

# Economic Impact of Deforestation and Land Degradation in Tajikistan

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**ABSTRACT:** : There is huge economic impact of deforestation and land degradation in Tajikistan. A UNEP-UNDP Poverty-Environment Initiative study estimates the economic cost of land degradation on degraded and fallow land is to be in the order of 1,946 million Somoni which is about 7.8 percent of Tajikistan's GDP. Due to degradation of land many farmers abandoning their land and 15,667 hectares of land has been abandoned from 2007 to 2010. Production of fodder crop, milk and meat production has decreased in the country. For the last 25 years milk production has decreased 290 kg per cow and meat production 420 kg per head. After the independence of the country in 1991 grain productivity has increased 1.25 tones per hectares due to increasing use of chemical fertilizers. Overall poverty and rural poverty in Tajikistan has decreased in the country due to remittances sent from abroad. Due to deforestation and land degradation large area of land have become useless in Tajikistan, so the government of Tajikistan is trying to reclaim the land for agricultural use. The cost to reclaim is very high. In 2009 about 5 million Somoni was allocated for the purpose of land reclamation. After five years in 2014 about 8.5 million Somoni was used for the same purpose.

**Key Words:** Land degradation, Deforestation, Pasture land, fodder, Remittance, Chemical fertilizer, Land reclamation, Poverty,

## Introduction:

There is an attempt made to establish the current cost of land degradation in the territory of Tajikistan. The research analysis provides the base for scenario analysis under which the 'Business As Usual' scenario can be compared with 'Sustainable Land Management' scenario. The analysis is focused on the on-site and off-site impacts of land degradation connected with agricultural practices, pastureland over-grazing and forest utilization in the country. It is acknowledged that land degradation is also caused by the activities of other sectors and by natural causes; this can impose costs on the agriculture and other sectors. On-site impacts from land degradation occurring on agricultural land, pastureland and forest land associated with poor management and utilization practices. Offsite impacts on agriculture, livestock rearing and forestry because of land degradation occurring outside of agricultural land, pastureland and forest boundary. As an example, overgrazing in the higher mountains may impact productivity in the valleys by increasing siltation of reservoirs, which can reduce the quantity of irrigation water and results in a reduced area under cultivation<sup>1</sup>.

Agriculture is the main employment generating sector in Tajikistan, and majority of the people depends on primary sector for their livelihood. A UNEP-UNDP Poverty-Environment Initiative Study estimate the economic cost of land degradation connected with less production on degraded and unused agricultural land to be in order of about 1,946 million Somoni which is about 7.8 percent of Tajikistan's GDP. However the actual cost is likely to be higher than this estimate as it does not consider the off-site cost land degradation, such as infrastructure damage. If the value of the foregone production was evenly distributed with rural households, this would have benefit of 583 USD per household per year based on the estimate of total 757,608 rural households. According to the Country Environment Analysis using Forest Resource Assessment (FRA)-2005, considering direct and indirect use value loss of forest, it was estimated about 14.5 million Somoni or 3 million USD or about 0.2 percent of GDP. This estimate does not count the loss of carbon linked with deforestation, soil degradation and landscape degradation<sup>2</sup>.

In Central Asian region, Tajikistan remains one of the countries, dramatically exposed to climate induced disasters, which have a serious effect on economic development. Tajikistan faces around 500 of natural disasters every year, which results in USD 100 million in losses and damages annually. Natural disasters have been accountable for 5 percent of the country's GDP during 1999 to 2008. During the period 1997 to 2009, natural disasters caused the loss of 933 lives and damages up to 1.15 billion Tajik Somoni, while floods of 1998 to 1999 led to death cases, and damages to agriculture and infrastructure amounting to 55 million USD. The severe drought in 2000 in Tajikistan affected 3 million people (half of the country's population at that time), risking the food security and development<sup>3</sup>. Rapid increase of air temperature

along with intensive snow and glacier melting in the mountains triggers flash floods and mudflows. In 2005 and 2010 they were the main cause of the infrastructure and agricultural damages up to 50-100 million USD<sup>4</sup>. “Compound crisis”, which occurred in 2007-2008, resulted in economic loss of 250 million USD or around 7 percent of Tajikistan’s GDP in 2007<sup>5</sup>.

