

Chapter 2: DESCRIPTION OF WADI RAJIB CATCHMENT AREA

2.1. Physiographic Characteristics

2.1.1 Location and Sub-Catchments

The Wadi Rajib watershed is situated in Ajlun Governorate, about 70 km NNW of Amman (see Location Map on the next page). It is one of the several Wadi catchments draining from the northern highland towards the Jordan rift valley and the Dead Sea in the West. The total area of the catchment covers 85 km², or 85.000 dunum and the length of the Wadi bed is approximately 26 km.

The geographical location is between latitudes 32° 14' and 32° 18' North and longitudes 35° 38' and 35° 49' East. The Wadi Rajib watershed lies between the larger basin of the Zarqa River to the South and Wadi Kufranja in the North.

The upper reaches of the Wadi Rajib watershed consist of three sub-catchments, the valleys of the Wadi Ash Sham, the Wadi As Safsafa and the Wadi Al Abar. These main tributaries have formed three distinct valleys in the Eastern part of the watershed, while the steeper but narrow lower stretches of Wadi Rajib only have minor lateral sub-catchments.

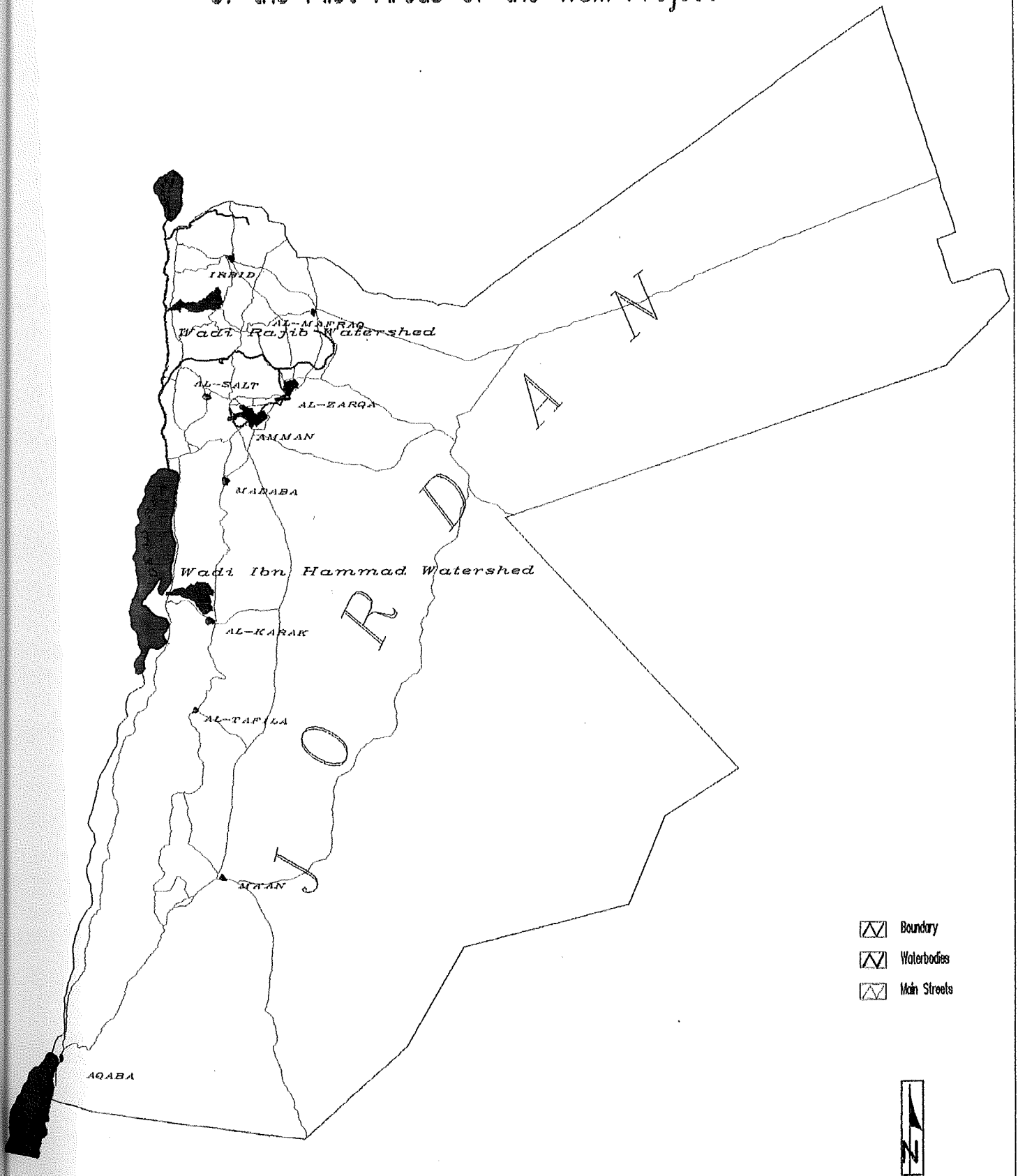
2.1.2 Topography, Geomorphology

The highest elevation at 1241 m a.s.l. is located in the north-eastern part of the watershed. The major part of the three sub-catchments in the East ranges in altitude between 850 and 1100 m a.s.l.. The center of the watershed area, after the confluence of the three main tributaries is between 400 and 850 m a.s.l., while the lower stretches of the wadi reach down to 150 m b.s.l., which is at the same time the Western limit of the WSMP project area. After crossing the irrigated plains of the Jordan Valley, the Wadi Rajib finally reaches the Jordan River at 300 m b.s.l..

