



Self Organization Map to Assess Forest Development and Problems with Multiple Regression Analysis

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Abstract - Sustainability is a burning factor in the forestry sector around the world. Understanding sustainability is also a critical question. This research examined the status of Bangladesh forestry by indicating the needs of forest products and the efficiency of forest policy and management practices, and relates sustainability with scarcity situations. Bangladesh is a country of beauty with forest and river. The natural significant of Bangladesh is mainly depends on its forest. The greenness of our country is the gift of heaven. But we are not aware of this marvelous asset. In this work we have evaluated the status of forest of Bangladesh under the approach of soft computing. The method is Self Organization Map (SOM). We classified the data set by Multiple Regression Analysis (MRA). The study area we have designed the south part of the Bangladesh.

Keywords : sustainability, multiple regression analysis (MRA), self organization map (SOM), greenness.

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Self Organization Map to Assess Forest Development and Problems with Multiple Regression Analysis

Md Saiful Islam ^α & Md Kamor Uddin Sikder ^σ

Abstract - Sustainability is a burning factor in the forestry sector around the world. Understanding sustainability is also a critical question. This research examined the status of Bangladesh forestry by indicating the needs of forest products and the efficiency of forest policy and management practices, and relates sustainability with scarcity situations Bangladesh is a country of beauty with forest and river. The natural significant of Bangladesh is mainly depends on its forest. The greenness of our country is the gift of heaven. But we are not aware of this marvelous asset. In this work we have evaluated the status of forest of Bangladesh under the approach of soft computing. The method is Self Organization Map (SOM). We classified the data set by Multiple Regression Analysis (MRA). The study area we have designed the south part of the Bangladesh.

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1. INTRODUCTION

Poverty could occupy many dimensions in space (resource, economic, cultural), in persistence (periodic, fluctuating and lifelong) and in its identity (child, woman and poverty of elders). Peluso, Humphrey, and Fortmann (1994) explained the sustainability issues as a condition of resource poverty, and coined the term natural resource dependent areas (NRDA) to address the unsustainable situation of resource abundant and resource scarce areas together. By NRDA the authors meant the places where natural resources either account for a substantial part of the local economy or attract population. The NRDA concept reiterates that even if resources are there, the nature of the policy may influence the availability of resources to ordinary people, and could influence the poverty. Therefore, sustainability evaluation may need to address different forms of policy measures explaining how they influence resource availability and poverty. The approach of sustainability indicators considered here is compartmentalization of policy evaluation. By compartmentalization of policy this article emphasizes particular issues like the nature of resources, market oriented investment and commitment to sustained

supply (e.g. Gaventa, 1980; Marchak, 1983; Peluso et al., 1994). However, natural resource dependence is not a prior cause of poverty and hence sustainability. There are some other causes, such as centralized economic structure (Bunker, 1984), technological inability (Blaikie, 1985; Freudenburg, 1992) and concentration of ownership and control (Marchak, 1983; Freudenburg, 1992) that may bring a sustainability risk to NRDA countries. Thus, policy discourses inevitably become linked with control of resources, such as, resource dependence, resource use, resource waste and nature of capital. Taking the present land use as the end result of past policies, an attempt is made to track the past social indicators of policy discourses. This study presents the resource scarcity situation of Bangladesh as links to those.

a) *Issues of sustainability indicators*

In Bangladesh about 16% of the land area is legal forest but mostly located in south-west (SW) and south-east (SE) corners of the country (Map 1). Bhuiyan (1994) reported that out of the forest areas, actual managed forest was only 9.2% (1.32 million ha) and Unclassed State Forest (USF) was 6.9% (0.99 million ha) in early 90s. WRI/CIDE (1990) estimated that the forest area would be only 1 million ha or 6.9% of total land area. Moreover, the cover intensity is different in different forest types (Table 2). An early report of Gittins and Akonda (1982) estimated remaining natural forest cover to be only 3.3% of total land, which is less than 0.5 million ha. Other than the mangroves and salt forests the distinct area patterns of forest ecotypes of Bangladesh are not well marked. Therefore, the spatial status of Bangladesh forests is often classified under legal types rather than ecotypes. A legal type may include different ecotypes and may be adjusted with the need of administration. As a result often there is a change in the space status of forests of Bangladesh. The following section presents the situation of changing forested space of Bangladesh. However, the most recent figure is stated by Muhammed, Koike, Sajjaduzzaman, and Sophanarith (2005) from unpublished data of the Forest Management Planning Database Survey 2003. They mentioned that the estimated forest area of the country is about 2.53 million ha and this is about 17.5% of the total land base of Bangladesh.

