

The Sustainability of Paper: A Campus Tree Walk Brochure Case Study

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Abstract: The use of paper has been a topic of environmental contention for many years with many people being told to limit their paper use all together. In this research, a case study of a paper brochure made from FSC Certified Mix paper illustrating a Campus Tree Walk on the SUNY New Paltz was conducted to get a better idea of the sustainability of paper. Main questions asked include, are FSC Certified Mix paper products carbon neutral, how does the paper choice affect the exogenous/endogenous carbon cycle, what percentage of the United States' wood product production is printing papers? After reading the FSC Forest Management Standards and researching the US production of wood and paper products in 2018, it was determined that FSC Certified Mix paper can be considered carbon neutral and reduce emissions associated with non-recycled paper products, and the paper used to produce the brochures makes up a small portion of the US total wood product production.

Keywords: Environmental Geochemical Science, paper, SUNY New Paltz, sustainability, campus tree walk, FSC Forest Management Standards, FSC Certified Mix paper, sustained yield, exogenous carbon sources, endogenous carbon sources, recycled paper, carbon neutral, brochure

Introduction

One of the major ways people have been told they can be more environmentally conscious is by switching from paper to electronic media sources. Many people have made this switch with little consideration of why this switch is being made or if this switch could have effects on how information is received. This research project was inspired after the creation of an educational brochure that outlined a Campus Tree Walk on SUNY New Paltz's campus was decided to be available to the student body and other people participating in the tree walk as an electronic media source rather than a printed brochure. This brochure includes a map of campus and marks locations of trees included in the tree walk with information on how to identify them. While this educational environmental brochure is currently only available as an online source, a few paper copies of the brochure were printed from Forest Stewardship Council (FSC) certified "Mix" paper. The FSC explains products certified as FSC Mix are products that are made from a mixture of materials sourced from FSC-certified forests, recycled materials, and/or FSC-controlled wood ("What the FSC Labels Mean: Forest Stewardship Council"). Therefore, the brochures printed were printed on paper that was produced from both recycled paper and non-recycled paper.

Using the Campus Tree Walk brochure as a case study, the availability of FSC Mix paper to print the brochure leads to the question: What is the carbon cycle impact of a paper brochure? In order for paper to be carbon neutral, three different elements may need to be considered, including sustained yield, whether old growth trees or young growth trees are being used, and exogenous and endogenous carbon sources involved in the paper production process. Sustained yield refers to how crops are harvested. When sustained yield is considered by forest management operations, the number of crops that harvested does not exceed the number of crops harvested that would result in harm to the future production of the crop, which in this case refers

to trees. Ideally, trees being harvested for paper production would be young-growth trees rather than old-growth trees, which are defined as trees that are old in age or trees that have never been harvested. When determining the carbon neutrality of paper/paper production, the endogenous and exogenous carbon sources throughout the process also need to be taken into account. Exogenous carbon sources come from either external carbon inputs or from instances where recycling of paper is used in the paper production process, which may reduce the concentration of carbon produced throughout the process, while endogenous carbon sources comes from internal carbon inputs. The idealized paper production process for paper that is carbon neutral is seen represented by Figure 1.

