RESEARCH REVIEW JOURNALS
Volume-03
Issue-06
June-2018

ISSN: 2455-3085 (Online)
RESEARCH REVIEW International Journal of Multidisciplinary
www.rrjournals.com [UGC Listed Journal]

Dynamics of land use pattern-A study of Kazakhstan

Syed Binish Gillani

Centre for Central Asian Studies, University of Kashmir, J&K (India)

ARTICLE DETAILS

Article History
Published Online: 19 June 2018

Keywords
Agricultural development, land use, Dynamics, Productivity

ABSTRACT

Food constitutes the first and one of the most fundamental needs of the human beings. No nation can hope to flourish in the environment of political, economic or social stability without securing ample and nutritious food for its population. It is the agriculture which fulfils the basic need of the human existence, as it naturally assumes a place of vital importance in the world economy. The development of the agriculture cannot be carried out without proper utilization of the land. Land is very important natural resource and it is the orifice of the horn of the plenty through which nature poured her gifts and is the main source of food. An analysis of the land resources, it is utilization; distribution and the extent are of permanent importance for the sustainable agricultural development. The present paper attempts to assess the spatial land use pattern and changes in the land use in Kazakhstan. Since land use is dynamic process and the humanized form of the earth surface, it keeps on changing with the change in economic returns, agro-climatic conditions, conservation strategies, farm programmes and environmental regulations. Kazakhstan experiences a change in land use through varying degree of intensity across its different oblasts (administrative division). The study is based on secondary source of data. A multifaceted analysis is carried out in order to analyse the extent as well as direction of change. The analysis of the data reveals that agriculture land contributes a major share in the land use in Kazakhstan (32.65% in 2008 and 34.28 percent in 2012). Other major share in the land use has been taken up by pastures. Major land use changes was observed in fallow land, forest cover, water bodies and other lands which have shown a negative change from 2009 to 2012.

1. Introduction

Land is a very important natural resource and is the commonly accepted meaning of the surface, Soil etc.-was the mouth piece as it were through which the nature spoke, the orifice of the "Horn of plenty through which she poured her gifts" (Zimmermen, 1951). Land is a delineable area of the earth's terrestrial surface, encompassing all the attributes of the biosphere immediately above or below this surface including those of the near-surface, climate, the soil and the terrain forms, the surface hydrology (including shallow lakes, rivers, marshes and swamps) the near surface sedimentary layers and the associated ground water reserve, the plant and the animal populations, the human settlement pattern and the physical result of past and the present human activity (FAO, 1995). Land is necessary for human survival, because it provides men with the food and raw materials which are used to satisfy hiswants. Man uses land within several frameworks i.e. physical, social and economic, which often operatetogether. Land is thus basic and indispensable resource for agriculture. It is repeatedly used for the production and cultivation of crops which sustained the human life. It is the most important recourse in the economy of the country and agriculture has remained the principal occupation of men since the ancient period. Hence the quality and extent of land determine the variety and magnitude of agriculturalproduction. In the older days population was less and necessities were limited. With the huge increase in the human population, their requirements increased and became complex. As a result of increasing pressure of population, changes are occurring in the land use and cropping pattern. Owing to the increasing pressure of human and livestock population on land and ever growing demand of food, fodder and fuel, there is need of scientific, rational and economic use of every piece of land in a sustainable manner (Mohmmed N, 1981).

Study of land utilization pattern is of great importance as it involves specific areas. Since land is the man limiting factor in agriculture production. The land utilization also indicates how efficiently the land recourses available to farmers are utilized, The land utilization pattern also indicates the area available for cultivation, gross cropped area and cropping intensity. The study of land use in its spatial content is essential to understand the regional zonation of the area of optimum land use, degraded areas etc. The utilization of land for different purposes indicate an intimate relationship between prevailing ecology conditions and the man. The efficient use of land depends on the capacity of men to utilize the land in proper perspective (Shinde, etal. 1987). Land use is a humanized form of earth surface synthesizing physical, chemical, biological system and process together with socio-economic transformation and behaviour in space and time. The diagnosis and progress of changes in man-land interaction in a holistic manner at various levels. Land use changes may be examined by considering conversion of forest to crop land and range of land, loss of productive land through various mechanisms, conversion of wet lands to agriculture and urban use and the conclusion of other type of land to various human uses etc. (stamp, 1984).

