Participatory Rangeland and Grassland Assessment (PRAGA) REPORT

Prepared by

HFDJB Team

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Introduction

The PRAGA methodology is designed to bring together diverse stakeholders and different types of data and monitoring systems to ensure ownership, acceptance, access and use. The method links data across different spatial and temporal scales to inform decision making at multiple levels while supporting global and national comparability (e.g. global indicators) and balancing the needs of cross scale coordination with local ownership.

The PRAGA methodology is based on established approaches developed at IUCN and FAO as part of the FAO Land Degradation in Drylands (LADA) programme. The method uses a combination of local and scientific knowledge to monitor rangeland health based on local management objectives to improve targeting, policy development and even the SRM investments. A key element of this process is enhancing the participatory approach in the local communities and expansion to the national level. Key guiding principles for this approach include multi-functionality (applicable in homogeneous and heterogeneous landscapes and diverse land uses), cost effective (encouraging the use of a minimum indicator set), and participation (to enhance trust and empowerment), with scales of use guided by the scales of local decision making.

The Participatory Rangeland and Grassland Assessment methodology is designed to be a flexible and sustainable tool for assessing degradation and rangeland health across a range of grassland and rangeland ecosystems and land use systems (FAO and IUCN, 2018). The PRAGA methodology is a decision support tool to assess rangeland health according to the management objectives of local users by combining local and scientific knowledge. The method is intended to guide policy, assist in the identification and implementation of management options and interventions and track the state and trends of ecosystem “health” in space and time.

The PRAGA methodology consists of 9 Steps in 5 Phases (Figure 1):

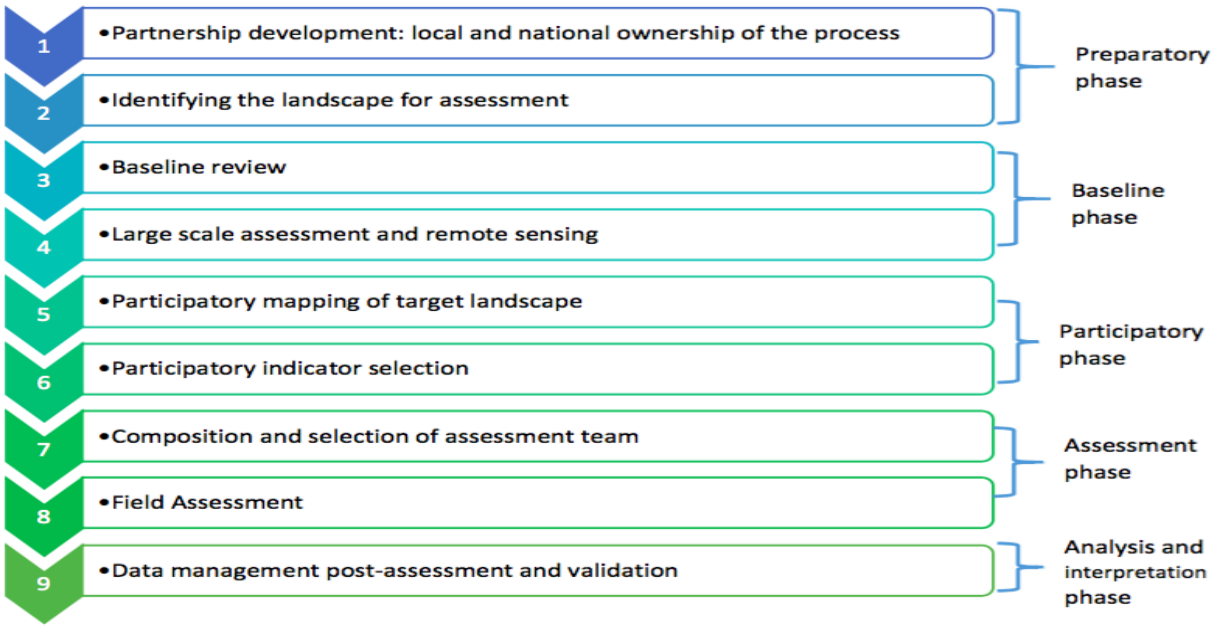


Figure 1: PRAGA methodology

PRAGA Steps:

1. Partnership Development
2. Landscape Identification
3. Baseline Review
4. Landscape scale assessment and remote sensing
5. Participatory mapping of target landscape
6. Participatory indicator selection
7. Selection of assessment team
8. Field Assessment
9. Data management, post-assessment and validation

PRAGA Phases:

1. Preparatory Phase
2. Baseline Phase
3. Participatory Phase
4. Assessment Phase
5. Analysis and Interpretation Phase

The project “Healthy Ecosystems for Rangeland Development (HERD): sustainable rangeland management strategies and practices” focuses on the iterative development and implementation of the PRAGA methodology with the objective of enhancing the capacity of local and national stakeholders in pastoral areas to assess land degradation and promote sustainable rangeland management approach (SRM). The project’s objective is to “strengthen restoration and sustainable management of pastoral rangelands for the provision of ecosystem services and protection of biodiversity in Egypt and Jordan and catalyzing scale up regionally and globally**.**

The HERD approach aims to improve Rangeland governance at the local level of rangeland users (local communities) and the intermediate level of decentralized rangeland managers and service providers in districts and governorates level, at the national level and at the regional level. The project approach designed to support dialogue-based processes in which all rangeland users and stakeholders are involved in a shared search for negotiated solutions. Rangeland governance is, on this basis, ‘improved’ or ‘good’ if the process that leads to it is transparent, democratic, equitable, pro-poor, and gendered, and that these approaches are reflected in the outcomes.

One of the important aspects of Sustainable Rangeland Management (SRM) is the active participation of local communities and collaboration with relevant stakeholders during the different phases of the strategic planning process.

This project is conducted in four main landscape in Jordan. Northern part of Jordan (SURA site), Southern part of Jordan (Al- Mansheyyeh/Ma’an), Eastern part (Al-Hazeem) and Middle part (Hima Bani Hashem).

The Project started with the inception workshops all over the sites discussing and explaining what this project will be holding and binging to the community.