**Impact on Agricultural Productivity: -**

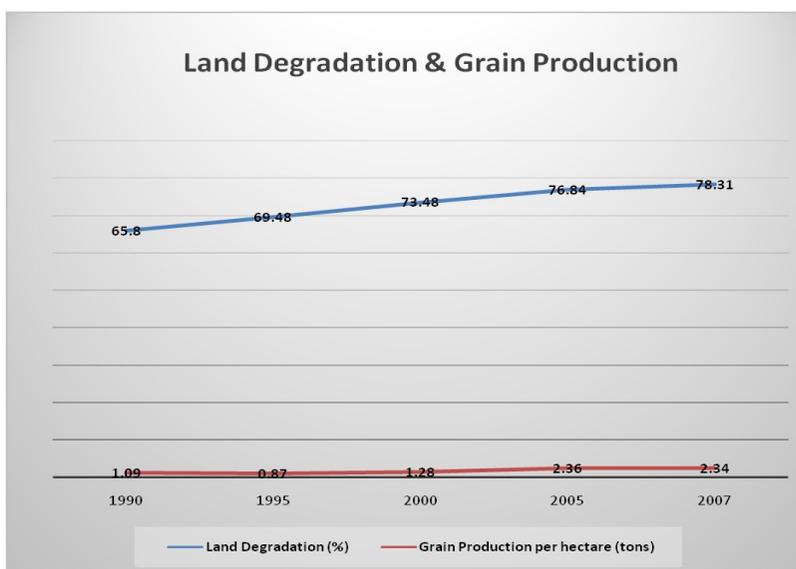
There is not much study to estimate the economic cost of land degradation. The closest estimation is shows the decline in agricultural productivity provided in the Tajik Nation Action Plan (NAP) and summarized in the Tajik CAMIN Working group on “National Strategy and Action Plan for Sustainable Mountain Area Development of Tajikistan” (NASAP). Land degradation has been main contributor to apparent decrease in the yield of many crops. The Tajik NASAP estimate that the decrease in production of only four crops caused a total loss of about 224 million USD to the economy of Tajikistan. These crops are raw cotton, potatoes, vegetables and melons and gourds<sup>6</sup>. Because of increase in land degradation the productivity has decreased in the recent years. The annual agricultural production for crops has decreased to about half due to land degradation.

A large area of the country has lost its production due to land degradation. It is estimated that about 100,000 to 120,000 hectares of salinized soils are spread from north to south of the country<sup>7</sup>. Because of the salinity of soils, the country is estimated loss of 100,000 tons of cotton and other agricultural products. Under the changing climate, the temperature rises and evaporation increases so prevention of salinization is becoming more difficult. A cursory look at Table 4.3 indicates that there has been an increase in the agricultural productivity for the grain crops over the period 1990-2007<sup>8</sup>. There has been significant increase in the land degradation in agricultural areas of Tajikistan but the productivity per unit area has not been reduced but has increased over the period because of several factors including – better land management practices and use of chemical fertilizers, high yielding varieties of seeds and improved agricultural technology. The fertilizer consumption for example has gone up from 40,000 tons in 1995 to 65,000 tons in 2015 at the national level in Tajikistan<sup>9</sup>.

**Table: 1. Land Degradation and Grain Production in Tajikistan (1990-2007)**

Year	Land Degradation (%)	Grain Area ('000 hectares)	Grain Production ('000 tons)	Grain Production per hectare (tons)
1990	65.80	230	252	1.09
1995	69.48	265	233	0.87
2000	73.48	421	543	1.28
2005	76.84	396	935	2.36
2007	78.31	397	931	2.34

Source: FAOSTAT, 2009



Source: FAOSTAT, 2009

**Fig: 1.**

**Impact on Incidence and Intensity of Poverty: -**

There is a close connection between land degradation and poverty in Tajikistan. Rural poor households are highly dependent on local natural resources for their livelihood and they are the most affected by degradation of environment, contamination of water and natural disasters. So it is important that policy makers consider the economic impact of land degradation in poverty reduction strategies<sup>10</sup>. Land degradation is an important factor leading to low agricultural productivity due to which low economic returns and reduced income of farmers.

