



ASSOCIATION OF AMERICAN PUBLISHERS, INC.

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**Association of American Publishers**

**Handbook on Book Paper**  
**and the Environment**

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## **Table of Contents**

I.	Introduction.....	5
II.	Recycling .....	6
	Recovered Fiber.....	6
	What is <i>Not</i> Recovered Fiber.....	7
	De-inking.....	7
	De-inking Sludge and Disposal.....	7
	Unrecyclable and Unrecovered Paper.....	7
	Supply and Demand.....	8
	Single Stream Collection.....	8
	Benefits and Challenges of Single Stream Collection.....	8
	Benefits of Using Recycled Paper.....	8
	Some Concerns about Using High Recycled Content Products.....	9
	Managing Virgin Wood Fiber Use.....	9
	Up-cycling Paper.....	9
	Down-cycling Paper.....	10
	Environmental and Cost Issues of Recycled Content Paper.....	10
	National Association of State Textbook Administrators (NASTA)	
	Specifications and Recycled Paper.....	10
III.	Forestry .....	11
	Forestry Defined.....	11
	Types of Forests.....	12
	Sustainable Forest Management.....	12
	Deforestation, Harvesting, and Illegal Logging.....	12
	Advantages to Using Wood Products.....	13
	Amount of Harvested Wood Used in Paper Production.....	13
	Type of Wood Used in Making Paper.....	13
	Forest Certification.....	14
	Major Forest Certification Programs.....	14
	Canadian Standards Association International (CSA).....	14
	Forest Stewardship Council (FSC).....	15
	Sustainable Forestry Initiative (SFI).....	16

Programme for the Endorsement of Forest Certification (PEFC).....	17
American Tree Farm Systems (ATFS).....	17
Master Logger Programs (MLPs).....	18
Mill Certification Versus Certified Paper.....	18
Chain of Custody.....	20
Controlled Wood.....	21
Old Growth Forests.....	21
Where Old Growth Forests are Being Logged.....	21
Concerns about Canadian Forests.....	21
Boreal Forests in Canada.....	22
Protections for Canada’s Forests.....	23
Protections for Forests in the United States.....	24
Concerns about Forest Plantations.....	24
How Forests are Harvested.....	25
Concerns about Clearcutting.....	26
How Forests are Regenerated after Harvesting.....	26
Genetically Modified (GM) Trees.....	27
Some Concerns about GM Trees.....	27
IV. Recovered Paper: Asia and North American Experience.....	28
A. Printing in China.....	28
B. Worldwide Practices, Including Economic Impact in China.....	29
1. De-inking.....	32
2. Recovered Paper Consumption.....	32
C. Indonesia.....	33
V. Green Production Efforts.....	34
Water.....	34
Air.....	34
Energy.....	34
Chemicals.....	35
Wood.....	35
VI. Metafore’s Environmental Paper Assessment Tool®.....	35
VII. Reducing Consumption and Waste.....	37
VIII. Frequently Asked Questions.....	38
Common Questions about Environmental Issues Regarding Paper.....	38

	Questions to Ask Suppliers to Assess Your Publishing Program.....	46
	Common Questions Smaller Publishers Can Ask Their Printers.....	47
IX.	Reference Organizations.....	47
	Environmental Nongovernment Organizations.....	47
	Certification/Standards Bodies.....	48
	Associations/Industry Consortia.....	48
	Retailers: Paper Mills and Printers.....	49
	Government.....	49
	Other Nonprofits.....	50
X.	Glossary.....	50

## **I. The Association of American Publishers Paper Issues Working Group**

The Association of American Publishers (AAP) Paper Issues Working Group (PIWOG) provides its members with a forum to obtain concise and accurate information on issues pertaining to the environmental aspects of the production of paper used in books. It convenes regularly with various constituents who have interests in book production and the environment. The AAP PIWOG does not make specific recommendations to members; rather, it compiles information that can be used independently by AAP member companies to make their own decisions regarding their paper supply.

The PIWOG represents a broad cross-section of the AAP membership. PIWOG members include: American Chemical Society, Cambridge University Press, CQ Press, Hachette Book Group USA, Harcourt, HarperCollins USA, Harvest House Publishers, John Wiley & Sons, Keene Publishing, Lantern Books, Macmillan, McGraw-Hill, Pearson, Random House, Scholastic, Simon & Schuster and W.W. Norton. The AAP PIWOG also seeks input from a variety of external sources. Some of these sources include paper mills, in regard to their current capabilities and future plans in the areas of sustainable forest management; carbon footprints; recycled paper production; and certification organizations and environmental groups, in regard to a better understanding of the issues involved and various ways of addressing them.

This paper addresses the following subjects: recycling, including pre- and postconsumer recycled fiber distinctions; carbon footprints; forestry; certification standards; paper recycling methods and economics; chain of custody; worldwide practices and economic impacts; green production efforts; reducing consumption and waste; frequently asked questions; and relevant contact information.

The AAP is the national trade association of the U.S. book publishing industry. AAP's more than 300 members include most of the major commercial publishers in the United States, as well as smaller and nonprofit publishers, university presses, and scholarly societies. AAP members publish hardcover and paperback books in every field; educational materials for the elementary, secondary, postsecondary, and professional markets; scholarly journals; computer software; and electronic products and services. The protection of intellectual property rights in all media, the defense of the

freedom to read and the freedom to publish at home and abroad, and the promotion of reading and literacy are among the AAP's highest priorities.

## **II. Recycling**

### **Recovered Fiber**

Recovered waste includes both preconsumer and postconsumer fiber. ***Preconsumer fiber*** includes dry paper and paperboard manufacturing waste generated after completion of the papermaking process, such as envelope cuttings; bindery trimmings; other paper and paperboard waste resulting from printing, cutting, forming, and other converting operations; bag, box, and carton manufacturing waste; as well as mill wrappers, and rejected, unused stock. Repulped finished paper and paperboard inventories of mills, merchants, wholesalers, dealers, printers, converters, and others, as well as unsold magazines and books returned to the publishers by newsstands and bookstores, are also considered preconsumer waste.

***Postconsumer waste fiber (PCW)*** includes paper, paperboard, and fibrous wastes from retail stores, office buildings, homes, and so forth, after they have passed through their intended consumer end use. This material includes used corrugated boxes, old newspapers, mixed wastepaper, tabulating cards, and used cordage.

Per the U.S. Environmental Protection Agency (EPA),<sup>1</sup> PCW currently *does not* include fiber derived from printers' overruns, bookstore returns, converters' scrap, or overissue publications.

Because of the unique returns policy tradition in the publishing industry, members of this community and the magazine industry have requested that the EPA and the Federal Trade Commission recognize obsolete book and magazine inventory and returns as PCW, owing to their conservation value. These sources of recovered fiber have often been shipped to their points of sale, need to be diverted from landfills, and must be de-inked and processed in the same manner as PCW. Reusing them has many of the same environmental benefits as using other materials currently defined as PCW.

### **What is *Not* Recovered Fiber**

*Mill broke*, which is any paper waste generated in a paper mill before completion of the papermaking process, is not considered recovered fiber. It is usually returned directly to the pulping process.

### **De-inking**

De-inking is the removal of printing ink and other impurities when wastepaper is repulped to be made into new paper. It should be noted that it is easier and more effective to remove conventional offset printing inks than to remove the pigments that are used by laser printers and copiers, as these pigments are fused to the paper fibers.

### **De-inking Sludge and Disposal**

De-inking sludge is composed of the inks, noncellulose materials from the fiber (including coating, adhesives, dyes, and fillers), and trash such as paper clips, staples, and baling wires that are left over at the end of the de-inking process. In the early 1990s, sludge was sent to special landfill sites under strict guidelines, used as biomass<sup>2</sup> fuel, or used as landspread. (Landspreading is recovering waste by spreading it onto land principally for agricultural benefit or ecological improvement. Sewage sludge and wastes from, for example, the food, brewing, and paper pulp industries, can be used for this purpose; see [http://www.ami.ac.uk/courses/topics/0100\\_gls/dfxh0152.htm](http://www.ami.ac.uk/courses/topics/0100_gls/dfxh0152.htm).)

Today, although a portion is still landfilled, de-inking sludge is used in a variety of innovative ways, including roofing tiles, shingles, roadbed filler, and glass aggregates. One company, ENCAP, combines the sludge with grass seed. The seed is planted with a cover material, which is then used to reseed burnt forests by dropping it from planes, thereby minimizing erosion. In Europe, new technology is emerging to allow the use of sludge in cement.

### **Unrecyclable and Unrecovered Paper**

Approximately 15%<sup>3</sup> of paper and paperboard products are either uncollectible or not fit for recycling—wallpaper, cigarette papers, and so on. Sanitary products and other paper that is soiled or contaminated cannot be recycled. A large amount of paper goes unrecovered when saved by the consumer in the form of printed books or documents.

## **Supply and Demand**

The recovery of all grades of paper, particularly printing and writing paper, has not kept up with demand. Asian paper manufacturers are driving the increase in demand for recovered paper in general. China is the largest foreign market for U.S. recovered fiber, buying up vast quantities of recovered fiber regardless of quality. Wastepaper is a commodity with a limited supply, and an increase in demand often results in higher prices.

## **Single Stream Collection**

A single stream collection program is defined as the collection of various types of recyclables (mixed paper, cardboard, plastic, glass, aluminum) in a single bin or cart.

## **Benefits and Challenges of Single Stream Collection**

The greatest benefit of single stream collection is that it reaches more areas of low population density and increases the amount of waste that can be recovered. One of the biggest challenges is that it leads to more contaminated wastepaper and can have a negative impact on the quality of recovered fiber collected and sold to paper mills. It also requires more sorting and processing at the material recovery facility, which can add costs to the collection process.

## **Benefits of Using Recycled Paper**

- Recycling keeps usable fiber out of the landfills.
- Recycled fiber can replace a percentage of virgin fiber, resulting in the harvest of fewer trees, thereby protecting the forest and biodiversity.
- Recycling reduces the need for landfill space and new incineration plants, resulting in fewer methane and other greenhouse gas emissions.
- Using 30% recycled uncoated paper in place of 100% virgin-fiber paper reduces the ecological footprint of a ton of paper by five trees, 324 pounds of solid waste, 3,059 gallons of water, 2.1 pounds of suspended particles in the water, 904 pounds of air emissions, and 2,472 feet<sup>3</sup> of natural gas.<sup>4</sup>
- Using 100% recycled uncoated paper in place of virgin-fiber paper reduces the ecological footprint of a ton of paper by seventeen trees, 1,080 pounds of solid waste, 10,196 gallons of water, 6.8 pounds of suspended particles in the water,

2,372 pounds of air emissions, and 2,472 feet of natural gas per ton of paper used.<sup>5</sup>

- Recycling reduces dependence on tree farming and plantations.

### **Some Concerns about Using High Recycled Content Products**

- Today recycled products may cost more.
- Fibers are weakened and damaged by the recycling process, making it difficult and in some cases impossible to produce the low basis weight, bulky (“thick”) paper used in many mass market and trade books. (Paper example: 33# 5 pt. caliper uncoated groundwood.)
- Higher percentages of recycled fiber can impact productivity in high-speed printing and converting operations.
- Currently, the supply of recovered fiber available for printing and writing grades has not kept up with demand.
- Using recycled fiber can also have an effect on the brightness and general appearance of the paper, which may require additional bleaching or other steps to enhance quality

### **Managing Virgin Wood Fiber Use**

Virgin wood fiber is presently the starting point for most paper produced on a medium-to-large scale. It is likely to remain this way for the foreseeable future. Recycled fiber cannot fully replace virgin wood fiber sources because a fiber can only be recycled a finite number of times.

### **Up-cycling Paper**

Up-cycling is the concept of improving material quality by recycling waste materials into more valuable products. For example, de-inked newsprint can be up-cycled to lightweight coated groundwood paper for magazines. However, given current technology, recovered groundwood fiber, which contains lignin, cannot be up-cycled to freesheet book-quality paper. De-inked newsprint can also be (and presently is) up-cycled into higher brightness groundwood grades that are used in many trade books and other products, but this requires extra chemical bleaching, adding cost and other concerns. (Certain grades of groundwood paper are used for some books, but freesheet book paper is of a higher quality. Please see the Glossary for more information.)

