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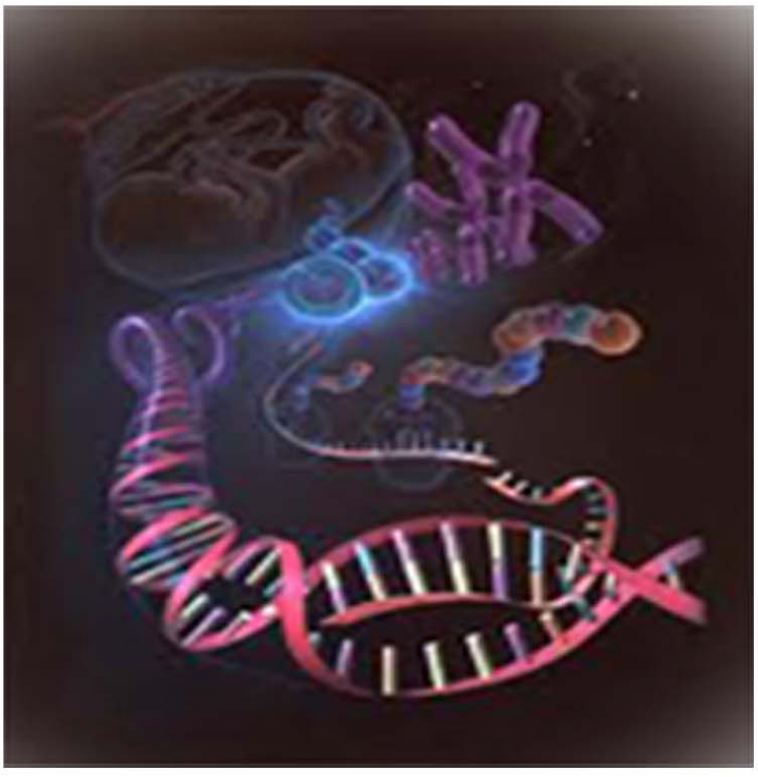

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Review Article

CARBON SEQUESTRATION IN WETLANDS- A PRESENT NEED

Ruchi Sharma[1*] and Kumari Manisha[2]

Corresponding Author:* ***Ruchi Sharma,* ✉ *ruchi12aug@gmail.com*

Carbon sequestration is helpful in mitigating global warming and accumulation of green house gases is also slowed down. There are natural carbon sinks where carbon sequestration occurs for a long period of time. The carbon is stored naturally in oceans, water bodies and wetlands due to photosynthesis by plants. The landfills are artificial sources for carbon reservoiring. The carbon is sequestered by the formation of fossil fuels, clatharate and limestones in nature, which is extracted through geoengineering. However, efficient carbon sequestration in agricultural soils demands a permanent management change and implementation concepts adjusted to local soil, climate and management features. It holds significance in the conservation and ecological studies and is a boon to the environment

Keywords: carbon, Sequestration, Geoengineering, Agriculture, Restoration

INTRODUCTION

The capturing and long term storage of carbon dioxide, by removing it from the atmosphere and depositing in reservoir is called carbon sequestration. It can be performed by geo-engineering and also occurs naturally by chemical weathering of rocks. This process is helpful in mitigating global warming and accumulation of green house gases is also slowed down. There are natural carbon sinks where carbon sequestration occurs for a long period of time. The carbon is stored naturally in oceans, water bodies and wetlands due to photosynthesis by plants. The landfills are artificial sources for carbon reservoiring. The carbon is sequestered by the formation of fossil fuels, clatharate and limestones in nature, which is extracted through geoengineering. The present review is based on carbon sequestration by wetlands naturally which are called as basic carbon pools. Restoration of wetlands is thus the key for sequestration. These wetland forms are mangroves, salt marshes as well as fresh water wetlands. Commonly wetlands are also seen to include fens, bogs and swamps. The carbon cycling in wetlands include inputs, outputs and storage capabilities. Inputs by photosynthesis, outputs via respiration as gases, and storage in

[1] Department of Biotechnology, Mahatma Jyoti Rao Phoole University, Jaipur, Rajasthan
[2] Department of Microbiology, Mahatma Jyoti Rao Phoole University, Jaipur, Rajasthan

the form of dissolved carbon compounds. Storage and formation of peat bogs in wetlands, reforestation processes, maintaining agricultural; soils, are other mechanisms to store carbon in nature.

