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## The Paper Tread: From Need to Greed

Long time ago the need of our first ancestors to transmit words and images found their way on stone walls, clay tablets, wax-coated boards, animal hides and other media. Later, around 3000 B.C. the Egyptians began writing on papyrus reeds. Papyrus stalks were laminated into strips (as were bamboo slivers in China). Ts'ai Lun, a Chinese official, is credited with inventing the first real paper around A.D. 105 by pounding mulberry, hemp fishing nets and rags into a material that ultimately allowed the calligraphy brush to dance across a smooth surface. Rolled up scrolls remained the standard information storage unit until the codex, or folded leaf notebook, appeared around the fourth century A.D.

Paper manufacturing techniques were transferred westward when an Arab army defeated Chinese forces in A.D. 751 and captured, among its war prisoners, a few papermakers who were later set up to practice their craft in Samarkand. Papermaking abilities then spread slowly from Islamic Asia to Europe. The Middle Ages in Europe remained a time of illiteracy, finally broken by Gutenberg's 15th-century invention of movable type. The publication of the Gutenberg Bible in 1455 and the subsequent rise of mass-produced books facilitated the broad dissemination of ideas and information. This triggered a demand for paper. At that time, rags provided the main source of fibre.

In the 19th-century, French and English factory owners, struggling to overcome the power paper artisans held by virtue of their specialized knowledge, began to develop, with the help of the industrial revolution's new machine tool industries, paper machines which centralized paper-making technique in capitalist hands. The advent of tree-based pulping provided a cheaper, more readily available fibre source (still, contempt for wood-based paper was so intense among local residents that deliveries of the tree pulp had to take place at night). The discovery of elemental chlorine in 1774 and the invention of the Fourdrinier continuous sheet paper machine, patented in 1807 eventually enabled manufacturers to chemically pulp and bleach wood fibres and to drastically boost production by creating rolls rather than individual sheets.

It was not until the late nineteenth-century development of commercial techniques for pulping wood, a material which could be harvested at any time and easily stored and shipped in great volume, that the full potential of the new machine began to be realized. Conversely, once wood-based pulps had inaugurated an age of cheap, large-scale paper production in the mid-1800s, new commodities began to be developed which embedded paper use ever more thoroughly into business and household activities. Paper shirt collars, building materials and bags were soon supplemented by toilet paper, drinks cartons, nappies, fax and computer paper, and export packaging.

In its present phase, the tree-based, globally oriented paradigm came to dominate 20th-century paper production as industrial manufacturing processes and forestry methods expanded. Global paper use has grown 423% from 1961 to 2002.

By the mid-1980s, the environmental impact of tree-based papermaking surfaced to intense public scrutiny. Scientists realized that elemental chlorine, the main chemical used to separate and whiten wood fibres, combined with lignin produced dioxin, one of the most potent carcinogens and hormone

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disrupters (after incineration, pulp and paper mills are the second greatest source of dioxin and the largest source of dioxin contamination of water). Paper became associated with public health problems and the poisoning of fisheries.

The international industry responded by investing in technologies that might lead to pollution reduction. The straight substitution of chlorine dioxide (ECF process) for chlorine gas has significantly reduced but in no way eliminated dioxin pollution. Also totally chlorine free (TCF) technologies were implemented --though its market share is marginal. ECF pulp dominates the world bleached chemical pulp market with more than two-thirds of the world market share (75%), followed by the traditional elemental chlorine gas at around 20%, while TCF production maintained a small niche market at just over 5% (2002 figures).

However, new evidence shows that problems persist in either technologies. There appears to be no correlation between AOX (absorbable organic halogens, a surrogate measure of the amount of chlorinated organic compounds in pulp and paper effluent discharge) discharge levels and environmental impact in studies of specific responses of fish. In addition, other observations have documented a variety of lesions in fish sampled adjacent to a mill using sodium hydrosulphite as a bleaching agent, with no chlorine chemicals in use. Also, the concentrations of metals present in TCF wastewaters have been found to be higher than in other bleachery effluents. Overall, such studies demonstrated that while environmental improvements could be achieved by process changes --and the elimination of chlorine based chemicals was a key factor in such improvements--, effluents from all processes were toxic to some degree. Furthermore, every stage of paper production, from the cutting of trees to disposal of paper into landfills, significantly adds to the greenhouse gases in the atmosphere. All these risks are being magnified by the ever increasing scale of new mills.

