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Reasons for the Expansion of Thar Desert & Methods to Control this Spreading

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ABSTRACT: Rajasthan is the western part of country with arid climatic condition with low average rainfall (150-200mm).In past fifty years number of drought came is twenty four which is approx (47%). Out of total thirty four districts in the most droughts affected nine districts. Total 23 years were drought affected out of last fifty years which is (45%). These nine districts have dry climate and average rainfall (32-78mm). The Great Indian Desert has similarity with other deserts of world in respect of flora and fauna. The increasing rate of desert affects our economy, anthropology, sociology and geography. In this review article we have tried to reveal reason behind the expansion of Indian desert and its effect on human being and local flora and fauna and have also suggested possible solutions by which we can stop its expansion.

Keywords: Thar Desert; Rainfall; Change in climate; Prevention of flora and fauna; Drought.

INTRODUCTION: Thar Desert which is also known as The Great Indian Desert or Marusthali (land of dead) is a large, arid region in the north western part of the Indian sub continent that forms a natural boundary between India and Pakistan. About 80% of Thar desert is in India and the remaining part is in Pakistan. Majority is hot arid zone, spread over 35 million sq-km area. Much of this arid zone is in the western part of the Rajasthan (61%), while in the state of Gujarat lies 20% area, in the state of Punjab and Haryana's 9% area and Maharashtra, Madhya Pradesh, Andhra Pradesh and Karnataka together contribute the rest (10%) area. An area of 7 million sq km in the higher latitudes of Ladakh in state of Jammu and Kashmir and Lahoul and spiti in Himachal Pradesh is designated as cold desert. The Thar desert comes between the Aravalli hills in the north-east and the Runn of kutch along the coast in north-west. Most of the Thar desert is covered by huge shifting sand dunes that receive sediments from the alluvial plains and the coast. The Luni river is the only river integrated into the desert. Rainfall is limited to 100-150 mm per year out of which mostly comes in July to September. The Thar desert is most densely populated desert in the world, with the population density of 83 people per km. The main occupation of the people there is animal husbandry and agriculture.

Due to the diversified habitat and ecosystem, the vegetation, human culture and animal life in this arid region is very rich in comparison with the other deserts of the world. About 23 species of lizard and 25 Species of snake are found here. Some wildlife Species which are fast vanishing in other part of India, are found in the desert in large number such as the Blackbuck (ANTILOPE CERVICAPARA), Chinkara (GAZELLA BENNETTII), Red fox (VULPES VULPES) and Indian wild ass (EQUUS HEMIONUS KHUR) in the Runn of Kutch. They have evolved excellent survival strategies their size is smaller than other similar animals living in different condition and they are mainly nocturnal. Due to lack of water in this region, trans- formation of the grassland into cropland has been very slow. The protection provided to these animals by local community Vishnoi is also a factor for their survival. This region is a heaven for 141 species of migratory and resident bird of the desert such as Eagles, Harriers (CIRCINAE), Falcons (FALCO), Buzzards (BUTEO BUTEO), Kestrel (FALCO FINNUNCLUS) and Vultures (ACCIPITRIDAE). They are Short-tall Eagles (Aquila Rapan), Greater Spotted Eagles (Aquila Clanga), Lagger Falcons (Falceo Juggler) and Kestrels.The natural vegetation of this dry area is classed as North Western Thorn Scrub Forest occurring in small clumps scattered more or less openly. Density and size of patches increase in rainfall. The natural vegetation of the Thar desert is composed of the following tree, shrub and species.

Tree and shrubs: Acacia Jacgucmontii (BAON), BalanitesRoxburghii (DESERT DATE), Ziziphus (SPINY SHRUB), ZiziphusNummularia (JHARBER), Calotropisprocera (SOODOM APPLE), and many more.

Herbs and grasses: OttochloaCompressa, Cenchrus, PanicumTurgidum, SaccharumSpontaneum and many more.

Table 1: Frequency and Intensity of drought of different districts.