### **Down-cycling Paper**

Down-cycling is the recycling of material into a material of lesser quality. For example, down-cycling to darker color products (like hanging folders or corrugated boxes) produces 20% higher yield and does not require bleaching. Parity or up-cycling of fibers wastes an additional 400 pounds of fiber per ton to make high-quality recycled paper.<sup>6</sup>

### **Environmental and Cost Issues of Recycled Content Paper**

- Recycled content paper requires collection of used paper from a dispersed resource base. It may take more energy to get recovered fiber to a mill than to get virgin fiber to a mill from a local forest.
- Although recycled paper uses less energy to manufacture than virgin fiber paper, it mainly uses purchased electricity and fossil fuels. The manufacture of virgin fiber paper may also use biomass energy or biorenewable energy such as unused parts of the tree.
- More recovered fiber is being shipped overseas, which has raised prices for all grades of recovered paper in the United States in recent years. (See section IV, Recovered Paper: Asia and the North American Experience, for a more thorough discussion.)
- If a paper mill is integrated with its own pulp mills and forestlands, using recycled fiber not only means the purchasing of recycled pulp, but also that production flows using virgin fiber will need to be interrupted for recycled fiber to be introduced.
- Reports from mills indicate bales of recovered paper can contain up to 20% contaminants. Buyers purchase recovered fiber based on weight, so contamination effectively increases the cost of purchasing recovered fiber.
- Contaminated bales present a number of technical consequences for mills, which may increase costs and/or decrease profits.

### **National Association of State Textbook Administrators (NASTA) Specifications and Recycled Paper**

Paper used in a textbook (K–12 curriculum) must meet the standards and tests listed in *Manufacturing Standards and Specifications for Textbooks* (MSST). To date, whether

the paper is manufactured from recycled fibers is immaterial, as long as it meets these standards.

The MSST is developed by ACTS (Advisory Commission on Textbook Specifications), an industry group consisting of the AAP, the Book Manufacturing Institute (BMI), and NASTA. Requests for clarification of the standards should be directed to the Technical Director:

Robert (Woody) Duncan  
P.O. Box 1993 (or 627 North Dawson St.)  
Thomasville, GA 31792  
PH 229-228-9011; FX: 229-228-9093; E-mail: [actstd@aol.com](mailto:actstd@aol.com)

Orders for the MSST publication should be directed to:

ACTS  
Two Armand Beach Drive, Suite 1B  
Palm Coast, FL, 33217  
P: (386) 986-4552

#### Endnotes

1. <http://www.epa.gov>
2. *Biomass*, in the energy production industry, refers to living and recently living biological material, which can be used as fuel or for industrial production. Most commonly, *biomass* refers to plant matter grown for use as biofuel, but also includes plant or animal matter used for production of fibers, chemicals, or heat. Biomass may also include biodegradable wastes that can be burned as fuel.
3. Metafore, The Fiber Cycle in Canada and the United States:  
[http://www.metafore.org/downloads/fiber\\_cycle\\_communications\\_deck.pdf](http://www.metafore.org/downloads/fiber_cycle_communications_deck.pdf)
4. Cascades Fine Paper Group, Eco Calculator: <http://www.environmentalbychoice.com/calculator.php/>
5. Cascades Fine Paper Group, Eco Calculator: <http://www.environmentalbychoice.com/calculator.php/>
6. International Paper, Environmental Update, Hamilton Lake, New York, 8/22/06.

### **III. Forestry**

#### **Forest Defined**

A forest is a diverse ecosystem that is dominated by trees but also includes other plants as well as animals; it encompasses numerous renewable resources and is a source for employment. There are many differing legal and historical definitions that can apply to any stand of trees.<sup>1</sup> A forest offers habitat for plants and animals, prevents erosion, and may be home to indigenous people. It is not only a resource itself, but supports the areas around it with food, shelter, and jobs. While young, rapidly growing forests may remove carbon from the atmosphere at a higher rate than older forests, older forests

may hold more carbon overall—in the larger trees themselves and in the soil. However, older forests often contain more dead and decaying wood and more animal life, which releases carbon into the atmosphere, which might reduce their effectiveness as carbon sinks.

### **Types of Forests**

There are numerous ways to classify forests. One can look at where the forest is located, the dominant species of tree, or relative age of growth. The United Nations Environment Programme has twenty-six different classifications of forest,<sup>2</sup> some of which are listed below.

**Boreal forests** occupy the Subarctic zone and are generally coniferous. **Temperate deciduous forests** and **temperate coniferous forests** are in the temperate zones. As their names imply, they can be mainly deciduous or coniferous. **Tropical** and **subtropical forests** are generally what are considered “rainforests.” Forests can also be classified more specifically based on the dominant tree species present, resulting in numerous different forest types (e.g., Ponderosa pine/Douglas fir forest).

### **Sustainable Forest Management (SFM)**

Sustainable forest management is an approach to maintaining a forest that sets very broad social and environmental goals. A range of forestry institutions now practices a variety of methods for sustainable forest management. The Food and Agriculture Organization of the UN describes it as follows: “The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.”<sup>3</sup>

### **Deforestation, Harvesting, and Illegal Logging**

Deforestation entails removing trees from an area with no intention of replanting or allowing the area to return to forest.

Harvesting is the removal of trees from an area but with the intention of permitting it to return to forest either by natural means or by replanting.

Illegal logging is the removal of trees from an area, or the selling of those trees, in any way that violates local, state, or national laws.

### **Advantages to Using Wood Products**

If the trees are sourced responsibly, there are advantages to using products made from wood. Trees are a renewable resource. Most alternative materials come from nonrenewable resources, such as the petrochemicals used in making plastics and the ores used in making aluminum, iron, and other metals.

### **Amount of Harvested Wood Used in Paper Production**

Although statistics vary, somewhere from 17%<sup>4,5</sup> to 42%<sup>6</sup> of the 3.3 billion cubic meters of wood consumed worldwide each year is used to make all types of paper products. Over half of the wood harvested in the world is used for fuel, mostly for cooking and domestic heating. In the United States, approximately 23 million tons of paper are made for printing and writing. Of that, roughly 4% went into book paper in 2006.<sup>7</sup>

More and more wood is used for disposable products like paper, shipping pallets, and packing materials. Nearly one-fifth of all lumber in the United States is used to make shipping pallets, some of which are discarded after a few trips,<sup>8</sup> whereas others are repurposed.

### **Type of Wood Used in Making Paper**

Softwoods (mainly evergreen trees such as spruce, pine, larch, fir, and cedar) have long fibers that provide strength to paper. Hardwoods (deciduous trees such as birch and aspen) have shorter fibers that result in smooth, flexible paper. The industry was once based almost entirely on softwoods, and softwoods are still used to a large extent in

applications requiring strength, such as grocery bags and boxes. Hardwoods are often used when flexibility and/or a good printing surface are required. Printing and writing papers generally use a blend of hardwood and softwood. Eucalyptus, native only to Australia and New Zealand, has been successfully cultivated in other warm climates (e.g., South America, Spain, and Portugal) as raw material for high-quality pulp suitable for a wide range of papers.<sup>9</sup>

### **Forest Certification**

Forest certification is the process of evaluating forests or woodlands to determine if they are being managed according to an agreed set of standards focused on sustainable forest management (SFM).

### **Major Forest Certification Programs**

#### *Canadian Standards Association International (CSA)*

CSA is a not-for-profit membership-based association serving business, industry, government, and consumers in Canada and the global marketplace. CSA was chartered in 1919 and has developed over 2,000 standards for various industries. CSA Z809, the CSA's SFM standard, was developed in the mid-1990s with the involvement of forest producers, scientists, provincial and federal governments, and environmental, consumer, union, and aboriginal representatives. A new edition of the standard was released in 2003, again with the collaboration of diverse stakeholders. The current standard outlines requirements for managing Canada's forests to ensure their long-term viability, and addresses such issues as protected areas, biodiversity, and aboriginal rights, as well as soil and water protection and maintenance of forest ecosystems.

Because Canadian forests are primarily publicly owned, the CSA-SFM standard places great emphasis on public participation at all levels down to the local community in identifying forest values and developing management plans that address the environmental, social, and economic concerns of all stakeholders.

Certification to the CSA-SFM standard requires independent, third-party audits by an accredited organization, with mandatory annual reviews and a full audit every three years.

Web site for more information:

[http://www.certificationcanada.org/english/csa/program\\_overview.php](http://www.certificationcanada.org/english/csa/program_overview.php).

### *Forest Stewardship Council (FSC)*

FSC is an international network that endorses managing the world's forests in a way that is suitable for the environment, that benefits society, and that is feasible for the economy. It originated in the early 1990s with environmental groups concerned with tropical deforestation and unsustainable logging practices globally.

FSC standards are based on a set of principles and criteria for forest management that are applicable to all FSC-certified forests throughout the world. The principles and criteria address legal issues, indigenous rights, labor rights, and environmental impacts surrounding forest management. These principles and criteria guide the creation of specific national and regional standards that are developed through a collaborative, multi-stakeholder process involving local and indigenous communities; businesses; environmental organizations; local, state, provincial, and federal governments; and academic and scientific participants. There are currently nine regional standards for forests in the United States and four for Canada.

In addition to protecting soil quality, air quality, and biodiversity, as well as promoting sustainable forest management, FSC standards are especially concerned with protecting traditional and indigenous social values and rights, and with preventing conversion of natural forests to forest plantations and nonforest uses. FSC certification requires independent, third-party audits by FSC-accredited organizations.

In 2005, FSC introduced its Controlled Wood Standard, a wood-sourcing requirement that controls which wood sources that are not FSC certified can be included in FSC-labeled products. The standard is to be used in conjunction with a global risk registry enabling wood buyers to identify areas determined by FSC to be marked by destructive and illegal logging and social conflict.

Web sites for more information:

<http://www.fsc.org/en/>

<http://www.fscus.org/>

<http://www.fscscanada.org/>

*Sustainable Forestry Initiative (SFI)*

The SFI program is a system of principles, objectives, and performance measures developed by professional foresters, conservationists, and scientists, among others, that combines the perpetual growing and harvesting of trees with the long-term protection of wildlife, plants, soil, and water quality. The SFI Standard spells out the requirements of compliance with the program. The SFI Standard is based on nine principles that address economic, environmental, cultural, and legal issues, in addition to a commitment to continuously improve sustainable forest management.

The SFI program is the most broadly used certification in North America today. A single standard, it focuses on desired outcomes for forest management. It includes a procurement component that requires producers to promote best management practices among the independent landowners and loggers from whom they purchase wood, and to do risk assessment and mitigation for fiber sourced outside North America, ensuring that it was legally harvested and comes from countries with effective laws protecting workers' health and rights as well as indigenous rights.

SFI certification requires rigorous, on-the-ground assessments by nationally accredited third-party auditors. Chain of custody certification is optional for general mill certification but is required to obtain dual certification from the Programme for the Endorsement of Forest Certification or to use SFI on-product labels.

SFI was originally created by the American Forest and Paper Association (AF&PA) in the 1990s, and as of January 2007 all SFI program elements are being directed by a new, fully independent nonprofit organization, the Sustainable Forestry Initiative, Inc. The new SFI is governed by an independent, multi-stakeholder board of directors comprised of 15 members, two-thirds of whom are from outside interest groups such as environmental and conservation groups.

Web site for more information: <http://www.sfiprogram.org/>

*Programme for the Endorsement of Forest Certification (PEFC)*

PEFC is an international forest certification recognition organization that promotes regional and national certification systems that meet PEFC's criteria for sustainable forest management. Currently, the program encompasses over 196 million hectares worldwide, making it the world's largest certification scheme.

Certification systems are assessed for endorsement by PEFC in a rigorous process that involves public consultation and the use of independent consultants. In addition to having criteria and standards for sustainable forest management, PEFC-endorsed schemes must require independent, third-party audits of forests managed by the companies they certify as well as of the chain of custody systems used to track all fiber used by the companies.

There are thirty-three independent national forest certification systems in PEFC's membership, twenty-two of which have achieved PEFC endorsement to date. These include SFI and CSA. American Tree Farm Systems' application for PEFC endorsement is currently being reviewed. (*Note: FSC has from the outset been a worldwide standard and not a national system.*)

Web site for more information: <http://www.pefc.org/internet/html/>

*American Tree Farm Systems (ATFS)*

ATFS is the oldest forest certification system in the United States and is designed for the nonindustrial private landowners who own the majority of the working forest areas in the United States.

