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Socio-economic Features of the Agro-pastoralists in the Zarafshan Valley, NW Tajikistan

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Abstract

This paper analyzes the livelihood of the agro-pastoral communities of Western part of Tajikistan, the Zarafshan valley. The data were amassed on current fodder management practices in eighteen villages through households as well as agro-pastoralists and visual observation on local pasture areas. The interviews and discussions yielded more information on the decision-making processes that dehkans (farmers) employ to determine the quantity and composition of feed offered to livestock at particular times of the year. Among the influences to decisions were constraints to grazing and knowledge of appropriate lopping regimes for different animal fodder species. Varying degrees of access to off-farm fodder sources and the numbers of livestock kept by different households were also seen to affect fodder management decisions. Development activities aimed at labour use to fodder collection and the exchange of local knowledge regarding local fodder management are most likely to result in improvements in the levels of fodder supply for the majority of households in the short term. The variations were discussed within site-specific dehkan groups and between group representatives at a series of workshops. According to the results, stable type, number of cattle, size of cultivated land, labor availability per household, existence of small ruminant flock in the village, and the number of small ruminants were found to be most important factors affecting household economic status. It was concluded that more robust and long-term studies should be conducted using a wider variation in grassland quality to confirm the study findings.

1. INTRODUCTION

Tajikistan is a small landlocked country of about 143.1 thousand sq. km, which located between 67°31’ and 75°41’ E longitude, and 36°40’ and 41°05’ N latitude in the south-east part of Central Asia (Figure 1). Mountains cover 93 % of the total area and most of the country lies at over 3,000 masl.

Figure 1. *Map of the Tajikistan*

Source: *http://www.un.org/depts/Cartographic/map/profile/tajikist.pdf*

1.1. Pasture Resources

Tajikistan is an agrarian country and pastures play a significant role in the national economy of the country. Therefore, pastures in the country are an important resource, which is 3.9 million ha or 83 % of agriculture land of the country (**Rakhimov et al. 2011**). In general, pastures in Tajikistan are distributed by according to their seasonality of use and also depending on their altitude. Summer pastures are used between June and August and are located from 2,200 to 3,400 masl; spring-autumn pastures are usually used from March to May and September to November and are located between 900 and 1,500 masl; winter pastures are used between November and March and are located 500 to 1,200 masl and all year-round pastures are located at the same level as winter pastures. The different regions are separated by high mountain ranges and are often isolated during the winter season (**Kodirov et al. 2010, Rakhimov et al. 2011**).

1.2. Grazing Management System

The high-mountain pastures of Tajikistan are a potential source of forage for livestock during summer season. A huge number of herds migrate to these areas in early summer, in beginning of May and return to lower elevations or plains in early autumn, in late of September. Traditionally this style of transhumance grazing has become well adopted and is the main animal production system of the country. It is a grazing system where animals move during the year to that places where fodder is available. The shepherds move their animals higher and higher as the snow pack melts. For centuries this system worked and made it possible to efficiently utilize of pasture resources in Tajikistan. However, in Soviet times the system was discontinued due to more intensive system of feeding, which based on conserving large amount of winter fodder and grain imports from other Soviet republics. This meant that the country has kept more animals than it could provide from own resources. Actually during the winter period livestock supported by grain import, and in the summer, some of them were sent to graze in the neighbour countries. After the collapse of the Soviet Union and the gain of independence, forage imports virtually stopped and the Soviet system became unstable. Furthermore, in conjunction with the Civil War (1991-1997) and changes in herd and farm ownership has led to significant reduction in animal numbers (**World Bank and SECO 2008**).

2. METHODS

2.1. Study Area Selection and Description

The Zarafshan valley lies in the north-western part of Tajikistan. In the administrative relation this watershed concerns to Panjakent (PD), Ayni (AD) and Kuhistoni Mastchoh (KMD) districts. For the study these three districts were selected (Figure 2). Two surveys were conducted in the study areas. The first survey was conducted in between Dec'10-Jan'11, but the second was in between Nov'11-Dec'11.

