are needed to meet demands for forest goods and services and match them with the forests and plantable land available.

## International agencies

These agencies have an important role to play in the areas of information, research, arbitration and finance.

### Information.

Agencies should help the development of national policies by providing the necessary information, for example on forestry management, principles and criteria. Furthermore, there is a need to encourage inter-governmental efforts to introduce sustainable forestry and a fund to help those stakeholders with limited means to participate in discussions.

### Research

Agencies should consider providing financial support for research and development. Possible subject areas are: forest ecosystem behaviour, especially for complex multiple-use production systems; clean production; and models of effective partnership with local groups.

### Arbitration

Agencies should consider setting up an independent arbitration panel to resolve conflict. It would be available to governments and other potential partners of the industry.

### Finance

Agencies should extend existing initiatives to offer global payments or other incentives to countries that invest in producing global benefits such as carbon off-sets and biodiversity conservation. Agencies should ensure that no financial support is given for the "mining" of forests.

## Consumers

- Householders should demand reliable information on products, both environmental and social. This could involve independent verification or greater pressure on manufacturers to substantiate their claims.
- Corporate buyers should integrate paper consumption levels and specifications into environmental management policies and systems.

### NGOs

Environmental, consumer and other non-governmental groups (NGOs) have a key role to play in bringing pressure to bear on the paper and pulp industry to provide more information, challenging its accuracy and urging the industry to improve its methods and expose bad practice.

Specifically, NGOs should:

- Broaden the focus of their challenges to the paper industry to include social and development issues as well as environmental concerns.
- Continue to expose bad practices but also acknowledge the good performers and improvements made in the sector.
- Be constructive in their criticism of the industry and base comments on detailed knowledge. Dialogue with industry is essential.

### Investors

Stock markets should insist on more environmental information as a way of identifying companies with low environmental and social risk.

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# The independence of the findings

It was essential that this study should contain the best available evidence. Credibility could only be provided by those with no vested interest in the conclusions.

This is why the London-based International Institute for Environment and Development (IIED), founded in 1971, was commissioned by the World Business Council for Sustainable Development to do the study.

IIED is an independent, non-profit organisation which promotes sustainable patterns of world development. IIED advises policy makers, undertakes research, training, public information activities and consensus-building. IIED is composed of 50 specialists in the natural and social sciences, led by Richard Sandbrook.

The study is based on input from a widespread consultation process to provide a practical perspective on the dilemmas and opportunities facing the industry. The process has been extensive, with regional workshops, specialist meetings, an advisory group, an industry task force, and numerous corresponding partners. The study draws also on the findings of 20 sub-studies.

An international group of senior advisers reviewed the research to ensure its independence.

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