Forest dynamics may reduce the role of Forests as 'Carbon sink'

Capturing the atmospheric CO_2 , fixing the carbon in plant biomass and translocation back to soil is the most economic way of sequestering excess carbon in the atmosphere. Consequently, carbon management in forests is regarded as an important strategy in the context of green house emission effects and fluctuating climatic conditions. A recent study on the impacts of forest disturbances in southern forests in United States has revealed that forest dynamics and land use changes strongly influence the accumulation of carbon. The study is the first of its kind to isolate the impacts of forest disturbances such as fire, disease, and tree cutting as well as land use changes (either decrease or increase of forest cover) in permanent observatory plots across the southeast forests. Hence it can be considered as one of the most thorough carbon studies completed. Such studies calculating the amount of entire forest carbon stock and projection of future accumulation potential is highly essential for India and must be carried out across several forest types.

The future C accumulation potential of forests is highly indecisive due to various effects of changes in tree growth rates, land use changes, tree mortality, forest fire and other natural calamities. In this scenario, quantifying the influences of various disturbances, land use changes and tree cutting effects on forest 'C' stock is highly essential not only for predictions of forest 'C-sink' efficiency but also to derive policy measures for a better environmental management.

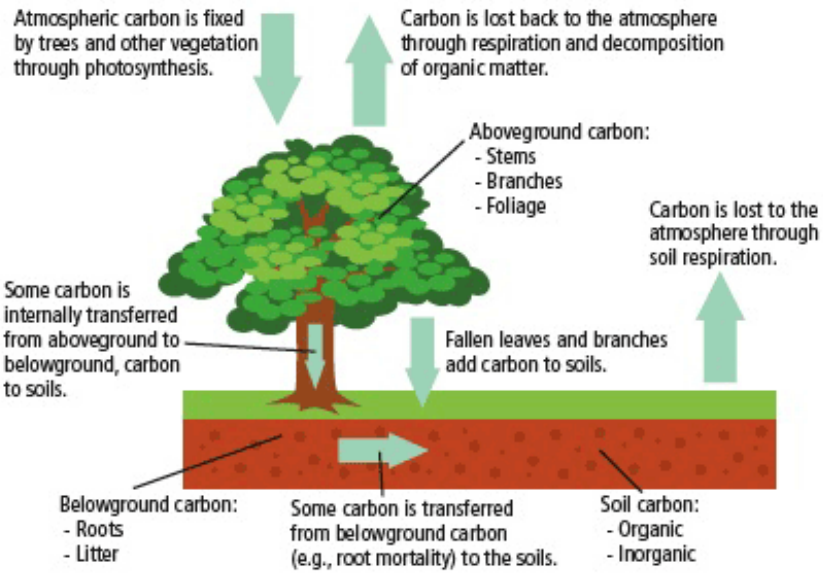

Illustration: Role of forests as 'C sink' in ecosystem balance

The study conducted by a team of three scientists Coulston, Wear, and Vose from Forest Service Southern Research Station (SRS) has revealed that that future carbon accumulation rates are highly sensitive to future land use changes. They used recently measured forest inventory and analysis data for their research work. In total, 49000 plots spread across eleven states of southeast forest were included for the study. A projection model was also developed by them based on observed transitions to consider the influence of various factors on forest 'C' accumulation rates for the next inventory period.

"Future land transitions are uncertain but relatively small changes in afforestation from agriculture resulted in substantial decrease in accumulation rates," said Coulston. "While tree-cutting did cause a decrease, overall forest growth was much greater, partly due to the rapid growth of younger forests." The aging of forests in the region was also a significant force behind potential slowing accumulation rates as growth rates are typically lower for older forest. The study found

forests to be fairly resilient to natural disturbances caused by weather, insects, diseases and fires. These disturbances reduced carbon accumulation rates but the losses were compensated by subsequent re-growth and storage of dead material on the site.

"These findings highlight the need for careful assessments of policies that affect forest management and land use changes in rural areas of the Southeast," said Wear, project leader of the Station's Centre for Integrated Forest Science."Continued forest carbon accumulation in the region is highly sensitive to land use transitions."

The impact of land use transition is especially significant in the Southeast where 89 percent of the forested land is privately owned, underscoring the importance of land use policies that provide incentives for keeping lands in a forested condition. The study estimated impacts on forest carbon accumulation in the region between 2007 and 2012, and projected potential changes out to 2017 based on forest growth and land use change scenarios.

While comparing the scenario in India, previous C studies in different forest types have revealed an improvement in forest carbon stock on a temporal basis. However, a particular study on carbon stock estimation in natural forests in Eastern Ghats conducted by Ramachandran and his team has indicated a less soil carbon (3.48 Tg) while comparing the biomass carbon, which stood at 2.74 Tg. This clearly shows that forest areas in our country faces degradation due to forest land use changes and anthropogenic activity. Similar other studies on C stock estimation across India have suggested that sequestration of carbon can be enhanced through implementation of proper initiatives. These include extending the plantation forestry with more short-rotation trees, focussing the idea of mixed forests with exotics and native tree species, multispecies reforestation on non-forest and forest wastelands, adopting farm forestry in marginal arable lands and finally better management of existing dense forests particularly through joint forest management. Moreover, our country needs a comprehensive assessment of C storage and prediction of future accumulation potential based on the influence of disturbing forces across various forest types and non-forest areas. The generated data from such observations will be so meaningful for executing strategies necessary for mitigation of fluctuating climatic conditions.

Source:

http://www.sciencedaily.com/releases/2015/01/150127111155.htm

http://www.iisc.ernet.in/~currsci/feb102007/323.pdf

http://www.ansfoundation.org/Uploaded%20Pdf/41/132-136.pdf