ATFS's current standards and guidelines for tree farm certification address contemporary benchmarks for sustainability. Minimum education and experience requirements have been established for certifying foresters and forest technicians, and ATFS has developed a national standardized training curriculum for its inspectors.

Certification in ATFS is voluntary and requires inspection by a qualified ATFS forest professional. Re-inspection is required every five years.

ATFS is mutually recognized by SFI, and is currently seeking the endorsement of PEFC.  
Web site for more information: <http://www.treefarmssystem.org/>

#### *Master Logger Programs (MLPs)*

MLPs promote safe and sustainable harvest and forest management practices among the many independent logging companies that provide much of the wood supply to United States paper mills and other producers of wood products. These programs vary from three-day courses that some states require of loggers supervising any harvest site to voluntary third-party certification programs (in Maine and Minnesota) that require documented harvest and forest management plans, extensive field audits, and adherence to specific practices that protect water and soil quality, forest ecosystems, and aesthetics. More information on various state MLPs can be found at the following Web sites:

Minnesota: <http://www.mlep.org/MMLC.htm>

Maine: <http://www.masterloggercertification.com/>

Pennsylvania: <http://www.sfiopa.org/training.htm>

Tennessee: <http://www.state.tn.us/agriculture/forestry/tdfceu.html>

Wisconsin: <http://www.wpla.org/master.html>

Florida: [http://www.floridaforest.org/master\\_logger.php](http://www.floridaforest.org/master_logger.php)

Maryland: <http://dnr.maryland.gov/forests/programs/mlprogram.html>

California: [http://www.calog.com/master\\_logger1.htm](http://www.calog.com/master_logger1.htm)

Ohio: <http://www.callb4ucut.com/default.aspx?id=3.0.4>

Atlantic Canada: <http://www.cwfcof.org/english/MasterLoggerPage.htm>

#### **Mill Certification versus Certified Paper**

Nearly all mills in North America have obtained certification of their operations under one or more of the three main standards described above: CSA, FSC, or SFI. This means that the forest management practices they use on land they own or manage meet the standards of the certification system, and that they have in place a procurement system that meets the criteria of the certifier for tracking fiber purchased from third parties and for assuring that it was legally harvested.

However, all paper produced by a certified mill is not necessarily certified. Each certification system has a variety of on-product labels that may be used to identify certified paper. Criteria for use of these labels focus on the percentages of certified and noncertified fiber used. CSA requires a minimum of 70% certified fiber for use of the on-product label. FSC uses a volume-credit system that allows a producer to sell as FSC-certified a proportion of its output of a specific product line that matches the average percentage of total fiber input that is FSC-certified. SFI allows producers to choose either a volume-credit system similar to FSC's, or to use a label for 100% of the output of a product that shows the average percentage of SFI-certified fiber used to manufacture that product. All three systems also have a 100% certified fiber label that may be used on product lines where 100% of the fiber input comes from certified sources. All three systems require the mills to have a third-party-certified chain of custody system to prove both the certified and noncertified sources of all their fiber.

FSC and SFI also have labels for paper produced from recycled or recovered fiber. Under the FSC system, only postconsumer recycled fiber may be counted, and the volume-credit system described above for FSC-certified paper must be used. Under SFI, recovered fiber from various sources meeting criteria outlined in the SFI standard may be used, and the product must be labeled with the average percentage of recovered fiber used. Neither the FSC-recycled nor the SFI-recovered fiber labels mean that the recovered fiber input used to make the labeled product was originally from FSC- or SFI-certified forests, as that cannot be ascertained.

All three systems require that the noncertified portion of the fiber input be proven legally harvested and from "noncontroversial" sources. FSC has additional requirements for the noncertified portion of any FSC-labeled product. These are detailed in the Controlled Wood section below.

*For more information on SFI, CSA, FSC, ATFS, and PEFC, see the following Web sites, which contain useful comparisons of the certification systems discussed.*

<http://www.metafore.org>. Metafore's Web site, which includes a Forest Certification Resource Center, with a 2007 update of a matrix that compares SFI, CSA, FSC, PEFC, and ATFS. To go directly to the matrix:

<http://www.certifiedwoodsearch.org/matrix/matrix.aspx>

[http://www.fpac.ca/en/members/Committees\\_Task\\_Forces/Certification/FPACertificationEN-less\\_resolution.pdf](http://www.fpac.ca/en/members/Committees_Task_Forces/Certification/FPACertificationEN-less_resolution.pdf) is a twelve-page document updated in January 2006 that summarizes the similarities among CSA, FSC, and SFI. It includes a matrix summarizing each system's approach to the main concerns of SFM.

<http://www.certifiedwoodsearch.org> is Metafore's Web site on forest certification—includes a 2005 chart comparing SFI, CSA, FSC, PEFC, and ATFS.

[http://forestrycertification.info/phpprograms/Content/story\\_template.php3?txtid=background](http://forestrycertification.info/phpprograms/Content/story_template.php3?txtid=background) is a site that was developed by the Confederation of European Paper Industries (CEPI) following a wide-ranging review of existing studies to compare forest certification systems and extensive consultation with interested parties including customers, forest owners, the forest industry, environmental groups, and the representatives of forest certification schemes. The user can choose to see a matrix comparing key elements of many global certification schemes, such as forest certification standards, forest certification procedures, environmental claims, and chain of custody certification procedures. FSC, SFI, CSA, and ATFS are included, along with many other national schemes.

<http://www.gnn.gov.uk/Content/Detail.asp?ReleaseID=166605&NewsAreaID=2> contains a press release outlining United Kingdom government treatment of various forest certification systems.

### **Chain of Custody**

Chain of custody refers to documentation of the original sources of fiber used to produce a wood product. As used by forest certification systems, it requires tracking timber from the forest stand to the end product to ensure that fiber originates from a legal source and, in addition, from a source that meets the certification system's criteria for forest management. Such documentation can be complex for paper manufacturers, as most grades require a mix of different types of wood fiber. Mills must track wood from many different sources, such as woodlands they own, manage, and harvest; forests owned

and managed by independent owners and logged either by those owners or independent loggers; wood purchased from log brokers; and pulp purchased from other mills.

### **Controlled Wood**

Controlled wood is a term used by FSC to refer to the non-FSC-certified portion of the fiber in an FSC mixed-label product. Controlled wood must be documented by FSC's chain of custody process to be free of wood from "forest areas where traditional or civil rights are violated; forest areas where high conservation values are threatened by management activities; forests where genetically modified (GM) trees are planted; wood that has been harvested illegally or wood harvested from areas which have been converted from natural forest to plantations or nonforest uses."<sup>10</sup>

### **Old Growth Forests**

The term *old growth forest* does not have a standard definition, but it is usually used to refer to forests that in general have not been touched by human activity. Such forests are usually dominated by mature trees; however, they also incorporate multiple layers of vegetation that include a variety of species at different ages, as well as standing and fallen deadwood that serves as wildlife habitat and decay to provide fertile soil with a healthy mix of microorganisms. Although old growth forests may be home to endangered and protected species such as the spotted owl, biodiversity in an old growth forest may be higher or lower than in second growth forests, depending on specific characteristics of the forest. Because there is much controversy over the definition of old growth or ancient forests, other terms such as *endangered forests*, *high conservation value forests*, and *forests of exceptional value* have been adopted by many groups to describe forests where harvesting and development could result in damage to biodiversity, endangered species, the global environment, or important cultural or social values.

### **Where Old Growth Forests are Being Logged**

Old growth forests form part of the forest harvest in most regions of the world. There is little remaining in Europe and the United States, however, which is attributable to those regions' history of land use and development. The forests of Canada were not cut as extensively in the past and remain mostly old growth.

## Concerns about Canadian Forests

Canadian forests comprise some of the largest, relatively undisturbed forest areas in the northern hemisphere, and there is concern that development activities (such as mining, oil and gas development, agricultural clearing, logging, and housing) could fragment these large ecosystems, changing the forest structure and threatening wildlife habitats and biodiversity.

## Boreal Forests in Canada

According to the Forest Products Association of Canada's *10 Key Facts about Canada's Forests* "Canada is home to 30% of the world's boreal forest. The remainder is found in other large forestry nations such as Russia (50%) and Scandinavia—Finland, Sweden and Norway—(about 20%). A full 93% of Canada's forests are publicly owned and regulated. This provides assurance that companies operating on these lands are bound by comprehensive legislation and enforcement; 20-25 year forest management plans; rolling five-year development plans and site-specific annual operational plans; and forest-management plans subject to public review prior to approval. Canada retains more original forest area (91%<sup>1</sup>) than any other country in the world. "

"Only one quarter of Canada's forests are managed for commercial use. The vast majority of the *boreal* region (70%) remains unaccessed. Of this, only 0.5% (1 million hectares) is harvested annually. By law, all harvested areas must be promptly regenerated. Canada has more protected forest (over 40 million hectares<sup>2</sup>) than any other country—28 million hectares of these protected areas occur in the boreal region. Canada has the most third-party independently-certified forests—CSA, FSC, and SFI—in the world (134 million hectares<sup>3</sup> of *certified forest*—75% of which is in the boreal region). Canada is home to over 40% of the world's certified forests and its area of certified boreal forest is three times larger than any other country's area of total certified forest." <sup>11</sup>

Forests are a renewable resource when managed sustainably. Wood products are considered to sequester carbon, much as living forests do. When discarded, wood-based products are often biodegradable. Some believe that Canada's forests absorb more greenhouse gases than they emit. Per Werner Kurz of the Canadian Forest

Service, years of higher carbon emissions were due to large forest fires and mountain pine beetle.<sup>12</sup>

Clearcutting is one of several methods of harvesting forests that can be used under SFM practices. When clearcutting under SFM, regeneration is the ultimate goal. If regeneration does not occur, it is considered deforestation, which is not allowed under SFM. Deforestation usually happens when a formerly forested area is repurposed for agricultural or some other nonforest use after clearcutting.

Many Canadian forest-products companies actively engage with environmental and governmental organizations and with local communities, and have programs in place to protect habitat from species extinction, including partnerships to protect woodland caribou. In areas where habitat extinction in the boreal region has occurred, some have argued that this might be attributable to natural disturbances, such as fire, insects, and disease.

According to the United Nation's World's Forest Report issued in March 2007, Canada's rate of deforestation is zero<sup>13</sup> and has been for over two decades.

### **Protections for Canada's Forests**

The Canadian Boreal Initiative is an independent organization working with conservationists, First Nations, industry, and others to link science, policy, and conservation activities in Canada's boreal region. The initiative has developed a framework that aims to protect at least 50% of the region from all commercial development and to support sustainable communities and ecosystem-based management practices and stewardship activities in the remainder of the region. In September 2006, the Forest Products Association of Canada (FPAC) and the Canadian Boreal Initiative issued a joint statement on the need to develop protections for the Canadian boreal forest.<sup>14</sup>

Various indigenous, environmental, community, government, business, and other interested groups have collaborated to protect other sensitive forest areas in Canada and to develop regional resource management plans.

Beyond this, a number of provincial governments require that logging operations on state-owned lands achieve third-party certification, and most working forests in Canada are now third-party certified by CSA, FSC, or SFI. All members of FPAC are required to obtain CSA, SFI, or FSC certification of all forests they manage.

### **Protections for Forests in the United States**

Five hundred million acres of U.S. forests are deemed productive and open to economic activity. About 7%, or 52 million acres, of forestland is managed by public agencies as parks and wilderness areas and is not to be used for timber.<sup>15</sup>

Many states require that all state-owned forests become third-party certified and are encouraging both private landowners and independent logging companies to obtain third-party certification.

All members of the AF&PA are required to obtain SFI certification.

### **Concerns about Forest Plantations**

A forest plantation is an area that has been planted with a single, fast-growing species of trees and is managed to produce multiple crops of trees. To preserve biodiversity, areas of natural forest may be maintained near a plantation. Plantations may be viewed as a way to relieve pressure on natural forests caused by the increasing demand for paper and other wood products. However, where they replace natural forests, they can constitute a threat to biodiversity and the survival of local cultural traditions. They also often result in greater use of pesticides to combat insect and fungal threats that can spread rapidly in a single-species stand.