Study areas differ in their land use management as well as in their bio-geographical resources. The KMD located on the upper reach of the Zarafshan River, being the remotest area of the Zarafshan valley. Zarafshan valley has a population of 301.9 thousand people; about 24 people per sq. km (**TajStat 2011a**). The Zarafshan valley includes the southern slope of the Turkestan ridge, Zarafshan and northern slope of

Hissar ridge. The highest peak Chimtargha (5,489 m) stands to the west of the AD. Other peaks are Ok-Su (5,355 m), Kaznok (4,886 m), Saratogh (3,904 m). The valley is drained by the Zarafshan River which originates from Pamir Mountains.

The total area of the valley is equal to 1,251.1 thousand hectares, and from them 384.4 thousand hectares (30.7 %) are the areas of agricultural grounds. Almost all the territory of the valley, which is located closer to settlements, is subjected to grazing with high intensity. According to Safarov (**2010**) natural pastures and hayfields are 354.2 thousand hectares (more than 90 % from total area of agriculture land).

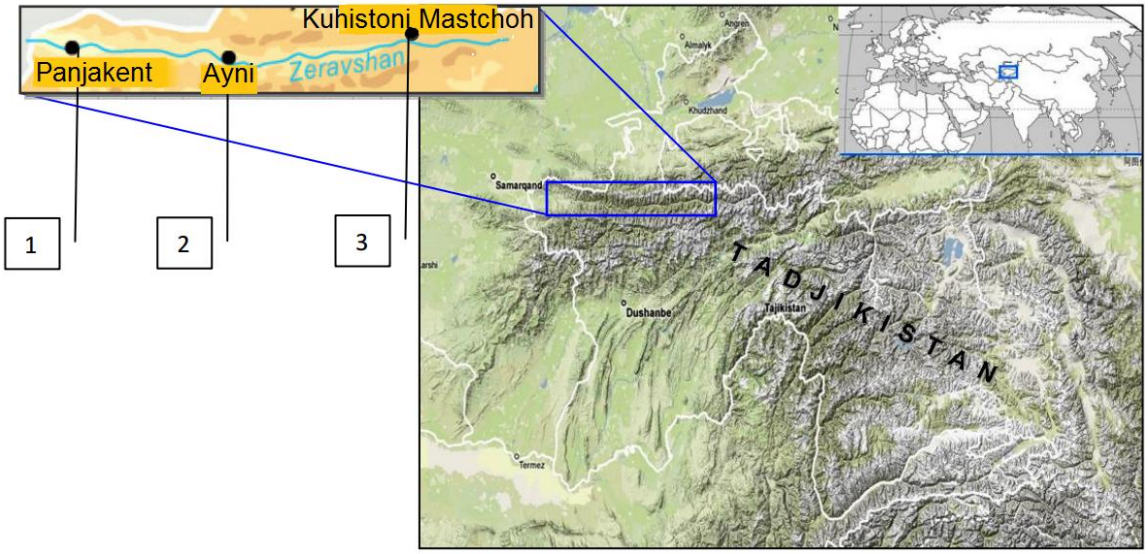


Figure 2. *Case study of three districts of the Zarafshan valley.*

Source: *developed by author*

The main means of livelihood of the people are pastoralism and crop production. Livestock husbandry contributes the lion's share to the livelihood of the people. The elevations of the study areas are various from 980 to 2,800 masl. The accessibility to the area mostly remains open for summer months. Jamoats in AD and KMD are practicing both livestock and crop production. But, the jamoats in PD rely more on crop production than livestock husbandry. According to the official statistics Anzob and Fondaryo jamoats (AD) are more pastoralists although crop production is gaining importance in these jamoats, too.

Presently, a total estimated population of the six research jamoats (Anzob, Fondaryo, Rudaki, Voru, Chinor and Ivan-Tojik) is about 60 thousand people and compared with

the area of arable land, which is about 3,251.4 ha, it gives an average of about 0.05 ha of arable land per person.

2.2. Sample Selection and Research Design

Six *jamoats* Voru, Rudaki, Shing (PD), Fondaryo, Anzob (AD) and Ivan-Tojik (KMD) were purposively selected from all 24 *jamoats* of the Zarafshan valley. The given areas that were selected are the high altitude zones and the most grazing areas relate to these belt zones. Lists of all *jamoats* were obtained from the *Hokimiyati mahalli* (local authorities), and at the jamoat level 3 villages per jamoat were selected. But at the village level, lists of households were obtained from the local authorities through randomization method, 5 households per village were selected. Totally, 90 households were randomly selected for interviews. Mostly family heads were interviewed.