Poverty rate is high in rural areas compared with urban areas but the difference reduced in between 1990 to 2003, because the poverty rate fell by 19 percent in that period. The rate of poverty reduction was not uniform across the country. Overall poverty fell markedly in RRS, which is 26 percent but in other province much less. Sughd reduced poverty by 15 percent, GBAO and Khatlon 13 percent and Dushanbe 12 percent only. The total number of poor and extreme poor people also decreased despite the high rate of birth in the country. One of the main reasons of high number of poor people in Dushanbe is high level of internal migration.<sup>11</sup>

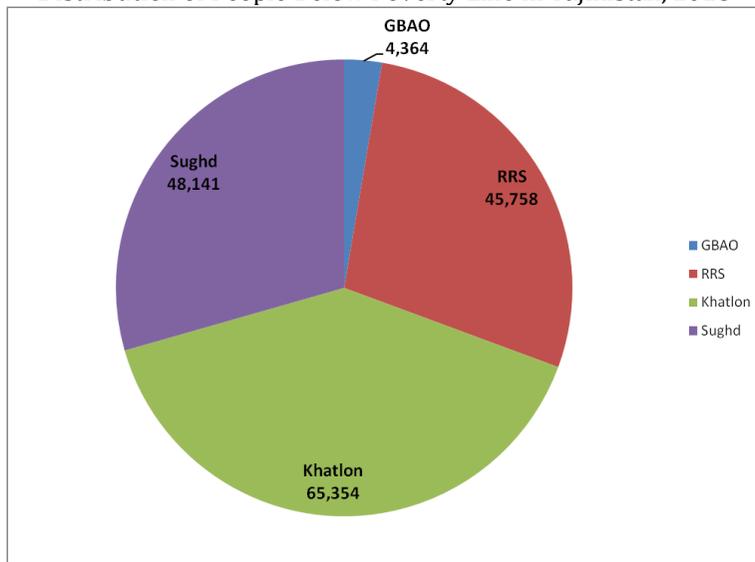
Incidence of poverty has declined by 34.6 percent in rural areas of Tajikistan from 2003 to 2012. Rural poverty reduced from 73.8 percent in 2003 to 39.2 percent in 2012. In rural areas it dropped from 42.3 percent in 2003 to 16.4 percent in 2012. The analysis of the 2003–2009 data about labor earnings brings to light the fact that wages, self-employment income, and remittance inflows were the most important factors that reduced poverty and enabled the rise in the middle class monthly consumption levels between 230 and 294 Somoni. During this period, 39 percent of the poor moved upward to the vulnerable group, while another 13 percent moved to the middle class; and 24 percent from the vulnerable group entered in to the middle class<sup>12</sup>. Table 4.5 reveals that rural poverty has decreased from 1999 to 2013 and on the same time the land degradation has increased. In 1999 there was 84 percent of rural population under poverty line. With the time it has decreased and reached 37 percent in 2013. Land degradation on the same period has increased from 72.42 percent to 82.73 percent. In Tajikistan land degradation has increased and because of many reasons poverty has decreased. So, there is no direct relation between land degradation and poverty in Tajikistan.

**Table: 2.** Registered People Below Poverty Line (BPL) in Rural Areas of Tajikistan (2015)

Region	Total Population	BPL People	BPL Females	BPL Households	BPL Female-led Households
GBAO	192,136	4,364	1,722	803	257
RRS	1,842,253	45,758	18,505	8,668	3,076
Khatlon	2,723,180	65,354	25,395	11,796	4,315
Sughd	1,977,271	48,141	19,352	9,137	3,365
Total	6,734,840	163,617	64,974	30,404	11,013