Districts	Very se-vere	Severe	Moderate	Light	%age of all drought years in the period
Western Region	12	12	11	11	45.0
Barmer	4	15	17	11	46.0
Jaisalmar	6	12	13	17	48.0
Bikanar	8	12	16	10	46.0
Sri Ganganagar	9	9	12	18	47.5
Churu	8	11	8	17	43.1
Jodhpur	5	16	18	15	48.5
Pali	7	12	19	18	53.9
Nagaur	2	17	15	14	52.0
Jalore	7	13	13	20	48.1

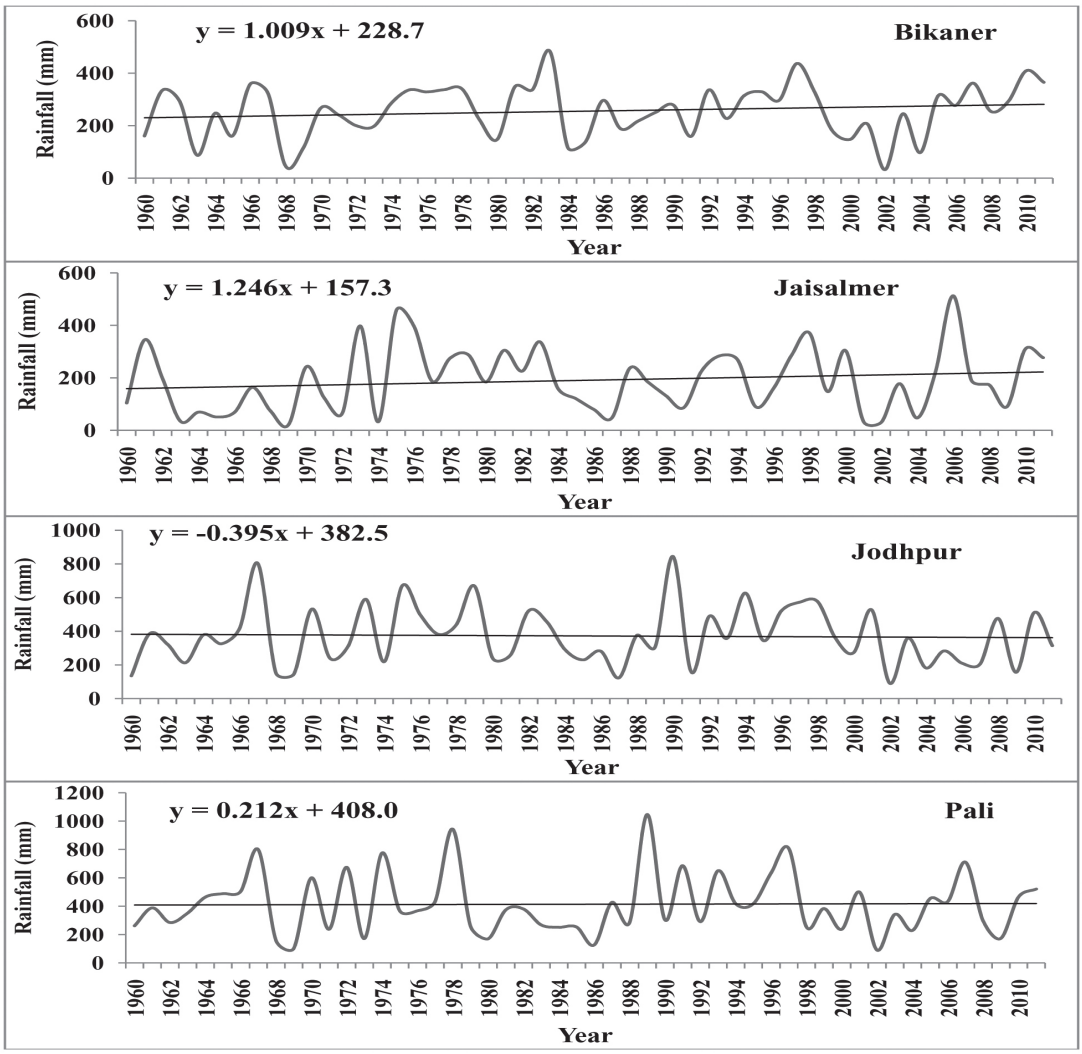

Figure 1: Average rainfall pattern in last fifty years.