Detailed PRAGA steps

Step 1. Partnership Development

1- Aim:

The aim of this step is to build a strong relationship with the local community to reach the goals through the project objectives.

2- Identification of key stakeholders

The identification of the stakeholders (Table 1) based on the site need and the local community will deal and collaborate during the whole life of the project and afterward through the sustainability approach.

Table 1: Key Stakeholder Identification

The Hashemite Fund for Development of the Jordan Badia (HFDJB)	The Hashemite Fund for development of Jordan Badia (HFDJB) is a key project partner at the national level and co-financier, and hence a member of the Project Steering Committee. Based in Amman and established in 2003 under Royal patronage, the Hashemite, the Fund's aim is to improve the socio-economic conditions in the Badia by building the capacities of local communities, and by implementing well-planned projects in various relevant sectors. The Fund way of working includes both direct and indirect involvement in development activities taking place in the Badia. It maintains a corps of research experts and networks with government, local NGOs, donors and community-based organizations, permitting it to implement a suite of projects relevant for Badia development. Previously responsible for Badia restoration projects, the Hashemite Fund for Development of the Jordan Badia can potentially play a role in the implementation of activities in relevant project components, the details of which will be clarified after due process.

Ministry of Environment (MoENV) Ministry of Agriculture (MoA) Ministry of Water and Irrigation (MWI)	Both ministries are project partners and co-financiers, responsible for ensuring the project is aligned with national priorities and investments and for supporting adoption of SRM approaches in national policies and budgeting processes. They are expected to participate actively in the Project Steering Committee. At the national level in Jordan, both line ministries will also facilitate for liaison with other ministries, sub-national governments (at the governorate and district levels e.g.), with local authorities and with foreign partners through LAS dialogue, to ensure coordination at the national and regional levels. The rangeland reserves are under the authority of the MOA and agreements are made o facilitate the accessibility and the rangers role to collaborate with the local herders as well.
Royal Botanical Gardens (RBG)	RGB's is a key project partner at the national level. Its role in supporting research on rangeland management is equally important. RGB is also a close project partner, co-financier and member of the project steering committee.
Royal Society for the Conservation of Nature (RSCN)	Because of RSCN's role in supporting research relevant for the sustainable management of rangelands, they are well positioned to assist in the implementation of certain project activities. More specifically, of the selected landscapes (Hazeem) has protected areas is in its vicinity, under the responsibility of RSCN and collaboration with the project in the management of the wider landscape can be beneficial to both. The exact collaboration framework regarding the management of Al Hazeem's landscape will be further detailed during the project inception.
GIZ Jordan	A project partner and co-financier. GIZ and IUCN have been instrumental in supporting a PES project in Jordan through each a key study on the economic valuation of a large-scale rangeland restoration has been implemented in Jordan, building on the Hima system. The lessons from the PES project are crucial for disseminating the model in other sites in Jordan, besides the pilot in Bani Hashem and the Zarqa Basin.

3- Local inception process

The inception workshops (Figure 2) were held in the three locations starting with an introduction to the project general objectives, inputs and outputs and the outcomes of each activity in the project.

Figure 2: Inception workshops

4- HFDJB Team

The team was formulated from the HFDJB in April of 2019 and the actual start to work on the project work plan.

Including the following:

- Dr. Maher Tadros – Project Director
- Eng. Mohammed Al - Omosh – Project Coordinator
- Mr. Raed Al-Atiyyat – Financial Manager
- Eng. Sari I. Shawash – GIS and RS Specialist.
- Mr. Abdallah Al- Sardi – Socioeconomic Specialist
- Eng. Firas Al-Shuyyab – Sura Site coordinator
- Eng. Abdul Majeed Al-Jazi – Al-Mansheyyeh Site Coordinator
- Eng. Mohammed Al- Harahsheh – Al-Hazeem Site Coordinator.
- Group of Social Workers and Gender Specialists.

The inception workshops started with the starting of the project on June 2019, meeting with the cooperatives and representatives of the local community in the study area. The local community representatives were enthusiastic with this project as a starting point for a future project in the area and all hoping that the project will bring new thoughts and sustainability to the projects with the local community.

Site Description

Sura

Location

Sura landscape is located north western parts of badia region in Mafraq governorate, about 80 kilometers to the north of the capital Amman and 40 kilometers southeast Irbid with a total landscape area of 12,767 ha (Figure 3).