One fifth of all wood harvested in the world ends up in paper, and it takes 2 to 3.5 tons of trees to make one ton of paper. On the other hand, pulp and paper is the 5th largest industrial consumer of energy in the world. Also, in some Northern countries paper accounts for nearly 40 percent of all municipal solid waste. With global annual growth forecast at 2.5%, the industry and its negative impacts could double by 2025.

All this worrying data should lead us to consider the ultimate reason of exposing the environment and the people to such risks. Is it the unavoidable cost that human society has to pay for the sake of literacy, information, culture? Or is present paper consumption linked to the modern living's disposable pattern?

In terms of the uses of paper, packaging now outweighs communication grades. Although paper is traditionally identified with reading and writing, communications has now been replaced by packaging as the single largest category of paper use. The real expansion in paper packaging has come since the 1950s with the spread of supermarkets and pre-packed food (though in some cases it is declining both as a consequence of overall reductions in packaging and as a result of substitution by other materials, notably plastics). The electronic information revolution has to date multiplied rather than replaced paper use, and a number of other factors such as advertising and food retailing also influence specific patterns of paper consumption, notably the demand for newsprint and packaging papers. The overwhelming majority of paper is used as an input to other manufacturing sectors: demand is therefore filtered via other industries and is rarely a direct response on the part of final consumers. In the USA, only 15% of paper production is bought directly by final consumers.

From the point of view of consumption, the trend is in line with the gross inequities that allow for the accumulation and centralization pattern of market globalization and a gulf separates paper

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consumption in North and South: the U.S. is by far the world's largest producer and consumer of paper. The average U.S. citizen consumes 27 times the amount of paper used each year by the average inhabitant of the South, while many African countries now consume less paper per capita than in 1975.

Consumerism and poverty live together in an unbalanced world where there is no political will to stop the wasteful over-consumption of some people and to enhance the standard of living of those in most need. Present paper (over) consumption is based on mortgaging humankind's future, and mainly to the benefit of a few corporations which control the global market through manipulation of markets, cartel agreements, price fixing and other similar practices. The size of large paper firms --the sales figures of International Paper alone rank above the Gross Domestic Product of more than 75 countries-- make them influencing political as well as economic actors whose profit-driven operations hold major responsibility in the shaping of the present environmental, social and economic crisis. Huge supermarkets and shopping centres are the new cathedrals of the modern consumer society which makes room for just an elite --28% of the world population, mainly from Northern countries, whose consumption habits have led to an unsustainable situation because of the huge consumption of water, energy, wood, minerals, soil and other resources, and the loss of biodiversity, contamination, deforestation and climate change.

Article based on information from: "Guide to Tree-Free, Recycled and Certified Papers", <http://www.watershedmedia.org/paper/paper-aconcise.html> ; "Towards Zero-Effluent Pulp and Paper Production: The Pivotal Role of Totally Chlorine Free Bleaching", [http://archive.greenpeace.org/toxics/reports/tcf/tcf.html#BIOLOGICAL IMPACTS](http://archive.greenpeace.org/toxics/reports/tcf/tcf.html#BIOLOGICAL_IMPACTS) ; "Rethinking Paper Consumption", Nick Robins and Sarah Roberts, International Institute for Environment and Development (IIED), <http://www.iied.org/smg/pubs/rethink3.html> ; "Paper Cuts: Recovering the Paper Landscape", Janet N. Abramovitz and Ashley T. Mattoon, World Watch Paper 149, December 1999 ; "Trends in World Bleached Chemical Pulp Production: 1990-2002", [http://www.aet.org/reports/market/2002\\_trends.pdf](http://www.aet.org/reports/market/2002_trends.pdf) ; "La sociedad de consumo", José Santamaría, World Watch, <http://www.nodo50.org/worldwatch> , e-mail: [worldwatch@nodo50.org](mailto:worldwatch@nodo50.org) , sent by the author; "The Pulp Pollution Primer", Delores Broten and Jay Ritchlin, Reach For Unbleached! Foundation, <http://www.rfu.org/PulpPrimer.pdf> ; "Paper Consumption Statistics", <http://www.njheps.org/drewpp.ppt>