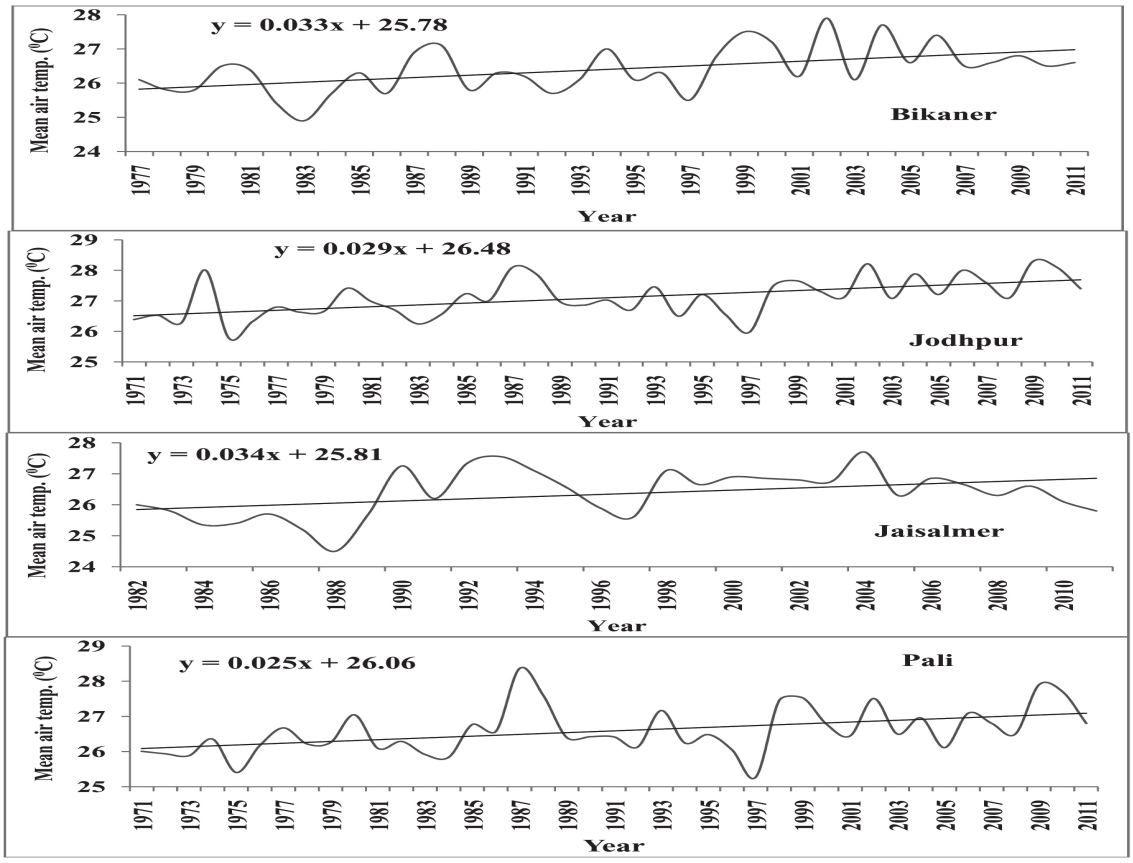

Figure 2: Mean temperature in last forty years.

