

Reviewer 1

Comments and Suggestions for Authors

The article presents research describing the potential carbon sequestration capacity of forests.

The location of the study was South Korea. This influences the selection of species considered in assessing carbon absorption.

Abstract

Separate descriptions of the purpose, method, results and conclusions are redundant. The description of the purpose and methods is correct, but (4) the results are redundant if it is the conclusions that provide the primary information for the reader.

[Answer] (Revision Completed) I have revised and supplemented the overlapping parts of the conclusion and results in what you said. Thank you so much for your Sincerely comments.

(Additional inserted sentence) 3. Results and Discussion

“Based on these results, we compared and analyzed them from two aspects. First, when compared with the statistical data of the Ministry of Environment's Greenhouse Gas Information Center, it was confirmed that the forestry sector sink, which had been offset by more than 6.26% as of 2019, could be changed by up to 8.74%. Second, when analyzed within the scope of this study, it was confirmed that the comparison value between the maximum and minimum sinks could increase by up to 36% depending on the forest management method. In addition, among the research data mentioned in the text, there is a result that pine trees absorb 11.0 tons of CO₂ per ha per year, and the sink offsets the greenhouse gases emitted by 5.7 passenger cars per year. When the maximum comparison value of 17,996,977 t CO₂ ha⁻¹ of carbon sinks is combined with the greenhouse gas offset effect of passenger cars, the conclusion is that it offsets the greenhouse gases emitted by approximately 9.32 million passenger cars per year. This is a figure that can offset more than 37.43% based on the 24.91 million domestically registered automobiles as of the end of 2021 announced by the Ministry of Land, Infrastructure and Transport. It is judged that it will be difficult to achieve the carbon sink target unless various interpretations and models for long-term renewal scenarios such as this study are developed in the forestry sector in the future. The major issues that have been recently debated in forest management are the extension of age ranges and the preservation and maintenance of forests from logging or deforestation, but this is far from the actual development and cultivation of forest resources. It is realistically impossible to increase carbon sinks with only small-scale forest management activities such as thinning and mowing. In order to continuously strengthen and increase carbon absorption capacity, forest circulation management should be strengthened based on expanded afforestation projects and planted tree species. By planting, cultivating, and harvesting tree species sustainably and utilizing them, added value such as the environment (carbon sink) and the economy (stable wood production) should be stably created. To do so, it is necessary to implement a more strategic approach, such as long-term afforestation, age reduction, and systematic logging systems in line with the circular economy. The important implication of this study is to maximize the utilization value of forest resources focusing on carbon sinks more efficiently.”

Keywords : The keywords are too elaborate. I suggest instead of Representative species of afforestation; insert “**natural species**”. Instead of Long-term carbon uptake; simplify and state “**CO₂ uptake**.”

[Answer] (Revision Completed) I have revised some of the keywords as you mentioned.

(Before) (1) “**Representative Afforestation Species**”, (2) “**Long-term Carbon**”

(After) (1) “**Natural Species**”, (2) “**CO₂ Uptake**”

Introduction

The authors have described the state of forests in South Korea very well. They pointed out the problem of CO₂ emissions and the changing capacity of forests to absorb them. It is very good that the authors pointed out the changing CO₂ absorption capacity of older forests. They pointed out the influence of species on the ability to absorb carbon. The authors referred to European forest management. There was a lack of indication of native species playing a key role in the counters of South Korea

[Answer] (Revision Completed) As you mentioned, I changed the location of [fig. 1.] for Korean afforestation species, and through this, I supplemented the additional information on coniferous and broadleaf tree species as follows.

(Additional inserted sentence)

"In South Korea, seven representative species are planted and managed according to the climate and terrain. These include five species of broadleaf trees, two species of coniferous trees, as well as mixed forests. These were selected as the research subjects."

Methodology

The exact tops assessed and verified were shown. Species present in the plot (dominant) were indicated. Representative species were selected. Are the CO₂ uptake data supported by other documents besides the National Institutr 2019? The method for assessing forest regeneration is briefly and precisely described . Scenarios of regeneration in years are presented. Scenarios of regeneration in years are presented. What is the breakdown of changes in CO₂ uptake for different species lacks information on the method of assessing species and possible labeling of these scenarios which would facilitate comparison of results.

[Answer] (Revision Completed) I have changed the diagram [Fig. 2.] to classify conifers and deciduous trees in more detail, and have supplemented the related content in detail in the text. Thank you.

Results and discussion

The results are presented in an unstructured manner, the results are described well, but the presentation in tables and graphs is not very clear. Discussion weak. Reference to dawn literature is missing.

[Answer] (Revision Completed) I have revised the graph as you mentioned and strengthened the discussion throughout the main text. Thank you.

Conclusions

Conclusions supported by results .

Indicators of the value of changes in CO₂ absorption are missing

[Answer] (Revision Completed) As you mentioned, I have supplemented the content on the value of CO₂ absorption changes in the conclusion. Thank you for your comment.

(Additional inserted sentence)

[1] "There is a limitation in not being able to reflect the dynamic stand growth changes under climate change scenarios (such as RCP, SSP, etc.) considering factors like temperature and precipitation."

[2] "To successfully execute the afforestation after harvesting timber without delays, a systematic seedling system should be in place. Additionally, efforts should be made to maximize carbon storage and the substitution effect of carbon-intensive materials by prioritizing the use of timber produced for long-life span, high-value purposes such as wooden construction and furniture."

[3] "Efforts should be accompanied by prioritizing the use of wood produced through species renewal for long-life, high-value-added applications such as timber construction and wooden furniture, in order to maximize carbon storage and the effect of substituting carbon-intensive materials."

[4] "This study is expected to be used as basic data for establishing detailed implementation plans for the forestry sector based on scientific evidence to carry out carbon neutrality policies. In the future, we aim to develop an integrated forecasting model that incorporates forest dynamic growth models, forest disasters such as wildfires, and trends in wood utilization, in order to predict more accurately the changes in forest carbon absorption."

"Thank you once again, dear reviewer, for your thorough examination."