Thar Desert and its Natural Resources: A Case Study of the District Tharparkar in Sindh Province of Pakistan

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Abstract

The research study aims to display natural resources of Thar Desert area of district Tharparkar in Sindh. It is being studied over the years that District Tharparkar is totaled as a richest district in natural resources, such as coal, granite, salt mines, china clay, livestock, range land forest and mushrooms. The topography of the District 99% area covered in the desert which is known as the part of Thar Desert. The Thar Desert existed into two countries-Pakistan and India. The discovery of Thar Coal Reserves is one of the significant developments in the history of Sindh province of Pakistan which placed country at 7th among world top 12 richest coal reserves countries due to its economic worth. On the basis of the previous studies; it is expected that Thar coal reserves having the potential to solve the energy crisis of Pakistan. The availability of granite is 26.05 billion tons found into 8 to 10 different colors in the area of Nagarparkar. Moreover, China clay extracted at 12 to 14 different locations and around 2000 people employed in the different fields. Thar Desert of Pakistan has around 120 salt lakes and around 400 laborers were employed to harvest salt. The Rangeland forests in the desert area of the district represents the main source of livelihood is livestock and the areas are highlighted the most densely populated in livestock in Sindh province of Pakistan.

Keywords: Thar Coal; Livestock; Range Land Forest; Mushrooms; China Clay.

1. Introduction

District Tharparkar is counted as a richest district in natural resources, significantly in indigenous coal, granite, salt mines, livestock and china clay. The 99 percent of the District Tharparkar falls it under the Thar Desert whereas on only 1% included in the agriculture land. The Thar Desert is one of the most densely populated in the world (Suthar, 2012). Stabilization of the sand dunes and siltification in the interdunal valleys have provided a good environment for cultivation and, consequently, raising of goats, sheep, camels, cattle, and so on, which is the primary source of living for the people of the desert. The Hills only exist in Nagarparkar Talukar of Tharparkar District, on the north edge of Runn of Kutchh. It has a quite different geological series.

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The length of Karoonjhar range is 19 km and has a height of 305 meters. Summer is so hot during the day time, and nights are cool. Three months are remarkably hot during the day including, April, May and June. However, three months are also the coldest in Thar Desert of Pakistan namely December, January, and February. There is a wide fluctuation in the rainfall from year to year, and the average rainfall in some area is as 100 Millimeters. There is no canal or other irrigated of water for cultivation of land, but people depend on a significant amount of rainfall during monsoon rainfall. The majority of people depend on livestock.

2. Literature Review

This term is applied for natural resources stocks from which resources have been derived such as, land, forest, air quality, erosion protection, degree of biodiversity and so forth. The significant position of those who utilize the all or share of their livelihood from natural resource. It is based upon the activities as it is often the case for the poor stakeholders, but also in more general terms, since a good air and water quality represent a base of good health and other aspects of a livelihood. Within the framework, a particularly close relationship exists between natural capital and the vulnerability context and many of the devastating shocks/ disasters for the livelihoods that are natural and man-made processes t which destroy natural capital (e.g. Fires, droughts, floods, earthquakes, cyclones, land sliding and so on.). *"The natural resource stocks from which resource flows and services (for instance, Nutrient cycling, erosion protection) useful for livelihoods is derived"*. A wide range of resources could be classified as natural capital, from intangible public goods (the atmosphere and biodiversity), to divisible assets used directly for production (trees and land) (UK Department For International Development, 2001). With respect to the restoration of sustainable livelihoods, natural capital is fundamental to livelihoods that are reliant on natural resources. However, (UK DFID, 2001), considers the importance of natural capital to extend beyond people's livelihoods, emphasizing that no human could survive without the key environmental services and food produced from natural capital. Moreover, health and well-being are dependent upon the performance of ecosystems that can be threatened by human activities.

District Tharparkar is counted as a richest district in natural resources, significantly in indigenous coal, granite, salt mines and china clay. Where the natural capital is particularly important to the rural community whose livelihoods are reliant on the land, livestock and range land. However, it is not only the type of the natural asset that is an important to the analysis of natural capital. Access, quality, interrelationships and the combined effect of the natural resources which are also critical to the strength of natural reserves as based (UK DFID, 2001). The analysis of the quality of natural capital should Include: (i) Productivity (ii) Soil fertility (iii) Structure (iv) Value of the different types of trees (vi) Variation in yields (vii) knowledge base (viii)

special variability in quality and (ix) externalities that may affect productivity likewise users of the resources affecting the individual user (Gobind, H. D., 2006).