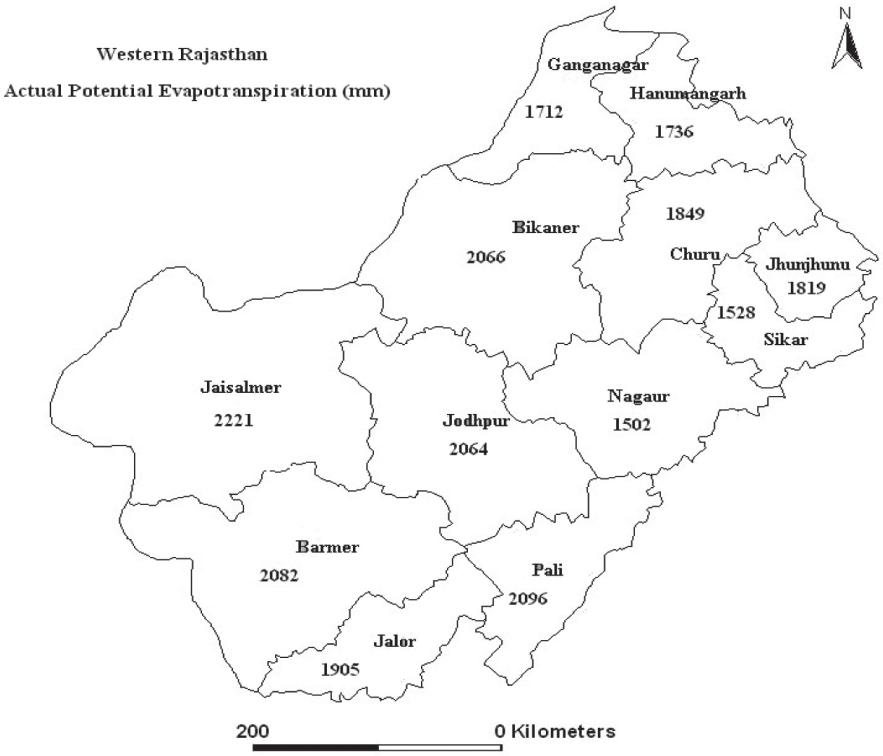

Figure 3: Map of western Rajasthan.

LITERATURE SURVEY: Few researchers worked on Thar desert changing pattern and climatic changes such as Surendra Poonia & A. S. Rao worked on climatic change and its effect on Thar desert[1], P. C. Bakliwal and S. K. Wadhwan[2] worked on geological evolution of Thar desert in India issues and prospects, Climatic pattern of Rajasthan is changing from a long time specially shifting of tectonic plates deposition and materials and their effects on geomorphic evolution specially in western and northern Rajasthan which was studied in detail by wadhwan and co workers.[3-4] K. S. Raghav worked on Quaternary history of a part of the northern eastern fringe of the desert of India.[5-6] Few researchers specially Singh and co workers worked a lot in mapping of the great Indian desert Thar, its spreading reason and control methods.[7-13] Omar A Abdi and co workers study on causes and impacts of land degradation and desertification: case study of the Sudan and found that desertification is due to combine effects of natural and human factors and they found that it is impossible to separate climate induced factors with human interference[14]. Human interference plays a vital role in spreading of desert[15] similarly climatic variations & fluctuation are also helpful for spreading desert[16]. Overgrazing and livestock concentration increase rapid growth of desertification[17-18].

PROBLEMS BEHIND SPREADING OF THAR DESERT:

1) **Illegal mining:** This is a major reason behind spreading of Indian desert Thar over last decade. Land thunders of dynamite blasts take place regularly in the Thar region and the sound can be heard even from close range of 4 km. The activities of mining start with drilling and placing of explosives in hills in broad daylight. The impact of dynamite, ammonium nitrate or TNT explosions is so intense that it changes even internal structure of Thar desert.

2) **Human Activities which affect climatic area:**As the main occupation of people living in the desert are agriculture and animal husbandry. Agriculture is not a dependable proposition in this area-after the rainy season, at least 33% of crops fails. As the rainfall is very less it result in no cropping, so people are totally depend and on animal husbandry and result is over grazing which increase rate of spreading Thar desert.

3) **Over population:** As the population increases there is no growth of cropping which resulted in other people moving towards animal husbandry, trees and grasses, or inter cropped with vegetables or fruit trees. As it is drought-prone regions, the region faces droughts frequently. As population increases there is also increase in population of animals which lead to overgrazing, wind and water erosion, mining other activities result in serious land degradation and exploitation.

4) **Exploitation of local vegetation:** Indian desert Thar is arid and poor in vegetation. However, flora of this area provides many useful floral species of local and commercial importance. In recent years, many such valuable species have becomes rare or nearly extinct owing to increase in population and commercial activities, indiscrimination exploitation, biotic pressure, mining activities, destruction collection and lack of regeneration effort.