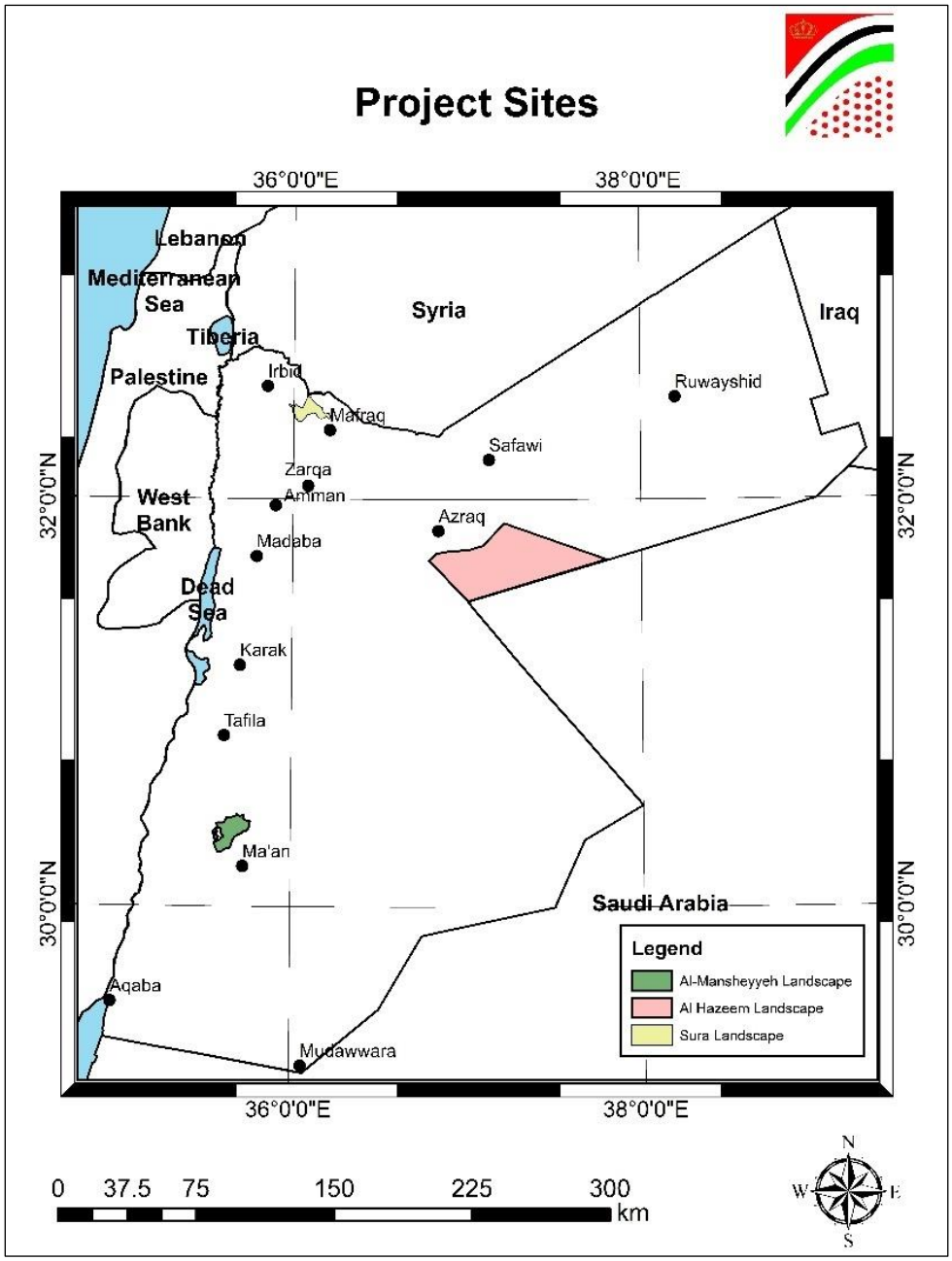


Figure 3: Project's Sites

NDVI (Normalized Difference Vegetation Index) analysis using Landsat satellite images showed that the landuse is classified into three categories: Forest, agriculture and Grasslands. Satellite analysis showed the there is a great change and decline in the areas covered by each category (Table 2).

Table 2: Landuse change in Sura Landscape

Land Use (%)	Year		Change (%)
	1985	2016	
Forest	15	1	-14
Agriculture	37	23	-14
Grassland	48	76	28

Al-Mansheyyeh

Location

Al-Mansheyyeh landscape is located south western parts of Jordan Badia in Ma'an governorate (Figure 3). The Total landscape area of the project is 20,929 ha. About 220 kilometers to the south of the capital Amman.

NDVI (Normalized Difference Vegetation Index) analysis using Landsat satellite images showed that the landuse is classified into four categories: Forest, bare rocks, grasslands. Satellite analysis showed the there is a great change and decline in the areas covered by each category (Table 3)

Table 3: Landuse change in Al-Mansheyyeh Landscape

Land Use (%)	Year		Change (%)
	1985	2016	
Forest	12	6	-6

Bare Rock	26	76	50
Grassland	35	0	-35
Bare Soil	0	18	18

Al-Hazeem

1-Location

Al-Hazeem landscape is located middle of Jordan Badia in Al Zarqa governorate (Figure 3) near the Jordan – Saudi borders. The Total landscape area of the project is 193,641 ha. About 150 kilometers to the east of the capital Amman and 40 kilometers southeast Azraq.

NDVI (Normalized Difference Vegetation Index) analysis using Landsat satellite images showed that the landuse is classified into five categories: Bare soil, basalt, grassland, low area and irrigated areas. Satellite analysis showed the there is a slight change and decline in the areas covered by each category (Table 4).

Table 4: Landuse change in Al-Hazeem Landscape

Land Use (%)	Year		Change (%)
	1985	2016	
Bare Soil	30	32	2
Basalt	16	10	-6
Grassland	38	34	-4
Low area	16	23.8	7.8
Irrigated	0	0.2	0.2

Team Members- HFDJB and local community

Many workshops were conducted in each site with the local communities to discuss primary assessment of the natural landscape areas through mental maps. Stakeholders were identified from

local communities and representatives of governmental institutions. In Sura and Al Mansheyyeh landscapes, range reserve sites were chosen for intervention activities, while in Al-Hazeem landscape, many proposed sites were selected by local community for the implementation of restoration activities.

1- local community members in each site

Local community committees were defined for each landscape area according to the workshops and meetings held with the representatives. In the workshops held in each site, each group was divided into sub groups (Figure 4: workshops for the definition of threats***, solutions to overcome, and produce participatory maps***) to produce the participatory map and to define the threats that exist in the site and the proposed activities to overcome these threats.

Figure 4: workshops for the definition of threats, solutions to overcome, and produce participatory maps

Participatory map included the definition of land use and land cover based on old local knowledge in order to try through this project to recover the best optimum environmental, vegetation cover conditions of land in each site. In Sura site, three subgroups were developed to produce the participatory map (Figure 5)

