

A geographical study of deserts

Poonam

MSc. geography

ARTICLE DETAILS

Article History

Published Online: 10 October 2018

Keywords

Precipitation, evaporation, humidity, cold desert, hot desert, landform, peneplains, sand dunes, topography, sand plains, inter-dunal, marshy, playas, ranns, genesis, wasteland, fallow land, deforestation, gully, saline, alkaline, encroachment, agro-ecology, gypsyferros.

ABSTRACT

Deserts alone covers about seventh of the land surface. We normally call deserts as "sand seas or oceans of sands". The vast majority of the major desert areas like as the Sahara, the Arabian, the Kalahari, and the Deserts of Australia all lie somewhere in the range of 10 and 30 degrees north or south of the equator. Deserts are dry environments involving a substantial part of the globe. Deserts are to be completely comprehended in earth science contemplates. This report is about the Deserts as special landforms. This chapter presents the major abiotic constraints that species face in hot deserts and talk about how organisms, primarily from the plant realm, have adapted to go around these constraints. The chapter also reveals insight into a portion of the biotic interactions that take place in desert situations. The biological systems of Indian deserts are administered by location, temperature and climatic conditions where landforms have their particular job. The main issues of desert areas are large scale deforestation and uncontrolled utilization of ground water. Desert areas have generally degraded lands where vegetative land spread has been constantly cleared for cultivation necessities and aridity has increased. Natural richness has vanished because of over the top utilization of chemical manures and chemical pesticides. Ground water level has gone down to a genuine critical level where further over-exploitation may cause genuine implications. Salinity and alkalinity are the resultant impacts of human interface. A large portion of the desert locales have no perennial water assets. The availability of surface water in some desert areas has created water logging issues.

1. Introduction

While studying the physical features and geomorphology of landforms, a one of a kind nature of landmass comes into our brain. It is interesting in various aspects. That is the dry landmass called as the Desert. Earth has various land areas secured by deserts. Among all the terrestrial biological systems, deserts are exceptionally typical landforms because of their one of a kind ecological conditions. Betray and near-desert areas spread nearly 33% of the land surface of the globe. Deserts alone covers about seventh of the land surface. We normally call deserts as "sand seas or oceans of sands". The majority of the major desert areas like as the Sahara, the Arabian, the Kalahari, and the Deserts of Australia all lie somewhere in the range of 10 and 30 degrees north or south of the equator. Deserts are dry environments containing a substantial part of the globe. Deserts are to be completely comprehended in earth science considers. This report is about the Deserts as one of a kind landforms.

Hot deserts spread somewhere in the range of 14 and 20% of the Earth's surface, approximately 19-25 million km² (see Middleton and Thomas.1997; Peel et al., 2007 for appropriation of deserts). Most hot deserts, for example, the Sahara of North Africa and the deserts of the south-western USA, Mexico and Australia, happen along the tropics in both the northern and southern hemispheres (between approximately 10° and 30-40° latitude). They are created subsequently of global Hadley air circulation (Warner.2004). The sun's radiation causes tourist torise and the accumulation of moisture around the equator. As the air moves away it cools, starts to slip and at this point all of the dampness is lost as rainfall in the tropics. As the air dies down and becomes compressed it also becomes warmer

and, consequently, the relative dampness in desert air decreases, despite the fact that the absolute amount of water vapor held may be substantial, as prove by dew-fall in the cold hours before dawn (Parsons and Abrahams. 2009).