5) **Plantation of new flora and fauna which are not easily adaptable:** Prosopis Juliflora (Vilayati Babul) this Mesquite tree growing to a height of up to 12 meter (39 ft) and has a trunk with a diameter of upto 1-2 meter (3.9ft) a mature plant need lots of water to grow as its roots are able to grow a depth in search of water. In 1960, they were discovered at a depth of 53 meter (175 ft). Its uses include fodder, wood and environmental management. The plant posses an unusual amount of the Flavanol Mesquitol in its heartwood. As it is hard and expansive to remove as the as the plant can regenerate from the roots. Due to over plantation of this tree in Thar desert availability of water decreases year by year which is very harmful for longer duration because this reason faces lack of availability of water.

RESULT AND DISCUSSION

1. **Management of resources:** Scientific management on sustained yield basis and conversation of endangered species can generate tremendous scope of commercial activities and employment opportunities for local inhabitants apart from their role in other socioeconomic and environmental impacts. Actions pertaining to conservation and management of floral diversity to Indian desert Thar have been discussed for sustainable development of the region.

2. **Introduction of fast growing 'exotic' tree species:** The indigenous tree species growing in the Thar desert are not only few in number but also extremely slow growing. So, great attention is required in plantation of fast growing exotic tree and shrub species from iso-climatic regions of the worldso, 115 eucalyptus species, 73 Acacia spe-

cies and 170 miscellaneous can be introduced. Some of them are:

- Acacia trotib's for sand dune stabilization.
- Prosopis Juliflora for suitable for fast biomass production.
- Aca-cianubica for sand dune stabilization.
- Colophospermum Mopane and Dichrostachys Glomeratafor fodder purpose.
- Eucalyptus Cameldulensis are few exotic suited for low rainfall

3. **Stabilization of shifted sand dunes:** As it is low rainfall (100 mm – 120 mm), huge shifting sand dunes are commonly found, particularly near human habitants so the techniques required for stabilization of shifted sand dunes are:

   - Protection against biotic interference.
   - Treatment of shifting sand-dunes by fixing barriers in parallel strips or in 'chess board' design, using the local shrub material starting from the crest of the dunes to protect the seedling.
   - Using the Phog (Calligonum Polygonoides) needs special mention. As it is very useful species of the Thar desert because it is a naturally growing shrub on the sand dunes. It has a massive network of underground root which work as effective 'sand binder'.

4. **Shelterbelt plantations to reduce wind velocity:** shelterbelts and tree-screens consisting of a row of trees such as Acacia Tortilis, Tamarix Articulate and Azadirachta Indica flanked by two rows (one on each side) of smaller trees Acacia Senegal, Prosopis Juliflora etc, with two rows (one on each side) of shrubs like Aervatomentosa were found to be affective in Thar region desert.

5. **Ecological re-generation through Aerial seeding:** Two methods of seeding i.e. seeded by helicopter and manual broadcasting of pellets were used. Data on establishment and growth were recorded twice i.e. at sowing and maturity stages.

6. **Stopping mining and restoration of mining wasteland:** By stopping the mining the growth of wasteland will generally stop and then we can divide the wasteland into several small blocks so that the plantation could be done thereand we can do fencing and enclosures in this land so there is good growth of vegetation, both trees and grasses, upon protection desertification.

7. **Village grazing lands and protected fodder lands**: As the population is increasing so they should stop cutting in trees, and overgrazing should be restricted because if it will not stop then some natural calamity, such as serve drought and flood will come on regular basis.

8. **Stopping of army activities:** As in Indian first nuclear exploded in the Thar desert on 18th may, 1974 which lead to destroy of many trees, and landscapes. So, army activities should be stopped.

CONCLUSION: The overall conclusion is that we can manage spreading of Indian desert Thar if we utilize use our resources wisely, stop illegal mining, use those plant species which can easily adapt in local climatic condition and work as a sand binder and decrease dependence on natural resources.

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