Source: JAMBI Dataset, based on records of jamoat social assistance Commissions

Distribution of People Below Poverty Line in Tajikistan, 2015

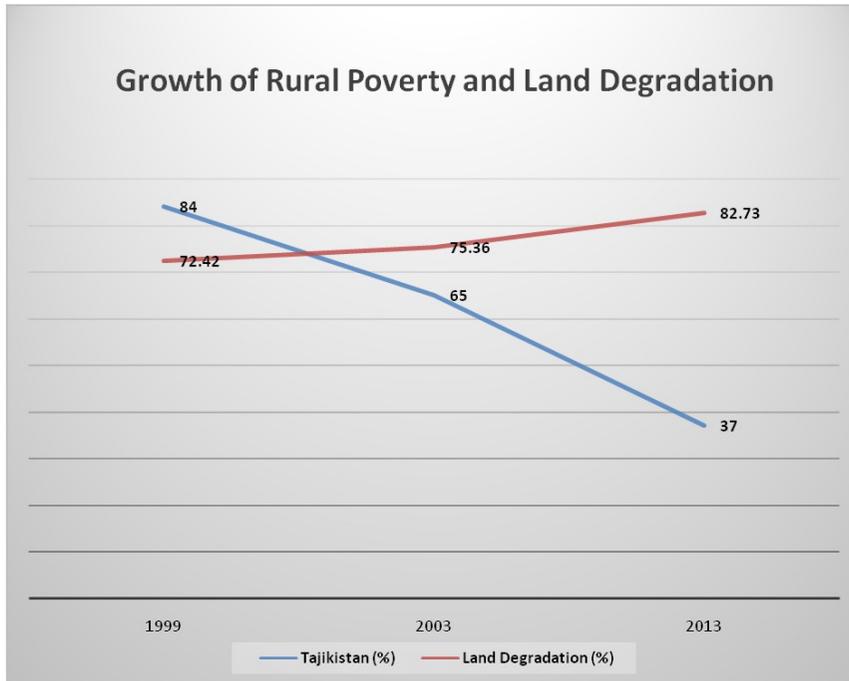


**Fig: 2.**

**Table: 3.** Growth of Rural Poverty and Land Degradation in Tajikistan from 1999-2013 (%)

Year	GBAO	Sughd	Khatlon	RRS	Tajikistan	Land Degradation
1999	96	82	92	72	84	72.42
2003	86	66	78	48	65	75.36
2013	51	24	39	45	37	82.73

Source: Country Partnership Strategy: Tajikistan, 2016



Source: Country Partnership Strategy: Tajikistan, 2016

**Fig: 3.**

**Land Abandonment: -**

Land abandonment by the farmers is one of the consequences of land degradation and deforestation in Tajikistan. Even after the reports of widespread land degradation in the country, there is very little statistical evidence of abandonment of agricultural land in the country. The abandonment can be measured by the difference between the total arable land and the actual cropped area. According to government statistics the areas of cultivable land has remained constant in 850,000 hectares since 1980<sup>13</sup>. However, because the abandoned land is not properly reported the complete picture remains unknown. The cropped areas has increased after 1995 and since 2000 the ratio of sown to arable land has been about 100 percent showing that around all the available area is under crop. Farm survey also shows the same figure that most of the land allocated for farming has used. According to World Bank’s baseline survey, the unused portion of land surveyed was less than 1 percent<sup>14</sup>.

The disparity between the statistical data and the opinion of experts that there are large areas which is unused therefore need to more in-depth evaluation. Statistical data is available from the State Committee on Land Management of Tajikistan on the land out of use due to over irrigation, salinization and damage to irrigation infrastructure. The land out of use has increased from 6,256 hectares in 2007 to 21,923 hectares in 2010, a two and half times increase in land degradation. About 68 percent of this degradation is in irrigated lands shows the condition of water management and maintenance of irrigation infrastructure. Sughd and Khatlon provinces are highly unused land which is accounting for 50 and 40 percent of the total unused land respectively. Due to these unused lands there is huge loss to the economy of the country. In 2010 itself a total value of about one billion somoni loss happened to the economy of Tajikistan (see Table 4.6). The loss has been calculated of cotton and grain production.

In Tajikistan, due to over utilization of land resource and mismanagement of irrigation system more and more agricultural areas are becoming useless. A careful examination of Table 4.7 reveals that in 2007 there

were 6,256 hectares of land out of use, increasing further to 21,913 hectares in 2010 due to many reasons such as salinization, landslide, irrigation infrastructure damage and improper irrigation system. By looking at 2010 data, Khatlon province has the highest area of land out of use, whereas RRS has the lowest. Khatlon has 11,128 hectares of land out of use and most of it is due to inappropriate farming practices. RRS has 2,044 hectares of land out of use and most of it is due to inappropriate farming practices. Sughd has 8,751 hectares of land out of use out of which 136 hectares are due to salinization, 105 hectares are due to irrigation infrastructure damage and 2,340 hectares are due to inappropriate farming practices.