Carbon fixation under wetland anaerobic soil conditions provides unique conditions for long-term storage of carbon into histosols. However, this carbon sequestration process is intimately linked to methane emission from wetlands. The potential contribution of this emitted methane to the greenhouse effect can be mitigated by the removal of atmospheric CO_2 and storage into peat (Whiting and Chanton, 2003).

Carbon sequestration implies transfer of atmospheric CO_2 into other long-lived global pools including oceanic, pedologic, biotic and geological strata to reduce the net rate of increase in atmospheric CO_2. Engineering techniques of CO_2 injection in deep ocean, geological strata, old coal mines and oil wells, and saline aquifers along with mineral carbonation of CO_2 constitute abiotic techniques (Lal, 2008).

Also, efficient carbon sequestration in agricultural soils demands a permanent management change and implementation concepts adjusted to local soil, climate and management features , although some of the present agricultural policy schemes have probably helped to maintain carbon stocks in agricultural soils (Freibauer *et al*. 2004).

Significance of Carbon Sequestration in Wetlands

The various advantages of carbon sequestration in wetlands are:

1. Protection of existing carbon sources on earth
2. Increased carbon content in soil may lead to more organic load and increased floral community
3. More floral matter releases oxygen and environmental balance
4. Increasing fertlilizer content by organic load and agricultural output
5. Good source of wildlife habitat and recreation
6. A basic key attained for life supporting system
7. Habitat of many endangered plant and animal species.

The restoration should be kept in progress by inhibiting drainage of these wetland sites. These have considerable potential for long term storage of carbon components. They are a wonderful source of energy utilized in the form of biofuels. Thus, power generation is another valuable factor evidenced from conservation of wetlands with carbon reservoirs. This is a form of geological engineering, a new scientific aspect in the field of environmental biology. Sustained wetlands are thus the present need for balanced ecosystems. Urea is used to fertilise oceans which encompasses more phytoplankton growth, more photosynthesis and carbon storage in water bodies. Setting up of BECCS viz. Biomass in power stations and boilers utilizing carbon capture and storage from atmosphere. The burial of organic biomass causes formation of fossil fuels, creation of biochar viz. charcoal via pyrrolysis of biomass waste. Subterranean injections are carried out in which carbon dioxide is injected into depleted oil and gas reservoirs. Carbon can also be stored in carbonate mineral forms by mineral sequestration viz. reaction of carbon dioxide with metal oxides forming stable carbonates. The natural exothermic reactions occurring are:-

$CaO + CO_2 \rightarrow CaCO_3$

$MgO + CO_2 \rightarrow MgCO_3$

The silicates of calcium and magnesium react with carbon dioxide in nature forming:

$Mg_2SiO_4 + 2CO_2 = 2MgCO_3 + SiO_2$

$Mg_3Si_2O_5(OH)_4 + 3CO_2 = 3MgCO_3 + 2SiO_2 + 2H_2O$

Forest management is a must for carbon sequestration. Afforestation and management of fast growing tree species incorporates carbon dioxide in plant biomass and thus increases the rate of carbon sequestration (Jandl *et al*. 2007). Specifically agroforestry has been aptly included as a strategy for carbon reserving. Its recent recognition as a greenhouse gas–mitigation strategy has earned it added attention as a strategy for biological carbon (C) sequestration. The perceived potential is based on the premise that the greater efficiency of integrated systems in resource (nutrients, light, and water) capture and utilization than single-species systems will result in greater net C sequestration. (Nair *et al*. 2008).

CONCLUSION

The process of reserving carbon by sequestration has been a significant integrated phenomenon for ecological balance and ecosystem management. The biological carbon source obtained is a useful means for the future of mankind and creation of varied carbon mitigation sources will be forwarded in future.

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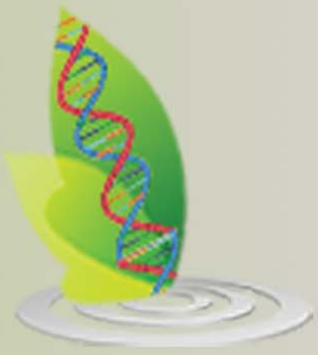

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