Land use is not always directly observable. Land use includes the aspects beyond the characterization of bio physical over of the land. Identifying land-use requires Socio-economic interpretations of the activities that take place on the

earth's surface (Fisher et al 2005:86). Land use can often be inferred from simple observation of land covers but to identify some land uses, additional information regarding the human activities on land or the presence of specific elements in the landscape have to be taken into account. Many factors determine land use. First of all, biophysical factors enhance or constrain the land use (climate, topography, soil, water) cultural content, local traditions, institutional and political aspect also interfere (Jansen 2006) and finally, demographic and economic dynamics may drive demand for particular services and commodities which in turn influence land use changes. Land-use is affected by natural and human factors. So, the use of land has been increasing as the science and technology increases. The developing countries need improvement in the proper utilization of the land resources to achieve the maximum output and productive capacity of the land.

Agricultural sector plays a very significant role in the economy of Kazakhstan. Agriculture has become priority sector for Kazakhstan strategic initiative. The transition to market economy has brought more opportunities for the sector. Agriculture represents 3.5 % of the GDP and employs 20% of the labour force with 43% of the population living in the rural areas. More than 74 % of the country's territory is suitable for the agricultural production and only 25 % of the land is arable (World development indicators- 2016). However, about half of the arable land of the country is located in the area of the risky agriculture created by the climatic conditions. The cropping land use in the state also underwent drastic change. The study of the shifting land use is necessary for sustainable agriculture of the state. Knowledge of cropping land use helps in maximization of productivity and conservation of land (ICAR, 1980).

2. Study Area

Kazakhstan is the second largest country to emerge from the collapse of Soviet Union. It is situated in Central Asia between the Ural River and the lower courses of the Volga River to the west, the Alataumountains to the east, the west-Siberian Plateu to the north and the Tien-Shan mountains chain to the south. The territory of the Republic stretches 1,600 km's North to South and more then 2,800km's West to East, covering an area of 2,724,900 Sq km. In terms of area, the Republic is the 9th largest country and second in the CIS after Russia in terms of territory. Kazakhstan roughly equals one-third of US or one-quarter of China. It is sparsely populated with only 16.7 million people (Grote, 1998). As a landlocked country, Kazakhstan borders Turkmenistan, Uzbekistan and Kyrgyzstan to the south, Russia to the North, China to the East and the Caspian sea to the West. Kazakhstan covers about 15 degrees of latitude from 40^0 N to 55^0 N and 35 degrees of longitude from 50^0 E to 85^0 E.Kazakhstan is located as the junction of two continents-Europe and Asia. Total length of borders exceeds to 12187 km.