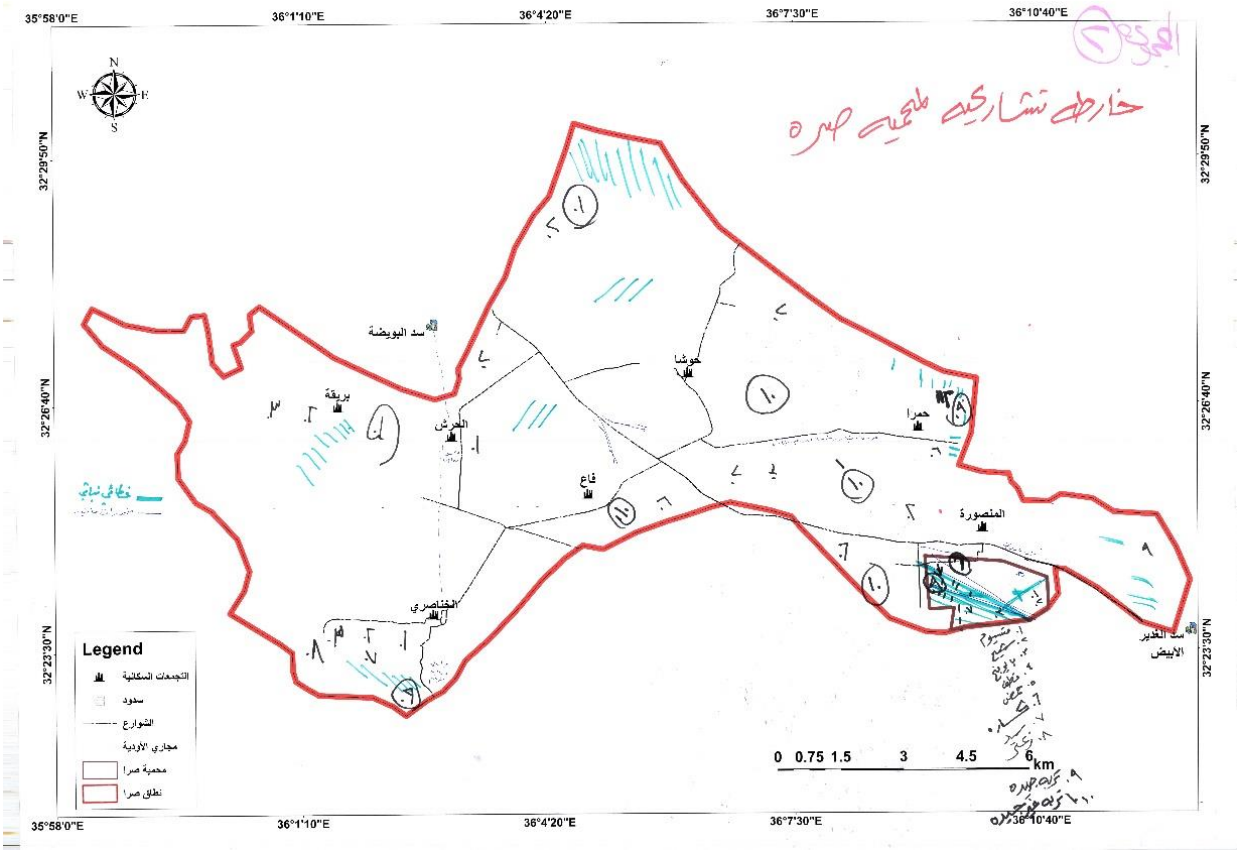


Figure 5: Participatory map for Sura Landscape

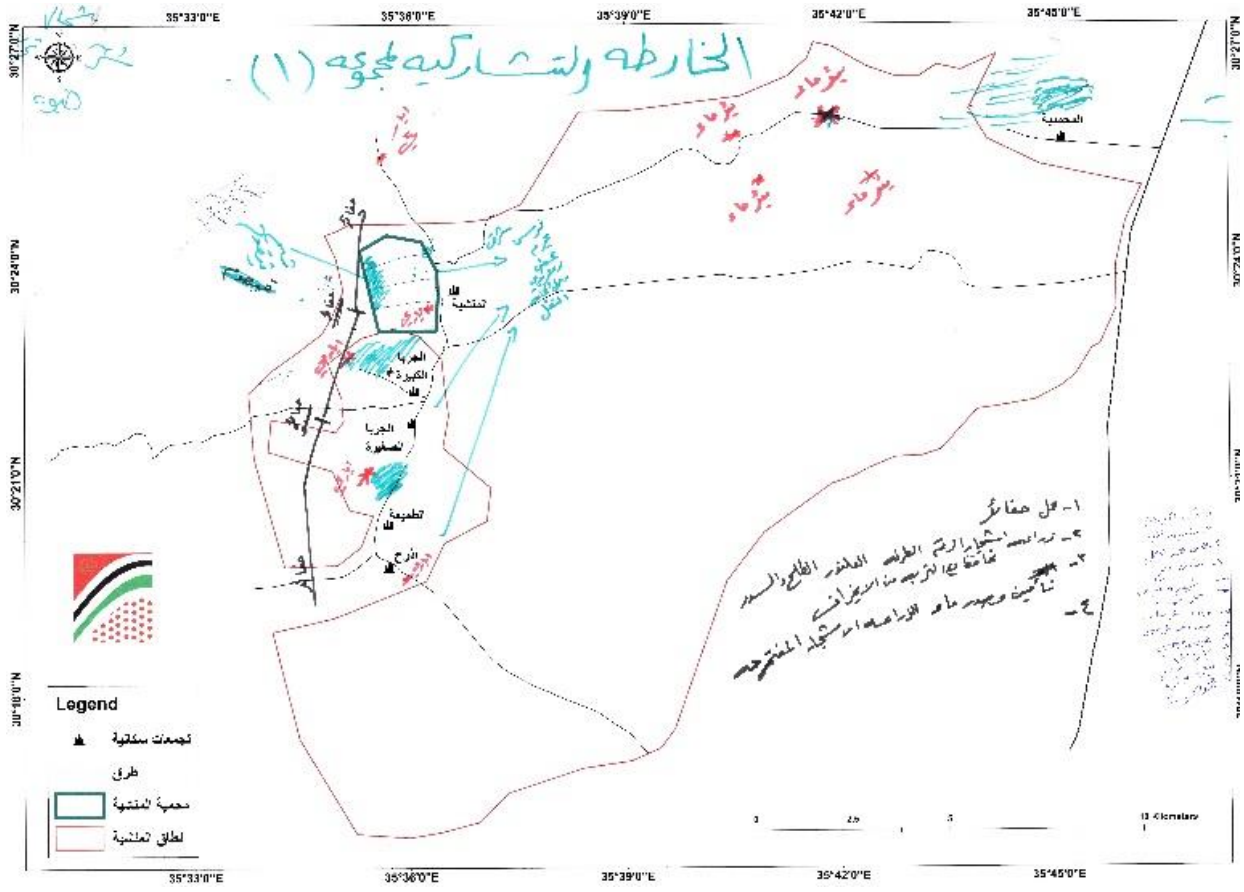
Each subgroup consisted of elders, young men ,and women to discuss the changes occurred on land use in each landscape areas, vegetation cover areas, type of vegetation cover and distribution, distribution of villages, distribution of common soil types, areas of sands, rocks, and quarries if exists, roads, water reservoirs and small dams.

