ESTIMATION OF SOIL CARBON ACROSS DIFFERENT DISTURBANCE REGIMES IN OAK OF CENTRAL HIMALAYA

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ABSTRUCT

A study was conduct to measure carbon stock in Mukteshwar region of Central Himalayas; 12plots of 20×20m (400m²) were laid down in four different disturbance regime of oak forest. The aim of the research was to estimate the soil organic carbon and role of organic carbon in degradation of oak forest. From this research we found that It was observed that the minimum carbon in the soil (%) was observed in the degraded forest and where the fall of the garbage was lower and the removal of the rubbish was considerable in relation to the fall of the garbage. The intensity of pruning in degraded forests was high, which reduced the crown coverage; The combination of the aforementioned factors had a negative impact on the physical and chemical properties of the soil. The percentage of carbon in the soil varied significantly between disorders. Undisturbed forest land showing a high level of carbon in the soil in the upper layers and in the degraded forest showed less carbon in the soil. However, when descending into the deeper depths, the variation in soil carbon through the disturbances is minimal, suggesting that the impact of the soil carbon disturbance is concentrated in the upper layers. Even the impact of the disturbances began to manifest in the deeper layers, but the difference is minimal.

Keywords: oak tree(quercus semicar) mukteshwar region , soil organic carbon, degraded and undisturbed

I. INTRODUCTION

The Indian Himalayas, the youngest mountain range in the world, covers about 18% of the total geographic area of India. The forest constitutes (50% of India's forest cover) an important natural resource base in the Himalayas. The Himalayan region occupies a special place in the mountain ecosystems of the world. These geodynamically young mountains are not only important from the point of view of the climate and as a supplier of life, they provide water to most of the Indian subcontinent, but also host a rich variety of flora, fauna, human communities and cultural diversity. . Despite the abundance of natural resources, most of its inhabitants are marginalized and still live at subsistence level. The unscientific exploitation of natural resources is leading to further environmental degradation and exacerbates the impact of natural hazards (Singh, 2006).

Himalayan oaks are evergreen, mostly gregarious, of medium-large size, distributed in altitudes from 800 to 3800 m throughout the Himalayan region. There are more than 35 species reported in this region (Negi and Naithani 1995), most of which are abundant in temperate forests. Oaks (Quercus spp.) They are among the dominant vascular plants of the Himalayas, ranging from subtropical to sub-alpine areas. They play an important role in maintaining the stability of the ecosystem. The oaks in the Himalayan region are intimately linked to subsistence agriculture, as they protect the fertility of the soil, the basin and the local biodiversity. They also provide forage, leaves, firewood and wood. Q. semicarpifolia is a high-altitude oak that extends to the wood line in the Himalayan region and forms the climax community in the southern aspect; It is considered one of the oldest plants in the region. It is also one of the most over-exploited species and does not regenerate properly in disturbed or undisturbed natural habitats. Because the plantation has not been successful, it is important to manage the natural forests more effectively. This can be done through the implementation of sustainable methods to cut tree fodder, eliminate an adequate amount of old and dying trees to open the foliage and control the population of livestock and wildlife that damage the seedlings through navigation and trampling.

There are some reasons that have been suggested to explain that the poor regeneration of Banj Oak (Quercus leucotrichophora) is by far the most significant victim of Himalayan degradation. A precious and fundamental species with a great social relevance, it provides a wide variety of ecosystem services, such as the formation of soil and the regulation of hydrological regimes. Some of the benefits of the oak forest are: (a) large biomass formation; (b) return a large amount of nutrients a year; (c) water retention; (d) Provide humidity to the ambient air. Banj oak leaves contain a high level of nutrients that enrich the soil every year and help the rapid formation of the upper soil. Its high water retention capacity maintains a high rate of water evaporation from its leaves, which contributes to heavy rains and snow. Banj oak offers a wide range of ecosystem services including: a) soil formation and reconstruction of fertility of cultivated land; (b) maintain the health of mountain streams and regulate the hydrological regime; (c) to contribute to stabilizing the local and regional climate through direct influences; (d) create a favorable humidity regime for wild species, as well as those of agronomic and horticultural value, and (e) create a surplus for a possible international carbon trade. From the point of view of carbon sequestration, the oak banj has an endowment of deep roots and has great potential to mitigate global warming, for example, predicts its system of massive roots and allocation of deep soils are first effective in seizing the carbon compared to other species with shallow roots. Mycorrhizal roots and external hyphae can contribute significantly to the carbon balance ecosystem and influence rates of carbon rotation in the soil influencing rates of fine root decay, which they inhibit more frequently. The amount of carbon sequestration varies from one species to another and from one forest type to another, to be measured as the system of huge roots and mycorrhizal support allow the Banj oak to have a seizure c below ground more effective than other forest species.