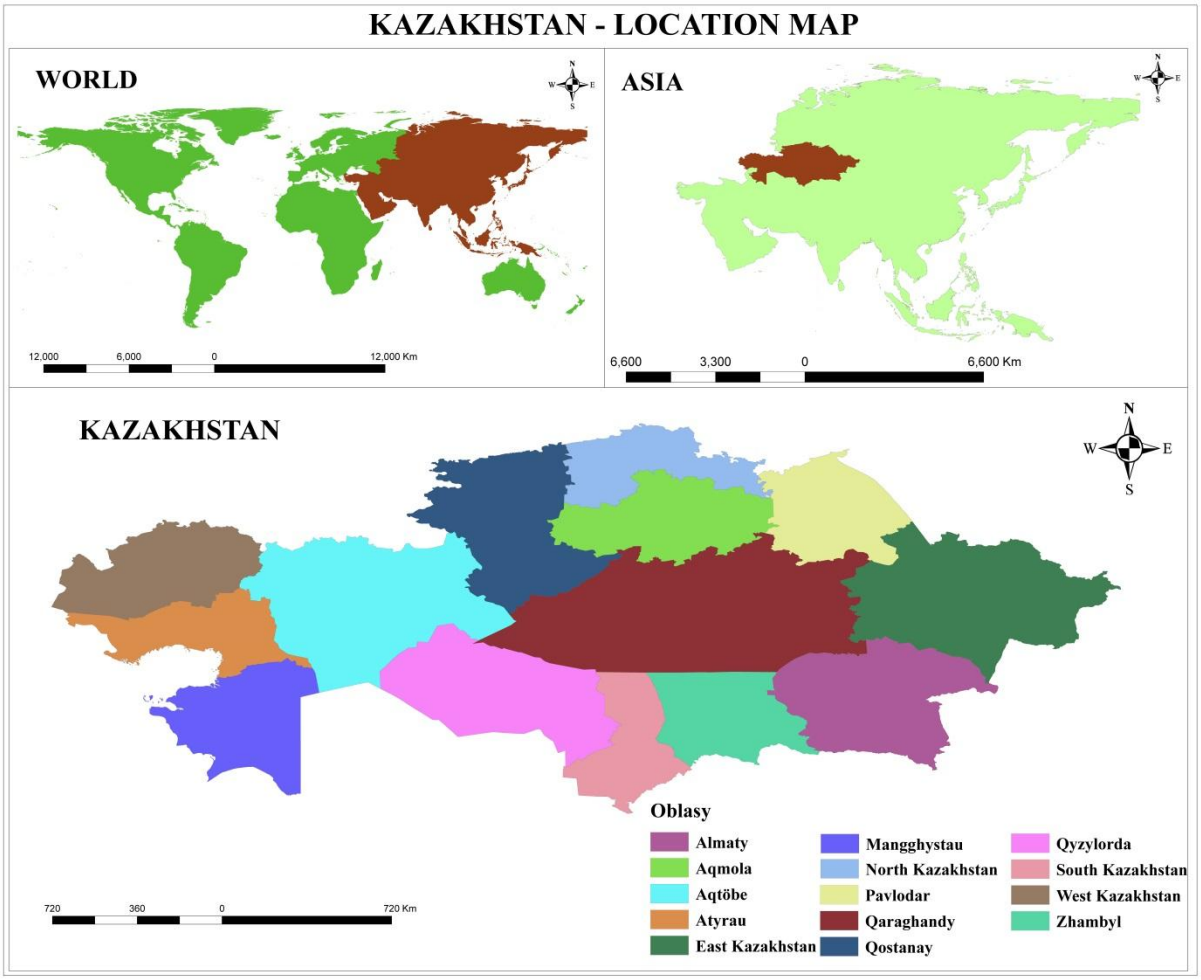

Fig. 1

Most of the area of Kazakhstan is flat and lowlying. The territory of Kazakhstan has complex geological history especially its central and eastern areas. Rivers of Kazakhstan have always played an important role in the life and history of Kazakhs. Infact almost all the main cities were founded on the bank of the major rivers. Largest rivers in the country are Irtysh, Yesil, Tobal Ural, Syr Darya, Ili, Chu. The length of each of them is more than 1000 km.

3. Methodology

Land use land cover data of different categories has been obtained from the statistical Agency of republic of Kazakhstan 2007, 2010, Agricultural census 2006/2007, World Bank-2008. Simple statistical techniques (percentage and average) and cartographic techniques are used to analyse the changes in the land use land cover of the study area.

4. Result and Discussions

The land use in Kazakhstan is the cumulative results of past and present decisions by individuals, communities or government and keeps or changing in any country, state or region in consonance with the changes in prices of the good, government policies and other related factors. The trends in the net sown area, irrigated area, fallow land, pasture land is analysed in the following discussions.

Table: 1 Kazakhstan Land use (2007)

Land Use	Area 000'hec	% Area
Agricultural land Total	87,324	32.04
Arable Land	21,925	8.04
Fallow Land	3,502	1.28
Pastures	55,840	20.49
Meadows	1,806	0.66
Forest	3,000	1.10
Wetlands	668	0.24
Land Under Water	224	0.08
Other Land	98,135	36.02
Permanent Crops	66	0.02
Total	272,490	100.00

Source: committee of the statistics of the Ministry of National Economy. (http://stat.gov.kz)