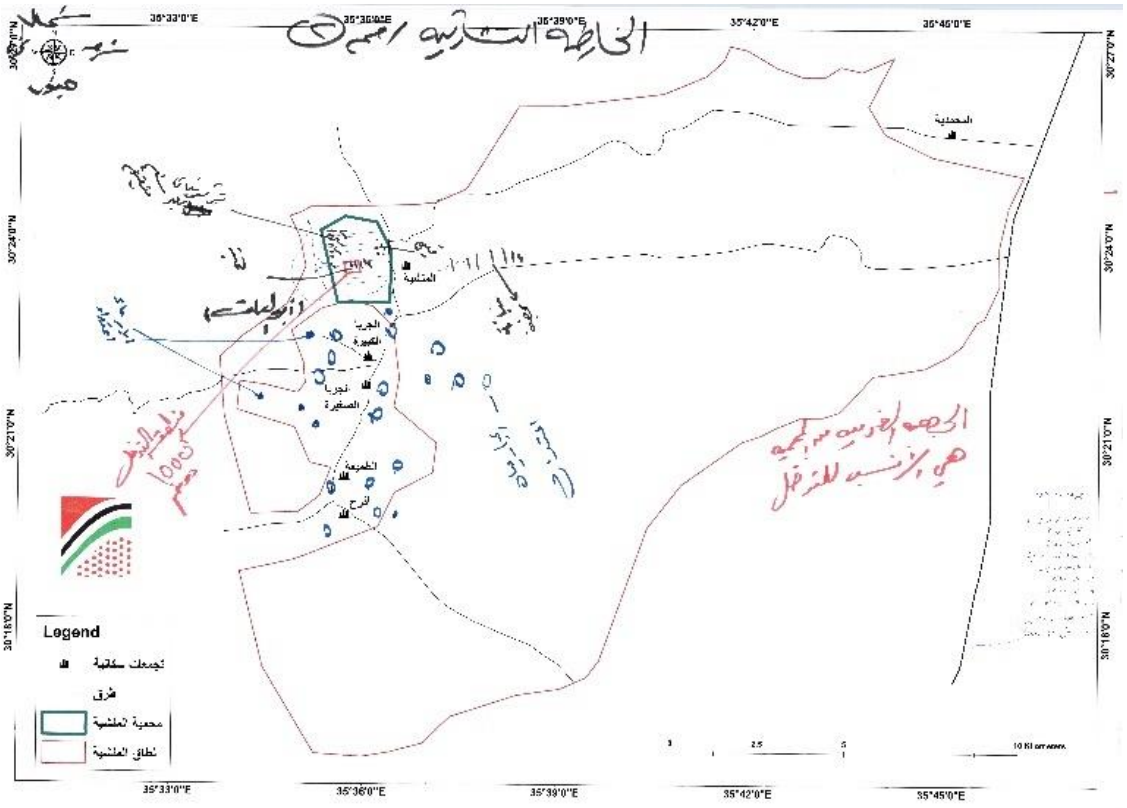
In Sura participatory map (Figure 5) locals determined the distribution of pastoral native plants in the past such as Artemisia (الشيح), Achillea (القيصوم), Chamomile (بابونج), Atriplex (القطف), Rumex (الحمض أو الحماض), and Thyme (الزعتر). Sites of quarries, previously good and fertile soils were also determined.

In Mansheyyeh participatory maps (Figure 6), locals also determined the distribution of pastoral native plants in the past such as Germanders (الجعدة), Achillea (القيصوم), Breckland thyme (الزعتر البري), Verbena ((نبتة رجل الحمام, Chiliadenu (نبات الهنيدة), distribution of water wells. many activities

were proposed such as construction of Hafeers and dams for rainfall water harvesting, cultivation of Retama (الرتم), Tamarix (نبات الإثل أو الطرفة), Acacia (الطلح), Ziziphus spina Christi (السدر) for soil conservation from erosion. And they proposed the best site for restoration activities based on their local knowledge.

In Al – Hazeem participatory maps (Figure 7) locals determined the distribution of pastoral native plants such as Atriplex (القطف), Artemisia (الشيح), Achillea (القيصوم), Prosopis (الينبوت), Alhagi (العاقول), Breckland thyme (الزعتر البري), Germanders (الجعدة) and native palm trees, distribution of soils, sands, rocks, roads, and water bodies exist.