II. RESEARCH OBJECTIVES:

To achieve the objective of assessing the state of the oak forest, with the basic knowledge within the study area, the following objectives have been established:

- To estimate the soil organic carbon.
- To estimate the role of organic carbon in degradation of oak forest.

III. METHODOLOGY

The study was conducted in Mukteshwar region of Central Himalayas; 12plots of 20×20m (400m²) were laid down in four different disturbance regime of oak dominant forest. The forest formation in this region has been classified as a low to mid-montane hemi-sclerophyllous broadleaf forest (singh 1987).In the altitudes in which this study was conducted, banj oak is the dominant forest forming species. Oak dominated species is Q. Leucotricophora stands were studied in Badhet (29°29′N, 79°37′E), Nathuakhan (29°28′N, 79°36′E) and Bhowali (29°23′N, 79°23′).

IV. ANALYSIS OF SAMPLE

We analysed the different soil samples on the basis of three parameters: Physical, Chemical and biological.

PHYSICAL PARAMETERS

pH of soil: The pH value is a measure of the hydrogen ions activity of the soil water system and expresses the acidity and alkalinity of the soil. PH is a very important property of the soil because it determines the availability of nutrients, microbial activity and the physical conditions of the soil.

Electrical conductivity: Electrical conductivity indicates the amount of soluble ions (salt) in the soil. The determination of electrical conductivity (EC) is performed with a conductivity cell that measures the electrical resistance of a 1: 5 suspension (soil: water).

CHEMICAL PARAMETERS

Organic Carbon: We have analyzed the organic carbon in a given sample by the rapid titration process of Walkley and Black.

V. RESULT

We take nine samples from the classification and the analysis of the chemical and in which we are based it is higher than moderately disturbed A, moderately disturbed B and degraded regimes. If the amount of nitrogen is also higher in the undisturbed regimen compared to other regimes.

VI. DISCUSSION

- The highest value of pH in undisturbed area 5.9-6.4 and lowest value of pH in degraded area is 4.9-5.It means the soil of sample are acidic in nature.

- The highest value of EC in undisturbed area 71-98 (µSimon/cm) and lowest value of EC in degraded area is 17-50 (µSimon/cm).

- The maximum percentage of organic carbon estimated in undisturbed area 1-3% and lowest percentage of available organic carbon in degraded area 0.1-1%.

VII. CONCLUSION

The study reveals that organic soil carbon is the main source of nutrient used for the growth of vegetation and is also used as indices for the evaluation of soil quality and the sustainable management of land use. Organic carbon and soil nitrogen can not only reflect the level of soil fertility, but can also explain the evolution of the regional ecological system. The organic carbon in our study area is quite low in moderately disturbed areas and areas degraded due to human interference. The forests of oaks are over-exploited by the villagers because it increases the degradation of forests.

It was observed that the minimum carbon in the soil (%) was observed in the degraded forest and where the fall of the garbage was lower and the removal of the rubbish was considerable in relation to the fall of the garbage. The intensity of pruning in degraded forests was high, which reduced the crown coverage; The combination of the aforementioned factors had a negative impact on the physical and chemical properties of the soil. The percentage of carbon in the soil varied significantly between disorders. Undisturbed forest land showing a high level of carbon in the soil in the upper layers and in the degraded forest showed less carbon in the soil. However, when descending into the deeper depths, the variation in soil carbon through the disturbances is minimal, suggesting that the impact of the soil carbon disturbance is concentrated in the upper layers. Even the impact of the disturbances began to manifest in the deeper layers, but the difference is minimal.

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