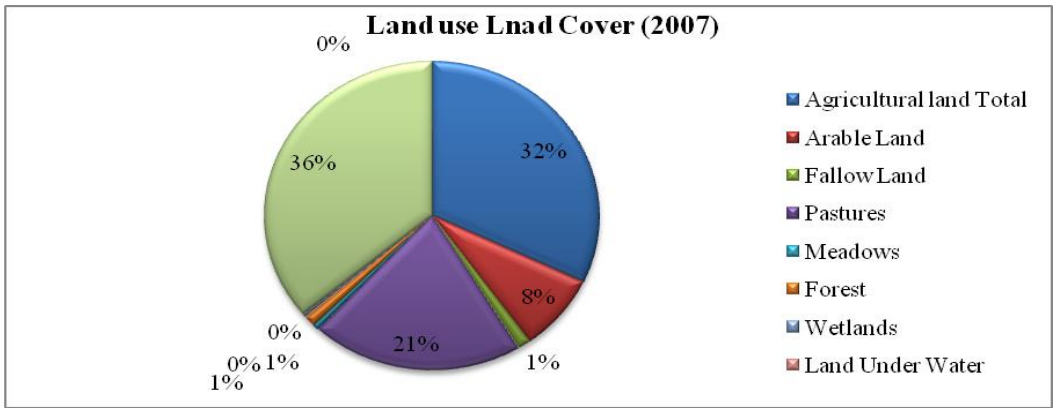

Fig. 2

The table 1 reveals that agriculture contributes a major share in the land use in Kazakhstan. Other major share has been taken by pastures. Arable land is also figuring in the higher ranks. With the use of adequate irrigation facilities new agricultural lands can be brought under cultivation.

Table: 2 Kazakhstan Land use (2008)

LAND USE	AREA 000'HEC	% AREA
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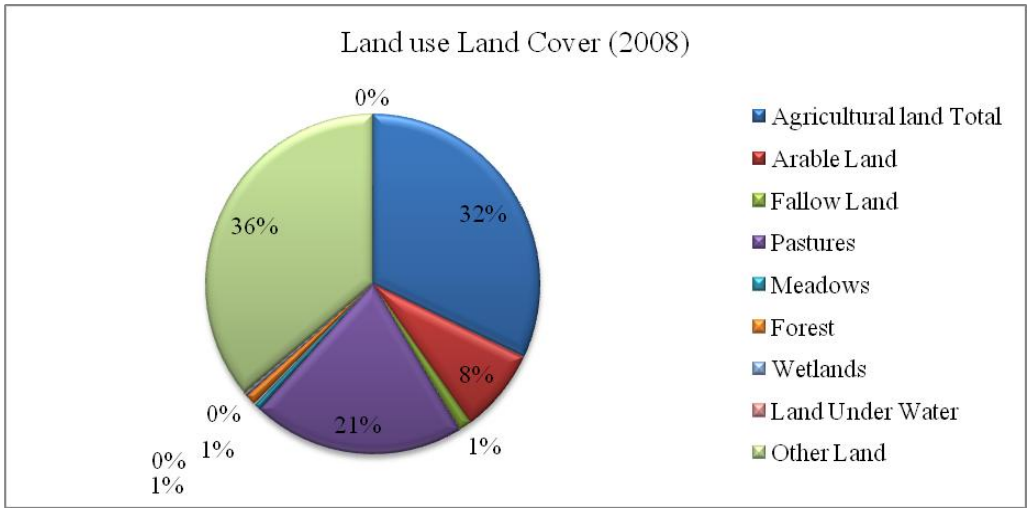

Fig. 3

The table 2 reveals that agriculture contributes a major share in the land use in Kazakhstan. Other major share has been taken by pastures. Arable land is also figuring in the higher ranks. With the use of adequate irrigation facilities new agricultural lands can be brought under cultivation. The various dimension of land use pattern indicate that permanent crops and non-arable land have maintained consistency and stability is their land use pattern. But at the same time there is dire need of the rational land use planning in order to achieve maximum yield from the existing land. Planners of Kazakhstan therefore should consult the developed world agronomists in order to attain the target of sustainable agricultural development.

Table 3: Land use land cover change in Kazakhstan (2009 - 2012)

Land Use	Area 000'hec	% Area	Area 000'hec	% Area	Percentage Change
2009			2012		
Agriculture Land	91,705	33.65	93,428	34.28	.63
Arable Land	23,211	8.5	24,203	8.88	.38
Fallow Land	3,024	1.10	2,657	0.97	-0.13
Pastures	59,628	21.88	61,123	22.43	.55
Meadows	1,962	0.72	2040	0.74	.02
Forest	3,398	1.24	3,287	1.20	-0.04
Wetlands	178	0.06	186	0.06	0
Land Under Water	243	0.089	239	0.087	-0.002
Other Lands	89,071	32.68	85,257	31.28	-1.4
Permanent Crops	70	0.025	70	0.025	0
Total	272,490	100	272,490	100	