Land area out of use from 2007 to 2010 has increased from 6,256 hectares to 21,923 hectares and land degradation on the same time has also increased from 78.31 percent to 80.52 percent. So there is a positive relation between land degradation and land area out of use in Tajikistan.

**Table: 4.** Value of the Production Lost due to Degraded Land in 2010

	Productivity (tons per hec./year)	Price per ton (Somon, 2010 price)	Value (per hec. /year)	Unused land (hec.)	Value of lost production (per year in Somoni)
Cotton	2	3,734	7,468	21,923	163,720,964
Grain	3	1,400	4,200	21,923	920,766,600
Total lost value of Cotton and Grain					1,084,487,564

Source: the economics of land degradation for agricultural sector in Tajikistan

**Table: 5.** Causes of Agricultural Land Abandonment in Tajikistan, 2010

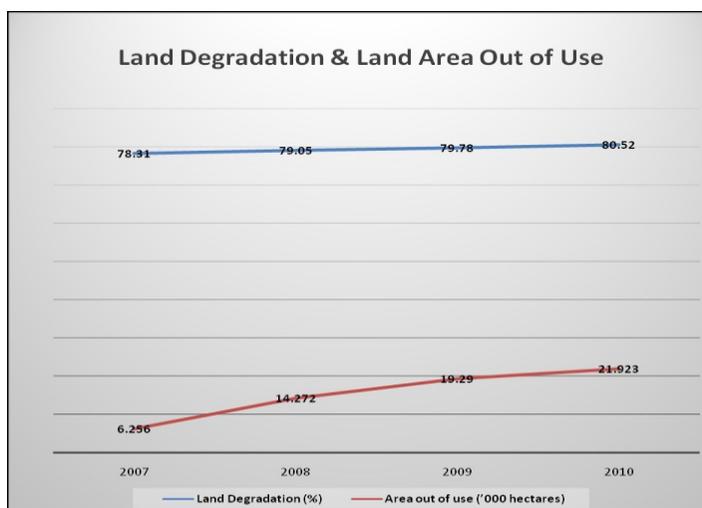
Region in 2010	Area out of use (hectares)		Reason why land is out of use in 2010			
	Total	Irrigated Land	Salinization	Infrastructure Damage	Mudslide	Inappropriate Farming Practices
RRS	2,044	241	0	10	0	738
Sughd	8,751	7,716	136	105	9	2,340
Khatlon	11,128	6,922	1,595	1,782	27	3,550
GBAO	0	0	0	0	0	0
Tajikistan (2010)	21,923	14,880	1,731	1,897	36	6,628

Source: State Committee on land management of Tajikistan

**Table: 6.** Land Degradation and Land Area Out of Use in Tajikistan (2007-2010)

Year	Land Degradation (%)	Area Out of Use ('000 hectares)
2007	78.31	6.256
2008	79.05	14.272
2009	79.78	19.290
2010	80.52	21.923