2.3. Data Collection

Some supplementary procedures to gather data and information were employed. These included key person interviews, focus group discussions, household surveys and field observation by researcher. Household data was collected by questionnaires to a total of 90 selected household in the three districts between November and December 2011. Data on socio-economic characteristics of farming families, available resources as well as quantities and costs were gathered. The monetary and labour units are expressed in Tajik somoni (TJS) and Man day (MD), respectively.

According to the preliminary preparatory visit in December 2010 and January 2011, which included the field trip to different sites in Zarafshan valley, discussions with local authorities, village representatives, agropastoralists and meetings with prospective counterparts and institutions in Dushanbe, revealed the following selection of criteria:

1. Gradient of intensity of land utilization and degradation of summer pastures from intensively utilized areas. Furthermore, it is planned to exclude selected sites from utilization and thus to observe regeneration processes from different states of degradation.
2. Climate, altitude and rainfall gradient: grazing areas shall be investigated on different altitudes with different conditions of temperature, precipitation, vegetation and utilization. Shepherds usually go higher with their herds in

different steps from early spring until late autumn, following the snow melting border.

3. Infrastructure availability such as water points for animals, maintained bridges and mountain paths on animal routes, road access, market distance, veterinary points etc.
4. Access rights of different user groups and assumed different types of pastures, e.g. heavily used interregional pastures, remote pastures, pastures closer to villages, mainly cattle pastures or sheep/goats.
5. Social gradients such as ethnicity, population of high social status and very susceptible groups.

Therefore the study timely since it will help to generate ideas on better ways to manage the pasture and other similar natural resources.

3. RESULTS AND DISCUSSION

3.1. Demographic and Socio-economic Characteristics

Socio-economic characteristics can influence the decision making process of livestock keeping, pasture use and grazing patterns. The main socio-economic attributes of the survey comprise sex, average and range of age, literacy rate and education level.

According to Table 1, at average more than 80 % of the interviewed respondents in all three selected districts were male. It means that men are the main decision makers in management of the household, basically in agriculture activity. Only 15.6 % and 26.7 % were found as female decision makers in the PD and the AD, respectively, which is also significant in the region. First of all, this fact may be the consequence of absent of husbands or sons, who are forced by economic circumstances to work abroad. Although, the range of age was from 25 to 75 years, the results show that the average age was around 50 years among the respondents.

Table 1. Respondents' characteristics in the study area

Features	Unit	PD	AD	KMD
Male	%	84.4	73.3	100.0
Female	%	15.6	26.7	0.0

Average age	yrs	49.9	45.6	49.5
Range of age	yrs	28-75	25-63	36-70

Source: Field survey, 2010/11

3.1.1. Education Level

Education levels of the respondents and their family members were also gathered in the study area. Results expose that 32.4 % of villagers are either dropped out of school at early primary level or did not study at school at all. There are various factors define whether a person continues with education or not in Zarafshan valley. These factors range from socio-cultural regulations to socio-economic issues in the community. Challenges such as forced marriages and poverty among others could be important restrictions to education improvement among the villagers in Zarafshan valley. But further observations showed that a significant part, i.e. 43.9 %, of the villagers achieve secondary level of education. An insignificant 7.8 % of the villagers attained university-level of education. Education of dehkans is very important because it influences the adoption of modern technology and methods to improve household livelihoods.

3.1.2. Household Income

The results below in Figure 3 comparative mean annual income of households show that Voru jamoat has the highest income level of 12,707 TJS annually per household. Taking into account an average household size of 6 in the study area, the figure translates to 5.9 TJS per person per day in Voru jamoat.