In general, the Wadi Rajib area has a mountainous topography and the wadis have formed relatively deep valleys heading westward towards the Ghore. Despite the drop of over 1500 m from the highest point in the watershed to the confluence with the Jordan River over a distance of merely 26 km (average longitudinal slope: 6%), very steep slopes of over 35% are an exception in the Wadi Rajib catchment. Generally the landscape can be described as undulated with medium and mostly concave slopes. Especially the upper parts of the watershed are dominated by slopes of between 15% and 35%, interspersed with some large flat plateau areas. Only the north-facing slopes along Wadi As Safsafa and Wadi Ash Sham form rugged cliffs and steep drops. Landslides are a fairly common sight in the area. (**see Map No.1: Slopes in the Wadi Rajib Watershed**)

MAP A:

Location Map of the Pilot Areas of the WSM Project



2.1.3 Climate

The Wadi Rajib area is part of the highest rainfall zones in the Kingdom of Jordan. Major parts of the watershed belong to the Mediterranean semi-arid bioclimatic zone and only the highest elevations belong to the Mediterranean sub-humid bioclimatic zone. Rainfall can be expected from mid-September until the end of May. Summers are dry but reasonably mild due to the elevation and relative humidity. According to the Emberger classification, the area is semi-arid mild.

The highest meteorological station in the area is located at Ras Muneef (1150 m a.s.l.). The long-term average annual rainfall at Ras Muneef is 625,2 mm, while the monthly variation in temperature ranges from 4.8°C in the coldest to 21.9°C in the warmest month. At the lower end and just outside of the catchment, the station of Deir Alla (180 m b.s.l.) registered an average annual rainfall of only 298,7 mm (1990-1999) with monthly variations in temperature between 14.4°C and 31.7°C. Interestingly, the available rainfall data for Deir Alla station for the time period 1950-1970 shows an average annual total of 266.8 mm. This means that rainfall in Deir Alla region has rather increased in recent years than, as it is usually assumed in connection with desertification phenomena in Jordan, decreased when compared to the 1950 to 1970 period. The overall climatic conditions can be considered as generally favorable for agricultural production under Jordanian circumstances (see complete set of meteorological data for the area in **Annex 1**).

Climatic extremes are generally more pronounced at the peak of Ras Muneef, especially between November and April. Snow occurs above 850 m a.s.l. with an average of 5 snow days on the peaks each winter. A total of 26.5 frost days can be expected on average on the peak of Ras Muneef.⁵

Other meteorological stations in the area have registered the following average rainfall: Anjara at 890 m a.s.l.: 600 mm/year, Kufranja at 700 m a.s.l.: 620 mm/year, Estafinah at 920 m a.s.l.: 583 mm/year and Rajib at 360 m a.s.l.: 520 mm/year.

The evaporation rate in Wadi Rajib exceeds the annual rainfall by approximately 3-4 times. Mean annual potential evapotranspiration is approximately 1700-1800 mm, while the mean annual Class A pan evaporation was measured at 2300 mm.

On the slopes above the Wadi Rajib enormous micro-climatic variations have been enregistered. North-facing slopes generally carry a thicker forest and bush vegetation than the south-facing slopes. Air humidity and local temperatures become milder in the proximity of the last extended forest areas.

2.1.4 Geology, Soils

The major part of the Wadi Rajib watershed is dominated by calcareous rocks. These belong to the Wadi As Sir formation (late Cretaceous) and are mostly marly limestones. Along the deeper incised wadi slopes, the older Shuayb and Hummar formations are also present. Some of the pure hard limestone banks form the steepest slopes and cliffs in the valley. Other sedimentary rocks like sandstones and some schists also occur in the area.

The prevailing soil type is loam. Towards the wadi bottom soils tend to get heavier and a variety of silt loams occur. All soils are affected by climate, topography, use and the natural vegetation cover. Generally, soils of the sub-groups of Typic

⁵ Ganter, E. et al.: Gender Specific Target Group Analysis - Wadi Rajib 1997

Xerochrepts dominate on the upper parts of the area. These belong to the Inceptisols. The soils have a deep profile, dark brown colour and silty clay texture. They are moderately calcareous and often have stony surfaces. Another sub-group belonging to the same order of Inceptisols are the Lithic Xerochrepts. This soil type occupies the convex upper slopes and their depth is less than 40 cm⁶.

Under the natural forest, the soils show a thin organic horizon over a shallow profile. These soils are non-saline, have a strong silty clay structure and contain moderate amounts of calcium carbonate (see the tabular summary on all prevailing soil types in the area in **Annex 2**).

Concerning the distribution of the various soil classes in the area see: **Map No.2: Soil Map of Wadi Rajib Watershed**.

The combination of a fairly stable rock underground with loamy soils, a comparatively favorable vegetation cover and medium slopes in the western part of the catchment results in slight to low erosion risks in the upper watershed (**see: Map No.3: Erosion Hazard Map of Wadi Rajib Watershed**). Contrarily, erosion hazard is much higher along the banks and in the direct vicinity of the wadis, in particular in the center and the lower parts of the catchment. Here gully formation, trenching slopes and mass movements in the form of slides and slumping are a common sight.