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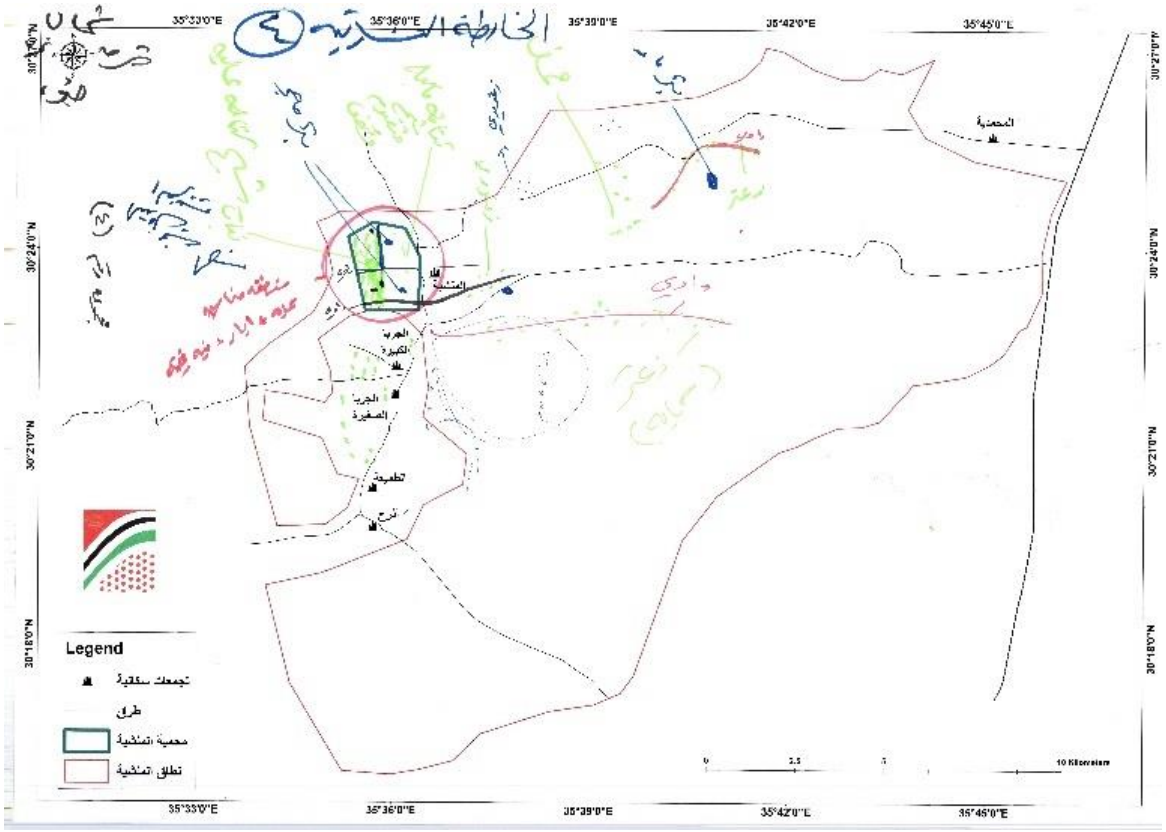
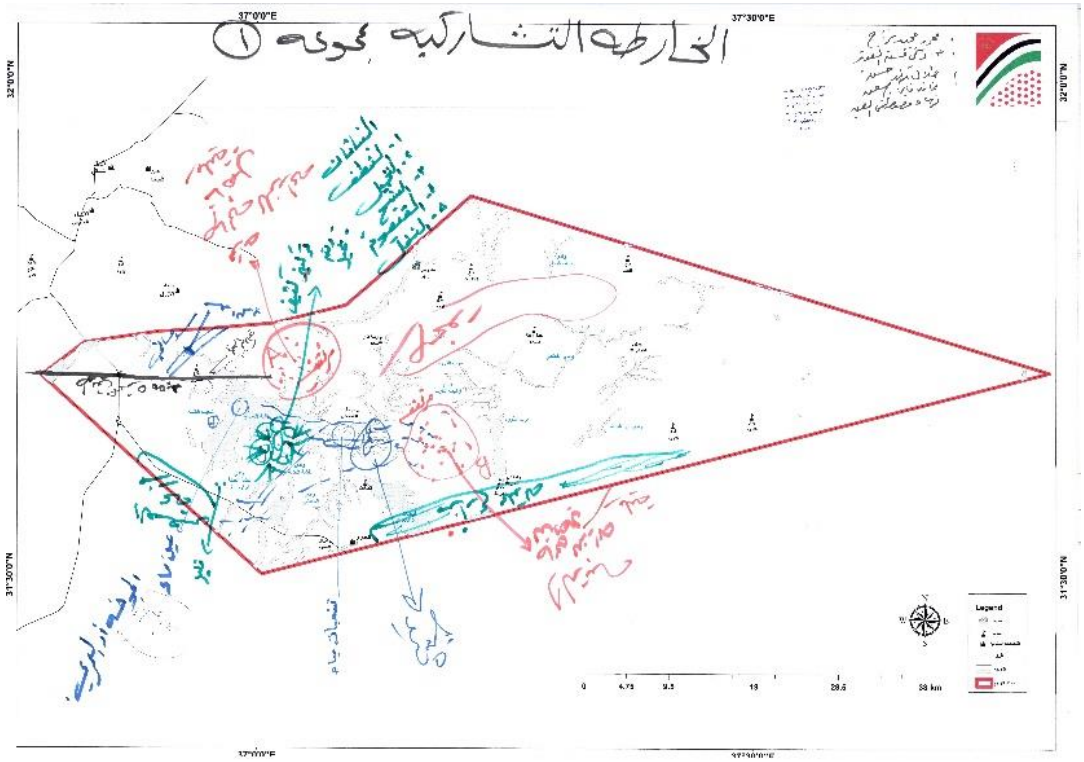
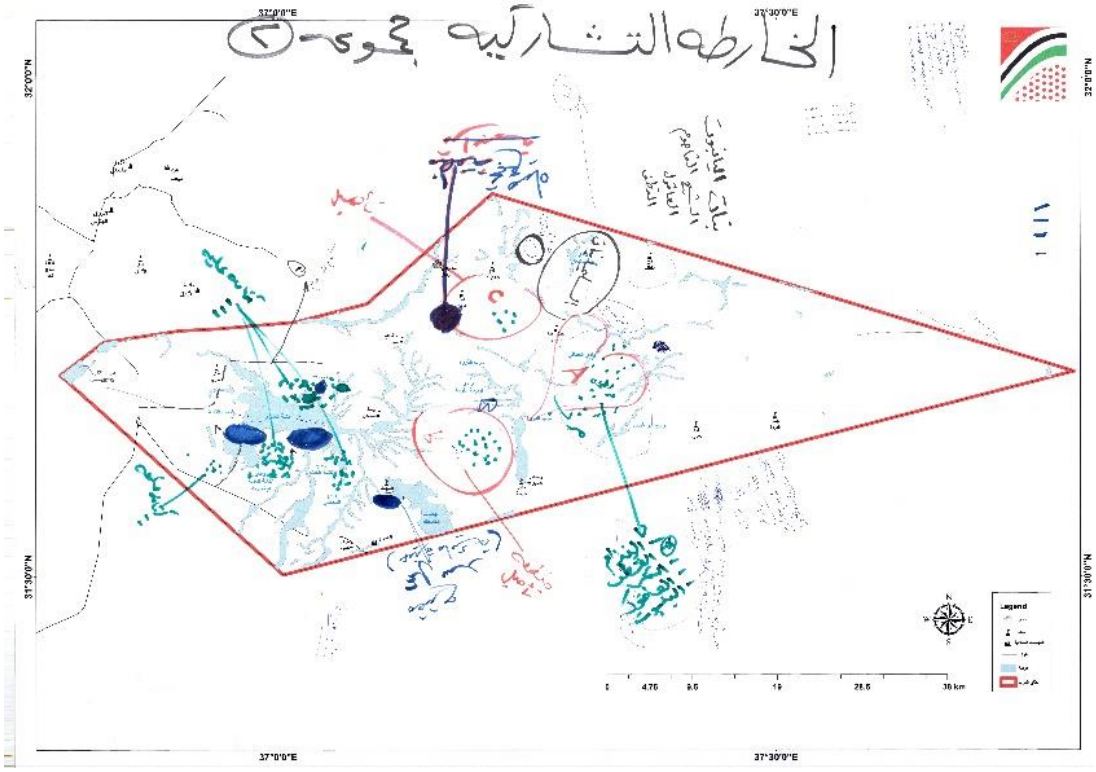