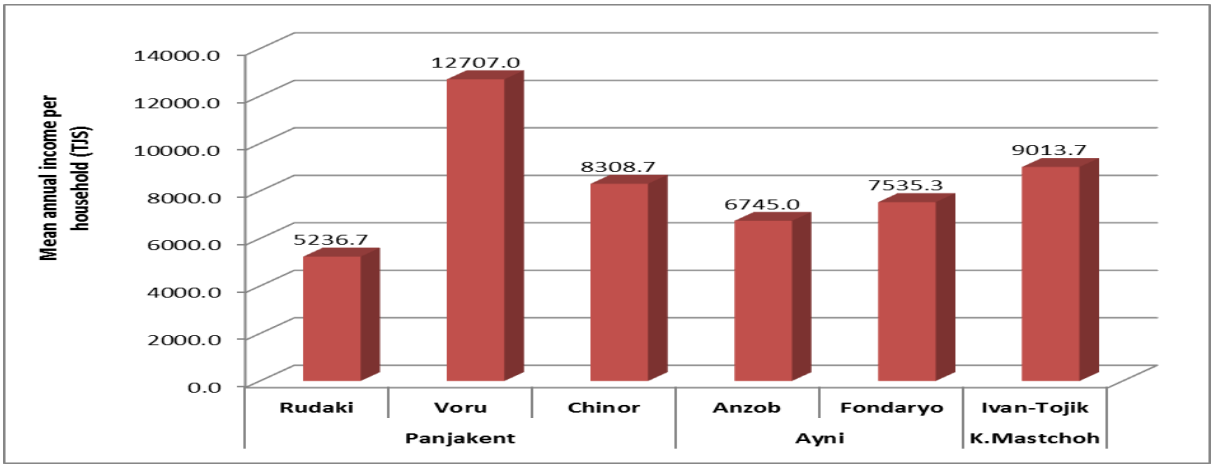


Figure 3. A comparative mean annual income of households in six jamoats of the Zarafshan valley.

Source: Field survey, 2011.

The jamoats with lowest income levels include Rudaki and Anzob. They have annual income levels of 5,236.7 TJS and 6,745 TJS, respectively. Also considering an average household size of 6, these data translate to 2.4 and 3.1 TJS per person per day respectively. It means that individual households are poor where a daily income of less than US dollar per person is quite inadequate.

3.1.3. Household Expenditure

The farming household costs such as coal purchase, animal feeding and pastoralist service were surveyed in the study area. Results show that Voru, Chinor and Rudaki have the highest expenditure levels of 2,394.1 TJS, 2,241.3 TJS and 2,195.5 TJS annually per household, respectively (Figure 4). Ivan-Tojik and Anzob jamoats are with annually lowest expenditure per household which are 1,197.7 TJS and 1,459.8 TJS, respectively.

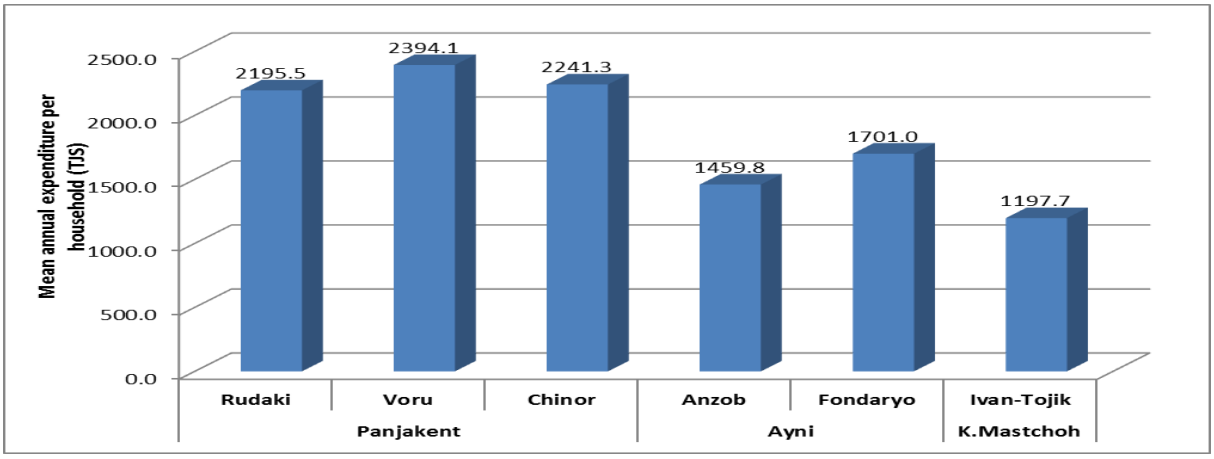


Figure 4. A comparative mean annual expenditure of households in six jamoats of the Zarafshan valley.