Source: State Committee on land management of Tajikistan



Source: State Committee on land management of Tajikistan

**Fig: 4.**

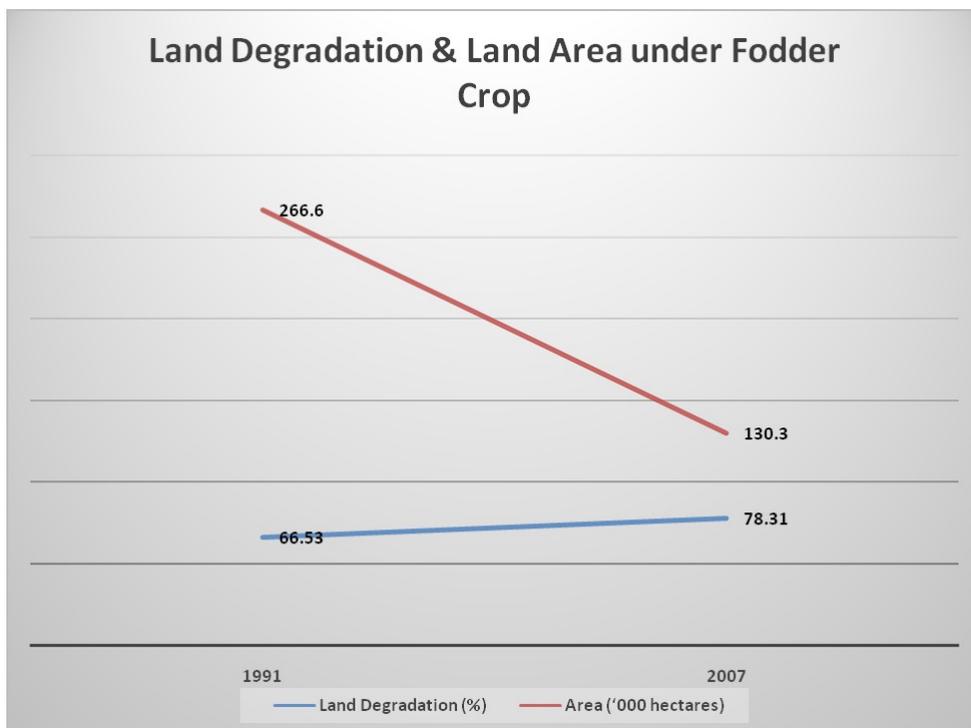
**Production of Fodder Crops: -**

Milk yield in Tajikistan is very low. It is lowest in all the CIS countries. It can be explained by the inadequate supply of animal fodder due to overgrazed and degraded pastures. The animal headcount has increased significantly over the past decade, the area of fodder crop fell by 27.5 percent in 1991 to 14.5 percent in 2007<sup>15</sup>. On the same time land degradation in Tajikistan has increased from 66.53 percent to 78.31 percent (see Table 4.9.). This was due to degradation of land and a 28 percent increase in food grain and leguminous cultures. Due to this there is an increase in use of both winter and spring-autumn pastures. According to Wofgramm, these changes are due to government policies that till recently imposed target of production of crops which discouraged the allocation of land for feed crop.

**Table: 7.** Land Degradation and Land Area under Fodder Crop in Tajikistan.

Year	Area Under Fodder Crop ('000 hectares)	Land degradation (%)
1991	266.6	66.53
2007	130.3	78.31

Source: Wolfgramm et. al.



**Fig: 5.**

**Impact on Milk and Meat Production: -**

Sustainable pasture management is important for addressing the land degradation in Tajikistan because 97 percent of the land is mountainous, livestock numbers are increasing and most of the land area is pastureland not arable land. The health of livestock is poor because of low production of fodder. Pastures also suffer from the bad management, distortion of laws and regulations. According to government statistics the headcount of animals have increased sharply over the time. The numbers of animals increased from 1.3 million cow equivalents in 1997 to 2.1 million in 2007. However milk production has declines about 271 liters per cow per year in the period from 2005 to 2009. The value of this loss is estimated at 96,122 USD per year.

There is a variation in density of livestock in the region of Tajikistan. Lowest is in GBAO which have 26 standard heads per 100 heaters and highest in Sughd which have 96 standard heads per 100 hectares.<sup>16</sup>. Livestock is an important source of income, food and wealth for rural households, it is ready cash and milk is sold to dairies or direct to consumers. Livestock wealth is estimated to represent about half of the total revenue of a household in rural Tajikistan.

