



## Paper recycling patterns and potential interventions in the education sector: A case study of paper streams at Rhodes University, South Africa

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### ABSTRACT

This paper considers the use of paper by academics and student computer laboratories at Rhodes University as a basis for identifying areas to reduce the amounts used and increase rates of recycling. A sample of 50 academic staff monitored the volume and purpose of the paper they used over 5 months, and the procurement officers in all the academic departments were interviewed regarding the total amount of paper used per academic department. Mean use was  $34 \pm 20$  new sheets of paper per working day, of which 3% were trashed, 15% were kept for later use (as scrap or printed on the opposite side) and 79% were given out as notes to students, filed as records or posted out as mail to other departments or institutions. There was a significant relationship between number of students served by a department and the overall demand for paper, as well the number of staff per department and the number of recycling bins. The university could save approximately US\$ 7000 per year for every 10% reduction in current use of paper (12,784 reams/year). Reduction in paper usage could be achieved through an increase in re-use of paper, printing handouts for students on both sides of each sheet of paper and by investing in printers that are capable of printing on both sides of a sheet of paper. Double-sided printers are only 20–25% more expensive than single-sided ones, but will potentially reduce paper usage by half. A 40% reduction would save the university approximately US \$ 20,000 per year in direct costs, and more in reduced waste streams, as well as help promote the environmental image of the university. On a per unit basis, the higher costs for a double-sided printer in offices would be repaid in 9 months or less through reduced paper use.

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### 1. Introduction

Paper is mainly produced from pulpwood and sometimes from recovered paper. In South Africa, plantation forestry is a significant economic sector based on commercial forests of exotic species, with significant negative impacts on biodiversity and water (Armstrong et al., 1998). The plantations cover 1.1% of the land surface and over the last few decades have focused on pulpwood production (Genesis, 2005). This is mainly due to the strong demand for paper and paper products on local and international markets (Genesis, 2005). Consumption of paper in South Africa increased by 125,000 tons to 2.1 million tons from 2004 to 2005 (PAMSA, 2006/7). In the year 2006, 1,056,000 tons of printing and writing paper were produced in South Africa of which 56% (587,000 tons) was consumed domestically and the rest exported (PAMSA, 2007). However, increasing environmental consciousness, and limited areas for expansion of the plantation forestry sector due to the general aridity of South Africa, means that paper use must become more efficient. In addition, many countries, including South Africa,

have adopted the principles of the waste management hierarchy and have set ambitious targets for recycling and for reduction of the volume of waste requiring disposal in landfills. The promulgation of the National Environmental Management: Waste Management Bill into South African legislation towards the end of 2008 will strengthen this position. Recycling is one strategy widely advocated to increase efficiencies and to meet the targets for waste reduction.

Several studies internationally have examined on use and recycling of waste paper. Ervasti (1999, cited in Li and Liu (2000)) investigated the recycling and alternative uses of waste paper in a world review. He concluded that using waste paper as an energy source creates a more stable waste paper market and may put an end to the wild fluctuations in price. An economics analysis of paper recycling in comparison to wood as raw material, done by Pati et al. (2006), revealed that paper recycling is an economical alternative to wood as a raw material. Schmidt et al. (2007) assessed the hierarchy of waste in Denmark and compared the present situation with scenarios of more waste being recycled, incinerated or consigned to landfill. They concluded that incineration of paper was a better disposal option than landfill, because incinerators provide heat and electricity, and also save wood resources. Masson et al. (2004) cross-contamination analysis of waste at Massey University (New Zealand) showed that an improved waste separation perfor-

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mance could increase the recycling rate. Optimal source separation has also been shown to minimise the energy and labour inputs to any downstream sorting process, reduce health hazards associated with the sorting of mixed refuse, lower recycling costs and provide opportunities for innovation (Murray, 1999).

### 1.1. Necessity for environmental management at tertiary institutions

A total of 737,472 students were enrolled in public higher education institutions in South Africa in 2005 (Department of Education, 2006). With regard to their waste generation and consumption of energy and materials, universities are therefore comparable to large commercial concerns (Viebahn, 2002). The waste and material consumption could be reduced considerably by the systematic implementation of environmental management principles and systems, and the majority of waste produced by tertiary education institutions is recyclable (Armijo de Vega et al., 2003).