Figure 6: Participatory map for Al-Mansheyyeh Landscape

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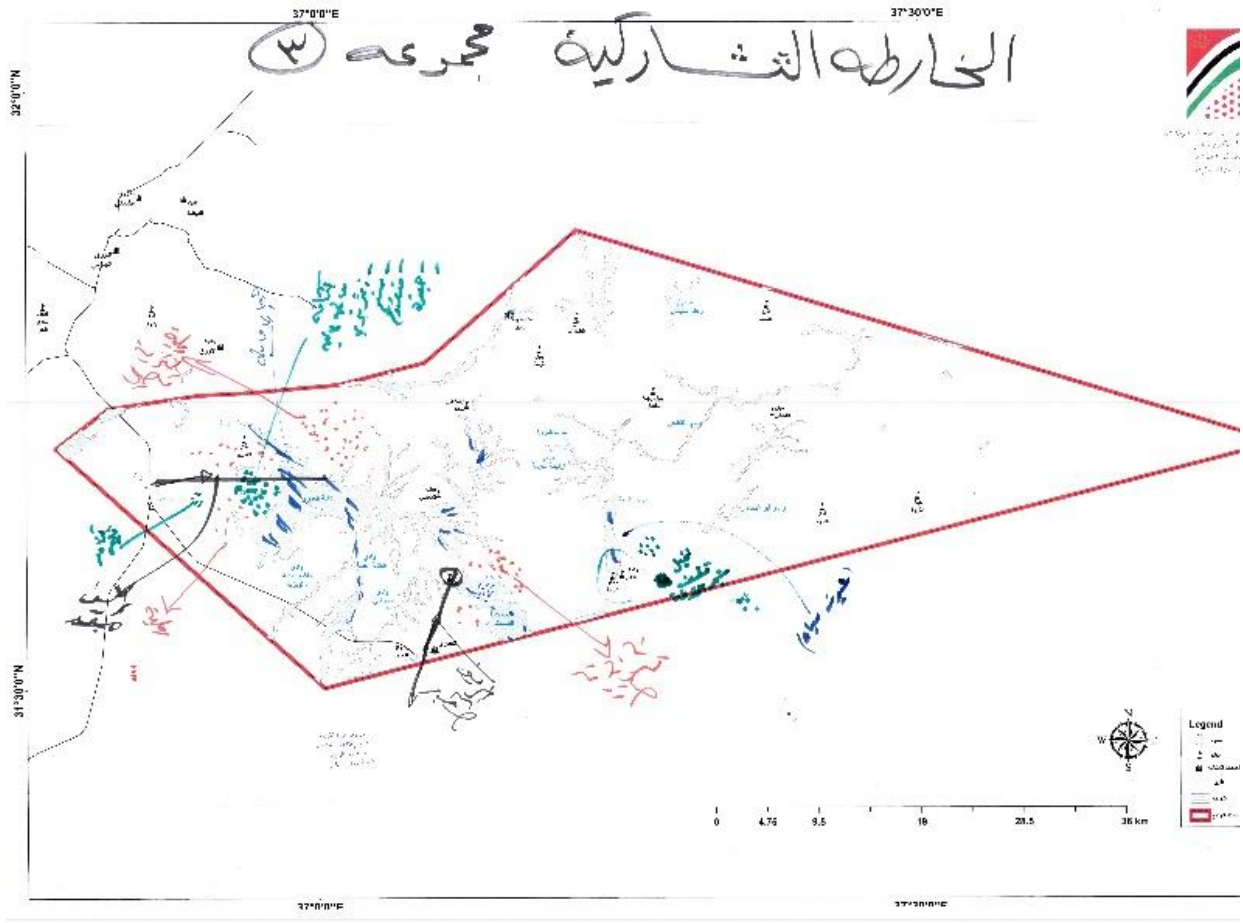

Figure 7: Participatory maps for Al-Hazeem Landscape

2- Ecosystem and land use

Range condition was a general term describing the status of resources at a site with particular reference to livestock grazing. The rangeland condition usually carries a specific connotation, reflecting current status of the vegetation and soils occupying a site in comparison to the site potential.

Range land condition status assessment Based on Vegetation cover at study area.

As a participatory approach a drawing of a preliminary participatory map by the local community using aerial photo was conducted. In which all the indicators based on the local knowledge is mapped.

(FIGURE)

3- *Timing of assessment*

After consultation with community and all stakeholders PRAGA practice was conducted including the field survey during the May in the field and August for PRAGA of the year 2019.