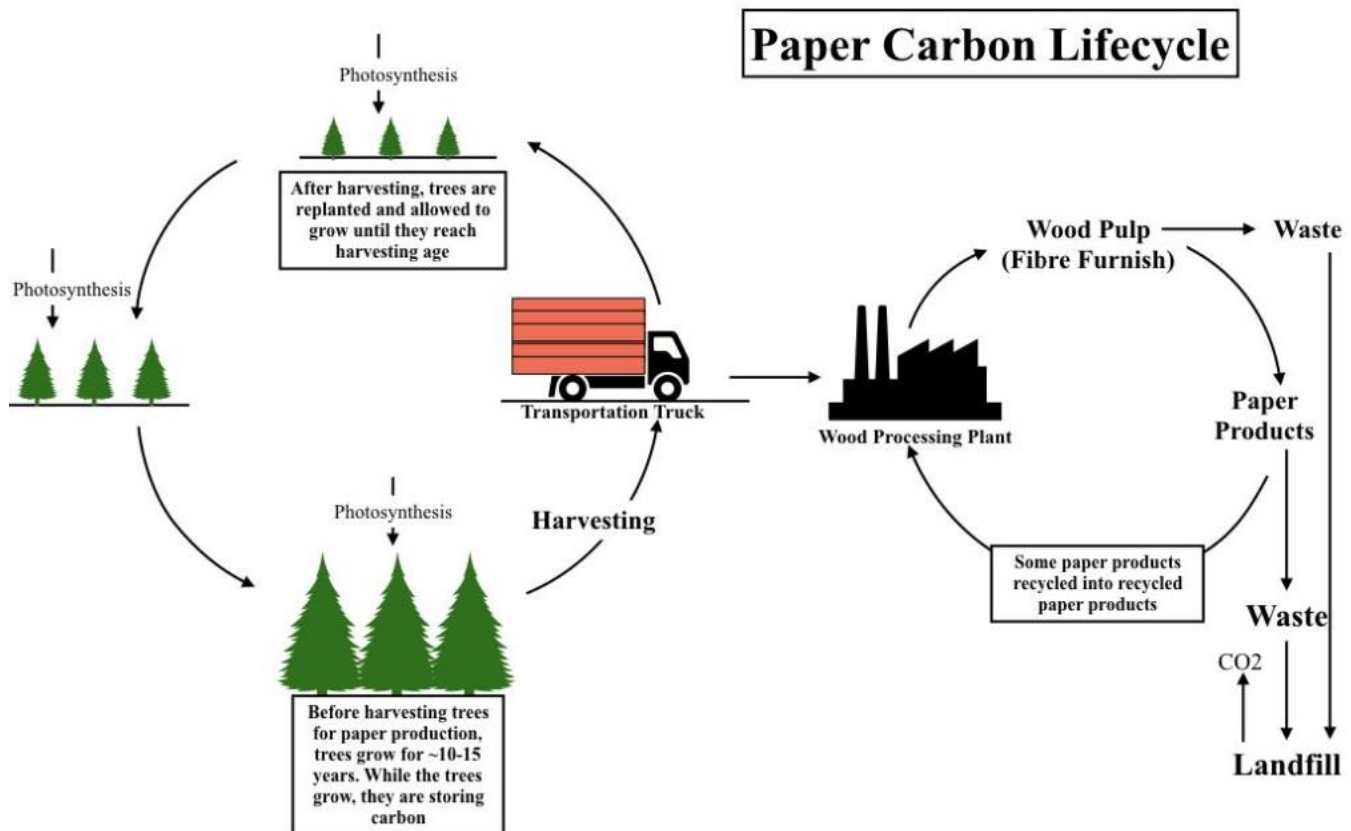


Figure 1: Idealized endogenous carbon cycle diagram for paper production

The use of the brochure as a case study also leads to the question: What percentage of the United States's wood product production is printing papers?

Methods

Research was conducted to answer the two questions: What is the carbon cycle impact of a paper brochure? and What percentage of the United States's wood product production is printing papers?

Initial research to answer the first research question began by reading the FSC Forest Management Standards to learn about the process that is involved in certifying "sustainable" paper, like the FSC Mix paper that the brochures were printed on. This document helped in the creation of a carbon cycle diagram for the paper production process. After this document was read, the majority of the research that went into answering the more refined research questions took place.

Then research was focused on answering the second research question: What percentage of the United States's wood product production is printing papers? This next step of research required researching the different type of wood products produced from harvested trees and finding out what percentage of wood products is paper. This data was found in the Food and Agriculture Organization of the United Nations 2018 Global Forest Products Fact and Figures. Wood product production amounts was explicitly given for the majority of the wood products, however data for Fiber Furnish and Paper and Paperboard had to be estimated from Figures 12A and Figure 16A provided by the document ("Global Forest Products Facts And Figures"). After this data was collected, it was recorded into Microsoft Excel. Data conversions then took place to convert the wood product production amounts from cubic meters into million tonnes in order to ensure that data remained consistent throughout the research. The conversion factors used were provided by forestresearch.gov.uk. Conversions were done for wood fuel, industrial roundwood, sawn wood, and wood-based panels. The conversion factors were stated clearly for the majority of the wood product types, except for wood-based panels. This conversion was calculated by using the conversion factor for "Veneer sheets," which was inferred to be the same as wood-based panels ("Conversion Factors"). In order to determine where paper products fall in wood product production, definitions of each category provided by the source needed to be learned as well.