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II. DATA COLLECTION

a) *State of Coastal Forest in Bangladesh*

The coastal part of Bangladesh includes the famous Sundarbans Mangrove Forest. A number of depressed basins are found in the district of greater Mymensingh and Sylhet, and some are found in Chittagong which are inundated by fresh water during the monsoon that gradually dry out during the dry winter season. These depressed basins are known as 'Haor'.

b) *Coastal Forest in Chittagong*

The coastal part of Chittagong includes the famous Sandip Mangrove Forest. A number of

depressed basins are found in the district of greater Mirsora, Gorokghata, Kutubdiya, Shitakundo, Chonuya, Banchkhali, Teknaf and some are found in Uirichor, which are inundated by fresh water during the monsoon that gradually dry out during the dry winter season.

c) *Coastal Forest are three types*

It is necessary to examine forest cover under different major categories of land, which are

- i. Mangroves
- ii. Non Mangroves
- iii. Strip

i. *Mangroves*

Mangroves are a group of trees and shrubs that live in the coastal intertidal zone

Year of Garden Create	Mangrove (Hector)	Strip	Non Manogrove
1990-91	80.97	--	40.48
1991-92	688.82	--	40.48
1992-93	688.37	--	60.73
1993-94	1044.86	3.00	139.67
1994-95	794.34	--	47.15
1995-96	310	--	384
1996-97	300	60.00	--
1997-98	600	--	--
1998-99	590	93	10

a. *Mangroves Forming a Wall Along Florida Inlets*

There are about 80 different species of mangrove trees. All of these trees grow in areas with low oxygen soil, where slow-moving waters allow fine sediments to accumulate. Mangrove forests only grow at tropical and subtropical latitudes near the equator because they cannot withstand freezing temperatures.

Many mangrove forests can be recognized by their dense tangle of prop roots that make the trees appear to be standing on stilts above the water. This tangle of roots allows the trees to handle the daily rise and fall of tides, which means that most mangroves get flooded at least twice per day. The roots also slow the movement of tidal waters, causing sediments to settle out of the water and build up the muddy bottom.

Mangrove forests stabilize the coastline, reducing erosion from storm surges, currents, waves, and tides. The intricate root system of mangroves also makes these forests attractive to fishes and other organisms seeking food and shelter from predators.

b. *Mangrove Plantation in Chittagong*

Mangrove afforestation along the entire southern coastal frontier is an innovation of foresters.

During 1960-61, Government undertook afforestation programme along the shore land of coastal districts. This initiative got momentum from 1980-81 with the aid of development partners and afforestation programs are extended over foreshore islands, embankments and along the open coasts. Since 1960-61 upto 1990-91, 142,835 hectare of mangrove plantations have been raised under a number of coastal afforestation projects. The present 2012 net area of mangrove plantation is 48466.97 hectare after losing some area due to natural calamities.

ii. *Non-Mangrove**Table 1* : Forest Area in Bangladesh

Country / region Bangladesh	Reference year	Total area ('000 ha)						
		Land area						Inland water
		Forest			Other wooded land		Other land	
		Closed	Open	Plantation	Shrubs/Trees	Forest fallow		
Bangladesh	1996	720	0	232	105	17	11,943	1,383
% of Bangladesh		5.0	0	1.6	0.7	0.1	82.9	9.6

iii. *Strip**Table 2* : Total Eco-type of the costal forest in Chittagong south

Total Eco-type at last-2012	Area in hectares
Mangrove	48466.97
Non- Mangrove	1211.95
Strip	4163.93