Beyond the problem of replacing a biodiverse forest with a monoculture, plantations often use species that would not naturally occur in the region. These may be hybrids and are generally species that are well suited to industrial applications. Pine, spruce, and eucalyptus are often used in plantations far beyond their natural range because of their fast growth rates and tolerance of poor or degraded soils.

Plantations are always young forests in ecological terms. Because of this, they do not support the same types of wildlife, undergrowth, and soil development as naturally

occurring old-growth or even second-growth forests. One element that is conspicuously missing is decaying deadwood, which is a crucial part of a natural forest ecosystem and is necessary for healthy soil.

In many areas of the world—particularly in Asia and South America—large areas of natural forests are being replaced at a rapid rate by high-yield, intensively managed, short-rotation plantations or fiber farms. The environmental and social impacts of this type of plantation have caused them to become controversial. They are often established with little regard for biodiversity or for the rights and traditional needs of local people.

FSC will not certify wood from plantations established after 1994. Their standards for plantations established before 1994 emphasize the use of native species, species diversity, promotion of long-term forest health, and reduction in the use of chemical fertilizers and pesticides. SFI does not prohibit plantations, instead emphasizing reforestation and management methods that promote forest health and long-term ecological and economic sustainability. SFI requires that certificate holders provide a written rationale that assesses the environmental impact of any proposed reforestation that would change the species mix in a harvested area.

### **How Forests are Harvested**

The criteria to determine the harvesting method used are the type of tree harvested, soil, terrain, wildlife habitat, conditions required for starting the next forest, and costs. The three basic kinds of harvesting are as follows:

***Selective cutting*** is used to maintain a forest with trees of various ages. Usually it is only the largest trees plus any defective ones that are harvested every five to ten years. The forest stand, in general, will stay mixed in age and size of trees.

***Shelterwood cutting*** is used for species needing some shade to protect seedlings. In this form of harvesting, some trees are removed and the rest provide a seed source and sheltered environment for the new growth. Mature trees are harvested over time. The final result is a stand of trees similar in age, comparable to a clearcut that has regrown.

**Clearcutting** is the removal of every tree from a predetermined area in one operation. There are various ways in which this done: blocks, strips, or patches of different sizes.<sup>16</sup>

### **Concerns about Clearcutting**

Although a clearcut is always an eyesore before regrowth gets underway, and poor practices can cause soil and water degradation and loss of biodiversity, clearcutting can be the most silviculturally appropriate harvest method for certain types of forests. Clearcuts, like natural disturbances such as fires, windstorms, and floods, create natural openings in the forest canopy that shade-intolerant species such as Douglas fir, aspen, and some pines require to regenerate. By concentrating the harvest in a smaller area, a clearcut can reduce road building and harvesting disturbances in a broader area, minimizing the impact to the larger surrounding forest.

Good management of clearcuts includes proper road building to minimize erosion; protection of buffer zones along streams; leaving blocks of uncut "reserve" trees to minimize the aesthetic impact; and leaving cavity or den trees, as well as standing snags and residual patches for wildlife; and leaving organic matter such as "slash piles" of unusable material on-site to decay and fertilize the soil. Retaining large tracts and connecting corridors of intact forest around clearcuts is essential to protect wildlife and preserve biodiversity.

Regulations for clearcutting are quite strict in some U.S. states, all Canadian provinces, and under most programs for forest certification. Both SFI and FSC standards place limits on clearcutting.

### **How Forests are Regenerated after Harvesting**

Some species regenerate naturally after harvesting, especially when selective or shelterwood harvesting has been used. Some species regenerate from seed trees, seeds and cones, or stumps and roots left after clearcutting. Other species require direct seeding or planting of seedlings. Seedlings are usually grown from seed gathered from high-quality trees in the same region where the seedlings are to be planted. Thinning and the use of pesticides and fertilizers may be required as the trees grow. Use of chemicals is allowed under both FSC and SFI standards, but FSC standards are more

restrictive, and both standards encourage use of nonchemical methods where possible. Chemical use may also be government regulated.

### **Genetically Modified (GM) Trees**

A GM tree is one that has been modified through the reorganization of its genes and/or the introduction or subtraction of genes. Although research on GM trees is ongoing, they are not being commercially grown or harvested in the United States today.

### **Some Concerns about GM Trees**

There are scientists who argue that genetic modification is simply a faster way to achieve the benefits of conventional hybridization methods. Some goals of GM research are to develop trees that are faster growing, are disease resistant, are better adapted to certain environments, produce higher-quality wood, or can remove soil pollutants. Critics of genetic engineering contend that it is impossible to predict how forest ecosystems might be affected in the long term, because trees have such long lives. Although GM trees are supposed to be sterile, there is concern that seeds drifting into neighboring forests could still hybridize with other species and alter the native ecosystem. It is also possible that faster-growing GM trees could absorb more water and soil nutrients, to the detriment of other organisms and natural balance. Furthermore, GM plantations—like other plantations—would limit biodiversity.

The FSC certification system prohibits the use of GM trees. SFI allows it, but only when the trees comply with “sound scientific methods,” are legal in the United States, and comply with “other internationally applicable protocols.”<sup>18</sup>

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## IV. Recovered Paper: Asia and the North American Experience

*Throughout its work researching information useful to publishers regarding environmental policies and paper, PIWOG spoke to experts on all aspects of the larger paper, printing, and book industry worldwide, including the areas of paper recovery. The following is a summary of a talk given to PIWOG in October 2006 by David Clapp, Senior Economist for RISI. <http://www.risiinfo.com>*

### A. Printing in China

The statements that follow primarily focus on China because a great deal of offshore printing is located in China. It is not meant to exclude other Asia–Pacific countries. Significant printing operations focusing on offshore business can be found in Korea, Malaysia, Thailand, Singapore, and other countries. The brief strategies suggested here for procuring paper in China apply equally as well to other countries in the region.

China is a large and rapidly growing consumer of recycled paper products, with much U.S. recycled office and other papers being absorbed by the Chinese market. Although this offers an enormous market for U.S. recycling companies, the majority of such

recyclables actually go to producing tissues, cardboard, and other nonbook products, and is of limited use for publishers, which need a higher grade of paper on which to print.

Publishers considering manufacturing a book in China have a number of options to consider with regard to the purchasing of paper. Initially, a decision must be made whether to purchase paper directly or through a third party. In many cases, the scale of printing in China will be of relatively small size and purchasing the paper through a third party is the most appropriate choice. Publishers purchasing paper in this manner should be sure to obtain samples and ascertain the exact brand. It is recommended that they ask some of the questions listed in the Frequently Asked Questions section of this paper. A wide selection of paper exists in the Chinese market from around the globe. A generic request, such as “50 pound #3 coated freesheet,” can result in a variety of paper being supplied.

For those concerned about the origin of the paper, due diligence may be necessary to ensure the paper is sourced from companies that have a proven commitment to environmental stewardship and source their wood from sustainably managed forests. Customers may wish to ask their suppliers which certification programs their plants fall under. Paper supply for printing books in China comes largely from Japan, Europe, North America, China, and Taiwan. Currently, Chinese and Japanese paper is used the most; North American paper is not frequently used because coated varieties are unavailable.

## **B. Worldwide Practices, Including Economic Impact in China**

China consumes half of all recovered paper exports from the United States and a quarter of all global recovered paper. China uses old newspapers (ONP) and old corrugated cardboard (OCC) to manufacture boxboard, corrugated cardboard, and newsprint. Since 2002, U.S. demand for both virgin and recovered-fiber newsprint has diminished because of lower newspaper circulation.

There is much less correlation between Chinese import, U.S. export, and U.S. domestic prices for sorted white paper (SWP) because demand from China for the higher white paper grades is much lower than for ONP or OCC. High grades, such as SWP and sorted office papers (SOP), are mainly used as substitutes for hardwood pulp in the

production of both tissue and printing and writing grades. Because China does not have a shortage of virgin hardwood fiber, Chinese demand has much less effect on global pricing of SWP than on ONP. The price of hardwood pulp has been rising, which is creating demand and higher prices for SWP.

In recent years, demand for imported fiber has decreased in the rest of Asia as China has become more self-sufficient in paper and paperboard production and less dependent on its neighbors to manufacture these items. China has also expanded its recovered fiber sourcing efforts to Europe and Japan in an effort to better manage its supplies and avoid the risk of being dependent upon just one market for all its recovered paper supplies.

In 2007–2008, China will add an estimated six million tons of paper and paperboard manufacturing capacity, much of it based on recovered paper as a fiber source. China's annual capacity growth will be about 8% to 9%, and about two million tons of capacity will be added in Europe in the next two years. Overall world paper manufacturing capacity will grow about 4% per year, but U.S. annual growth will not surpass 2%, because of weakening North American paper markets. World recovered paper consumption will grow by almost twenty million tons in 2007–2008, with more than half of the increase in Asia. China's recovered paper consumption is expected to increase by 6% next year, while North America's consumption will be flat and Europe's will rise only slightly.

China's printing and writing (P and W) paper capacity increases will rely more on virgin fiber from plantations than on imported recovered paper because the hardwood needed for this grade grows readily in Asia. New machines will not use domestic Chinese recovered P and W paper because it is generally poor quality, owing to its high nonwood (bamboo, straw) fiber content, which is a short fiber with a high silica content (relative to wood) that can wear down papermaking equipment. Changes will need to be made in China for the country to support its new, world-class paper production capacity. China's domestic sources of recovered fiber cannot meet these new needs because China's position as a net exporter of consumer goods reduces its potential domestic supply of OCC and, although collection of recovered material in China is quite efficient (near 100% in Beijing), this material cannot feed the new mills, which are generally located outside

the city centers where the paper is collected by people on bicycles. Several U.S. waste haulers have attempted to penetrate the Chinese market, but they have met stiff resistance at both the private and public levels, as mechanized collection efforts would ultimately put the independent collectors and local operators out of work. Still, China will have to fill its supply gap, and higher import prices will provide the incentive needed to change current practices and develop the technology and structure to better utilize their domestic supply.

Because of limitations in U.S. supply, papermakers in China have increasingly turned to Europe and Japan to satisfy their ever-growing demand for recovered fiber. Recovery rates of paper in Japan alone have risen to 75% in recent years, which in large measure is attributable to strong export demand. U.S. and Canadian recovery—still quite low relative to the rest of the world—will climb in the long-term while rates in Europe and Japan will begin to level off as they approach their practical limits. The United States generates an ample supply of recovered fiber stemming from our high consumption of paper products. Although our overall recovery efforts have improved, our rate is still low compared to the global marketplace. One reason for this is because Europe and Japan have more government-initiated recovery systems, while the United States is more market driven. U.S. recovered paper exports are increasing steadily; high grade has had the least growth and will most likely remain relatively low, as China has little need for it as compared to the lower-quality bulk grades.

China's consumption of recovered corrugated cardboard comprises at least 40% of the total market. China uses very little recovered fiber in its P and W papers. In China, plantations for virgin fiber are growing. The hardwood rotation period from planting to harvest is short—five to ten years. Some companies source their hardwood from eucalyptus and mixed tropical hardwoods. The sourced fiber primarily originates in Indonesia, New Zealand, and Australia with softwood fibers (spruce, fir) used for packaging grades. Asia Pulp and Paper, Inc. (APP), exports paper products to sixty-five countries; APP is the seventh largest producer of paper in the world.

There is a 17-20% cost disparity between recycled and nonrecycled papers, with customer preference, price, and quantity determining paper choices.

## **1. De-inking**

About ten different manufacturers support the North American market, creating a combined capacity of about 800,000 tons per year. This is actually about half the de-inking capacity that existed in the late 1980s, when there was a boom in developing new de-inking plants in the United States as a result of increased public consciousness, high prices for virgin pulp, state and federal government commitment to increase purchases of recycled-content paper, as well as tax breaks and low-interest loans for siting new de-inking plants in legislators' districts. However, de-inked pulp turned out to have disadvantages, with a substantial loss rate at mills and lower-quality pulp and printed material. Government agencies failed to honor their commitments because of cost and quality issues; when wood-pulp prices fell, the relative price of de-inked pulp among other problems made it an even less attractive alternative to virgin-based paper grades, and the boom turned to bust. Many de-inked pulp mills were permanently shut down in the mid-1990s.