2.1.5 Natural Vegetation

The Wadi Rajib area is part of the Mediterranean vegetation region. The northern and eastern halves of the area contain some of the most important coherent forest remnants of Jordan. These parts are dominated by evergreen oak forests, which are unfortunately in most places subject to various forms of degradation⁷.

The major vegetation types are:

1. Natural pine forests

In this forest the dominant species is *Pinus halepensis* of up to 15m height. These trees have a shallow root system and are very susceptible to forest fires. They mainly occur above 700 m a.s.l. on Rendzina and calcareous soils. Other tree species occurring in the pine forest are: *Arbutus andrachne*, *Quercus calliprinos*, *Pistacia palestina*. The undergrowth is formed by *Calycotome villosa*, *Cistus creticus*, *Cistus salvifolius*, *Fumana arabica*, several orchids and the grasses *Dactylis glomerata* and *Poa bulbosa*.

2. Evergreen oak forests

Old oak trees usually attain an average height of up to 6m. The upper stratum is usually composed of: *Quercus coccifera*, *Pyrus syriaca*, *Crataegus azarolus*, *Pistacia palestina*, *Arbutus andrachne* and *Phyllirea media*. The lower stratum consists of *Amygdalus communis*, *Asparagus aphyllis*, *Lonicera*, *Sariopterium spinusum*, *Rhamnus palaestinus*, *Calycotome villosa*, *Cistus villosus* and some other herbs in varying densities.

3. Deciduous oak forests

These forests consist of a majority of *Quercus aegilops* or *Quercus ithaburensis* (synonym) trees. They occur at lower altitude than all other forests and are subject to

⁶ FAO: Management of Forests and Range Lands of Ajlun Agricultural District, Amman 1994

⁷ FAO: Management of Forests and Range Lands of Ajlun Agricultural District, Amman 1994

the most severe degradation. *Quercus ithaburensis* grows well on hard, shallow calcareous rocks in the drier parts of the catchment. The upper stratum is formed by the following trees: *Quercus ithaburensis*, *Ceratonia siliqua*, *Olea europaea*, *Styrax officinalis* and *Pistacia atlantica*. In the lower stratum shrubs, herbs and bushes of the following species are present: *Crataegus azarolus*, *Amygdalus communis*, *Rhamnus palaestinus*, *Olea europaea*, *Calycotome villosa*, *Retama retam*, various herbs and smaller bushes.

For a summary on the most common tree and shrub species in the Wadi Rajib area consult **Annex 3**.

The proportion of agricultural land increases from East to West and takes up between 10% and over 60% of the total area respectively. Below 400 m a.s.l. pastoral vegetation types occupy an increasing share of the vegetation cover. The original pastoral bush and shrub vegetation, which is either severely degraded or has disappeared entirely in most parts today, consists of the three plant associations of *Poterium spinosum*, *Ononis natrix* and *Anchusa strigosa*. The only area where this natural vegetation of the lower valley has survived or regenerated is in the Rajib range reserve. (see: **Map No.4: Vegetation Map of Wadi Rajib Watershed**)

In the area of Rajib village there are 500 dunums (50 ha) of pine plantation established by the forestry services of Ajlun.

2.1.6 Hydrology

The Wadi Rajib receives its waters from a multitude of smaller tributaries and several natural springs. Therefore the main wadi never falls entirely dry, even though the discharge varies substantially between the winter and the summer season.

The mean daily base flow discharge varies between 0.05 and 9.26 m³/sec. Over the year the average base flow discharge fluctuates at 0.1-0.2 m³/sec.

The Wadi Rajib has reasonably good water quality for irrigation, but substantial pollution from household waste, livestock and agricultural production makes the water unsuitable for human consumption. Nevertheless several of the tributaries are used for pumping water into cistern trucks, particularly in summer, which is then sold as household water in the neighbouring villages.

There are also 13 major springs located within the watershed, most of them being used for either human or livestock water supply (see **Map No.5: Hydrological Map of Wadi Rajib**).

2.2 Socio-economic Characteristics

2.2.1 Administrative Boundaries, Villages

The entire target area of the Wadi Rajib catchment is part of the Ajlun Governorate with its regional center located at the town of Ajlun, 6 km North of the watershed area. The eastern boundary of the watershed partly coincides with the border to the Governorate of Jerash.

The catchment area itself is shared administratively by nine municipalities. These are: Ain Janna, Suf, Sakib, Al Husayniyya and Burma in the eastern part; Anjara and Safa in the center and Kufranja and Rajib municipalities in the west. None of these municipalities is entirely located within the project area, and all of them are also responsible for land falling outside the watershed boundaries. This clearly reflects the difficulty of defining a project area according to physiographical boundaries (the watershed) and not by administrative units (e.g. municipalities).

The main villages within the watershed are Rajib, As Safina and the agglomeration of Al Fakhira/ Ash Shikara/As Sakhina in the center. In addition to these main villages there are a number of smaller villages (Az Zarra'a, Jabal Al Akhdar) and hamlets or scattered settlements (As Safsafa, Al Husayniyya, Khirbat Assuq and Najda). (see **Map No.6: Administrative Map of Wadi Rajib Watershed**)

The rural towns of Kufranja, Anjara and Ajlun as well as the village of Sakib are located just outside the boundaries of the watershed. Many of the inhabitants of these centers originate from the Wadi Rajib area, still possess land within the catchment and regularly make use of the local natural resources in the watershed.