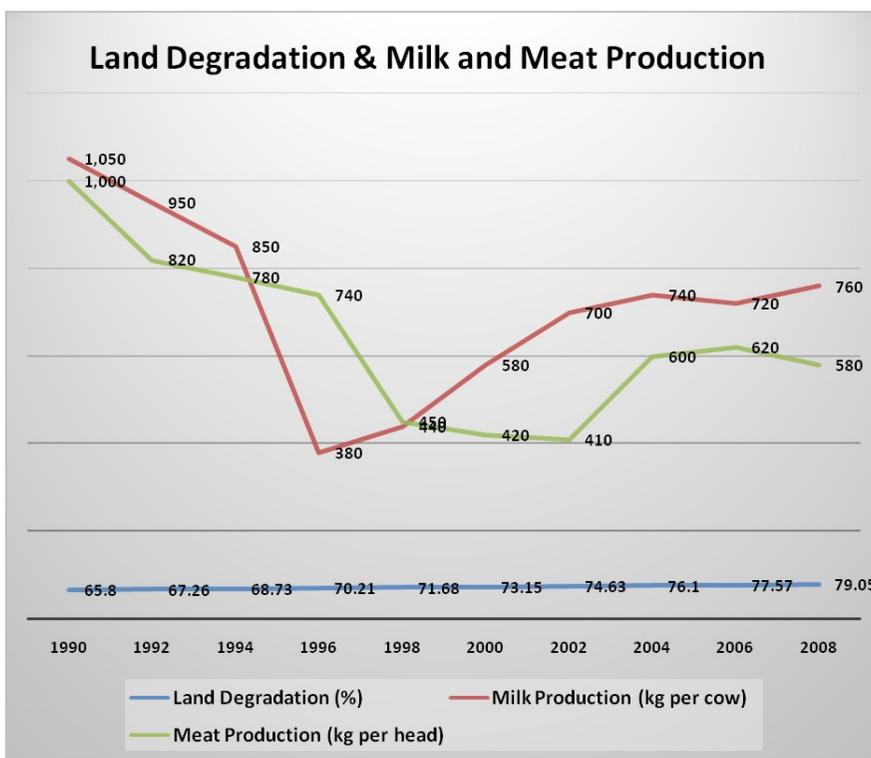
Overall there has been sharp decline in the milk and meat production from 1990 to 2008 (see Table 4.10). In

1990 there was a total production of 1,050 kg of milk per cow which has declined to 760 kg milk per cow in 2008. In the same way production of meat also declined from 1,000 kg per capita to 580 kg per capita in the same time. In the same period land degradation has also increased from 65.80 in 1990 percent to 79.05 percent in 2008. So, there is a positive correlation between land degradation and production of milk and meat in Tajikistan.

**Table: 8.** Land Degradation and Productions of Milk and Meat in Tajikistan

Year	Land Degradation (%)	Milk Production (kg per cow)	Meat Production (kg per head)
1990	65.80	1,050	1,000
1992	67.26	950	820
1994	68.73	850	780
1996	70.21	380	740
1998	71.68	440	450
2000	73.15	580	420
2002	74.63	700	410
2004	76.10	740	600
2006	77.57	720	620
2008	79.05	760	580

Source: CISSTAT, 2008



Source: CISSTAT, 2008

**Fig: 6.**

**Expenditure in Land Reclamation: -**

Most of the land in Tajikistan is mountainous and only 7.0 percent is in valleys and plains. The agricultural land is only 34 percent of the total geographical area of Tajikistan. To make the country self-sufficient in food production the government of Tajikistan is trying very hard to reclaim the degraded lands in the country. The Ministry of Land Reclamation and Water Resources is the concerned governmental organization facilitating the land reclamation to ensure food security, and employment generation of in rural areas of the country. The activities of the said ministry therefore contribute significantly to the economic development of agro-industrial complex of Tajikistan. The Government of the Republic of Tajikistan attaches priority importance to the preservation of sustainable activities in the land reclamation and their development. Poverty reduction in rural areas is highly dependent on the sustainable functioning of this sector in Tajikistan.