Source: Field survey, 2011.

4. Land Resource in the Study Area

Undoubtedly, the land is one of the most important and valuable natural resources for all rural households. Moreover, the land is a major factor in the survival of the poor strata of the population of Tajikistan, including the Zarafshan Valley. Due to population increase,

arable land size per person decreases which is a threat for future household food security. Most of the farmers hold less than 1 ha of land in Tajikistan (***Lerman & Sedik 2008:44, FAO 2013b***). Hence, farm lands in the study area were categorized into three different groups namely small farms, which are less 1 hectare of land holding, medium size farms, which are 1 to <2 hectares of land and large farms, which are >2 hectares of land holding. Shared or rented lands for cultivation were not taken into consideration, because many of the farmers (dehkans) rent out/in or share their land for few seasons only and this land can be withdrawn at any time by primary or secondary land users. Table 2 shows that small farms are in the majority in the AD and the KMD with 53.3 % and 46.7 %, respectively, whereas 60 % of farms in the PD are classified as medium class. In a result, 45.6 % of total selected households are classified as medium farm size in the study area.

Table 2. Distribution of households by land holding size in the study area

Districts	No. of households	Share of households (%)			Mean land holding size (hectare)			
		small	medium	Large	small	medium	large	total
PD	45	37.8	60.0	2.2	0.58	1.24	2.13	1.01
AD	30	53.3	26.7	20.0	0.27	1.33	3.94	1.29
KMD	15	46.7	40.0	13.3	0.63	1.42	2.46	1.19
Total	**90**	**44.4**	**45.6**	**10.0**	**0.47**	**1.28**	**3.41**	**1.13**

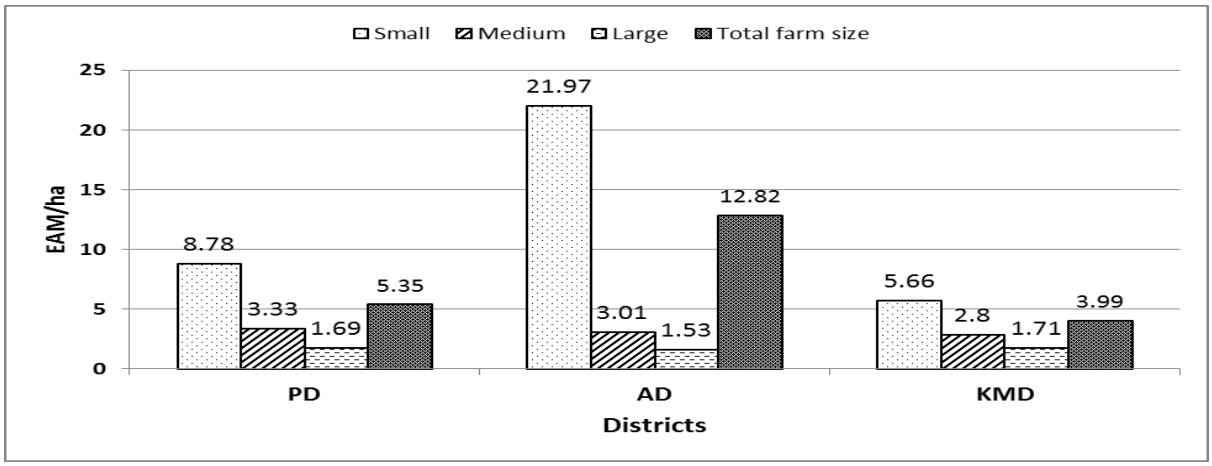
Note: small farms = <1 ha; medium farms = 1 - <2 ha; large farms = >2 ha

Source: Field survey, 2010/11

The comparison of the average land holding size among the study area has depicted that the landholders from the PD own a relatively lower land holding size in two classifications (medium and large) of the land size. The indicated results show that in total, the landholders of the PD with a total average of 1.01 ha own less land holding size, whereas with a total average of 1.29 ha, the landholders of the AD have relatively higher land holding sizes.

According to the economically active members (EAM) ratio per hectare by farm size categories (see Figure 5), more pressure falls to small farm size in all three research districts.

Figure 5. Ratio of economically active members (EAM) per hectare by farm size distribution.