India is situated between 8°4' N to 37°6' N and 68°7' E to 97°25' E and spread over 3.29 million sq km of area. Geologically, the nation speaks to monumental assemblage of land pieces varying in age from pre-Cambrian to late inception. The peninsular massif is part of the excessively landmass Gondwana land till its crack and float once in a while in the mid-Mesozoic era, lay some place near the South Pole along with Australia, South Africa and South America, as has been seen in Palaeontological, Palaeobotanical, Palaeomagnetic and glaciological formations, at present lying distantly apart. Flat summits, settled in valleys, dykes, overlap and faults all speak of alternating times of disturbances and inactivities liable for the present landform configurations. Deserts shaped in various locales are situated on the western side over a significant lot from the north-west including coastal locales, which is a general marvel with the world desert locales. Deserts arise because of an extremely moderate procedure of land degradation yet human activities lead to environmental degradation and asset consumption. Indiscriminate utilization of natural assets leads to increasing troubles in maintenance of these assets in a sustainable manner. The greater part of the desert locales had been thick woods and fruitful cultivated lands and their present set up is a combination of natural and human interfaces. Be that as it may, it is hard to bear the obligation, as the total degradation process was because of the impact of between related factors. For the past thousand years, Indian deserts remained one of a kind human environments as all life-structures human, animal and vegetation made due by

advancing delicate and precarious relationship with the fragile environments with representative relationship among man and condition. Most marvelous inheritance of this desert civilization is its great physiocultural organizations and biotechnological capacities to sustain variety of living things. These locales have high biotic concentration of human and animals population. After some time, a novel socio-ecological organism, multi-ethnic, multi-caste hierarchical society was conceived, interlaced in emblematic relationship.

2. Literature review:-

Renu and Christie (2018) conducted a theoretical study on "A Behavioral Finance Perspective of the Stock Market Anomalies". The paper mainly explained the idea of behavioral finance, prospect hypothesis, and classical financial hypothesis and the inconsistency in the stock market from the behavioral finance aspect. Only secondary data was gathered for this study. The paper summarized various issues like biases that lead to the abnormal behavior of the stock market that was left unexplained by scholastic financial speculations. Shunmuga (2017) conducted a study on "Behavioral finance a study with reference to the small individual investors in Tirunelveli city". The primary goal of the study was to recognize the impact level of behavioral factors on the investment decisions and performance of the workers of construction companies. The study was a sample overview. Sample size for the study was 384 out of total population of the Tirunelveli city. The sampling method utilized was probability sampling. The statistical tool utilized for the analysis was chi square test analysis. The finding of the study was that there was a high impact of behavioral aspect on the investment decisions and performance of the workers of construction companies. Yamini (2016) conducted a study on "Behavioral finance a study on investors behavior towards equity market investments with reference to investors of Delhi". The main goal of the study was to recognize the various behavioral biases affecting the decision making procedure of investors and to analyze investors attitude towards various equity market investment. The study was a sample review. The sample size was 5000. 10% of 5000 samples, for example 500 samples were picked randomly and after disregarding the deficient questionnaires, 380 samples were utilized for the analysis. The sampling method utilized was random sampling. The statistical tool utilized for the study was discriminant function analysis and weighted scoring strategy. The finding of the study was that the investors are not familiar with the concept of behavioral finance and the investors are very little familiar with the equity market instrument to make investment decisions.

3. Types of hot deserts:-

A characterizing characteristic of a hot desert is aridity. According to the Koppen-Geiger climate classification, deserts are regions with an annual precipitation of less than 250 mm (Peel et al., 2007). Be that as it may, annual precipitation can be misleading because water misfortune is similarly as important a component of the water spending plan. Along these lines, the United Nations Environmental Program's definition of desert is an annual dampness deficit under normal climatic conditions, where the potential evapotranspiration (PET) is over multiple times higher than actual precipitation (Middleton and Thomas, 1997). The high PET prevails because,

attributable to the lack of overcast spread, approaching solar energy approaches a maximum in arid regions. Deserts can be separated into two types according to their degree of aridity: hyperarid deserts have an aridity index (P/PET) of <0.05 and arid deserts have P/PET between 0.05 and 0.2. As such, deserts are distinguished from semi-arid drylands (P/PET 0.2-0.5) and dry sub-damp drylands (P/PET 0.5-0.65). The diurnal temperature variation in deserts is articulated, with high day time and low evening time temperatures (Woodward, 2003). Because of the high surface temperature and temperature differences most deserts are also high wind vitality environments (Parsons and Abrahams, 2009).