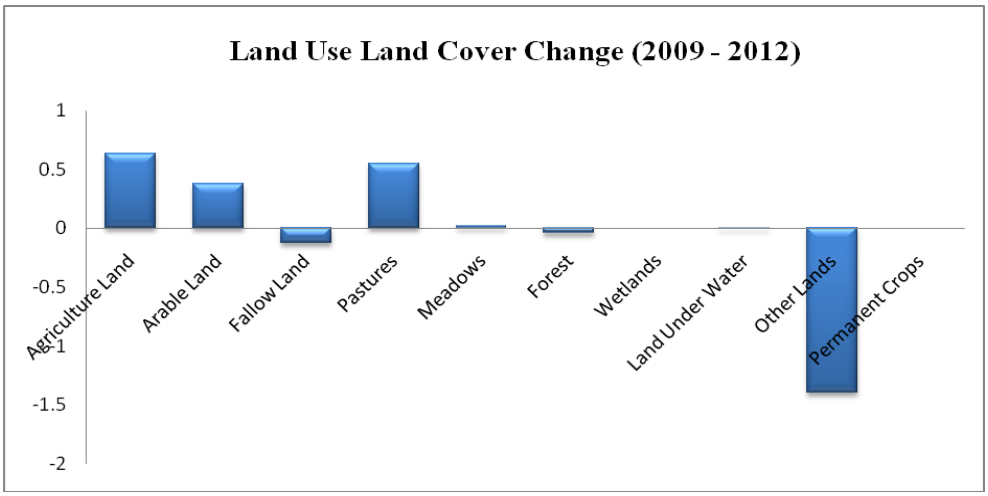

Fig. 4

I. Forest: -The area under forest includes all lands which are under forest, whether private or state owned. There is a close association between nature of terrain, the amount of rainfall received and the area under forests (Diddee, et al., 2002).

II. In Kazakhstan the area under forest was 1.24 percent (3,398) in the year 2009 and it decreased to 1.20 percent (3,287) in the year 2012 showing a decrease of -0.04 percent. Some changes in the forest cover had taken place but overall change is small and insignificant.

III. Fallow Land: -Unlike the other agriculture related uses, fallow lands are the regular part of the cultivated land on which the cultivation has been temporarily suspended due to some reasons. Fallowing is either enforced by unfavourable weather conditions like droughts and floods due to which land cannot be sown or seeding get destroyed or farmers resort to fallowing because the returns from the cultivation of the involved may be too low (Sharma, 1999). If the land remains fallow for only the current year, it is recorded as current fallows (ICAR, 1980) the other fallow lands include all land which are used for cultivation but are temporarily unsown for a period not less than one year and not more than five years.In Kazakhstan the fallow land was 3,024 thousand hectares in 2009 i.e. about 1.10 percent which fell to 2,657 thousand hectare in 2012 i.e. 0.97 percent. Thus there is a percentage decrease of -0.13 percent.

IV. Arable Land: -Arable land is the land under temporary agricultural crops (multiple cropped areas are counted only once), temporary meadows for pasture, land under market and kitchen garden and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category.

V. Permanent Crops: - The land that produces crops from the woody vegetation e.g. orchard land, vineyards, Coffee plantations, rubber plantations and land producing nut trees.In Kazakhstan the land under permanent crop was 70 thousand hectares in 2009 as well as 2012. This shows that there was neither increase nor decrease in the land use.

VI. Meadows and Pastures: - The land used as pasture and grazed range and those natural grasslands and sedge meadows that are used for hay production in some regions.

VII. Kazakhstan was having 1,962 thousand hectares under Meadows in 2009 and it rose to 2040 is 2012 (0.74 percent). There was an increase of .02 percent. Pastures were about 59,628 thousand hectare in 2009 which rose to 61,123 thousand hectare is 2012 i.e. 22.43 percent thereby increasing it to 0.55 percent.

5. Conclusion

The analysis and interpretation of data revealed that on an average agricultural land has slightly increased is Kazakhstan. The arable land has also shown an increasing trend. The area under forest has shown a decreasing trend from 2009 to 2012 and there is a decrease of -0.04 percent while pastures have increased by 0.55 percent.

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