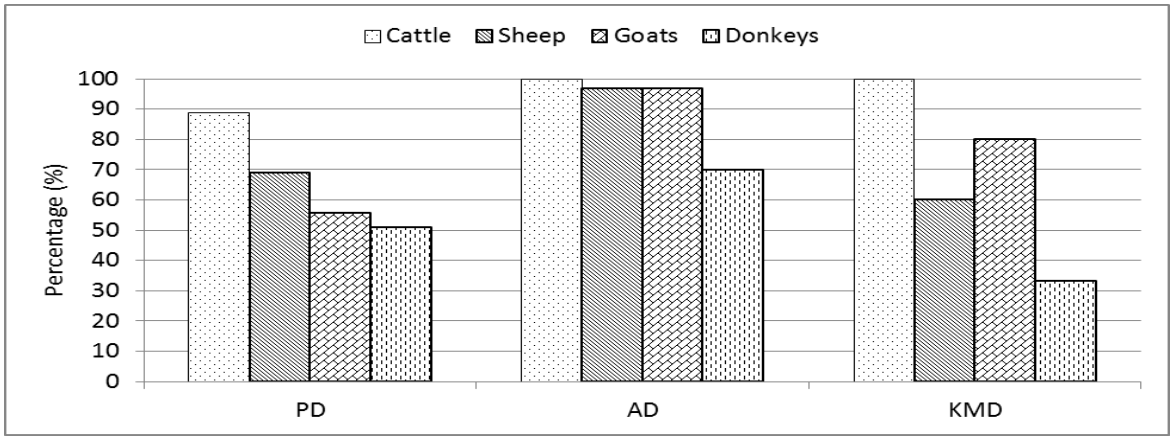


Note: EAM - 16-60 years age group, where men and women equal to 1.0 and 0.8 respectively.
Source: Field survey, 2010/11

5. Livestock and Its Composition

Animal husbandry is an integral part of the life of the rural areas in Tajikistan and especially in the Zarafshan Valley. Farmers, who do not own any livestock are considered to be poorest in the country as one of the main income sources in mountainous areas are derive from livestock keeping. Hence, considered as necessary for maintaining farm survivability, every household should have at least 1-2 cows or a few small ruminants (***Kurbanova, 2012:145***). Livestock numbers were estimated in order to analyzing the grazing pressure on near-village pastures as well as the fodder amount needed. Average livestock units range from 0.24 to 7.73 per household across all types of livestock. The highest proportion of livestock per household is observed in the AD. More than half of the surveyed households, i.e. 54.4 % own a donkey, which particularly served as transportation of different household's needs as well as hays from the hayfields, woods for the fuel and organic matters (dungs) from the livestock's summer rest points in the highlands.

Figure 6. Distribution of livestock types (%) among households in the study area



Source: Field survey, 2010/11

The Figure 6 demonstrates that almost all households in the study areas keep cattle; concretely every household in the AD and the KMD owns cattle. Families prefer to keep dairy cows than dry cows to enable the consumption of dairy products in the daily diet. In this regard, during the study were also given special attention to the presence of dairy cows in the household. Nearly every household in the AD also keeps sheep and goats; while the percentage is less in the other two districts.

6. Labour Resources

Particularly, when the endowment with machinery and agricultural technology of a farm is low, human capital plays an important role in the economic development of the rural society. This is also the case for the Zarafshan Valley where labour is mainly provided by members of households and relatives. Hired labour is not practiced in the research sites. Instead, according to local tradition, people often support each other during the harvest, cultivation, and other activities of household farming. This tradition of mutual support is called "*hashar*". Labor compilation is consisted by different ages and gender groups, and then converted into the standard man-equivalent. According to calculation system used by Langemann (***1977:170***), coefficients of 1.0 and 0.8 were set for adult males and females of between 16-60 years, respectively. Furthermore, 0.5 was set for the group over 60 years and 0.3 for children of between 8-15 years. One man-day was considered as an 8 hour working day. Thus, the man-equivalent day was calculated by multiplying the number of man-equivalents of households with the number of hours, divided by 8 hour working day.

The availability of rural labour is often limited as there is a high percentage of temporarily labour migration of Tajik men to Russia and/or Kazakhstan. In the interviewed households the percentage of labour migrants amounts to 30-35 %. A result of the labour migration is that often women, elder men and children do the farming.