The inventory of the natural resources of the Thar Desert were developed in the context of fundamental livelihood resources and historical perspectives. The grasses, wheat, cotton, breeds of cattle such as sheep, camels and so forth (used for transport and cultivation) are the main natural resources of the Thar Desert (Human Appeal International Pakistan, 2016). Livelihood resources are categorized in two ways. In the first, livelihood assets and in the second, livelihood strategies. Livelihood assets are the forms of capitals in which livelihoods are built with a sound and sustainable livelihood. In the searching of assets, the aim is to accumulate an accurate understanding of the peoples' strengths (assets or capital endowments) (UK DFID, 2001). UK DFID bases its approach on that the public requires a number of the assets to meet a positive livelihood outcome.

The News (2021), reported that due to poor irrigation system Thar land is highly depends on rain water for irrigation. On the other side, on account of low rainfall the people of Thar facing the many problems including crop failure and animal loss and so on which in turn leads to unemployment, poverty, lack of drinking water and so forth.. The peoples of Thar have also been facing the problem of poor infrastructure, inadequate heath facilities, illiteracy, and high population growth rate. Resulting that the people of Thar inclined to migrate from that to other areas.

To sum up, the natural resources in Pakistan and Thar desert as recognized a richest in the country but remains poor on account of management for the natural resources.

3. Research Design

However, the research design is a strategy which defines how, when and where data is to be collected and assessed (Parahoo, 1997). The research approach consisted of three steps. The first involved identifying the different types of natural resources of Thar Desert area of District Tharparkar in Sindh province of Pakistan through the available materials including books, research studies, newspapers, magazine and so forth. Further, it is found in soft form which is also available on the different websites. The second step was to review the existing material both in soft and hard, then develop tools for the data collection from the study area. In the third stage, the data collection from the study area through in-depth household interviews. The Study area covers the District Tharparkar, Taluka Islamkot, five Union councils and fifteen villages. Hence the sample size 290 respondents from households. Raosoft calculator as employed to determine the sample size. Statistical tools likewise percentage, frequencies, diagram and tables are used to analyze the data and so as to present the findings with assistance of Microsoft Excel and SPSS software.

Table 3.1: Indicating the Stages of the Sampling

Province	Stages				
	First	**Second**	**Third**	**Fourth**	**Fourth**
	District	**Taluka**	**Union Councils**	**Villages**	**Respondents**
Sindh	Tharparkar	Islamkot	05	15	290

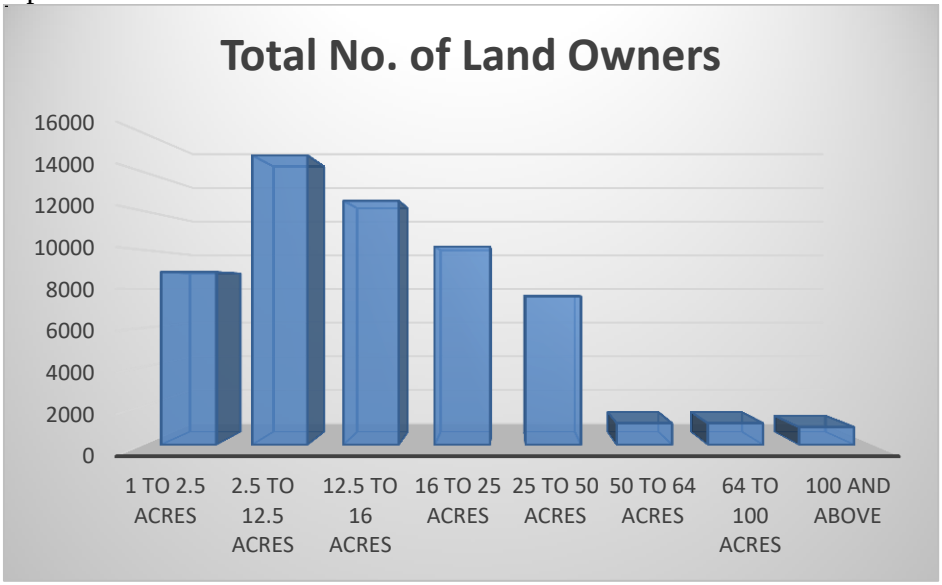
3.1 Study Area: District Tharparkar

Tharparkar District has been selected as a study area. Tharparkar district lies in the south-eastern part of Sindh province. The population is 16,49,661 souls and represents 3.4 percent of population of Sindh province of Pakistan. The 92% population is as rural population and 8% as urban with population growth rate 3.15 percent. Tharparkar District spread over 19838, Square Kilometers with rural scattered population The land comprises on nearly 99% desert and 1% barrage areas (Agriculture land which is classified cultivated through irrigation system) (Census, 2017).