However, the necessity for universities to become more involved in environmental protection should not be guided by financial arguments alone: universities make a significant contribution to the development of society through training professionals and decision makers, and therefore have a special societal responsibility, in particular with regard to the sustainable protection of the environment and the use of resources (Alabaster and Blair, 1996; Viebahn, 2002). Universities' environmental management projects or the adoption of environmentally sound technologies can encourage other public institutions to act, thus making the universities role models. It is further stated in the third Point Action Plan of the Talloires Declaration 2005, that the universities must: "*Educate for Environmentally Responsible citizenship: Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and have the awareness and understanding to be ecologically responsible citizens*". Rhodes University is a signatory to the Talloires Declaration.

Examples of environmental protection measures can be seen at most universities (Alabaster and Blair, 1996), but professional environmental management systems which are efficient enough to reduce utilisation of resources are often lacking (Mbulungwe, 2002). Rhodes University has developed an environmental policy that was ratified by the University Senate and Council in 1998 (Rhodes University, 1998), but implementation is lagging. Amongst the aims of the policy are (i) to provide opportunities for students to study campus and local environmental issues, and (ii) to reduce campus waste (Rhodes University, 1998). As part of the policy objectives, the University committed itself to improve its management of both general and hazardous waste produced on campus by adopting a purchasing policy sensitive to environmental concerns and by using recycled products wherever feasible. The policy encourages students to play an important role in the implementation, maintenance and assessment of the environmental policy. Lastly, the University management will continue to uphold the University's responsibility as a signatory of the Talloires Declaration (Rhodes University, 1998).

### 1.2. The case study institution, Rhodes University

Rhodes University is located in Grahamstown (33° 18'26.9"S; 26° 31'10.3"E) in the Eastern Cape of South Africa. It has a student enrolment of approximately 6200, making it the smallest university in South Africa. Approximately 24% are postgraduates and 25% are international students. Almost 50% of the students live in the university's residences. Rhodes University has 327 academic staff members and 951 administrative and support staff. The university has six faculties, 12 administration and support

divisions and 40 academic departments. Most of the students are reregistered on a full time basis. As mentioned above, the university is a signatory to the Talloires Declaration and has an environmental policy which is reviewed every 3 years. However, implementation is weak due to the absence of a designated staff post responsible for environmental issues. There is a waste management system for toxic and hazardous waste, but not for general waste streams. There is no centralised and promoted system for recycling; but the university will set aside paper for a local recycling company if individual sections and departments separate at source.

Paper products make up a large proportion of the solid waste generated by universities, due to their educational and academic endeavours. Generally, paper and paper products are regarded as cheap products and are often undervalued as waste products. Because of this, much paper is wasted with minimal re-use. This project was aimed at examining streams of paper use at Rhodes University, as a basis for identifying areas to reduce overall demand of paper and to increase recycling. It points out what could be done to reduce the amount of paper used and to contribute to the environmental management in general. It considers the hypothesis that Rhodes University can make meaningful financial savings through efforts to manage paper streams and promote re-use. The word "paper" used in this document refers to the fine paper, which is mainly used for printing and photocopying.

## 2. Methods

### 2.1. Data collection

#### 2.1.1. Individual academic staff

Seventy academic staff members were randomly selected from the total staff list, and invited to participate in monitoring their own paper use. This was to be done by simply ticking off how many sheets of paper, both new (clean) and old (already used on one side) they used on selected days, and what they actually did with those sheets, i.e. the number filed, re-used, stored for later re-use, trashed, posted, handed over to someone else (e.g. student notes). It was clarified in the invitation to participate that they would be required to monitor their paper use for two randomly selected days per month between May and September 2007, making up 10 recording days. After 2 weeks, only eight of the respondents agreed, 10 said that they are either busy or unwilling to take part, the rest failed to respond. Consequently, a second round of sampling was conducted; 130 people were selected and then a similar invitation to participate in the study was sent. After 3 weeks, 17 of the 130 people agreed to take part in the project, 20 said they are not able to take part and the rest did not reply. This low response rate in itself indicates that paper recycling has a low level of support amongst the academic staff, and that possibly those who did agree represent a biased sample, and thus the paper incidence and volumes of paper recycled as reported in the results, are probably overestimates for the university as a whole, meaning that a sustained recycling initiative would have potentially larger benefits and savings than reported here.

From the two rounds of sampling, 25 people agreed to participate. The recording days were then randomly selected; 2 days a month from May to September. A reminder e-mail (with a recording sheet attached) was sent 1 day before each recording day, and the recording sheets were collected the day after the day of recording.

#### 2.1.2. Secretaries and administrative assistants in academic departments

The secretaries or administrators of all 40 academic departments were interviewed. Each one was sent an e-mail a week before the visit informing them about the visit as well as the aim of the

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