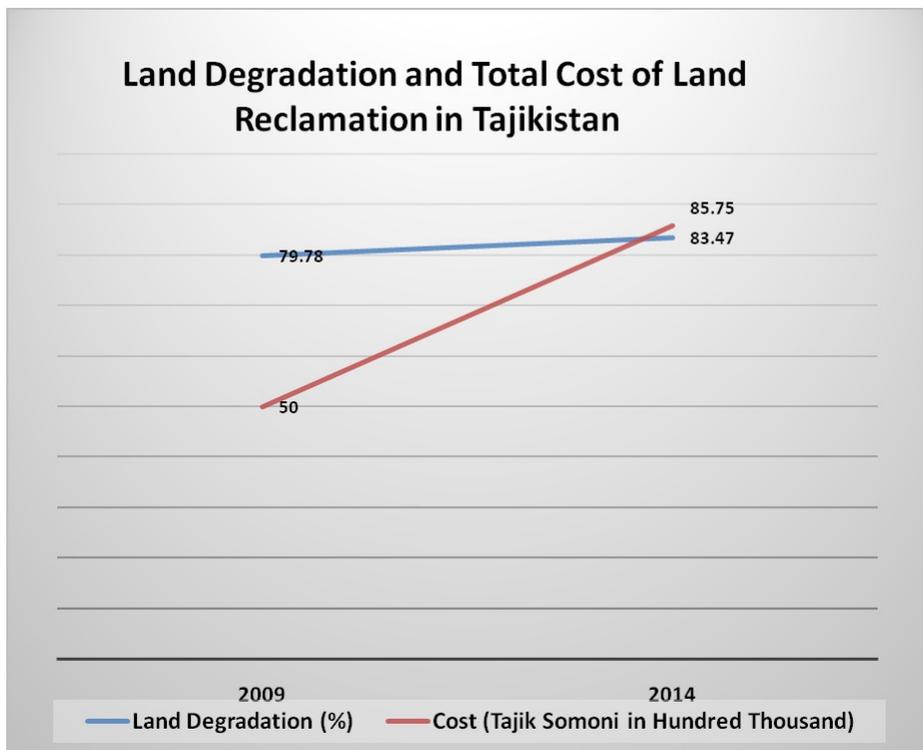
Land degradation has increased in Tajikistan with the passage of time and presently most of the land is degraded. A cursory look at Table 4.11 reveals that about 80 percent land was degraded in 2009 and it has increased to 83.47 percent in 2014. The government of Tajikistan with the help of non-government agencies is investing more money to reclaim the degraded land. In 2009, an amount of 5 Million Tajik Somoni was invested for the reclamation of the land in the country. There is jump of 70 percent in the allocation of funds for the land reclamation from 2009 to 2014. In 2014 a huge amount of 8.5 Million Tajik Somoni was invested for the same purpose.

The development of land reclamation sector need certain expenditure related to infrastructure and modernization. Improved infrastructure will be beneficial for the agriculture sector. In 2015, the total amount of ongoing projects invested by international partners will be about 153.7 million USD. Most of the money of this investment will be spent on modernization and rehabilitation irrigation and drainage infrastructure as well as in the water sector reforms, including improvement in land reclamation and irrigation management system. Annual direct financial support from the government is equal to 6million Tajik Somoni. Government also helps through subsidized electricity for pumping water and for reclamation of pumping stations throughout the year.<sup>17</sup>

**Table: 9.** Land Degradation and Total Cost of Land Reclamation in Tajikistan

Year	Land Degradation (%)	Cost in Tajik Somoni (Hundred Thousand)
2009	79.78	50.00
2014	83.47	85.75

Source: Ministry of Land Reclamation and Water Resource, 2015



Source: Ministry of Land Reclamation and Water Resource, 2015

**Fig: 7.**

**Conclusion:**

There is huge economic impact of deforestation and land degradation in Tajikistan. A UNEP-UNDP Poverty-Environment Initiative study estimates the economic cost of land degradation on degraded and fallow land is to be in the order of 1,946 million Somoni which is about 7.8 percent of Tajikistan’s GDP. Due to degradation of land many farmers abandoning their land and 15,667 hectares of land has been abandoned from 2007 to 2010. Production of fodder crop, milk and meat production has decreased in the country. For the last 25 years milk production has decreased 290 kg per cow and meat production 420 kg per head. After the independence of the country in 1991 grain productivity has increased 1.25 tones per hectares due to

increasing use of chemical fertilizers. Overall poverty and rural poverty in Tajikistan has decreased in the country due to remittances sent from abroad. Due to deforestation and land degradation large area of land have become useless in Tajikistan, so the government of Tajikistan is trying to reclaim the land for agricultural use. The cost to reclaim is very high. In 2009 about 5 million Somoni was allocated for the purpose of land reclamation. After five years in 2014 about 8.5 million Somoni was used for the same purpose.

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