Source: Chittagong Coastal Forest Division of Bangladesh (2011-12)

d) *Man-Made Mangroves, Coastal Afforestation*

These mangrove plantations were established on newly accreted lands (mud flats) prior to formal declaration as Reserved Forest. The species used were mostly Keora (*Sonneratia apetia*) and Gewa (*Excoecaria agallocha*). Since these lands were not declared as "Reserved Forest" the Forest Act was not strictly applicable on them. Consequently the FD in mostcases failed to provide the required protection because of the land litigations and poor legal back up from other government agencies such as district administrations, police, etc. Many of the good coastal plantations established in Chittagong and Noakhali were lost to shrimp farms with the direct and indirect indulgence of other government officers such as DCs and land administration agencies. Ultimately the wish of the DCs prevailed since they are the most powerful actors and highly favored by ministers, members of parliament, etc. Thus many of the coastal plantations were devastated. Revilla (1998) during the FRMP inventory reported the following growing stock in the mangrove a forestation areas.

Table 3 : FRMP inventory results of coastal afforestation divisions

Description	Chittagong Coastal Afforestation Division
Area in hectares	20042
Sample size	408
Number of trees with DBH 15 cm and above	10
Basal area in m ² per hectare for trees with DBH 15 cm and above	0.29
Volume in m ³ per hectare contributed by trees having DBH 15 cm and above	1.02
Poles per hectare	15228
Saplings per hectare	2202
Seedlings per hectare	373

Source: FD, Government of Bangladesh

e) *Self Organization Map*

A **self-organizing map (SOM)** or **self-organizing feature map (SOFM)** is a training Map that is trained using unsupervised learning to produce a uncertain result discredited representation of the input space of the training samples, called a **map**. Self-organizing

maps are different from other artificial neural networks in the sense that they use a neighborhood function to preserve the topological properties of the input space. The figure 1 shows the impact of SOM implementation in this work.