4. Radiation and temperature:-

The broad hand broadening across the Sahara and the Arabian deserts is the largest area to get radiation of this magnitude. Deserts are eminent for their large diurnal temperature fluctuations; low vegetation spread inside deserts means that the sun heats up the area rapidly, yet at night heat radiates rapidly away. While the temperature of winter evenings in blistering deserts may fall beneath 0°C, daytime air temperatures may remain as high as 40°C. The most elevated air temperature ever recorded was 57°C in the Libyan part of the Sahara. In any case, the temperature on the dirt surface can be considerably higher than the air temperature; as high as 75-80°C (Ward, 2009). Both high radiation and high temperature significantly affect the physiology of organisms, especially if water is scarce. In plants and some cyan bacteria, the visible part of the radiation range (photosynthetically active radiation - PAR-wavelength 400-700nm) is captured by shades (chlorophylls and carotenoids) and they convert its vitality, via photochemical processes, into reductive chemical items. The products are mainly used to create sugar in a process named the Calvin Cycle. In hot deserts, the significant level of irradiance is usually joined with high temperature and shortage of water, which confines the activity of the Calvin Cycle. In this manner, high irradiance may create a flood of excess reductive force in the chemical structure of reactive oxygen species (ROS). These molecules can react and cause damage to DNA, proteins and lipid membranes, which are crucial to plant survival (Akashi et al., 2008). In higher plants, one approach to dealing with ROS abundance is to lessen light absorbance by the leaf. Light absorbance is strongly affected by leaf orientation and reflectance, accordingly, although sun-tracking leaves are advantageous in maximizing photon absorbance, leaves that are not arranged perpendicular to the sun's rays may be increasingly advantageous to forsake plants by decreasing irradiance and heat accumulation (Gibson, 1996). Plants with fixed vertical and steeply angled leaves, and with azimuth east-west orientation of leaves and branches, have been seen in deserts (Nobel et al., 1993). These leaves receive most light in early morning and late after-early afternoon while avoiding capturing excess levels of radiation during midday.

5. Geomorphology of Deserts:-

Deserts are created by changes in climate and accumulation of sands and other rough wastes. A high extent of the desert floor is a disintegration surface of a bedrock. Sand covers about 10 to 20 percent of the deserts. The remainder of the land comprises generally of gravels, stones, mountains, and various kinds of soils. A desert landscape incorporates

various landforms created by wind disintegration. In the heart of the desert the breeze has a free play. Wind disintegration creates hills of sand rises and flat-beat slopes known as mesas and buttes. The sand assortments of deserts are always on moving movement because of the prevailing action of wind. Sand floats, Crescentic Dunes or Barchans, Loess and Longitudinal ridges and sand sheets are the notable breeze borne geomorphic features. One of the most remarkable features of desert ridges is their capacity of gathering all the sand from their neighborhood. Rises are large heaps of wind-borne sands reaching a maximum stature of 250 meters above the surface. Hills show many shapes and patterns that change continually because of the profoundly active breezes. Deserts are viewed as profoundly dynamic geomorphic features. Ridges are characterized by two-sided inclines one along the windward heading and the other along the leeward side.

Climatologically, deserts are the most sweltering places on the planet because they absorb more heat from the Sun than any other land in damp climates. Deserts are for the most part under arid to semi-arid climates. The temperature varies during day and evenings. In summer, desert temperatures often reach upto 38 °C during the day. They drop upto 25 degrees Celsius or more at evenings. Throughout the winter, temperatures in the desert range from 10 to 21 °C. Mists would reflect a significant part of the sun's extraordinary radiation during the day, easing back the rate of heating of the air near the surface. Around evening time, mists and water vapor would absorb a great part of the earth's radiation - the majority of which comprises of infrared rays - easing back the rate of cooling. Winters are a lot colder in center latitude semiarid areas and deserts.