Thus it is necessary to look at the presence as well as the characteristics of the labour force in the households. In the current situation, the labor force plays an important role among the rural society. All the household members, who are able to work in the fields, are considered to be as household labour force.

Table 3. Household labour availability in the study areas

Characteristics	Unit	PD	AD	KMD
Availability of household labour force*	%	87.07	89.73	89.13
Average male labour (16-60 yrs)	man-equivalents	2.51	1.97	2.33
Average female labour (16-60 yrs)	man-equivalents	1.44	1.60	1.23
Average child labour (8-15 yrs)	man-equivalents	0.19	0.45	0.46
Average others (>60 yrs)	man-equivalents	0.19	0.03	0.17
Average household labour availability	man-equivalents	4.33	4.05	4.19

*Including children labour of between 8-15 years

Source: Field survey, 2010/11

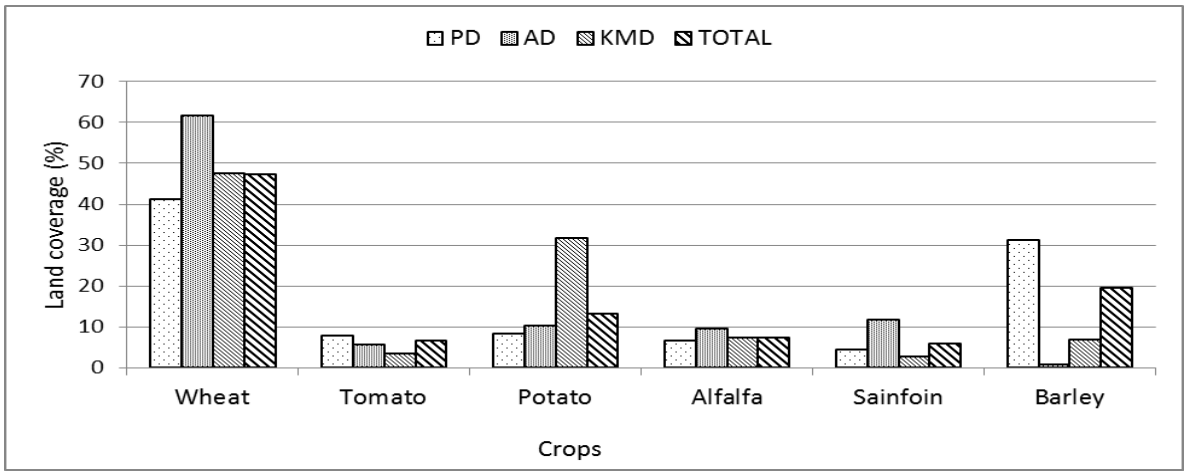
Table 3 indicates the presence of the adult labor force between 16-60 years including males and females. Besides, child labour between 8-15 years was also included in the calculation of available household labour force. This is because due to the absence of adult males in the households, who are the main wageworkers in the family.

7. Crop Production: Land Allocation and Yields

During the conducting research works in the study area, special attention was paid to the crops and forage cultivation in the cropping season 2010/11. Figure 7 demonstrates the percentage of land coverage by different crops among the study areas. The food and forage crops of wheat, potato, tomato, alfalfa (lucerne), sainfoin and barley are the main crops grown in in Tajikistan and in the Zarafshan Valley. In addition to the fodder crops

of alfalfa and sainfoin also cereal crop residues and partly barley are used for livestock feeding. Compared to other crops grown in the study areas, in total, wheat occupied the highest percentage of land coverage, i.e. 47.4 %.

Figure 7. Land coverage by crops (%)



Source: Field survey, 2010/11

KMD is dominated by the cultivation of potato due to the good natural conditions, mainly its higher altitude which is favorable for potato. These results also reflect fact that more than 1,680 hectares of land allocated for potato in the KMD (**Tajstat, 2011b**). Thus, the KMD is characterized by the mass production of potatoes in the country allowing trade and additional income for the population of the KMD.

In the case of barley, the PD had a significant percentage of land coverage by barley (31.2 %) compared to the AD (0.8 %) and the KMD (6.9 %). The reasons behind this that at first, relatively more plain, rain-fed area available in the PD, and the second one is farmers in the PD prefer to cultivate more barley than alfalfa and sainfoin. Thus, the AD had the highest share of cultivating alfalfa and sainfoin, which is related to the higher livestock numbers in the AD.

