

Tree planting/Afforestation

What is it?

- The process of planting trees in order to remove carbon from the atmosphere

How does it work?

- Trees/plants store and remove carbon through the process of photosynthesis and carbon can also be stored in trees for long periods of time (hundreds and thousands of years) making this technology sustainable

formula for photosynthesis;



Carbon dioxide + water \longrightarrow glucose + oxygen

- The most successful types of biomes (large ecosystem = plant and animal community) are tropical rainforests, grasslands and savannah (mixed woodland and grassland)
 - The Amazon rainforest is one of the largest (organic) carbon stores globally and sequesters (removes carbon dioxide) nearly 17% of the planet's carbon.

Benefits of this technology:

- **Impacts are seen straight away** – shortest temporal scale compared with other carbon removal technologies
- **Low cost** - tree planting costs are low (for implementation and management/upkeep) – costs could be as low as under 30\$ per tCO₂ to sequester 1.2 GtCO₂, making this technology ideal as it's effective, the positive impacts it has are nearly instant, it's sustainable and readily available
- **Can be used globally** - this carbon removal technique is used widely around the world, and is effective, especially due to its low cost, making it particularly beneficial in developing countries that may not have sufficient resources for developing and implementing high cost carbon removal technologies
- **Spatial impact** – works well regionally and potentially nationally reducing anthropogenic (human induced) climate change, and can decrease temperatures within regions where the technology has been implemented

Other benefits:

- Have other benefits too including, increased biodiversity, lowering flood risks (through higher interception and infiltration) and increasing the quality of soil
- depending on the scale of the afforestation (tree planting). In order to have a positive impact globally large-scale tree planting would need to be put into place around the planet

Negatives of this technology:

- **Efficiency varies seasonally** - during cooler/winter months less photosynthesis occurs (as there's less sunlight, something required for this process to occur). This results in the atmospheric carbon volume increasing, and this technology becoming less effective for a significant proportion of the year
- **Potential damage** – trees could become damaged through means such as, deforestation, drought or wildfires which would significantly reduce the efficiency of this technology and could worsen the climate crisis
- **Scale** - to achieve the maximum effectiveness, tree planting should occur on a large scale. This is something that requires high volumes of space. This may not appeal to some (e.g. farmers) as land used for afforestation cannot be used for other purposes such as farming, something that's increasingly demanded due to the increasing global population size. It therefore may occur in huge food security issues, particularly in a warming world
- **We don't understand trees**- we don't really know the overall balance of greenhouse gases trees remove. Studies have suggested trees may actually release certain greenhouse gases called methane and volatile organic compounds
- **Saturation**- trees take ten years to reach maximum efficiency, and after they have reached at maximum efficiency, the amount they remove starts to reduce hugely, until, after a rather short amount of time, they actually do very little removal at all, as they have been saturated
- **Permanency**- trees don't permanently store CO₂, and therefore, can release all the CO₂ they have removed back into the atmosphere if conditions are right for that to happen. This makes their efficiency very questionable