In the late 1990s, improved de-inking technology became available and surviving producers invested heavily in improvements at the mills as office-products retailers and government agencies showed renewed interest in using recycled paper. Mills also secured more reliable contracts with their suppliers to guarantee better-quality sorted white paper and sorted office paper. High-quality recycled paper products are now available and are cost competitive. The quality of de-inked pulp these days is high, but without government involvement, demand for it in the United States will decrease if wood-pulp prices fall below de-inked pulp prices.

## **2. Recovered Paper Consumption**

Recovered paper consumption in North America has been flat since 2000. The only area of real growth has been the use of recovered fiber to make tissue, where steady demand is leading to new investments in machines that use recovered paper (SWP and SOP grades) as their supply. Flat North American consumption has been offset, or possibly even caused by, growing export demand for paper recovered in North America. Export demand is at about fifty million tons, and continues to climb.

Municipal recycling coordinators tend to prefer single stream systems because they have higher participation rates and lower collection costs, and may provide opportunities to expand into collecting office waste from suburban office parks. However, single stream collection adds cost at the material recovery facility, where additional processing is required to separate the recovered materials for sale to brokers or mills. There is also a higher contamination rate in single stream collected materials—broken glass and plastic film are major problems for papermakers. Contaminants reduce the effective yield of the material when it is used to make paper and can cause damage to papermaking equipment. Single stream collections at offices also tend to mix nonwhite paper and newsprint with white office paper, which limits the types of paper that can be manufactured, thus lowering the value of the material in the recovered paper market. All of this adds cost for the mills that buy and use recovered paper.

Increasingly, companies are looking to shred their wastepaper because of concerns about identity theft. Shredding contracts are commonplace at government offices, hospitals, and high-rise office buildings, and are becoming common practice in suburban office parks. Shredded paper is considered the low end of recovered paper grades because it cannot be sorted for newsprint, colored, and white papers with current technology, including optical sorters.

Collection rates in the United States are not high enough to provide increased availability of the high-quality recovered paper that is needed to support production of more and better-quality recycled paper.

### **C. Indonesia**

Rapid deforestation in Indonesia has been a significant problem for decades, because of both authorized and illegal logging. It has been reported that between 1985 and 1997, Indonesia lost 17% of its forest area. Large amounts of Indonesian wood fiber are used in China. In 2004, more than 20% of pulp and 28% of paper imported to China was sourced from Indonesia or from other countries that use large amounts of Indonesian pulp to manufacture paper.<sup>1</sup>

There are several questions that publishers can ask their printers and/or book manufacturers in Asia, including where the fiber used in the paper originated, whether

there is any chain of custody certification, and what documentation the supplier can provide to prove that the fiber was obtained from a legal and sustainable source.

Endnote

1. Green Press Initiative, *Indonesia Under Pressure: Understanding the Social and Environmental Impacts of Printing in Asia*, available at <http://www.greenpressinitiative.org/documents/indonesia.pdf>

## **V. Green Production Efforts**

What efforts are mills taking to minimize air, water, energy, chemical, and wood use?

### **Water**

Efforts have been made over the last few years to reduce the amount of wastewater generated in the papermaking process. Much of this is accomplished by reusing water in closed loop systems, which reduces energy use and greenhouse gas emissions. The elimination of elemental chlorine at many mills has ensured the improved quality of water returned to the environment. The focus remains on using less water, recycling what is used, and the quality of the water returned to the environment.

### **Air**

Most mills collect, track, and report data as it relates to air emissions. The results show improvements in reducing odor, particulate matter, sulfur dioxide, nitrogen oxides, and carbon dioxides released into the air. Mills continue to work with environmental agencies including the EPA to develop strategies to reduce greenhouse gas emissions (GHG). Some mills have set specific timetables by which they expect to voluntarily reduce emissions up to 15%. In Canada, some mills will be subject to mandatory GHG reductions under Environment Canada's Large Final Emitters (LFE) process. This process will require all pulp and paper facilities in Canada to reduce their GHG emissions by 12% from the levels emitted in 2000. They have set 2012 as a deadline to meet this goal.

### **Energy**

Mills are taking action in many different ways to reduce and/or reuse energy. Some are self-sufficient in that they generate all of the power required for the papermaking process, relying on bark and other residues in boilers and the use of black liquor to generate steam and electricity. Others rely on biomass, wind power, hydrogas, and biogas to reduce the need for fossil fuels. The use of cogeneration (production of steam

and power from the same energy source) has allowed some mills to generate a good portion of their electricity.

## **Chemicals**

The focus on reducing chemicals in the papermaking process is a priority for all mills. Closed loop systems recover residues of many chemicals and recycle them back into the process, reducing both chemical effluents and the overall use of chemicals. Carbon dioxide is the most prevalent GHG in the paper industry. Many mills are increasing their use of biomass and other carbon-neutral energy sources. They also carefully measure the amounts of sulfur dioxide, nitrogen dioxide, and carbon dioxide emissions being released into the air to make sure they are within acceptable limits. Use of water is significant in the papermaking process. Mills routinely monitor and report on water discharges, including biochemical oxygen demand (BOD), total suspended solids (TSS), and absorbable organic halides (AOX). It is important to note that generally mills use an elemental chlorine free (ECF) process for bleaching pulp.

## **Wood**

Some mills manage their own woodlands and create forest management plans that are implemented and overseen by professional foresters. Other mills purchase all of their fiber from private landowners, loggers, log brokers, or in the form of market pulp produced by other companies. Many mills with their own forestland still rely on private landowners for a large portion of their fiber. Forest certification allows mills to verify that the wood fiber they use comes from legal sources and was harvested using sustainable forest management practices. Most mills are certified under one or more of the three most prevalent systems in North America, and all three systems require third-party verification of the mills' practices. The most common forest certification standards in the United States are SFI and FSC. In Canada, the most widely recognized third-party certification is the CSA. (See Forest Certification under section III.)

## **VI. Metafore's Environmental Paper Assessment Tool®<sup>1</sup>**

Headquartered in Portland, Oregon, Metafore was founded in 1997 as a nonprofit organization that works with business leaders to align business objectives with environmental and social outcomes. It is funded by grants and contributions from the government, foundations, and corporations.

Metafore's Environmental Paper Assessment Tool (EPAT®), is a web-based, data-driven, environmental assessment tool that enhances the quality and depth of communication between buyers and sellers of paper products. The EPAT® provides a way for buyers of environmentally driven products to assess and measure the environmental quality of suppliers' products based on a series of environmental categories and standards, each individually weighted according to the buyers' product requirements and areas of concern.

Metafore is a source of tools, information, and innovative thinking for businesspeople focused on evaluating, selecting, and producing environmentally preferable products. The EPAT® was conceived by Metafore's Paper Working Group, a collaboration between Metafore and 11 leading companies. The Group was developed out of a shared goal of making environmentally preferable paper products more widely available and affordable. For more information on the EPAT® tool and Metafore, please visit [www.epat.org](http://www.epat.org) and [www.metafore.org](http://www.metafore.org)

The EPAT® is a mechanism that provides a standardized way for suppliers to communicate environmental performance to buyers and for buyers to assess how well a product meets their corporate environmental values. It is a communication tool and provides a data point to measure progress over time. Buyers can also use this tool in place of individually developed supplier report cards to track supplier improvements over time. Because the tool allows buyers to assign scoring weights to the various metrics measured, it also facilitates supplier understanding of individual buyers' objectives. Data entered by suppliers is normalized to industry averages, enhancing the validity of comparisons between suppliers. This also offers transparency along the supply chain.

With participation from various stakeholders, Metafore's Paper Working Group identified a total of twenty-seven environmental impact indicators/metrics, under the following categories: (1) Efficient Use and Conservation of Raw Materials (including preconsumer and postconsumer recovered content, fiber efficiency, water and energy use); (2) Minimization of Waste (i.e. recyclability, recovered content); (3) Conservation of Natural Systems (i.e. source, certified forest management—FSC, SFI, CSA, and so on—and conservation values); (4) Clean Production (including air quality, mercury, water quality, climate stability, and so on); (5) Community and Human Well-Being (i.e., labor and

human rights, human health and safety); (6) Credible Verification and Reporting; (7) Economic Viability.

1. Endnote: Reprinted with Permission from Metafore at [www.metafore.org](http://www.metafore.org); [www.epat.org](http://www.epat.org)

## **VII. Reducing Consumption and Waste**

Publishers can minimize their consumption of paper and trees through a number of approaches. These may include the following:

- *Lower basis weights:* Lower basis weight papers require less fiber, and therefore use fewer trees.
- *Groundwood content paper:* Groundwood paper uses approximately 85% of the tree, while freesheet grades use about 25%. However, the groundwood pulping process consumes much more energy than chemical pulping, resulting in greater GHG emissions.
- *Trim size and cut size efficiencies:* Matching print jobs to the right paper roll sizes and presses ensures that as little paper as possible is wasted in the printing process.
- *Print on demand:* Traditional offset printing has a minimum quantity, usually around 2,000 units. For print runs under that minimum, where a publisher might normally scrap the unneeded units, publishers can explore print on demand technologies that print books one at a time.
- *Higher-bulk papers:* Papers with a relatively high bulk to basis-weight ratio allow the use of a lower basis weight without loss of paper (or book) bulk, thus saving paper and fiber. The higher bulk is generally achieved by using bulkier fiber (e.g., adding a small amount of groundwood to a groundwood-free grade) and/or by calendering it less (that is, compressing it less) during the papermaking process. The resulting paper is bulkier than other paper of the same basis weight, but the surface is also rougher, possibly making it unsuitable for printing photographs and other types of demanding graphics.
- *Alternative fiber sources:* Paper can be made from fiber that does not come from trees. Some alternative fibers include hemp, kenaf, bamboo, flax, cotton, and agricultural by-products.
- *Minimize packaging:* Packaging, whether shipping boxes or paper filler, can create a significant amount of waste.

- *Two-sided printing*: Printing on both sides of the page in office copiers and printers can reduce office paper use by half.
- *Soft proofing*: Using electronic files for proofing eliminates the need to send printed versions back and forth between publishers and vendors.

Publishers can also pursue several strategies to minimize waste. These strategies may include some or all of the following:

- *Smaller laydowns*: Printing fewer books in the initial run reduces the number of copies that might be returned if a book does not sell as anticipated. However, the publisher needs to get fast turnaround on reprints so that there will be enough inventories if the book sells well.
- *Managing reprint quantities*: Matching reprint quantities to current demand helps publishers avoid having too much inventory on hand when demand drops off. As in the strategy above, turnaround time is critical if this strategy is to succeed.
- *Markdowns in place*: Publishers may work together with retailers to reduce the price of books already in stores to encourage customers to buy them.
- *Selling nonreturnable*: Some publishers choose to sell and some accounts choose to buy on a nonreturnable basis. Typically, customers in nonreturnable transactions receive a higher discount from the list price to compensate them for the inventory risk they are assuming.

Once books have been returned, publishers may find ways to sell them at deep discounts as hurt or remainder books, or they may recycle them. Sometimes “recycling” a book may mean cutting off a hardcover binding and rebinding the pages as a lower-priced paperback. More commonly, it means that books are shredded at the publisher’s warehouse or at a third-party facility, and the resulting scrap is sold off.

## **VIII. Frequently Asked Questions**

### **Common Questions about Environmental Issues Regarding Paper**

#### *1. What are the limits of the supply of recycled paper?*

The answer will vary with the type of paper involved and the amount of recycled content requested. Please refer to the Recycling section for greater detail.

## *2. What's the difference between preconsumer and postconsumer fiber?*

Preconsumer fiber includes dry paper and paperboard manufacturing waste generated after completion of the papermaking process, such as envelope cuttings, forming, and other converting operations; bag, box, and carton manufacturing waste; and butt rolls, mill wrappers, and rejected, unused stock. Repulped finished paper and paperboard inventories of mills, merchants, wholesalers, dealers, printers, converters, and others, as well as unsold magazines and books returned to the publishers by newsstands and bookstores, are also considered preconsumer waste.<sup>1</sup>

Postconsumer waste fiber (PCW) includes paper, paperboard, and fibrous wastes from retail stores, office buildings, homes, and so forth, after they have passed through their intended consumer end use. This material includes used corrugated boxes, old newspapers, mixed wastepaper, tabulating cards, and used cordage.