The Ministry of Agriculture is represented locally by "Agricultural Directorates" which are located either in Governorate centers or in selected municipalities. In terms of agricultural extension responsibility, the project target area of Wadi Rajib is part of the Agricultural Directorate of Ajlun. The Agricultural Directorate of Ajlun, same as most other directorates, consists of 5 sections: agricultural services, animal health/veterinary services, extension, forests and afforestations and range, finance and administration.

2.2.2 Population, Tribal Groups and their Social Structures

Statistics on the population living in the area are available from the Department of Statistics in Amman and Ajlun for the years 1994 and 1997 (see **Annex 4**). Rajib is the only village inside the catchment area with more than 1000 inhabitants. The other main villages of Al Fakhira/Ash Shikara and As Safina have approximately 900 inhabitants.

The total population of the area is given as 39,505 inhabitants in 1997, but this includes the two small rural towns of Kufranja (18,770 Inh.) and Anjara (15,309 Inh.) which are both located outside the watershed boundaries. 50.8% of the population is male and 49.2% female. (see **Map No.7: Population Map of Wadi Rajib**)

Statistics for 1997 report a total number of 6,059 households living in the area. This would place the average household at 6.5 members. 63% of the households have 6-10 people and about 30% of the population live in extended families. Average annual population increase between 1994 and 1997 is 3.66% according to the available data.

The population of Wadi Rajib adheres to Sunni Islam and is ethnically and culturally very homogenous. All households are patrilineal and the household budget is disbursed by the oldest adult male who is the head of the family. About 20% of all marriages are polygyne, while 80% of the marriages are between relatives⁸. 45% of the population is young (under the age of 20) and 40% are children⁹.

Apart from the sedentary population living in villages and hamlets, a few camps of nomadic beduins can be found in the lower parts of Wadi Rajib just after the late spring harvest. The beduins take their animals to graze on crop residues and stubbles.

The most prominent tribes from the area are: Zghoul, Nuaimat, Freihat, Zreiqtat, Amarat, Bani Fawaz, Rawajbeh, Dababseh, Greishat, Balawneh and Ananseh. In addition to the Islamic majority there are minorities of Christians living in Anjara town and As Safsafa village. In the towns there is also an important number of West Bank families.

2.2.3 The Specific Situation of Women

In Jordanian society Islam determines a patriarchal family structure. Here the classical role of a woman is a domestic one, while the husband is usually the family provider. The daily life of a woman in Jordan is influenced by some main factors. Of central importance among these are religious and traditional norms and values. The strong tribal system has a very strong influence on all aspects of a woman's life. The tribal origin shapes relationships within the village and often decides on the social position of the individual. For example, female members of a powerful tribe will also enjoy a more respected position within their community.

Particularly in rural areas it is still regarded as unacceptable for a woman to take an active and independent part in public life. Girls and women are expected to stay close to their homes or be accompanied by male family members if they have to travel.

On the other hand women in rural areas are very important productive members in family and farm life. The usual domestic activities like cooking, housekeeping, bread-baking and child caring usually make up the bulk of the time spent on daily routine work. Apart from this, women in Wadi Rajib are often involved in livestock keeping activities and handicraft production. Especially the rearing of poultry (mainly chicken and turkeys) is generally seen as a woman's activity. They usually feed and water the animals, milk sheep and goats and prepare milk products. Several women also maintain homegardens with herbs and vegetables¹⁰.

The general economic situation in the project area has forced the women in smaller farm enterprises to be more active and responsible in farm managing due to the necessity for their husbands and sons to seek employment or other sources of income outside the farm. Nevertheless, access to their own money and own income still remains difficult. Many younger wives of men serving in the army and unmarried girls complain about being bored and under-employed by only performing their routine household tasks. Government institutions and agricultural extension services

⁸ Ganter, E. et al.: Gender Specific Target Group Analysis – Wadi Rajib 1997

⁹ MoSD: Study Survey on Economic and Social Situation for a Number of Families in both Rajib and Sakhne 1993

¹⁰ Ganter, E. et al.: Gender Specific Target Group Analysis – Wadi Rajib 1997

in particular have not yet started addressing women's need for advice and support. For example, women are still excluded from rural credit schemes or need male guarantors to access loans. Female land ownership is still rare despite the legal situation (Shari'a) providing for inheritance by women (half of the share of their brothers).

In Wadi Rajib, as in most other rural areas of Jordan birth spacing practices are not known, forbidden for religious reasons or simply not available. The resulting high number of births per married woman places a heavy burden on women. Traditional customs favor paternal cousins as marital partners for women. This practice has resulted in a high occurrence of mentally handicapped children in the area.

Approximately 10% of all households are women headed households. These are mostly widows as cases of divorce are rare.

2.2.4 Local Institutions

Apart from the administrative institutions like municipalities there are only very few local institutions in the target area of Wadi Rajib. Real self-help organisations or local common interest groups are virtually non-existent. The lack of social organisation outside the administrative and the tribal structures reflects the strong individualism prevailing in these rural communities.

In terms of target group organisations, two types of institutions exist. On the one hand there are charitable societies registered with the Ministry of Social Development, which mainly focus on support to the poorer parts of local communities and are usually involved in community development activities such as operating kindergardens. The other type of local organisation can be a production or marketing cooperative registered and supported by the Jordanian Cooperative Cooperation (JCC). Cooperatives are oriented towards income generation and business management for the entire membership in the group. Cooperatives therefore focus less on the social or charitable aspects than the societies. A list of the charitable societies and registered cooperatives in the Wadi Rajib area is listed in **Annex 5**.

