Reforestation on a global scale. Is it the best tool available to limit the magnitude of climate change?

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Introduction

Reforestation has been proposed as a fundamental tool in the fight against the climate emergency, and there are good reasons for this. Most of us have participated in emissions offset campaigns based on planting forests (or avoiding deforestation). However, the role of forests in climate change is complex, and the implications of increasing forest area on a large scale are multiple and not always well understood. For this reason, and also because of some probably overly optimistic estimates about the potential role of reforestation, these proposals are not free from controversy. The intention of this 'debate' is to delve into the arguments for and against the use of reforestation on a global scale as a tool to limit the magnitude of climate change, to better understand its potential and limitations.

Development of the debate

The activity must start by watching the introductory video. This can be done under the supervision of the instructor (in the class) or by the student outside the classroom. We recommend that students have enough time (for example, two weeks) between watching the video and the presentation they will have to prepare, and that they have access to the video and the bibliography provided at the end of this document to have them as support throughout the process.

The debate should take place in the classroom, in person, and we recommend that, as long as the number of students allows it, they work in groups of approximately 4 people. Each group must prepare a presentation (for example, using a Power Point slide support) related to one or more of the aspects (positive

or negative) associated with the potential of reforestation as a tool to limit the magnitude of climate change. Both the aspects discussed in the video and different elements identified by the instructor or students may be included (see the list of possible questions or additional activities to develop to guide the debate provided below). Prior to the debate in the classroom, each group will be randomly assigned a position in relation to the potential of reforestation in the fight against climate change (for or against). The corresponding presentation should emphasize the arguments that support this positioning.

The debate session should last about 2 hours, and each presentation should last approximately 10 minutes, leaving 15 minutes maximum for each group's debate with the rest of the class. Therefore, a 2-hour session can accommodate a maximum of 4 presentations. If, due to the high number of students, some groups cannot present, we recommend that the identity of the groups that present orally be determined at random on the same day of the debate. All groups must submit the presentation document prior to the day of the debate (preferably in a pdf file to avoid formatting problems), for evaluation by the instructor.

The instructor should guide the session as appropriate (see the list of possible additional questions or activities to develop to guide the debate provided below, which can be posed during the debate or prior to it). Instructors can choose to ask the different groups to make general presentations arguing the reason for their position, or distributing specific aspects between groups depending on their preferences (but avoiding that all groups choose very similar aspects and therefore the resulting debate is very limited in terms of content).

The references provided below allow to delve deeper into the different aspects covered in the introductory video. As the scientific bibliography is extensive and more knowledge is periodically added to scientific repositories, we encourage students to search for other relevant works, both older and newer those mentioned here. This can be done by using keywords in specialized scientific literature search engines, such as Google Scholar, or by searching directly among the articles that are cited by the articles we contribute below, or that have subsequently cited them (this last option is also available in the most specialized search engines). Finally, we encourage instructors to positively evaluate this

additional search for bibliography and the consideration of aspects that go beyond those presented in the introductory video.

Some additional questions or tasks to guide the discussion

- Bastin et al. (2019) estimate that reforestation could store up to an additional 205 Gt of carbon, but many subsequent works lower that figure and contextualize it. What would be a more reasonable value of the potential of reforestation to increase carbon storage on a global scale and what would be its expected variation over time?
- How could risks from different types of disturbance be integrated into estimates of the potential of reforestation to increase carbon storage?
- What is the role of forest soils? How should they be introduced into the debate?
- Do you think that increasing the forest area always contributes to increasing biodiversity? Can you give an example of the opposite? What elements must be taken into account to answer this question?
- What criteria would you use to determine which forests are restored and where?
- What additional elements do you think should be taken into account in this debate?

Basic bibliography

(mostly cited in the video)

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