4. Results and Discussion

The topography of the Tharparkar exists on 99 percent on Thar Desert which is spread over 18,638 square kilometers and inhabited by 1.65 million people (Census 2017), in 2500 villages of District Tharparkar. Tharparkar district is divided into seven ecological Zones including, Khaur, Kantho, Watt, Muhrano, Samroti, Parkar and Dhat. However, the land owners of district Tharparkar are reported in eight different sizes of land and the total number of land owners (57154). The details of land owners as explained in the following table (01). According to the figure (4.1) that the large number of Khatedars (Land-owners in Sindhi language) 14,848 possess the land between 2.5 to 12.5 acres. On the contrary, a very few numbers of Khatedars 912 owns 100 acres and the above acres of land in a whole district. The leading members of Khatedars are in Chachro 24,865 Khatedars and followed by Nagarparkar 28,276 Khatedars, Diplo 7,403 Khatedars and Mithi 6,610 Khatedars respectively.

Table 4.1: Disclosing the Khatedars in the Different Categories in District Tharparkar



Source: District Government Official website of District Tharparkar, 2011.

In Tharparkar District, the land is divided into three categories private land, State land and Enemy land which is known as "Enemy Land" actually during the war between India and Pakistan in 1965, and 1971. Due to some grave reasons; some Hindu Khatedars had been gone to India, leaving their agricultural lands, non- agricultural lands, houses, shops and plots in Tharparkar district, subsequently, their assets were declared as enemy property. Taluka wise details in **(Table 4.1)** portrays that there are more than half of enemy land exited in Chachro 125,831.5 acres. The remaining land is in Nagarparkar 76,025.01 acres, Mithi 16,750.04 acres and Diplo 476.38 acres.

Table 4.1: Enemy Land and Properties in District Tharparkar

District Tharparkar	**Land (In Acre)**	**Houses (No.)**	**Shops (No.)**	**Plots (No.)**
Total	219353.08	247	286	10

Source: District Government Official website of District Tharparkar, 2011

4.1 Range Land

According to District Tharparkar official website that the district has not riverine forest land ,but other type of forest as found in desert area known as range land forests which spread in 2,30,324 acres in four Talukas. The largest area of range land forest spreads in four Talukas of the District. The largest area of rangeland is in Mithi Taluka 93,325 acres and this figure followed by

Chachro 59, 058 acres, Diplo 49,726 acres and Nagarparkar 28,215 acres respectively.

Table 4.2: Represents the Range Land Forest area in the District Tharparkar

Range Land Forest Area in Tharparkar District	
Total	2,30,324 Acres

Source: District Government Official website of District Tharparkar, 2011

4.2 Thar Coal Reserves

Thar coal deposits is most important discovery in history of Sindh province of Pakistan which has uplifted Pakistan's coal resources 184.658 billion tones and ranked at the 7th position in the list of the top 12 coal countries in the World. Whereas only Thar coal reserves counted as 175.5billion tones (GSP, 1992). These largest coal reserves are spread over 9100 square kilometers with dimension of 140 km (N.S) *and 65km (E-W) ** in Mithi, Islam Kot, Chacharo, Daheli and Nangparkar Talukas of District Tharparkar. However, the Thar coal field area covers 48.82 percent area of the district Tharparkar. The following (Table 4.3) shows the district- wise coal reserves of Pakistan. According to these figures that 99.7 percent coal reserves are existed in Sindh province of Pakistan. However, coal deposits of Punjab 0.127 percent, Balochistan 0.10 percent and Khybar Pukhtoon Khawa. According to table (4.4) that the leading coal reserves of Pakistan was found in the District Tharparkar that is 175,506 million tones and these were the 95.06 percentage of all the coal reserves of Pakistan. Followed by District Thatta 7,773 million tones, District Jamshoro 1,328 million tones and District Badin 16 million tons respectively. The below table (4.4) reports the district wise coal reserves of Sindh province of Pakistan.