Once the 2018 data was collected for US wood product production, data was collected for the 2018 US production of paper product production. This data was provided by the Food and Agriculture Organization of the United Nations through an online database that requires users to select the country that they are looking for data from, the type of data that they are looking for, and other important information that helps the database in providing the wanted information. Conversions for this data were not needed, as this data was already provided in tonnes. This data was also recorded in Microsoft Excel.

Once data was collected for wood product production and paper product production, bars graphs were created to represent the data using Microsoft Excel. Both graphs were sorted based on the greatest amount of each produced to the lowest to allow for the graphs to be easily read. Data on the graph that was pertinent to the research were colored red to make the graphs easier to read and follow.

Results

Based on reading the FSC Forest Management Standards, paper can be considered carbon neutral. One of the major principles included in this document is Principle 5 entitled “Benefits from the Forest.” This principle states that, “Forest management operations shall encourage the efficient use of the forest’s multiple products and services to ensure economic viability and a wide range of environmental and social benefits” (Forest Stewardship Council® – United States 23). This principle is made up of many different indicators that the forest management operation should follow, including one that states that the rate of forest harvests should not exceed rates that take into account the sustained yield harvest. The FSC defines “sustained yield harvest” as, “harvest levels and rates that do not exceed growth over successive harvests, that contributes directly to achieving desired future conditions, and that do not diminish the long term ecological integrity and productivity of the site” (Forest Stewardship Council® – United States 27). The FSC will not certify forest management operations that harvest more trees than it should, preventing harm to the forest and hopes for the forest’s future conditions.

“Fibre furnish” and “Paper and paperboard” made up about 2.6% of the United States’s production of wood products in 2018 (Figure 2)(“Global Forest Products Facts And Figures”).

The Food and Agriculture Organization of the United Nations defines fibre furnish as “the fibre used to manufacture paper and paperboard...this includes recovered paper (wastepaper), other fibre pulp and the wood pulp used to make paper” (“Global Forest Products Facts And Figures”). Paper and paperboard is defined as “graphic papers (newsprint, printing and writing paper) and other paper and paperboard” (“Global Forest Products Facts And Figures”). Based on this definition, the paper used to print the brochures is assumed to fall under fibre furnish and paper and paperboard.