Table 4. Average crop distribution by households (ha)

Crops	PD		AD		KMD		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Wheat	0.79	0.476	0.79	0.893	0.68	0.423	**0.77**	**0.610**
Tomato	0.10	0.106	0.06	0.025	0.04	0.012	**0.08**	**0.083**
Potato	0.14	0.113	0.12	0.180	0.41	0.335	**0.19**	**0.222**

Alfalfa	0.09	0.037	0.11	0.099	0.12	0.062	**0.10**	**0.064**
Sainfoin	0.09	0.050	0.49	0.025	0.09	0.035	**0.15**	**0.149**
Barley	0.66	0.325	0.04	0.013	0.29	0.396	**0.52**	**0.384**

Source: Field survey, 2010/11

The following table 4 shows an arithmetic mean value of cropland distribution by households among the study areas. The value for each crop was calculated taking into account only those households who grow these particular crops. Significant positions in the table occupied by wheat, barley and potato. Wheat had covered the highest average area in the PD and the AD, i.e. 0.79 ha of land for each, respectively. But households in the AD occupied the highest percentage of coverage of wheat area, which is 32.7 % more than that PD (see Figure 7). Likewise, the standard deviation of the average wheat area in the AD nearly 2 times higher than that PD, despite the fact that the average value of this crop is the same in both districts. In total, potato and barley, after the wheat, occupied the largest area coverage i.e. 0.19 and 0.52 ha of land per household, respectively. But compared to the PD and the AD, a significant part of potato cultivation is grown in the KMD. In the case of barley, a similar situation was observed with regard to the PD that is averaged 0.66 ha of land.

Table 5. Average production, yield and percentage of crops by regions

Crops	**PD**			**AD**			**KMD**		
	Prod. (kg)	**Yield (kg/ha)**	**Sold (%)**	**Prod. (kg)**	**Yield (kg/ha)**	**Sold (%)**	**Prod. (kg)**	**Yield (kg/ha)**	**Sold (%)**
Wheat	1583.3	1986.4	6.0	1285.4	2033.1	9.0	1255.6	1829.4	-
Tomato	421.2	4949.0	-	304.1	5029.3	-	194.0	4648.3	-
Potato	2026.3	15786.7	0.8	2181.4	17394.3	-	8710.0	21782.4	49.0
Alfalfa	628.9	6579.9	-	571.3	5677.1	-	727.5	6024.8	-
Sainfoin	180.8	1890.2	-	950.0	1947.2	-	176.3	2046.2	-
Barley	1178.4	1751.2	-	70.0	2041.7	-	386.7	1497.2	-

Source: Field survey, 2010/11

When the average production of crops by study areas was compiled, it was found that the farmers of the PD were producing the largest quantity of potato (2026 kg), followed by the wheat (1583 kg) and barley (1178 kg). In the case of the AD, potato production was leading (2181 kg), followed by wheat (1285 kg) and sainfoin (950 kg). But in the case of the KMD, the production of potato was observed highest (8710 kg), which is compared to the PD and the AD highest by 77 % and 75 %, respectively. Then after potato production in the KMD, followed by wheat i.e. 1256 kg, and alfalfa i.e. 726 kg (see Table 5).

8. CONCLUSIONS

Pastures of Tajikistan, including the Zarafshan pastures, have gone through many changes during the last century, especially in Soviet times in terms of property rights of the locals. The governments' policies were the major reasons for these changes. After the collapse of Soviet Union the new government faced an impasse to change nomadism to sedentarization, which the traditional systems have been gradually eroded. Inaccuracy of land reform and absence of laws for pasture management are among the key causes destroying the traditional systems.

To overcome the problem of pasture degradation, there is an urgent need to crystallize the government's role in managing pasturelands and how the government can play an effective role in achieving a sustainable management plan (**Abolhassani 2011**). In the case of the Tajik pasturelands, the role of the government has usually been inappropriate and it is due to the Tajik policy of not intending to manage rational the traditional system of pastoralism. However, finding an answer to the question of how the government can play an effective role in the transition requires more studies and research on the relationship between the government and communities in the present day (***ibid***).

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