Table 4.3: Coal Deposits in Sindh Province of Pakistan

District Wise	**Million Tons**	**Percent**
1. Badin	16	0.009
2. Jamshoro	1,328	0.719
3. Thatta	7,773	4.210
4. Tharparkar	175,506	95.062
Total	**184,623**	**100**

Source: Geological Survey of Pakistan, 1992 (www.gsp.gov.pk)

According to Dr. Murtaza Mughal – the famous Pakistani economist discussing that the economic value of Thar coal resources about 25 Trillion United State Dollar (USD) which can generate electricity of Pakistan for next

100 years and also save 4Billion USD in oil import bill. In addition, only 2 percent of Thar coal reserves would produce 20,000 megawatts for the next 40 years. There is a huge difference in rate of coal generated electricity and individual power plants. Coal generated electricity produced at 5.67 Pakistani Rupees (PKR) per unit which is 4.40 PKR lesser threat of individual power projects. He also estimated that only invest 420 Billion PKR at the initial level and earn 1,220 Billion PKR from tax only (Dr. Murtaza, 2008). Dr. Samar Mubark Mand is working on Pakistan's first Underground Coal Gasification (UCG) pilot project in Tharparkar District reveals that due to short fall of energy in Pakistan lost 400 thousand new jobs every year.

4.3 Granite in Thar Desert

Granite is an available in the Taluka Nagarparkar of District Tharparkar covered the area of 1000 sq. kms, which is located at the extreme South East Corner of Sindh Province of Pakistan. Actually, the granite is pointed out the Karunjhar hills of the Nagarparkar Nagarparkar (24' 21' N and 20' 45' E) boarder area with India. (Hasan, 2009), (SIA, 2012). According to Geological Survey of Pakistan in 1977-78, estimated the total granite found as 15.864 billion. Whereas, Government of Sindh claims the availability of granite is 26.05 billion tons found in the different colors in the following table (GoS, 2019). The hillocks included of 8 to 10 varieties of pink and grey colored granites. The smaller rock bodies are known as Voravoh, Churio, Berano, Parodharo, Dhedhvero, Dhingano, Chanida, Densi, Wadhrai, Ranpur and Kharsar, amongst others (Pathan, Musthaq et al., 2018). According to a booklet (Nagar Parkar: Granite of Sindh) published by Mines and Mineral Department, Government of Sindh about the granite found in the following colors.

Table 4.4: Displays the estimated Granite in various Colors

S#	Color of the Granite
1.	White
2.	Grey
3.	Black
4.	Pink to red
5.	Green
6.	Blue
7.	Grey- Bluish

Source: Nagar Parkar, The Granite of Sindh, (A booklet Published by Mines and Minerals Development, Government of Sindh, 2019).

4.4 China Clay in Thar Desert

China Clay is discovered in the Taluka Nagarparkar and spread over in the area 125 square kilometers. It is roughly estimated 400 million tons and found

in 35 different pocket zones. (Suthar, 2012). China clay extracted at 12 to 14 different locations and around 2000 people employed in the different fields such as extraction, management and transport. The work is in decline on account of the closure of ceramic factories in Karachi. Hence, Silica which is a by-product of the china-clay extraction process -can be marketed for purposes of road building. It can also be used as aggregate for cement plaster and for earth filling purposes in building sites (Hasan, 2009).

4.5 Salt Mines in Thar Desert

Thar Desert divided into two countries after partition of south Asia in Pakistan and India likewise Thar Desert also separated into both countries. The origin of salt lakes reveals the numerous theories as proposed in the earlier and describing the salt lakes were the pools of sea which had leftover the area (Roy, 1999). Thar Desert of India harvesting up to 76 % of the salt produced in India. (Mukherjee, 2016) Thar Desert of Pakistan has around 120 salt lakes and around 400 laborers were employed. The largest salt lake is Saran in Taluka diplo of District Tharparkar. However, the greatest quantity of salt has been supplies in Sindh. (Mangrio, 2017). The estimated production of salt from the 50 salt lakes provided salt around 50000-70000 tons per year and distributed in Sindh (Suthar, 2012).