The Ministry of Social Development has established a community development center in Rajib village, which provides various social services to the communities as e.g the management of kindergardens and support to the charitable societies in the area.

2.2.5 Employment and Sources of Income

The rural population of Wadi Rajib is highly dependent on income from employment and Government institutions are the principal employers. In the villages some live from self-employment including agriculture and from remittances paid by emigrated family members. A case study as part of a gender-specific target group analysis found out that in the village of Al Fakhira 78% of the income is derived from employment¹¹. Households depending entirely on wage labour as only source of income achieve very low income levels. In the example of Al Fakhira the sample of 10 households had an average monthly income of only 121 JD. On the other hand low education standards limit employment options for many young male family members and therefore there is a high rate of unemployment.

¹¹ Ganter, E. et al.: Gender Specific Target Group Analysis – Wadi Rajib 1997

Only 7% of the sampled households during the target group analysis relied on agriculture as their sole source of livelihood, while 70% had regular revenues from work or pensions, 8% were self-employed and 23% were farmers.

Nevertheless about 65% of the rural population in Wadi Rajib spend part of their working time with some kind of agricultural activities¹². This is a typical feature of the family operated subsistence-oriented farm with the men searching other employment opportunities and working only partly on their own land, while the women spend all their time on the farm and mostly look after the small livestock. The majority does not employ labour for agricultural activities as this would be too expensive, but make use of all family workforce during peak times (e.g. harvest). Hardly any of the smallholder farms have any entrepreneurial ambitions. This is rather a pensioner dominated or a part-time subsistence oriented agricultural economy. Livestock usually only plays a minor role for income generation.

The Ministry of Social Development (MoSD) has fixed the following thresholds in monthly income as poverty indicators for the Ajlun area:

- a) the absolute poverty line is 60JD/month and family. Families with less than 60JD/month income get support from the National Support Fund for needy and old people;
- b) poverty is defined as a family income of less than 100 JD/month;
- c) 294JD/month is considered the average income of a better-off rural family.

According to a socio-economic survey in 1995¹³, 87% of the families in Ajlun Governorate have less than 250 JD/month. 77% of this amount is earned by the head of household. Contrary to these figures from 1995, the target group analysis conducted in 3 villages of Wadi Rajib (Al Fakhira, As Safina, Rajib) in 1997 by E. Ganter and others found the average household income to correspond to 282 JD/month. Important variations in income were identified from one village to the other (Al Fakhira avg. 121 JD, Rajib avg. 405 JD¹⁴).

About 10% of all families living in Ajlun Governorate receive permanent support from the National Aid Fund, which is managed by the Ministry of Social Development. The fund also supports income generating activities for 92 families.

All surveys on household expenditure have shown that expenditure exceeds actual income levels on a large scale. This means that people are at great risk of getting trapped in heavy debts. The dependency on support and subsidy from Government institutions and foreign aid keeps increasing not least because of the relatively low levels of self-sufficiency by rural standards.

2.2.6 Physical Infrastructure (Roads, Water Supply, Electricity)

The Wadi Rajib area is easily accessible by all-weather roads. The main paved access roads are:

- a) Sakib – Al Fakhira – Rajib
- b) Anjara – As Sakhina – Al Fakhira
- c) Anjara – As Safina and Ballas
- d) Al Fakhira – Jabal Al Akhdar

(see Map No.8: Physical and Social Infrastructure Map of Wadi Rajib)

¹² Aridi, N.: Socio-economic Survey in Ajlun and Jerash Districts 1995

¹³ Aridi, N.: Socio-economic Survey in Ajlun and Jerash Districts 1995

¹⁴ Ganter, E. et al.: Gender Specific Target Group Analysis - Wadi Rajib 1997

Apart from these major roads, there are several unpaved tracks and agricultural or forest roads opening up the area.

Most villages in the area benefit from regular public bus services to Anjara/Ajlun and Sakib/Jerash.

All houses in Rajib village are connected to a piped water system fed from a spring called Ain Um Qasim. As Safsafa, Al Fakhira, Az Zarra'a, Ash Shikara and As Sakhina do not have piped water supply. In other villages like Jabal Al Akhdar water is pumped only for a few days per year. Frequent health problems are reported from As Safina and Al Fakhira mainly in summer due to consumption of dirty truck water from Ain Um Al Abr. Consequently water-borne diseases are a general health problem, in particular during the summer months.

Apart from a couple of scattered settlements the village of As Safsafa is the only hamlet in the area not connected to public electricity supply. A survey by MoSD in 1993¹⁵ gives the following statistical data for Wadi Rajib: 94.8% of the population have electricity. 82.7% use gas for cooking, while 15.2% use firewood or charcoal. The source of drinking water is in 62.9 % of the cases from springs through piped water and in 30% from cisterns.

2.2.7 Education, Health

There is a total of 11 schools in the villages of the Wadi Rajib catchment. Only three of these schools are secondary schools (1 for boys and 2 for girls). On the other hand there is a wide range of public and private schools just outside the area, e.g. 9 in Anjara (3 secondary), 8 in Sakib (2 secondary) and 7 in Kufranja (2 secondary). See **Annex 4** for an overview on all schools and health facilities in the Wadi Rahjib area.