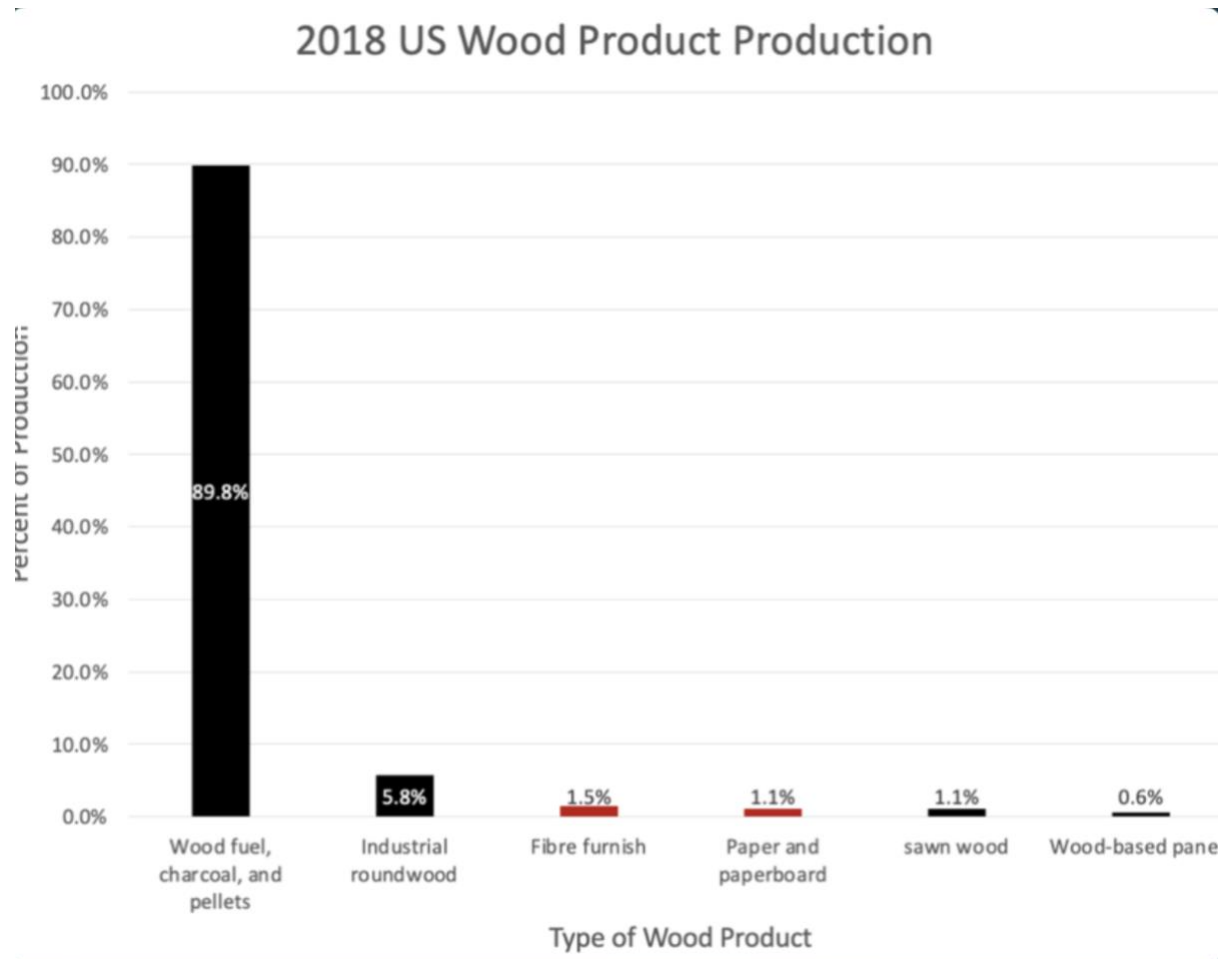


Figure 2: Graph of 2018 US Wood Product Production. Relevant information to this research is color coded red (“Global Forest Products Facts And Figures”)

Among the 2.6% of paper products produced lies printing and writing papers, which make up 11.9% of 2018 US paper product production (Figure 3)(“Forest Production and Trade”). The printing and writing paper category can be further broken down into coated printing and writing papers (37.5%), uncoated and wood-free printing and writing papers (55.8%), and uncoated and mechanical printing and writing papers (6.7%)(Figure 4). The paper used for printing brochures is best classified as coated printing and writing papers, therefore brochures

made up approximately 38% of the printing and writing papers produced in 2018.