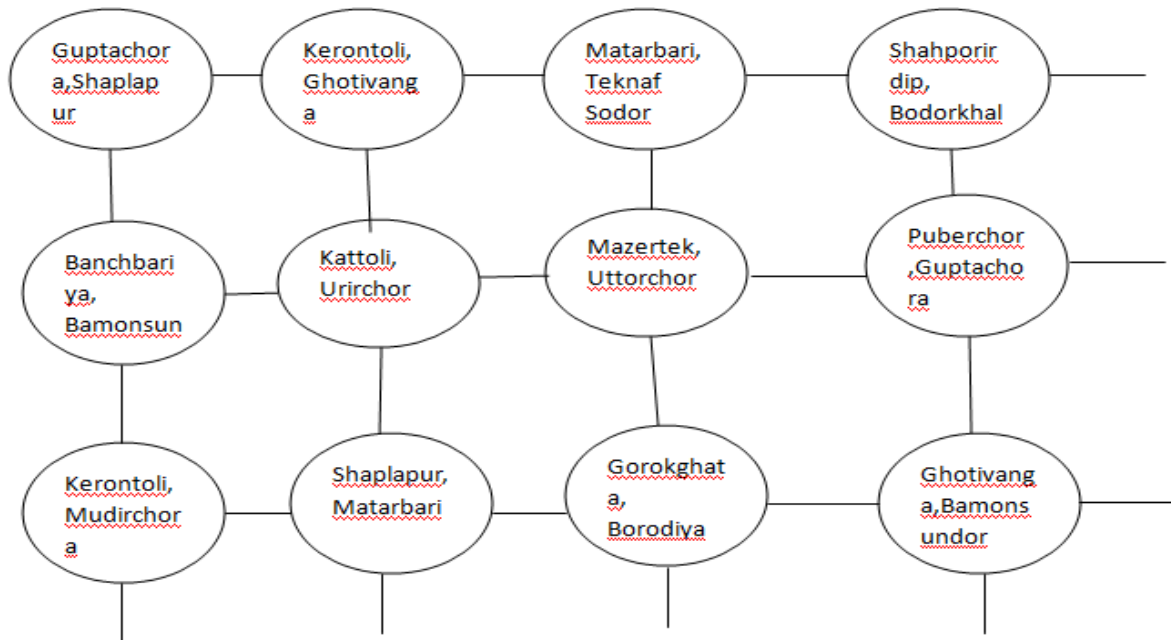
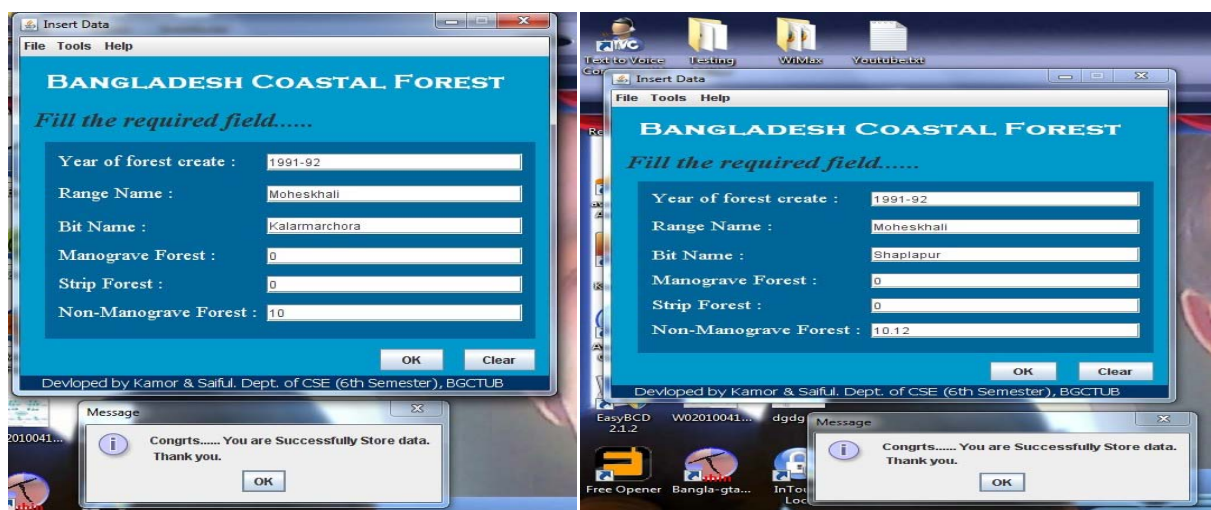


Figure 1 : The Self Organization Map

III. RESULT

In this work we have implemented the system based on the SOM and got the following result.



BANGLADESH COASTAL FOREST

Fill the required field.....

Year of forest create : 1991-92

Range Name : Moheskhali

Bit Name : Mudirchora

Manogrove Forest : 0

Strip Forest : 0

Non-Manogrove Forest : 10.12

OK Clear

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Message

i Congrts..... You are Successfully Store data.
Thank you.

OK

BANGLADESH COASTAL FOREST

Fill the required field.....

Year of forest create :

Range Name :

Required result is.....

Output Here:

Year of forest create :

Range Name :

Bit Name :

Manogrove :

Non-Manogrove :

Strip :

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IV. CONCLUSION

This research in general reflected that the "Forests and Forestry in Bangladesh" (Forestry Sector) is experiencing problems. The current trends are in no way favorable for the overall development of the sector. By 2020 there may be a big lockage between the demand and supply of wood. Peoples' expectations from the FD will increase many fold, especially for forest

based recreation, small wood supply, environmental parameters, peoples' participation, etc. Though most of the forest lands are managed by the FD the major supply of wood comes from homesteads. All possible lands especially the USF should be brought under proper management. The process of degradation should be stopped. The FD should be drastically reorganized on par with other Government administrative set ups. At the same time the

Government should allocate adequate funds for the forestry sector and encourage large scale social forestry programme.

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