## *3. Does mill broke count as "recycled"?*

No, mill broke refers to any paper waste generated in a paper mill before completion of the papermaking process. It is usually returned directly to the pulping process. Mill broke is excluded from the definition of "recovered fiber."<sup>2</sup> Please refer to the Glossary and the Recycling section for greater detail.

## *4. How is paper de-inked?*

After the recovered paper is chopped up (pulped) and mixed with water to make a slurry, it is put through a series of washing and/or flotation de-inking processes in which water and/or soaplike chemicals called surfactants remove the ink from the paper.

## *5. What happens to the strength of the paper that is de-inked?*

Paper cannot be recycled indefinitely because de-inking washes away portions of fiber strands, so the fibers are gradually degraded and eventually become too short and weak to use in repeated recycling.

6. *How many times can a sheet of paper be recycled?*

Paper can be recycled no more than five to six times before the fibers that hold it together become so damaged that they do not bond, and paper cannot be made.

7. *What is de-inking sludge and how is it disposed?*

De-inking sludge is the ink, noncellulose materials from the fiber, including coating, adhesives, dyes, and fillers, as well as trash such as paperclips, staples, and baling wires, that are left over at the end of the de-inking process. In the early 1990s, sludge was sent to special landfill sites under strict guidelines, used as biomass fuel, or used as landspread. (Landspreading is recovering waste by spreading it onto land principally for agricultural benefit or ecological improvement. Sewage sludge and wastes from, for example, the food, brewing, and paper pulp industries, can be used for this purpose. See [http://www.ami.ac.uk/courses/topics/0100\\_gls/dfxh0152.htm](http://www.ami.ac.uk/courses/topics/0100_gls/dfxh0152.htm)

For more on disposal of de-inking sludge see The Recycling Section.

7A. *Why don't all mills integrate de-inking facilities into their respective operations?*

De-inking is a slow and inefficient process that produces toxic effluent, so siting and approval of new de-inking plants is a matter of concern to localities, as it requires many levels of approval. In addition, an integrated facility assumes efficient collection and transport to the facility. The global economy also influences where de-inked fiber is sold and used, and at what cost

Paper manufacturers that already have efficient virgin-fiber pulp mills integrated into their operations would also need to write off that capital investment or find other end uses for the virgin-fiber pulp that would still be produced but would not be needed to manufacture paper in their own facility if they were to shift a significant portion of their pulp usage to recycled pulp.

8. *What are some environmental concerns with regard to manufacturing recycled paper?*

The creation of both nonrecycled and recycled paper uses energy for manufacture and transport. This energy will almost certainly come from nonrenewable fossil fuels. Although recycled paper uses less energy to manufacture, it mainly uses purchased electricity and fossil fuels. Virgin fiber manufacturing, however, also uses biomass energy, or biorenewable energy, such as unused parts of the tree.

De-inking leaves a by-product called sludge that, when landfilled, needs to be regulated to special landfill sites under strict guidelines. Mills are working on innovative ways to use the sludge, including roofing tiles, roadbed filler, and glass aggregates. (See question 7, above.)

Parity or up-cycling of recycled fibers wastes an additional 400 pounds of fiber per ton to make high-quality recycled paper.

Environmental groups have concluded that the benefits on the whole of recycled paper far outweigh the costs.<sup>3</sup>

An energy audit (a systematic measuring and recording of energy consumption to identify opportunities to reduce and minimize energy use and cost) of a company's activities may assist in determining its overall environmental impact. See EPAT® tool (section VI).

9. *What percentage of recycled paper can be used?*

Up to 80% of the content of recycled paper can be used. The balance is trash, sludge, plastic, inks, staples, and so on, that needs to be sent to a landfill.

10. *What level of recycled content is needed for a publisher to indicate on a book that it is "printed on recycled paper"?*

The Federal Trade Commission instructs that the entire product (i.e., 100% of the content) must be made of recycled material. If less than 100% of the product is recycled, the statement must specifically indicate the percentage that is recycled (such as "20% total recycled fiber"). To the extent that the source of recycled content includes

preconsumer material, there must be substantiation for concluding that the preconsumer material would otherwise have entered the solid waste stream. A publisher may (but is not required to) indicate specific percentages of pre- and/or postconsumer recycled fiber (such as “contains XX% total recycled fiber, including YY% postconsumer”).

For further guidelines and information:

<http://www.ftc.gov/bcp/grnrule/guides980427.htm>

[http://www.afandpa.org/Content/NavigationMenu/Environment\\_and\\_Recycling/Recycling/Recycling\\_Resources/RECYCLIN.PDF](http://www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/Recycling/Recycling_Resources/RECYCLIN.PDF)

#### 11. *What is forest certification?*

It is a procedure to assess the quality of forest management in relation to the criterion of forest management standards involved. This sometimes includes chain of custody monitoring. (Please refer to the Forestry section for greater detail.)

Chain of custody is the process of tracking and recording the possession and transfer of wood and fiber from the forests of origin through the different stages of production. Chain of custody certification assures consumers and forest product companies that the wood they buy comes from certified forests.

#### 12. *What's the difference between the Forest Stewardship Council (FSC) and the Sustainable Forest Initiative (SFI)?*

The FSC was initially designed to protect endangered forests in tropical, developing countries with few landowners (usually the government) and no sustainable forest management infrastructure, and is used and advocated for in other parts of the world as well as in North America. It is independently governed by nonprofit environmental groups, academic and technical institutions, businesses, and others. Standards vary from region to region. SFI was initially established by the U.S. paper and forest products industry in North America. It is focused on landowner and/or user requirements, which include ongoing sustainability of the forests on which they depend for their raw materials. SFI is now independently governed by a board that includes representatives of forest products companies, nonprofit environmental groups, universities, and other entities.

13. *What is the Canadian Standards Association (CSA)? Is it different from the Sustainable Forest Initiative (SFI) and the Forest Stewardship Council (FSC)?*

CSA is an independent, not-for-profit entity specializing in standards development, product certification, and management system registrations—forest certification is simply one of the many areas where CSA has established standards in Canada. (Please refer to the Forestry section for greater detail.)

14. *If paper is recycled, how can you tell if it's FSC or SFI certified or something else?*

You cannot tell unless you know the specific grade, in which case you can research specifications with the mill or merchant.

15. *Why are many mills that want certification selling their timberlands? Is it so they can avoid the problem of SFI vs. FSC?*

No, mills that want certification still need verifiable arrangements ensuring that the forests which are the source of their virgin fiber are managed and third-party certified under SFI or FSC standards. Selling their lands has primarily been a way to turn assets into cash in a healthy real estate market.

16. *Are we cutting down more trees than we're planting in the United States?*

Canada and the United States contain 15% of the earth's forest cover. The UN's Food and Agriculture Organization (FAO) 2001<sup>4</sup> report states that North American forests expanded by nearly ten million acres in the previous decade. According to the Abundant Forests Alliance, the U.S. forest inventory has increased by 39% since 1952.<sup>5</sup>

17. *What are old growth forests?*

Although there is no set definition, old growth forests are generally defined by age, structural characteristics, and relative lack of human disturbance.

18. *Are tropical rainforests being deforested to make paper?*

Yes. Specific facts and figures vary, but in Indonesia and parts of South America, Africa, and Asia, forests are being destroyed by logging.

19. *What is clearcutting? Are there issues concerning clearcutting?*

Clearcutting is the removal of all trees from a designated area in a single operation.<sup>6</sup> While they can be an eyesore, under some circumstances, clearcuts, like natural disturbances, such as fires and floods, create openings in the forest canopy that allow certain species to regenerate, and if concentrated in a small area can have a minimal impact on the environment. Poor practices during clearcutting and inappropriate selection of areas to be clearcut can cause soil erosion, water degradation, and loss of biodiversity. Please refer to the Forestry section for greater detail.

20. *Are any mills using genetically modified tree species now?*

If not, are there plans for any to do so? The technology does not currently exist. There are studies in place.

21. *Can using recycled paper save publishers money?*

There are many variables in paper cost, but recycled paper usually costs more than a virgin fiber grade of similar quality. The cost difference may be offset by such changes as reducing the basis weight or brightness level of the paper used, or even changing from groundwood-free to partial-groundwood paper. Costs may also be reduced by standardizing and consolidating grades, sizes, and basis weights purchased to place higher volume orders, which usually carry lower pricing. Mills that have de-inking plants and thus are able to produce their own de-inked pulp may include de-inked fiber as a normal component of some of their grades at no extra charge. These grades may be priced competitively with similar virgin fiber grades from other mills, especially at times when market prices for virgin pulp are high.

Even with a de-inking plant in place, the cost of using recycled fiber varies depending on the type of paper to be produced. Groundwood and partial-groundwood grades can be produced from lower-cost recovered paper grades such as mixed office waste and old newsprint, while groundwood-free grades must rely on more expensive and scarcer sorted white recovered paper. Groundwood grades of lower brightness level require less bleaching (in some cases no bleaching) of the de-inked pulp, making it more economical to produce these grades rather than higher-brightness grades using de-inked pulp.

However, all pricing depends on supply and demand, which is highly variable over time in the paper market.

*22. How is paper recycled in the papermaking process?*

Paper is recovered, turned to pulp, and used to replace part or all of the virgin fiber that would otherwise be used to make paper. Recycled fiber is one of the ingredients in the grade “recipe.”

*23. Which has more recycled content—coated or uncoated paper?*

It varies by manufacturer.

*24. What percentage of recycled content must be included for a paper to be considered recycled?*

Please refer to the following Federal Trade Commission link:

<http://www.ftc.gov/bcp/qnrnrule/guides980427.htm#260.3>

This section contains a lot of good information, with section 260.7(e), example (3), illustrating a specific example of how to interpret recycled content. (Please refer to question #10 for further detail on levels of recycled content.)

*25. Are there other fiber sources that could be used to manufacture book paper?*

Although material such as hemp, kenaf, biomass, sugarcane, and recycled plastics are now being used to produce writing paper, envelopes, and other individual-sheet paper products, the technology does not yet exist that can produce affordable nontree paper of sufficient quality with the durability, printability, and machine-friendly quality needed for books. The industry for nontree paper is evolving, with early projects and ideas in development, so the situation may change. (For more on what level of recycled content is needed, please see question #10.)

*26. Why do paper choices matter?*

By choosing the right paper, you can save wood, water, and energy, and cut pollution and solid waste. Please refer to the Paper Calculator site:

<http://www.environmentaldefense.org/papercalculator>

The Paper Calculator shows the environmental impacts of different papers across their full life cycle.

To compare different papers, enter the grade of paper you use and how much, and see how using less paper, increasing recycled content, or making other changes can reduce impacts. Compare individual papers or groups of papers.

To view the environmental benefits, save the results in an easy-to-read report to help your company, community, school, nonprofit, or other organization measure the benefits of better paper choices.

*27. What is the “Book Industry Treatise on Responsible Paper Use” and does the AAP have a position on it?*

This treatise, coordinated by the Green Press Initiative, declares goals for the use of certain levels of recycled fiber, as well as a preference for using paper that is certified by FSC. The treatise has been revised as of September 2007 to allow preconsumer recycled fiber to be counted, as long as the majority of the recycled fiber is postconsumer. The treatise’s stated goals match those advocated for by the Green Press Initiative, a nonprofit program whose stated mission “is to work with publishers, industry stakeholders and authors to create paper-use transformations that will conserve natural resources and preserve endangered forests.” The Green Press Initiative is funded primarily by grant foundations. AAP does not have a position on either the contents of the treatise or whether companies should sign it, as AAP views its role on environmental issues as helping publishers obtain a breadth of information on the issues so they can make their own informed decisions about which practices to pursue. The treatise can be found online: <http://www.greenpressinitiative.org/industrytreatise.htm>

## **Questions to Ask Suppliers to Assess Your Publishing Program**

1. What's the postconsumer waste content of [fill in grade]? The typical question is: "For Grade X, is there any postconsumer waste content and, if so, how much?" Depending on the grade, there may be a postconsumer waste version available.
2. Have you conducted an energy impact audit; if so, what were the results?
3. What future plans do you have to reduce the carbon footprint?

## **Common Questions Smaller Publishers Can Ask Their Printers**

1. What house papers do you stock that are 10%, 20%, or 30% postconsumer content?
2. What mills do you work with for recycled paper options?
3. Would you provide a "GREEN" samples binder of paper samples so that we can better select our papers to match our green efforts?
4. Do you offer cooperative purchasing programs?

