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To Establish Remote Sensing Based Climate Vulnerability Standards And Associate Them with Optimum Carbon Stocks

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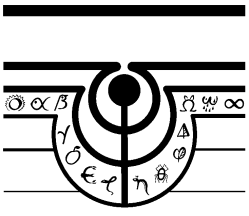

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To Establish Remote Sensing based Climate Vulnerability Standards and associate them with Optimum Carbon Stocks

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ABSTRACT

To find location/region specific climate vulnerability standards based on carbon stock. "Climate Vulnerability Indices", (CVI) are to be obtained by superimposing greenhouse emissions data on the carbon stock data. The concept proposes to determine optimum carbon stock through forest area and wooded area datasets of LANDSAT ™ satellite data with the support of data of last twenty five years. The archival and current forest area datasets of LANDSAT ™ satellite data are to provide (CVI_{max} and CVI_{min}). The optimum carbon stock standards so generated are to act as vulnerability restrictions in which greenhouse emission(s) on the same time scale may remain/fluctuate. The concept would give scientifically determinable vulnerability standards which can be used under international climate protocols

General terms

Algorithms, Measurement, Documentation, Performance, Design, Reliability, Experimentation, Standardization, Languages, Theory, Verification.

Key words

Climate Vulnerability Indices, greenhouse emissions, optimum carbon stock, Optimum Climate Vulnerability Indices, Maximum Carbon stock, Minimum Carbon stock, irregular polygon, fragmentation

1. INTRODUCTION

There is practically complete absence on global based *protocol* for determination of limit of vulnerability of *climate* in relation to *changing carbon stock*. It is, therefore, imperative to generate optimum Climate Vulnerability Indices (CVI_{max} and CVI_{min},) having corresponding relationship with "vulnerability standards of "carbon stock". The scheme of concept is shown in Figure (i)

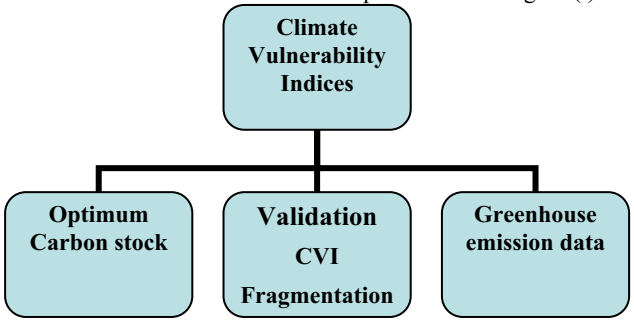

Figure 1. Climate Vulnerability Standards based on Carbon Stock

2. OBJECTIVES

2.1 Optimum Carbon Stock

To determine *optimum spatial carbon stock* studying global carbon vulnerability using forest area datasets of LANDSAT ™ satellite data of last twenty five years for generation of location based Carbon Vulnerability Indices.

2.2 Optimum Greenhouse Emissions

To generate *optimum spatial climate standards* based on carbon stock data (CVI_{max} and CVI_{min}) of global forest area in relationship with the greenhouse emission data

2.3 Optimum Climate Vulnerability Indices

To convert into Climate vulnerability Indices through specifically designed software linking both of them

3. METHODOLOGY

The conversion of grid based CVI is essential for knowing confidence limits/optimum standards of carbon. Converting forest area datasets of LANDSAT ™ satellite to vector layer would give polygons of various sizes which can be used to know optimum carbon stock. The method of calculating optimum carbon stock based on the forest area/cover polygons obtained taking into account canopy density greater than 10%. The method of calculating optimum biomass and optimum carbon is associated with the concept of geometry of figures.

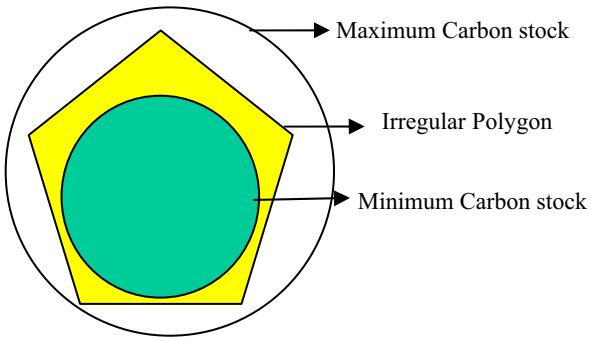

Figure (ii) Satellite Imagery based Irregular forest polygon

If one considers an arbitrary closed polygon of any forest area/cover in the plane of a fixed perimeter taking into account definition of FAO. The forest area or forest cover would be represented through irregular shaped polygon. Based on the simple concept of geometry of figures, it is the circle that enfolds the largest volume enveloping the polygon and also the smallest volume once enclosed in the polygon, (Figure-ii). The same concept is proposed to calculate optimum carbon stock for spatial forest area datasets of LANDSAT™ satellite of a given year corresponding to each polygon having density of more than 10% of canopy density. The value of carbon (CVI) corresponding to two different hypothetical circles would give optimum standards of carbon in each grid. The modeling for generation of CVI_{max} and CVI_{min} can be linked with emission data based on past twenty five year's data, The "Climate Vulnerability Standards" of particular grid can be linked at global level through (GML) to "Carbon Stock Values" through a proposed software. The optimum carbon stock i.e. the circle which is enveloped with in the polygon (CVI_{min}) has relationship to fragmentation indices which can also be verified through Patch Density and Mean Patch Size.

4. SCOPE

The concept advances efforts for global conservation, and has potential to provide optimized standards of carbon stock, which can have lot of relevance for atmospheric warming and climate change. It has potential to lay standards in the UN framework convention on climate change to be later linked to geo referenced and location specific land based greenhouse gas emissions.

5. ACKNOWLEDGEMENTS

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