One of the major problems is the high turnover rate of teachers in the rural schools. There is also a lack of sufficiently qualified female teachers. Another general handicap to the education of female students is the fact that girls are normally not sent to secondary schools outside the village. This would only be possible if the girl could stay with close relatives near the respective secondary school. Such arrangements are rare and therefore secondary education for rural girls is not available for many.

Despite all the efforts made by the Ministry of Education in improving the education standards in rural areas like Wadi Rajib, numerous problems remain. The official illiteracy rate in Wadi Rajib is given as 12% in 1995 (MoSD). Own investigations during the target group analysis revealed that as many as 35% lack basic literacy skills.

Health and first aid centers are located in Rajib, Ballas, Anjara, As Sakhina, As Safina, Jabal Al Akhdar and Sakib. Mother and child health care is only available in Anjara and Rajib, while there is a total number of 8 pharmacies in the area.

According to figures published by MoSD in 1993, 64% of child births take place in a hospital or health center and 36% at home. Only 50% of the mothers visit doctors during pregnancy.

¹⁵ MoSD: Study Survey on Economic and Social Situation for a Number of Families in both Rajib and Sakhne 1993

Still a large number of hygiene related health risks persist. Drinking water is usually not treated and water pollution is a common problem. MoSD found 107 household out of 174 visited (61.5%) to live in an unhealthy environment due to lack of cleanliness and hygiene. In the rural areas there are no garbage containers, mostly no collecting areas, but the majority of the farm houses nowadays at least have separate stables¹⁶.

2.3 Present Land Tenure and Land Use

2.3.1 Land Tenure

Land tenure in the Wadi Rajib watershed area can be distinguished between private and Government land. Over the total area of the 85.000 dunum of the watershed there are about 62.050 dunum owned privately (73%) and 22.950 dunum classified as state or Government land (27%). The state land is concentrated in the south-eastern part of the catchment. (see **Map No.9: Land Tenure Map of Wadi Rajib**)

The privately owned land falls into two categories:

- a) "Mulk" - this is land owned by an individual as private property;
- b) "Masha'a" - this is land owned by several members of the same family or kin-group (multiple ownership in a single parcel of land)

The widespread existence of land falling under the "Masha'a" category is linked to the high population growth and the traditional laws of inheritance. Male and female heirs can inherit land from their parents based on the laws of the Islamic Shari'a. The share of a female is one half of the share of the male heir when both have the same relationship to the deceased. Yet, in the project area there are only very few registered female landowners because of the female heirs frequently renouncing their rights and transferring their land ownership to their brothers. In such cases a female heir would normally receive a compensation payment from her brother.

The Jordanian Government has issued a law that prohibits the splitting up of "Masha'a" land into "Mulk" below a minimum size of 10 dunum, in order to avoid excessive fragmentation of agricultural land holdings¹⁷. It is estimated that today the "Masha'a" category dominates over "Mulk" in the entire target area of WR, in some parts reaching as much as 90% of the privately owned land. Although there are enormous differences from one village to the other in the proportions of the various types of land tenure, the village of Al Fakhira was found to have as much as 90% of its private land falling into the Masha'a category.

Most villagers engaged in farming activities are at the same time landowners of some "Masha'a" plots and also lease additional land for cultivation. Only families with substantial "Mulk" land can afford not to lease additional production area. The sale or lease of land is therefore frequent practice in the area, but necessitates the previous agreement of all co-owners in the case of "Masha'a" land. In all the villages there is also a minority of landless people without any rights to either "Masha'a" or "Mulk" land. In most cases these families are either recent immigrants to the area without sufficient resources to buy land from the others, have sold their land property in the past due to economic hardship or widows who have renounced their land rights in

¹⁶ MoSD: Study Survey on Economic and Social Situation for a Number of Families in both Rajib and Sakhne 1993

¹⁷ Massey, D.T.: Laws and Regulations relevant to Implementation of Agricultural Policy Charter for Jordan, 1994

favour of their male family members. In the village of Rajib there is an estimated proportion of 30% landless families¹⁸.

Generally speaking the present land tenure system assures the direct or indirect access to land resources and crop yields by the vast majority of the local population and even their family members having left the area for good. The crop yield or the rental fee for land, which is usually paid in kind is shared by all brothers and sisters having rights to the "Masha'a" land. This means that a small benefit from the co-owned land is available to many people. On the other hand this also leads to a situation where only very few families actually manage to live entirely off the land and are in a position to invest in improved farming systems. All transactions of land, be it for sale or lease, require a very long decision making process among all kin members and often result in family feuds (see chapter 2.3.2 on sharecropping and land lease).

In Wadi Rajib the Government land almost entirely falls under the category of forest land or treasury land. Smaller parts of the Government land are not stocked with trees and used as grazing land. De facto the major part of the Government land is regarded by the local population as a common access area and used for cutting firewood, grazing livestock or pruning trees for animal fodder. The present use of the natural resources on state land is therefore not sustainable. Agricultural and forestry staff have the mandate to manage and protect this land by law, but are insufficient in number to fulfill these tasks. Especially poor inhabitants are forced to illegally use the Government land in order to fulfil their subsistence requirements e.g. in household energy supply and are thus constantly in conflict with local authorities.

Presently the laws do not allow for the leasing of Government land to individuals or groups, although some of the more favourable parts of the Government land would be suitable for annual crop production or fruit tree cultivation.