4.6 Livestock

These Rangeland forests in the desert area of the district represent the main source of livelihood is livestock. Therefore, these rangeland areas are known as grazing and pasture land which is the provision of livestock. The major source of people of the district is agriculture and livestock. Thar is a densely populated in livestock in Sindh province. According to Livestock Census 2006, (Table 4.5) the highest number of cattle 7,52,265, goats 22,17,876, sheep 11,85,122, camels 1,35,356, asses 2,35,356 and horses 8,519 are inhabited and second largest in mules among all districts of Sindh .

Table 4.5: District wise Livestock Population and Domestic Poultry in Sindh

District	Cattle	Buffalos	Sheep	Goats	Camels	Horses	Mules	Asses	Poultry	Total
Hyderabad	76484	309163	29134	295962	1075	1638	230	15935	315410	1045031
Badin	315369	498253	223072	578299	8672	1714	184	18947	611560	2256070
Thatta	410614	367117	162131	351366	10702	3036	566	19137	973268	2297937
Dadu	468802	385983	283729	800064	42027	3475	1907	38983	800570	2825540
Jamshoro	163732	118740	171748	414191	4078	870	109	29384	281818	1184670
Tando	58149	139224	17124	212633	539	488	227	11539	239242	679165
Matiari	266906	234683	51865	330003	876	690	69	20328	213809	1119229
T.M Khan	57416	157934	24233	136266	2429	83	211	8257	239491	626320
Mirpurkhas	201533	234348	67922	666012	3066	925	246	14973	365231	1554256
Umer Kot	197308	97842	149006	536387	6459	491	58	28635	179945	1196131
Tharparkar	752265	46328	1185122	2217876	135356	8519	1475	246657	263431	4857029
Sanghar	370235	323543	83579	696584	6406	1600	989	45818	437343	1966097
Sukkur	211623	196505	47472	249589	8266	794	1192	10324	435034	1160799
Ghotki	281697	246801	73503	374908	10137	2045	522	26272	437248	1453133
Khairpur	493427	527875	109174	900463	18229	2884	1203	44341	1449101	3546697
Nawabshah	339188	390259	101810	877509	4577	3527	329	42424	863147	2622770
Naushero	334758	530530	51564	820422	3711	627	1204	35593	932006	2710415
Larkana	216199	531329	52237	248057	608	521	107	82161	889812	2021031
Shahdadkot	229617	375132	159938	351413	883	1418	168	72740	1126848	2318157
Shikarpur	511040	549631	293468	342054	1080	1846	1683	56928	1065707	2823437
Jaccobabad	507241	469182	369693	524396	1588	1975	1252	83280	1061207	3019814
Kashmore	190872	195704	138344	148022	1411	2587	4089	31908	519589	1232526
Karachi	270547	414056	112640	499745	6249	3246	1492	20361	434723	1763059
Population of Sindh	6925022	7340162	3958508	12572221	278424	44999	19512	1004925	14135540	46279313

Source: Livestock Census Report of Pakistan, 2006, Published by Bureau of Statistics, Government of Pakistan, Islamabad

Table 4.6: Displays the People Owned Livestock n=290

Livestock	Total Frequency	No. of Respondents	Out of 100 percent
Cattle	290	149	55.2
Buffalos	290	12	4.4
Goat	290	239	88.5
Sheep	290	129	47.7
Camels	290	43	15.9
Horse	290	14	5.2
Asses	290	251	93.0

Source: Study Survey, 2014

4.7 Agriculture

The vulnerable conditions of the study area where almost in every 3rd year droughts occurred. According to (Gobind, 2006) due to a long drought, agricultural potential is reduced considerably and agricultural condition had not back to the precondition that was in 1987. Therefore, the people of Thar found the alternative source of income generation activities such as, handicrafts, carpet industry, seasonal migration and out migration to urban areas as emerged in the study area. The district is divided into two parts. The largest area consists on desert area (4731089 acres) and barrage area (59936 acres). Similarly, crops are also the different in both areas. As the crops of desert areas including Jowar, Bajra, Mung, Korar /Moth, Tir and Sesame are cultivated whereas the crops of barrage areas are cotton, sugarcane, wheat and chilies. According to Agricultural census of Pakistan (2008-09) that Guar and Bajra produced in the largest quantities that of other districts of Sindh province. On the other stream, due to shortest irrigated area, and existed in the tail of the water courses, the lowest production of cotton, sugarcane, wheat and chilies in the district Tharparkar.