### Endnotes

1. See <http://epa.gov/cpg/products/paper.htm> for additional information on product information, recommended recovered materials content ranges, product definitions, and additional links.
2. U.S. Environmental Protection Agency Comprehensive Procurement Guidelines: <http://epa.gov/cpg/products.htm>
3. [http://www.environmentaldefense.org/documents/1618\\_WP3.pdf](http://www.environmentaldefense.org/documents/1618_WP3.pdf) and <http://www.environmentalpaper.org/documents/commonvision-paper-guidelines.pdf>
4. United Nations Food And Agricultural Report 2001: <http://www.fao.org>
5. <http://www.abundantforests.org/abundant.html>
6. Magazine Publishers of America, *2007 Environmental Handbook*, found at <http://www.magazine.org>

## **IX. Reference Organizations**

Additional information is available at the following web sites. This list is being provided for reference only, and does not constitute an endorsement of any web site listed.

### **Environmental Nongovernment Organizations (ENGOS)**

Dogwood Alliance: <http://www.dogwoodalliance.org>

Ducks Unlimited: <http://www.ducks.org>

Environmental Defense Fund: <http://www.edf.org>

Forest Ethics: <http://www.forestethics.org>

Greenpeace: <http://www.greenpeace.org>

Green Press Initiative: <http://www.greenpressinitiative.org>

Rainforest Alliance: <http://www.rainforest-alliance.org>

Rainforest Action Network: <http://www.ran.org>

World Wildlife Fund: <http://www.worldwildlife.org>

### **Certification/Standards Bodies**

American National Standards Institute (ANSI): <http://www.ansi.org>

Canadian Sustainable Forestry Certification Coalition: <http://www.certificationcanada.org>

Canadian Standards Association (CSA) International: <http://www.csa-international.org>

Forest Stewardship Council (FSC): <http://www.fsc.org>

Global Reporting Initiative (GRI): <http://www.globalreporting.org>

International Organization for Standardization (ISO): <http://www.iso.org>

Sustainable Forestry Initiative: <http://www.aboutsfi.org>

Standards Council of Canada: <http://www.scc.ca>

### **Associations/Industry Consortia**

Abundant Forests Alliance: <http://www.abundantforests.org>

American Forest and Paper Association: <http://www.afandpa.org>

American Tree Farm System: <http://www.treefarmssystem.org>

Boreal Forest Initiative: <http://www.borealcanada.ca>

Business for Social Responsibility: <http://www.bsr.org>

Canadian Paper Recycling Association: <http://www.pppc.org>

Ceres: <http://www.ceres.org>

Confederation of European Paper Industries: <http://www.efi.int>

Conservation Fund: <http://www.conservationfund.org>

Environmental Paper Network: <http://www.environmentalpaper.org>

Forest Products Association of Canada: <http://www.fpac.ca>

Greenbiz.com: <http://www.greenbiz.com>

Metafore: <http://www.metafore.org>

Paper Industry Association Council: <http://www.paperrecycles.org>

Printers National Environmental Assistance Center: <http://www.pneac.org>

Programme for the Endorsement of Forest Certification Schemes: <http://www.pefc.org>

The Pulp and Paper Products Council: <http://www.pppc.org>

Printing Industries of America/Graphic Arts Technical Foundation: <http://www.gain.net>

TAPPI: The Leading Technical Association for the Worldwide Pulp, Paper and Converting Industry: <http://www.tappi.org>

World Business Council for Sustainable Development: <http://www.wbcsd.org>

## **Retailers: Paper Mills and Printers**

*Note:* In some cases, depending on the size of the publisher, there are houses that purchase paper products directly from printers rather than mills.

Abitibi: <http://www.abitibiconsolidated.com>

American Fiber Resources International: <http://www.afri.us>

Appleton (formerly Appleton Papers, Inc.): <http://www.appletonideas.com>

Asia Pulp and Paper Company Ltd.: <http://www.asiapulpanpaper.com>

Asia Pacific Offset: <http://www.asiapacificoffset.com>

C and C Offset: <http://www.ccoffset.com>

Cascades, Inc.: <http://www.cascades.com>

Dirigo: <http://www.dirigopaper.com>

Domtar: <http://www.domtar.com>

Finch Paper: <http://www.finchpaper.com>

Fraser: <http://www.fraserpapers.com>

Glatfelter: <http://www.glatfelter.com>

Gold East: <http://www.goldeastpaper.com>

International Paper: <http://www.internationalpaper.com>

Manistique Paper: <http://www.manistiquepapers.com>

MeadWestvaco: <http://www.meadwestvaco.com>

Mohawk Paper Mills, Inc.: <http://www.mohawkpaper.com>

Myllykoski: <http://www.myllykoski.com>

NewPage Corporation: <http://www.newpagecorp.com>

SAPPI: <http://www.sappi.com>

Stora Enso: <http://www.storaenso.com>

Tembec Paper Group: <http://www.tembec.com>

UPM-Kymmene Group: <http://w3.upm-kymmene.com>

Verso Paper: <http://www.versopaper.com>

Weyerhaeuser: <http://www.weyerhaeuser.com>

## **Government**

Canadian Forest Service: <http://www.nrcan.gc.ca>

EUROPA (European Commission Environment Web Pages):

<http://ec.europa.eu/environment>

Department of Agriculture Forest Services (USDA Forest Service): <http://www.fs.fed.us>

Environmental Protection Agency (EPA): <http://www.epa.gov>

UK Government's Central Point of Expertise on Timber Procurement:  
<http://www.proforest.org>

### **Other Nonprofits**

Conservatree: <http://www.conservatree.org>

Keep America Beautiful: <http://www.kab.org>

NatureServe: <http://www.natureserve.org>

## **X. Glossary**

### **A**

**Absorbable Organic Halides (AOX):** A standard measurement quantifying the amount of chlorinated organic material that is discharged from a mill.

**Acid Rain:** The precipitation of dilute solutions of strong mineral acids, formed by the mixing in the atmosphere of various industrial pollutants (primarily sulfur dioxide and nitrogen oxides) with naturally occurring oxygen and water vapor.

**Acid Free:** Made in a neutral pH process that increases the longevity of the paper.

**Acre:** Measurement of land; English unit of land. An acre is 4,840 square yards or about 75% of a U.S. football field.

**Agricultural Fibers:** Fibers harvested from nonwood plants grown intentionally for tree-free paper or other fiber products.

**Agricultural Residue:** A harvested-crop residue that can be used to manufacture tree-free paper.

**Ancient Timber Old Growth Fiber Free:** Products in which no content is from old growth forests.

**ATFS:** American Tree Farm Systems, a forest certification system designed for the small, nonindustrial landowners who own most of the working forest areas in the United States.

### **B**

**Basis Weight:** Traditional paper basis weights common to each grade of paper are based on measurements determined hundreds of years ago by Middle Eastern papermakers. They represent the finished weight of a ream of paper in a size specific to

the grade of paper. (These sizes are usually "parent sheet" sizes, not cut size reams.) Therefore, weights are not always the same between grades. For example, a 20# writing/script paper is not less than half the weight of a 50# text paper but, rather, similar to it. A 24# writing paper is generally equivalent to a 60# text, while a 28# writing paper is generally equivalent to a 70# text paper. That is because the size of paper being weighed by the ream is different for text than for writing papers.

**Bast Fiber:** Strong, woody fiber, usually forming the food-conducting tissue of a plant.

**Biodegradable:** Waste material composed primarily of constituent parts that occur naturally, are able to be decomposed by bacteria or fungi, and are absorbed into the ecosystem. Wood, for example, is biodegradable, while plastics are not.

**Biodiversity:** A large number and wide range of species of animals, plants, fungi, and microorganisms. Ecologically, wide biodiversity is conducive to the development of all species.

**Biological Oxygen Demand (BOD):** A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. BOD is used as an indirect measure of the concentration of biologically degradable material present in organic wastes. It usually reflects the amount of oxygen consumed in five days by biological processes breaking down organic waste. BOD can also be used as an indicator of pollutant level, where the greater the BOD, the greater the degree of pollution. Also referred to as "biochemical oxygen demand."

**Biomass:** In the energy production industry, biomass refers to living and recently living biological material, which can be used as fuel or for industrial production. Most commonly, *biomass* refers to plant matter grown for use as biofuel, but also includes plant or animal matter used for production of fibers, chemicals, or heat. Biomass may also include biodegradable wastes that can be burned as fuel.

**Blade Coating:** A process in which paper is given a clay coating that is spread by a blade that covers the width while the paper runs underneath it, rather than the paper running through a bath of clay coating.

**Boreal Forests:** Forests found in the northern parts of North America, Europe, and Asia, consisting mostly of coniferous trees.

**Brightness:** A technical measurement of the light reflected back from the paper, with 100 being the highest brightness. High-bright papers also usually look the whitest, although visual comparisons between papers of different brightness are often difficult

unless they are side by side. Even then, close brightness between papers is often difficult to distinguish. Also called “whiteness.”

**Broadleaf Trees:** Trees with wide, flat leaves that are shed annually. Examples include oak, ash, and maple.

**Butt Rolls:** The excess ends of rolls of various grades of paper.

## C

**Calender:** A series of rollers that squeeze the finished paper, creating a harder, firmer surface that often looks somewhat shiny.

**Carbon Footprint:** The total amount of greenhouse gases produced (measured in amounts of carbon dioxide) by a particular human activity.

**Carbon Sink:** Matter that absorbs and stores more carbon than it emits. Common examples include oceans, soil, and growing forests.

**Chain of Custody:** The process of documenting the source for fiber used in a specific manufacturing run paper all the way back to the forest or forests where the trees were harvested.

**Chlorine-free Product (CFP):** Any product produced without the use of chlorine chemistries, including elemental chlorine gas, chlorine compounds, and chlorine derivatives. See also Elemental Chlorine Free, Totally Chlorine Free, and Processed Chlorine Free.

**CITES:** Convention on International Trade in Endangered Species of Wild Fauna and Flora (U.S. Fish and Wildlife Service) provides lists of endangered species of timber and other natural products.

**Clearcutting:** A method of harvesting trees in which an entire stand is felled and removed at one time. Clearcutting may be done in blocks, strips, and patches with intact buffer areas left between the harvested areas. See fuller discussion of this in the Forestry section.

**Coated Paper:** Paper with a clay coating, which provides a better printing surface for crisper, more brilliant colors.

**Controlled Wood:** A term used by FSC to refer to the non-FSC-certified portion of fiber in an FSC mixed-label product.

**Commodity Paper:** High-volume paper, usually white, that forms a large percentage of paper sales, including offset and copy paper. High-volume production compensates for commodity grades' slimmer profit margins.

**Converter:** A company that buys raw, finished paper rolls to make into value-added products such as envelopes, continuous forms, and cut-size sheets.

**CSA:** Canadian Standards Association is a not-for-profit group that has developed standards for many different industries. CSA's sustainable forest management standard was developed with the participation of government, academic, environmental, business, and other stakeholder groups. It is particularly suited to Canada, where much of the wood used by the forest-products industry comes from government-owned lands and where forest-products companies have been granted management and harvesting licenses.

## D

**Deforestation:** The destruction of forests through the widespread removal of trees without adequate replanting or a plan for regeneration.

**De-inking:** The process by which ink is lifted off used paper, which is then broken back down into fibers to be recycled into new paper.

**Dioxin:** A toxic chemical that either occurs naturally or as an unwanted by-product of industrial manufacturing, including papermaking. Exposure to dioxin has been linked to cancer. New bleaching methods eliminate dioxin by-products in pulp and papermaking.

**Dirt Count:** The average amount of dirt specks in a specific size of paper area. Both virgin sheets and recycled sheets have "dirt," although recycled paper usually has a slightly higher dirt count than virgin paper. However, it rarely affects recycled paper's quality and use.

## E

**Ecology:** A branch of science concerned with the interrelationship of organisms and their environment.

**Ecosystem:** An interconnected and symbiotic grouping of animals, plants, fungi, and microorganisms that sustains life through biological, geological, and chemical activity.

**Elemental Chlorine Free (ECF):** Virgin paper processed without elemental chlorine but with a chlorine derivative such as chlorine dioxide. A postconsumer paper would be a greener choice than an ECF paper.

**Emission Factor:** Quantity of a substance or substances released from a given area or mass of a material at a set point in time—i.e., milligrams per square meter per hour.