6. Water availability in Deserts :-

Another controlling factor of desert is the nearness of water. Because of scanty rainfall and sandy soil, deserts have no or next to no probability of holding water. Just in certain dejections next to no water may exists. Soil dampness is a rare feature in deserts. Regardless of whether little soil dampness is available, because of hot climate and prevailing breezes, it will be evaporated rapidly. The drainage framework is made up of dried streams called arroyos. After a rainfall, water fills the arroyos. They run down the mountains and remove the land, carrying stores of gravel, rock, and sand to the base. Oasis is a wet and prolific zone in a desert with vegetation. Underground water comes nearer to the ground surface. Open wells and springs do exist in such spots. Water that happens inside an oasis has been drawn through groundwater base stream from

distant catchments like mountains or slopes. Because oases have some water, farming and settlement are relied upon to be more. A few oases may be small and can bolster just a couple of individuals, however others are sufficiently large to help a huge number of individuals. Desert Topography The typical desert topography incorporates playas, alluvial plains, Pediments, inselbergs, mesas, buttes and badlands. Playa are dry lake beds shaped by evaporation from temporary (not many hours to several months), shallow accumulations of overabundance water (playa lake) following rare and exceptional rainstorms. Playas are characterized by mudcracks and precipitated salt crystals, shaping salt pans. Alluvial fans are dregs saved downslope of the land, typically as aprons at the mouth of canyons or as a piedmont plain. Alluvial fans coalesce to shape a bajada, a broad alluvial apron with an undulating surface. Pediments are the inclining low-help surfaces adjacent to mountains coming about because of disintegration and retreat of the mountain front. Generally secured by flimsy facade of trash, alluvial fans, or bajadas.

7. Conclusion:-

Moving sand rises speak to a natural marvel in generally arid and hyper-arid sand deserts, for example, the Sahara, Namib, Taklamakan and Rub'al Khali. The preconditions for large sand ridges or even broad "sand seas" are, from one perspective, the geological situation with a large wellspring of sand gave by the weathering of parent rocks and, then again, the climate, which is normally arid and showing typically solid breeze frameworks. These rise frameworks – for example in the Gobi, the Rub-al-Khali and the Namib – are typical sand deserts. The water system of these sand deserts is rather favorable in comparison with that of adjacent stone, gravel or clay deserts. The biomass coming about because of 1 mm of rainfall on sandy soils is 2.5 occasions higher than that created on fine-surface soils (Le Houérou 1986). This can always be found in some particular stands of plants, for the most part in the stable hill valleys where eventually once in a while even water can be found. The versatility of these rise frameworks is constrained by the particular breeze system, which may cause various kinds of rise morphology and ridge types (Bagnold 1941; Besler 1980; Lancaster 1982; Tsoar 1984; Tsoar and Møller 1986; Cooke et al. 1993). There are also less arid deserts. These are found along desert margins or as semi-deserts, where fixed sand hill frameworks start to get versatile for various reasons (Wang et al. 2006), mainly by overgrazing and trampling, together with kindling assortment. In geological timescales, climate change can be a trigger for the reactivation of stable sand rises (Lancaster 1987; Littmann 1988).

References

1. Harper, Douglas (2012). "Desert". Online Etymology Dictionary. Retrieved 2013-05-12.
2. "Desert". The Free Dictionary. Farlex. Retrieved 2013-05-12.
3. "Desert Island". The Free Dictionary. Farlex. Retrieved 2013-05-12.
4. Meinig, Donald W. (1993). *The Shaping of America: A Geographical Perspective on 500 Years of History, Volume 2: Continental America, 1800–1867*. Yale University Press. p. 76. ISBN 978-0-300-05658-7.
5. Marshak (2009). *Essentials of Geology*, 3rd ed. W.W. Norton & Co. p. 452. ISBN 978-0-393-19656-6.
6. "Precipitation and evapotranspiration" (PDF). Routledge. Retrieved 19 October 2017.
7. Smith, Jeremy M. B. "Desert". Encyclopædia Britannica online. Retrieved 2013-09-24.
8. "What is a desert?". United States Geological Survey. Retrieved 2013-05-23.

9. Walter, Heinrich; Breckle, Siegmund-W. (2002). *Walter's Vegetation of the Earth: The Ecological Systems of the Geobiosphere*. Springer. p. 457. ISBN 978-3-540-43315-6.
10. Negi, S.S. (2002). *Cold Deserts of India*. Indus Publishing. p. 9. ISBN 978-81-7387-127-6.