Table 4.7: Agricultural Crops and Production in the Study Area

(In Million Tonnes)

Desert Area			Barrage Area	
S.No.	**Crops**	**Production Quantity**	**Crops**	**Production Quantity**
1	Bajra	40.0	Cotton	3.5
2	Guar	25958.0	Sugar Cane	59.1
3	Moong	-	Wheat	3.7
4	Moth	-	Chilies	2.1
5	Sesame	-	-	-

Source: Federal Bureau of Statistics, Statistics Division, Government of Pakistan, 2008-09

3.8 Mushrooms

Mushrooms are rich in the several bioactive components and measured as a good source of proteins, vitamins, carbohydrates, fats, amino acids, and minerals. These are highly fragile product with shelf life of 3-5 days chilled in refrigerated and 1-2 days at ambient conditions (Biology & Products, n.d.). In Thar Desert, there are a variety of mushrooms grow in the monsoon season from July to September. (Ismail, Hussain, & Anjum, 2014). These mushrooms rise after two days of monsoon rain. The mushrooms are the only essential source of protein for the poorest communities of the Tharparkar District. (Rajab, 2003), (Channa, 2018). Tharparkar is the only District Sindh where mushrooms are sold in all towns after rain and the people of Thar send mushrooms to their kith and kin as the gift of Thar.

3.9 Flora and Fauna

The district is divided into eight ecological zones including Muhrano, Dhat, Watt, Kantho, Samroti, Parkar and Khaur. Rainwater is an only source to provide water to the people of Tharparkar district. There is no canal or stream in the District. The district is known as drought disasters prone area and commonly disasters are occurred in every three years. In case of non-sufficient rain fell in the district in the month of August. Government of Sindh declared as drought affected district at the end of August month. The soil of the district is arid due to severe wind erosion. The vegetation including Hardy Kandi (Propos Ginerasia), Thuhar (Euphorbia Caducfiolia), Phog (Calligonum Polygoneides), Ak (Calotropis Gigantea), Jar/ Khabar (Salvadora Persica) Neem (Azatrileha Indica) Khip (Leptadnia Spartium) Liar (Coredia rothu) Khumbat (Acacia Senegal) Rohero(Tecomella Undulate). Tharparkar district is blessed with a number of the beautiful species birds and animals. The most famous birds are peacock, partridge, barn owl, Sindh night jar, Indian scoop owl and Indian night jar (Gobind, 2006).

Table 4.8: The Majority of Trees in district Tharparkar

S.No.	Names in Sindhi	Names in English
1	Thuhar	Euphorbia Caducfiolia
2	Phog	CalligonumPolygoneides
3	Ak	Calotropis Gigantea
4	Kandi	Propos Ginerasia
5	Jar/ Khabar	Salvadora Persica L.
6	Neem	Azatrileha Indica
7	Khip	Leptadnia Spartium
8	Liar	Coredia rothu
9	Khumbat	Acacia Senegal
10	Rohero	Tecomella Undulate

Source: World Wildlife Fund (a hand out) Native trees of Sindh, Published by World Wildlife Fund (WWF), Karachi

5. Conclusion

Tharparkar is one of the areas where agriculture is less developed by the people due to deserted land, but it is rich in natural resources specifically massive amount of availability of Thar coal, granite, china clay and salt mines. According to sources, 99.7 percent coal reserves of the Pakistan is an available in Sindh, and it is also being found 95% of total coal of the Sindh province which is the available in Tharparkar district of Sindh -Pakistan. Having said that, a huge amount of such natural availability of coal and yet local population suffers from the various problems including unemployment, poverty, impure drinking water, ill-health environment, ; illiteracy, shortage of food ; and much more. This is being question mark on the policies and performance of government that how they utilize and incorporate local people to improve the condition of Tharparkar and its people as a whole because these are human beings like us and have some dreams to fulfill and desire to spend a healthy life.

The provincial government is working for the improvement in the field of energy, health, and education sector in Tharparkar district. However, It is suggested that provincial government should have to take more effective initiatives particularly or Providing canal water to a desert, to health and education facilities and so forth.it is recommended that problems of Thar must be taken seriously not just by government, but all the stakeholders and powerful class of society in their hands so that there may come happiness in their life.

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