2.3.2 Sharecropping and Land Lease

Virtually all families living in the target area of WR have emigrated family members, who have permanently left the rural areas in search for better jobs in towns like Ajlun, Jerash or in the city of Amman. Very often these people are landholders on their own or as part of the extended family under the "Masha'a" system. If a landholder can not negotiate for the cultivation of his/her land within the family, e.g. by those remaining in the village, he or she will enter into a sharecropping or land leasing agreement in order to secure additional income. Such arrangements are mostly based on a verbal agreement.

There is no legislation securing tenancy relationships and specifying or enforcing the rights and obligations of the contracting parties. No provision for payment of compensation for the value of unexhausted improvements carried out by the tenants is given. This limits the preparedness to invest in rented land (e.g. in soil conservation measures) and very often renders cultivation practices highly exploitative.

Sharecropping is quite common in the project area, particularly in the lower-lying western parts. In total there are three forms of rental or sharecropping: sharecropping, lease against cash money and rent of harvest only (in cash payment). The costs for seeds, water and other inputs plus the outputs are usually shared exactly 50:50 between the owner and the tenant, while the tenant has to

¹⁸ Ganter, E. et al.: Gender Specific Target Group Analysis – Wadi Rajib 1997

provide 100% of the labour input. There are other cases where the tenant only keeps 10-40% of the harvest. In case of land lease the usual rates vary between 12 and 13 JD per dunum and year for irrigated plots.

According to a survey conducted in 1995¹⁹, 36% of the villages in Ajlun area have more than 10 dunum of unused land. The total area of unused agricultural land is estimated at 251 dunum in the entire Ajlun area. The main reasons for not using the land are: insufficient rainfall, lack of irrigation water, neglect of agricultural activities by the villagers, land fragmentation, migration to urban areas, high cost of agricultural land rehabilitation on steep or rocky areas, unavailability of agricultural credits.

2.3.3 Rainfed Crop Production and Orchards

The agricultural land of Wadi Rajib is dominated by olive plantations, fruit orchards and some vineyards above 300 m a.s.l.. Rainfed annual crop production (cereals and pulses) is of lesser importance and can be only found in the center of the catchment area. (see Map No.10: Present Land Use Map of Wadi Rajib)

On the other hand, the prevailing rainfall pattern would provide a solid base for intensive rainfed agriculture also in the upper part of the catchment (500m - 1000m a.s.l.). Yet, the local population shows clear preference for perennial fruit and olive production over annuals, partly for subsistence production, partly for the better market revenue of these crops. Dominant type of agricultural holding is a family operated farm of less than 50 dunum.

See **Annex 6** for a summary on crop production and yield data from Wadi Rajib.

According to a survey carried out in 1995²⁰, 57% of the farmers cultivate olives and 44% even have more than 10 dunum of olives. 33% of the farmers cultivate other fruit trees, but only 2% grow cereals under rainfed conditions.

The main tree crops are olives, some grapes, pomegranates and figs. Limited amounts of peaches, apricots, citrus fruits, apples, pears, almonds, pistachio and walnuts are grown, mostly in homegardens. There are two nurseries in the area supplying most of these seedlings. Part of their activity is the multiplication of the famous "Roman" olive variety which is still available in the Wadi Rajib area.

Nevertheless olive cultivation is not practiced intensively. For example pruning and irrigation only takes place during the first two years. Consequently a high variability in olive production from year to year and within the year from one location to the other can be observed. Overall production is well below the ecological farming potential. Fortunately pests and diseases seem to constitute only a minor problem. Some farmers use dry and compact organic manure for fertilisation. The general planting distance between olive trees is around 5m. In between intensive tilling of the land takes place, with a 1st ploughing in November, 2nd in March and 3rd in April. Soil cultivation along the slope can be observed in several locations. Only very few farmers, and mostly those having acces to supplementary irrigation water, practice undercropping under the orchards with legumes, cereals or horticultural crops.

Overall, the existing farming potential is not fully exploited. Hardly any improved crop management techniques like mulching, green manuring, minimum tillage, planned crop rotation, intercropping of vegetables or pruning of fruit trees is practised. Very

¹⁹ Aridi, N.: Socio-economic Survey in Ajlun and Jerash Districts 1995

²⁰ Aridi, N.: Socio-economic Survey in Ajlun and Jerash Districts 1995

few farmers own agricultural machinery, but they mainly make use of horse drawn ploughing, which is hired locally.

The cold winter temperatures are a limiting factor for agricultural production at higher altitudes in the watershed. In micro-climatically favorable locations some winter vegetable production is done under rainfed conditions.

2.3.4 Irrigated Agriculture

In the lower, western parts of the catchment (below 500m altitude) a good potential exists for irrigated agricultural activities. Around the village of Rajib it is common practice to irrigate crops by furrow irrigation fed from open concrete canals. Some of the better-off farmers make use of drip irrigation methods.

Despite this potential the open canal system is ill-maintained and farmers argue that a lack of financial means prevents them from improving the systems. The target group analysis of 1997²¹ revealed that there are 14 open water canals in Rajib totalling 35.5 km in length. 11 of these canals are currently partly dysfunctional over a length of 8.85 km. In total 30% of the irrigated land and 60% of the rainfed land of Rajib village is currently not used. The Land and Survey Department defines and registers plots suitable for irrigation, regardless whether these plots are then planted or not.