**Emissions:** The release of gases, liquids, and/or solids from any process or industry. Liquid emissions are commonly referred to as effluents.

**Environmental Footprint:** For an industrial setting, this is a company's environmental impact determined by the amount of depletable raw materials and nonrenewable resources it consumes to make its products, and the quantity of wastes and emissions that are generated in the process. Traditionally, for a company to grow, the footprint had to get larger. Today, finding ways to reduce the environmental footprint is a priority for leading companies.

**Environmental Impact:** Any change to the environment, whether adverse or beneficial, wholly or partially resulting from human activity, industry, or natural disasters.

**Environmental Restoration:** The act of repairing damage to a site caused by human activity, industry, or natural disasters. The ideal environmental restoration, although rarely achieved, is to restore the site as closely as possible to its natural condition before it was disturbed.

**EPA:** U.S. Environmental Protection Agency publishes guidelines for minimum recycled product content for use by federal agencies for purchasing standards. Most U.S. state and local governments, as well as businesses and organizations, have also voluntarily adopted these content standards. Further, EPA advocates source reduction practices, and other aspects of environmentally sound products, such as reduced toxics, energy savings, and biomass projects. In addition to providing guidance on environmental products, EPA regulates many aspects of paper industry production, including emissions (air, water, land) and solid waste management.

## **F**

**Finish:** The physical "look and feel" of the paper's surface. May include raised designs such as "linen" and "laid," or a smooth surface.

**Forest:** A diverse ecosystem dominated by trees, but also including other plants as well as animals that contribute to the world at large.

**Forms Bond:** Paper converted into continuous forms.

**Freesheet:** Groundwood-free, freesheet paper is made from a chemical pulping process in which all the lignin is removed from the pulp. Freesheet paper has more longevity than groundwood paper such as newsprint, which contains lignin and may yellow rapidly. The chemical pulping process (usually a kraft process) requires less energy than

groundwood pulping, but uses a lower portion of the tree so that more trees are used to produce a ton of pulp than with groundwood paper.

**FSC:** Forest Stewardship Council is an independent, international, environmentally and socially oriented forestry certification organization. It trains, accredits, and monitors third-party certifiers around the world and works to establish international forest management standards. FSC considers itself as having established credibility with the major environmental and social organizations worldwide.

**FTC:** U.S. Federal Trade Commission publishes guidance to help companies clarify which kinds of product-labeling language would be regarded as appropriate and which misleading, with potential for FTC investigation.

## **G**

**Global Warming:** A process that raises the air temperature in the lower atmosphere because of heat trapped by greenhouse gases, such as carbon dioxide, methane, nitrous oxide, chlorofluorocarbons (CFCs), and ozone. It can occur as the result of natural influences, but the term is most often applied to the warming predicted to occur as a result of human activities (i.e., emissions of greenhouse gases).

**Greenhouse Effect:** The warming of earth's surface and lower atmosphere as a result of carbon dioxide and water vapor in the atmosphere, which absorb and reradiate infrared radiation.

**Greenhouse Gases:** Gases that absorb sunlight and trap the heat in the atmosphere. The buildup of greenhouse gases has led to concerns about global warming.

**Greenwash:** Disinformation disseminated by an organization intended to present an environmentally responsible public image.

**Groundwood:** Paper made from pulp that was produced using a partially or entirely mechanical process in which the entire tree is ground up. Heat and chemicals may be used in this process as well, but all groundwood pulp retains lignin. It thus yellows and deteriorates more rapidly than groundwood-free paper. Groundwood pulping processes use more energy than the totally chemical processes that produce freesheet, but groundwood pulping uses more of the tree; it therefore requires few trees per ton of paper produced.

## **H**

**Habitat:** (1) The natural home of an animal or plant; (2) the sum of the environmental

conditions that determine the existence of a community in a specific place.

**Hardwoods:** Trees that lose their leaves in autumn (see Broadleaf Trees).

**Harvesting:** Cutting down trees in a forest, but also managing the forest so that it will be replenished with new trees (either naturally or through replanting).

**Hectare:** 2.47 acres. There are 100 hectares in a square kilometer.

**House Sheet:** The standard paper kept on hand by a printer in each grade. Although the printer will usually be able to get most papers customers ask for, house sheets are the most easily available and, because they are bought continuously in large quantities, usually offer the best price.

## I

**Integrated Mills:** Mills that manufacture pulp as well as paper.

## J

## K

**Kraft Process:** A chemical pulping process that cooks down the tree to remove lignins, retaining the fibers for papermaking. Freesheet papers are made in a kraft process.

## L

**Laid:** Paper that, when held to the light, shows a series of ribbed lines. Has a high-quality, handmade appearance and is often used for stationary.

**Landspread:** Landspreading is recovering waste by spreading onto land principally for agricultural benefit or ecological improvement. Sewage sludge and wastes from, for example, the food, brewing, and paper pulp industries, can be used for this purpose. (See [www.ami.ac.uk/courses/topics/0100\\_gls/dfxh0152.htm](http://www.ami.ac.uk/courses/topics/0100_gls/dfxh0152.htm)).

**Lignin:** The "glue" that binds the cells of the tree and creates its structure. Approximately one-third of the tree is lignin.

## M

**Making Order:** A paper that is not available off a supplier's shelf, but must be ordered from a mill. The mill and supplier will advertise the paper's availability, but customers must buy enough to warrant production, usually a truckload or more.

**Master Logger Programs (MLP):** These programs, which exist in many U.S. states, promote safe and sustainable practices among the many independent logging

companies that provide much of the wood to forest products companies in the United States. Requirements of these programs vary widely from state to state.

**Mill Broke:** Any paper waste generated in a paper mill before completion of the papermaking process (usually returned to the pulping process).

**Mill Wrappers:** Protective wrappers that mills often place on rolls of paper before shipment. They are torn off and discarded when the rolls are put on press. If there is no wrapper, there will almost always be some damage to the outer few layers of paper, which are then stripped off and discarded. Beyond protection against damage, some mill wrappers are also vapor barriers that keep the moisture content of the paper stable under the varying temperature and humidity conditions it is subjected to during transport and storage. This can be very important for assuring good press performance, especially on the heatset presses used for most books other than mass market paperbacks.

**Monoculture:** An area where a single species predominates. Monocultures are usually created through planting and are maintained for commercial purposes. Biodiverse nonplant species are limited in a monoculture and greater use of pesticides may be required to maintain the health of the selected species in the face of insect or disease invasions in the stands.

## N

## O

**Old Growth Forest:** A term that generally refers to forests that are relatively untouched by human activity.

**Opacity:** The amount of "show through" in a sheet, or how much of the text and design on one side of a paper shows through on the other side.

## P

**Pallet:** A standard amount of paper that fits on a wooden pallet. In cut size sheets, a pallet equals forty cartons.

**Parent Size:** Sheets of paper larger than cut size. Parent size sheets are often 22" x 35" or 25" x 40".

**PEFC:** Programme for the Endorsement of Forest Certification, a global organization that evaluates and endorses regional and national certification systems that meet its

standard for sustainable forest management. PEFC endorsement is widely accepted as an indicator of good practices. SFI and CSA have been endorsed by PEFC.

**Postconsumer Material:** Paper that has reached its intended end user before being discarded. For example, paper recovered from curbside collections is considered postconsumer, but paper scraps from a print shop are not. The print shop is not the "intended end user," but is adding value to the paper that will eventually reach the end user.

**Postconsumer Recycled Content:** A product composition that contains some percentage of material that has been reclaimed from the same or another end use at the end of its former, useful life.

**Postconsumer Waste Fiber (PCW):** Same as postconsumer material. Note that papers containing a percentage of PCW are a "recycled" option.

**Postindustrial Material:** Industrial manufacturing scrap or waste; also called "preconsumer material."

**Postindustrial Recycled Content:** Product composition that contains some percentage of manufacturing waste material that has been reclaimed from a process generating the same or a similar product. Also called "preconsumer recycle content."

**Preconsumer Fiber:** Includes manufactured waste such as dry paper and paperboard from the cutting process.

**Processed Chlorine Free (PCF):** Recycled paper in which the recycled content is unbleached or bleached without chlorine or chlorine derivatives. Any virgin material portion of the paper must be TCF.

**ppb:** Parts per billion.

**ppm:** Parts per million.

**Private Label:** Paper made by a paper mill to be sold under a customer's brand name rather than the mill's. The paper may be the same as one sold under the mill brand name, or the private-label customer may require unique specifications for its paper. Examples include copy paper that carries the Xerox label, made at several different mills, and office papers that carry the Hewlett-Packard label. The private-label customer does not own or operate the paper mill, only contracts with it for paper marketed under the customer's label.

## Q

## R

**Reclamation:** Restoration of materials found in the waste stream to a beneficial use that may be other than the original use.

**Recovered:** Scrap paper collected for remanufacturing into recycled paper. EPA's definition for "recovered," which is most widely accepted, does not include scrap created in the initial papermaking process, but it does include scrap created in a mill after the paper comes off the paper machine.

**Recycled:** Paper made, at least in part, from recovered scrap paper. There is no universally accepted definition for "recycled," and legal requirements vary. EPA requires postconsumer content in "recycled" papers bought by federal agencies, but FTC does not require postconsumer content in papers labeled "recycled." Most U.S. state and local governments and companies use EPA's standards, but European producers do not isolate postconsumer content.

**Recycling:** Process by which materials that would otherwise become solid waste are collected, separated, or processed and returned to the economic mainstream to be reused in the form of raw materials or finished goods.

**Renewable Resources:** A resource that can be replenished at a rate equal to or greater than its rate of depletion—i.e., solar, wind, geothermal, and biomass resources.

**Resource Conservation:** Practices that protect, preserve, or renew natural resources in a manner that will ensure their highest economic or social benefits.

**Reuse:** Using a product or component of municipal solid waste in its original form more than once.

## S

**SFI:** Sustainable Forestry Initiative, the predominant forest certification system in the United States. Nearly all mills with operations in the United States are SFI certified. SFI was originally created by the U.S. paper industry but is now independent and includes some participation of environmental and other nonindustrial groups. SFI's sustainability standards are tailored to privately owned forests, whether owned by forest products companies or by private landowners. The SFI Standards now include an optional chain of custody certification that is required when using the SFI product label.

**SFM:** Abbreviation for the generic term *sustainable forest management*, which is generally construed to mean a set of forest management practices intended to preserve the long-term health and viability of forest ecosystems. Economic, social, and

environmental sustainability are promoted by forest certification systems intended for working forests. Most forest certification systems claim to be SFM systems.

**Single Stream Collecting:** A program of collecting various types of recyclables in a single can or bin.

**Sludge:** The waste material left over after pulping and de-inking. Although some sludge is produced in the virgin papermaking process, far more is produced in the de-inking (recycling) process. Recycling breaks recovered paper down into fibers, which are sent to the paper machine for new production, and other materials, which drop into the sludge. These "other materials" include clay coatings, fillers from the previous paper, paper clips and staples, fibers too short to be made into paper, ink if it was not skimmed off in the de-inking process, and any "junk" that crept into the wastepaper bales.

**Stocking Paper:** A paper kept in current inventory by mills, distributors, and/or printers, so that it is readily available to customers. Mills should have it always available to ship to distributors. Each distributor and printer comes up with its own mix of stocking papers, so availability will vary within areas.

**Sustainability:** Practices that would ensure the continued viability of a product or practice well into the future.

**Sustainable Development:** An approach to progress that meets the needs of the present without compromising the ability of future generations to meet their needs.

## T

**Totally Chlorine Free (TCF):** Virgin paper that is unbleached or processed with a sequence that includes no chlorine or chlorine derivatives. TCF papers are a better choice than any paper that contains chlorine.

**Total Suspended Solids (TSS):** A measure of the amount of solids (especially pollutants) in wastewater.

**Truckload:** Generally refers to 40,000 pounds of paper.

## U

**Uncoated paper:** Paper without a clay (often slick) coating.

## V

**Virgin:** Paper made the first time, most often from wood pulp.

## **W**

**Web:** Many printing presses work with huge, continuous rolls of paper. Web presses are used for large printing jobs, such as large magazine runs, newspapers, or tens of thousands of brochures.

**Weight:** See Basis Weight

## **X**

## **Y**

## **Z**