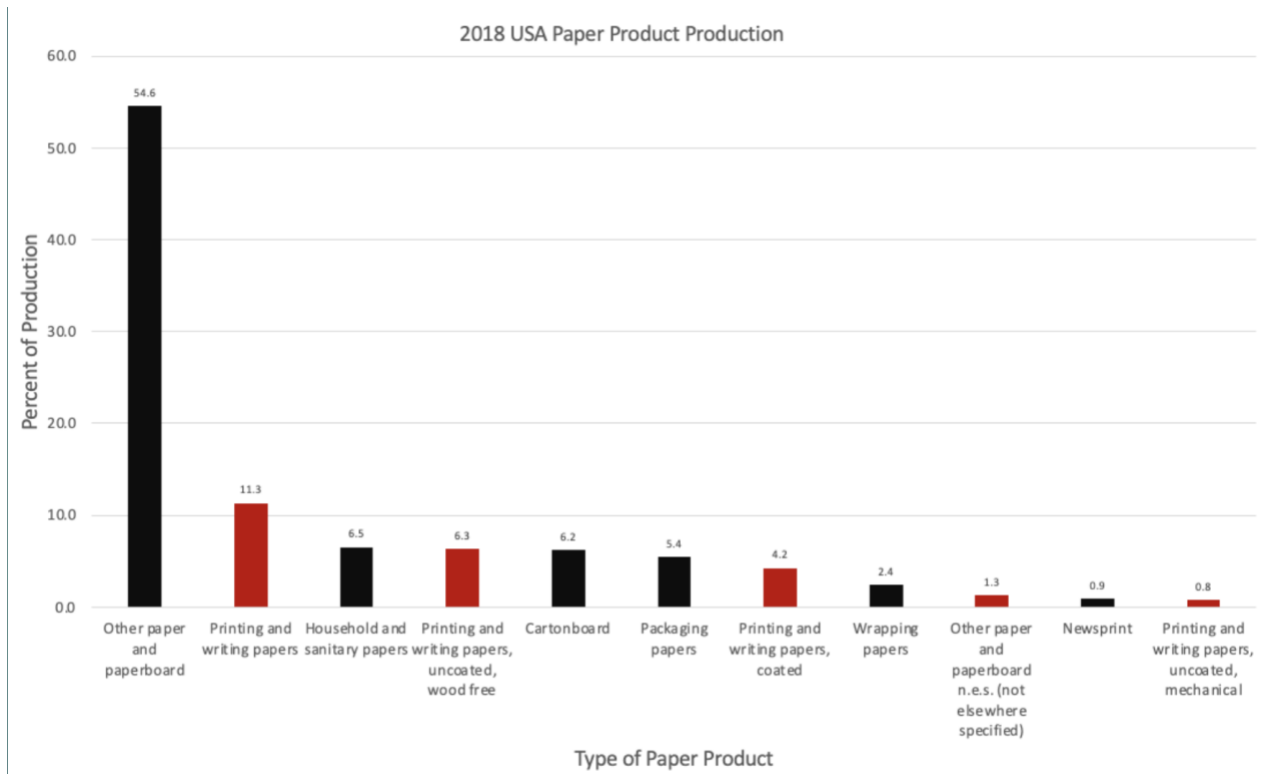


Figure 3: Graph of 2018 US Paper Product Production, relevant information to this research is color-coded red (“Forest Production and Trade”)