On irrigated land wheat, barley, lentils, peas and beans are cultivated from December to April. Thereafter sesame, okra, eggplant or chilli are planted even though eggplant and chilli have the highest water requirements. There is no organised water user group in Rajib practicing controlled water management. The general rule is that every 10 dunum can be irrigated for 1 hour per week. Verbal agreements exist between farmers regarding the water distribution, which mainly depends on the water flow and the cropping season.

Farmers preferably sell their agricultural produce at the central market in Ajlun. Olives are sold directly to oil mills in Anjara and Ajlun or pressed for home consumption.

2.3.5 Livestock Production, Rangeland

The Wadi Rajib area is not particularly famous for its livestock production potential. The local flocks consist mainly of goats and some sheep. Livestock owners have generally further reduced their flocks since the cutting of Government subsidies for feed in 1996. At the farm level many families keep chicken, mostly for home consumption.

About 19% of the local population do not have any livestock of their own²². For all the other households involved in some kind of livestock production the respective activity only contributes on average 5% to the total household budget. This reflects the low importance of animal husbandry in the area as a whole.

Nevertheless, the low level of livestock production could be increased by suitable measures. For example the local goat breed of Baladi produces an average of 1-2 kg milk/day, while the improved breed of Shami goats can produce up to 4 kg/day. See **Annex 6** for additional data on livestock production in the Wadi Rajib area.

²¹ Ganter, E. et al.: Gender Specific Target Group Analysis – Wadi Rajib 1997

²² Aridi, N.: Socio-economic Survey in Ajlun and Jerash Districts 1995

Dairy cows and horses are not very common sights in the area. Dairy cows can produce up to 6 kg of milk/day under the local conditions. Horses are rented out for ploughing at a daily rate of 20-25 JD. The inavailability of sufficient fodder, the high investment costs and limited local markets prevent smallholder farmers from investing in more dairy cows or draught horses. No veterinary services are available locally, but Government and private veterinary services are available from Ajlun town.

The increased cost for feed in recent years has led to more grazing and pressure on the commonly used rangelands. The rangelands are generally state owned, but there are also private and a few communal grazing lands. Usually, all rangelands have traditional (tribal) grazing rights to specific areas. As state property, these lands are treated as common wealth that can be used and over-used by anyone without restriction. Restriction in grazing rights means a reduction of the family income, which would raise grave socio-economic problems. De facto, no law exists to provide control for grazing and no policy has been formulated and enacted for range management. Also, these lands are ploughed with impunity.

On the western edge of the catchment the official range reserve of Rajib was established in 1983. This is one of the first range reserves of its type in Jordan and falls under the management responsibility of the DFR and the Agricultural Directorate of Ajlun. The total area of the reserve comprises 2000 ha and the average rainfall in this part is about 250 mm/year. Over the years an area of 600 ha was improved by plantations of fodder trees and shrubs as well as by direct seeding of grasses and shrubs. Today it is estimated that the carrying capacity of the Rajib range reserve corresponds to 1 sheep per 7 dunum. The average cost of range improvement measures was calculated at 293.3 JD/du.

2.3.6 Forests

About 20% of the land in the Wadi Rajib watershed is covered by natural oak and pine forests. The entire Ajlun Governorate has a forest area of 9230 ha²³. The local forests have mostly protective value, but only little economic value. The ongoing degradation and forest destruction has important consequences on soil erosion and micro-climatic changes. Due to grazing livestock and forest fires hardly any natural regeneration of the indigenous trees can be found.

Of the total forest area 83% are Government forests, either natural or man-made, while 17% are private natural forests. The landowners of such plots are prohibited by law to cut the trees growing on their land or to transform the use of the respective plot to other purposes. The owner may collect dry firewood from the area and carry out tree pruning. These legal limitations have brought about very negative attitudes of people towards the forest area and forests are frequently destructed or burnt on purpose.

Literally all forest areas are used for grazing livestock. Branches of trees are cut in particular in forests close to human settlements and fed to goats at home. The remaining wood is used for cooking and heating. Illegal cutting of firewood provokes some fines by forest guards, but law enforcement is difficult.

²³ Aridi, N.: Socio-economic Survey in Ajlun and Jerash Districts 1995

A detailed forest inventory in Ajlun Governorate was finalised in 1994²⁴ and very specific forest management guidelines were elaborated. Unfortunately none of these recommendations have yet been implemented by the local authorities.

The forest inventory identified that the net forest area has an average number of rootstocks of only 32.68 per dunum which reflects the very sparse vegetation cover. Therefore theoretically 65% of the forests are available for underplanting. 76% of the stands are comprised of *Quercus coccifera*, *Arbutus andrachne* and *Quercus aegilops*. Systematic tending operations are recommended for all types of natural forests, such as pruning, coppicing and thinning measures. Regeneration of *Arbutus andrachne* would be particularly worthwhile.

83% of the standing volume is made up of oak trees. The recommended silvicultural treatment under the oak working cycle would be selective coppicing and tending of oak and other broad leaved species with interplanting of seedlings with suitable species in order to improve the quality and density of the future crop.

The average increment of local forests was measured at 0.345 m³/ha/year. The highest production level is achieved by natural *Pinus halepensis* forests with 0.782 m³/ha/year at a density of 906 trees per ha. In this context it is important to know that the overall annual production of all trees in Jordan is estimated at 12.000 tons of wood and firewood.

²⁴ FAO: Management of Forests and Range Lands of Ajlun Agricultural District, Amman 1994