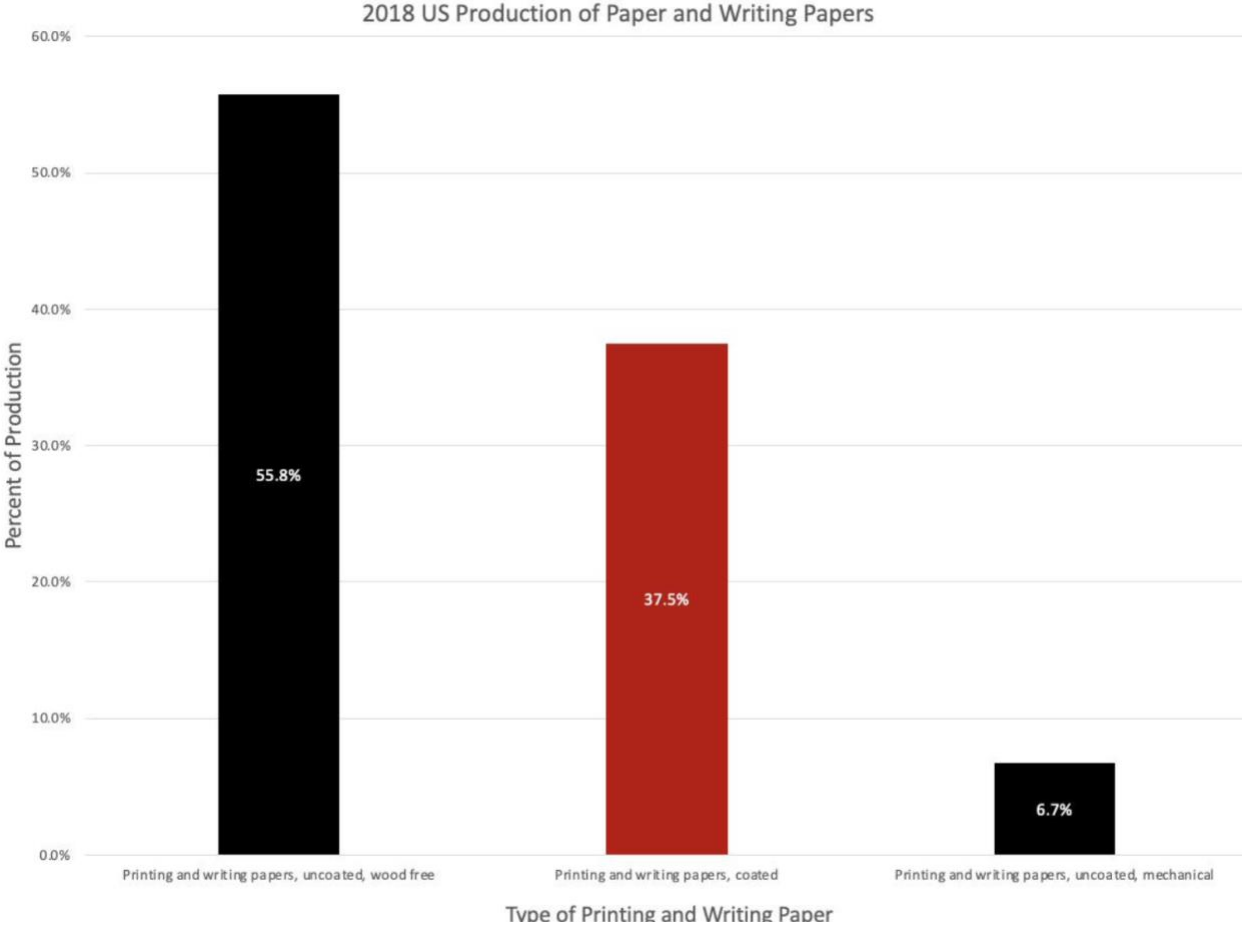


Figure 4: 2018 US Production of Paper and Writing Papers, relevant information to the research is color coded red (“Forest Production and Trade”)

Discussion

Research conducted during this project was done in response to the decision to provide educational brochures for a Campus Tree Walk on SUNY New Paltz's campus via an online source rather than a printed brochure. Using the brochures as a case study, research was centered around answering the two questions: What is the carbon cycle impact of a paper brochure? and What percentage of the United States's wood product production is printing papers?

The FSC Forest Standard Management document allowed the first question of the research to be answered, showing that paper production can be carbon neutral based on endogenous carbon sources. Along with ensuring that forest management operations are engaging in sustained yield practices, the FSC shows great interest towards preventing the harvest of old-growth trees, forests that are simply old in age or that have never been harvested, found under Principle 6 of the FSC Management Standards. The FSC prevention of the harvest of old-growth forests allows paper to be considered carbon neutral, paper production did not result in a net increase of carbon into the atmosphere. Paper can be considered carbon neutral, because the trees being harvested for paper were grown for 10-15 years prior to being harvested for paper production (Figure 1). This indicates that the carbon being released was utilized by the tree recently. In contrast, if paper was produced from old-growth tree harvest, the carbon released had been carbon used by the tree for its natural, biological processes for an extended period of time, which would likely result in a net increase of carbon into the atmosphere.

The paper that the brochure was printed was from FSC certified mix paper, meaning that the paper was produced from both recycled paper and non-recycled paper. Paper is also carbon neutral, because it can be recycled—not all paper produced and used will end up in the landfill. In 2017, approximately 22 million tonnes of paper ended up in landfills, which was a 14 million decrease from the year prior (LeBlanc). Since recycled paper pulp is used to produce more paper (Figure 4), the amount of trees being harvested for paper is not as high as it would be if all paper was created from non-recycled, newly harvested trees.

Information provided by the Forest and Agriculture Organization of the United Nations answered the second research question, What percentage of the United States's wood product production is printing papers? Based on the research, we found that brochures, which fall under

in printing and writing paper production, made up 11.9% of the United States's total paper production in 2018. Printing and writing papers are produced from the wood products fibre furnish and paper and paperboard, which made up 2.6% of the United States's wood product production in 2018. Within this 2.6% of paper products from wood lies 11.9% of printing and writing paper production. This category was further broken down into three separate subcategories, including uncoated and wood free printing and writing papers, coated printing and writing papers, and uncoated and mechanical printing and writing papers. Brochures are likely printed on coated printing and writing papers, which is defined as, "Paper that has a surface coating added for the purpose of improving the appearance and printing surface" ("Printing and Writing Papers"). This data shows that the effect of brochures on the environment is extremely low, since they make up an incredibly small portion of the United States's wood product production in comparison to other wood products, like wood fuel which made up approximately 90% of the United States wood product production in 2018 ("Global Forest Products Facts And Figures").

Research also showed that paper can be considered carbon-neutral product as a result of the extremely thorough FSC certification process and the carbon cycle as it relates to paper production. The FSC Forest Management Standards from 2018 provides the forest management requirements/principles that small tree farm businesses/forest management units must follow in order to achieve FSC certification.

Initial research of paper production focused mainly on the endogenous carbon cycle. Future research will be focused on the exogenous carbon cycle as it relates to paper production, and learning about the CO₂ emissions from paper products and the energy use required by paper production.

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