Step 3. Baseline review

Sura

1- Topography and Geology

Sura landscape is a part of the Northern Highlands Dissected Limestone Plateau which is extending from Yarmouk river in the north to Wadi Al-Wala in the south. The entire region is typically Mediterranean and has a xeric moisture regime. The region contains a wide range of soil types, reflecting the wide range of physical characteristics. Xerochrepts and chromoxererts are the major soils with typic subgroup occur predominantly in the western half of the region and calcixerollic in the eastern half. Lithic subgroups are occurring on the shallow eroded areas of the steeper slopes and in particular, the hill tops and upper slopes from which most of the residual soils have been eroded. Dominant soil subgroups in this region are Calcixerollic, lithic and typic Xerochrepts, typic and entic chromoxererts. The main limitation of these soils are their high silt and calcium carbonate content which can lead to capping, and possible nutrient imbalances due to their highly calcareous nature. Many of shallow soils were cultivated for cereals without specific conservation inputs; these soils would be better left for fodder production and/ or grazing.

Altitudes vary in Sura landscape between 861 meters in the south and 566 meters to the north of Al-Harsh village (Figure 8). An altitude gradient is obvious across the east-west direction in the whole landscape; in the west parts of the landscape, the altitude gradient is obvious across the north- south direction, while the altitude gradient is gentle in the eastern parts.

2- Climate

The area has a Mediterranean climate. A rainfall gradient is obvious across the east-west direction, where the mean annual rainfall is 300 mm in the west and 200 mm in the east. The rainy season starts in November and ends by early May. The mean annual minimum and maximum temperatures are 11.2 °C and 25.3 °C, respectively.

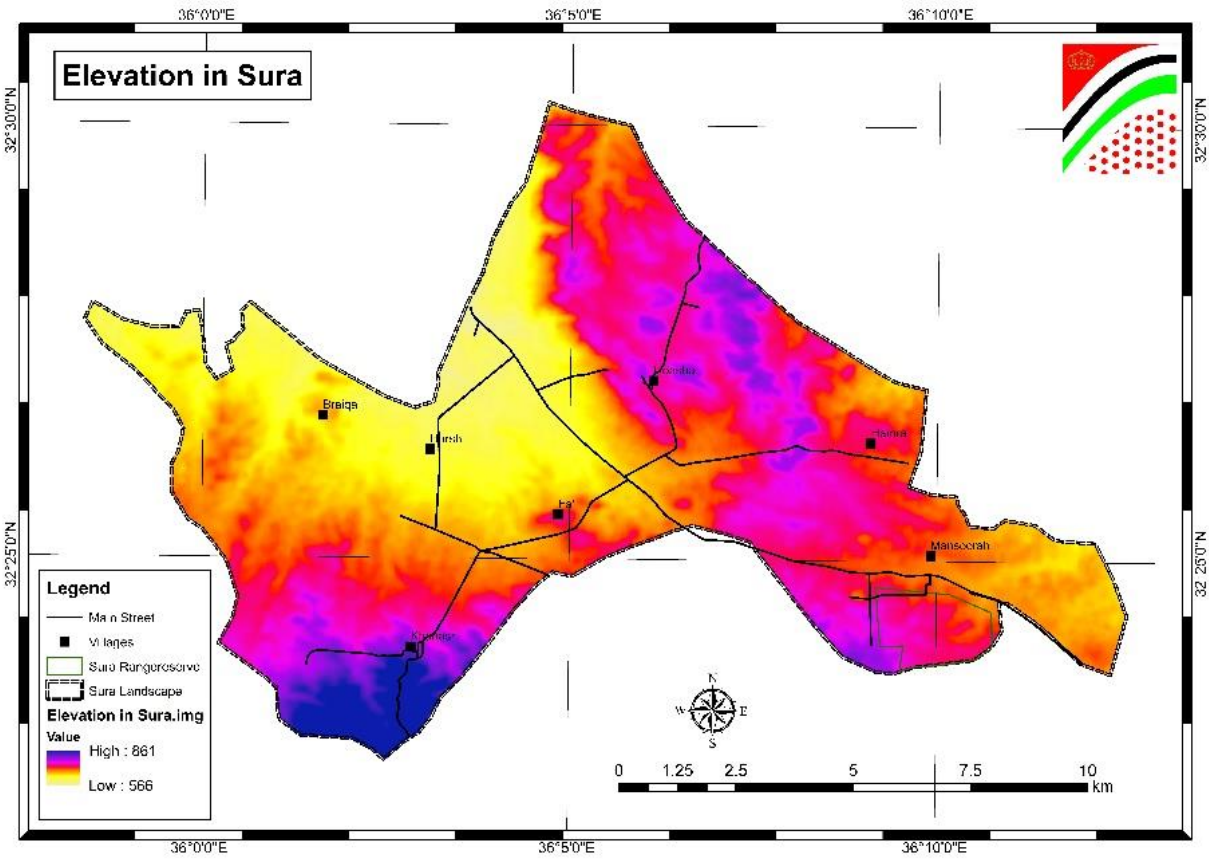

Figure 8: Altitude Variation in Sura Landscape

3- Vegetation and Landcover

Satellite Images for the years 2008, 2013 and 2018 were used to derive land cover classes based on NDVI. Visual interpretation was used to classify the NDVI classes to different classes such as Water, Quarries, Non-Vegetated areas, Bare Soil, Sparse Vegetation, Medium Vegetation and Farms. (Table 5, Table 6, and Table 7), (Figure 9, Figure 10, and Figure 11).

Table 5: Land Cover Classes in 2008 in Sura

No.	Class	Area (m^2)	Percent (%)
1	Quarries, Non-Vegetated areas	30,600	0.024
2	Bare Soil	51,885,900	40.258
3	Sparse Vegetation	67,180,500	52.125
4	Medium Vegetation	9,033,300	7.009
5	Farms	753,300	0.584
Totals		128,883,600	100

Table 6: Land Cover Classes in 2013 in Sura

No.	Class	Area (m^2)	Percent (%)
1	Quarries, Non-Vegetated areas	901,800	0.700
2	Bare Soil	15,118,200	11.730
3	Sparse Vegetation	96,763,500	75.078
4	Medium Vegetation	14,688,000	11.396
5	Farms	1,412,100	1.096
Totals		128,883,600	100

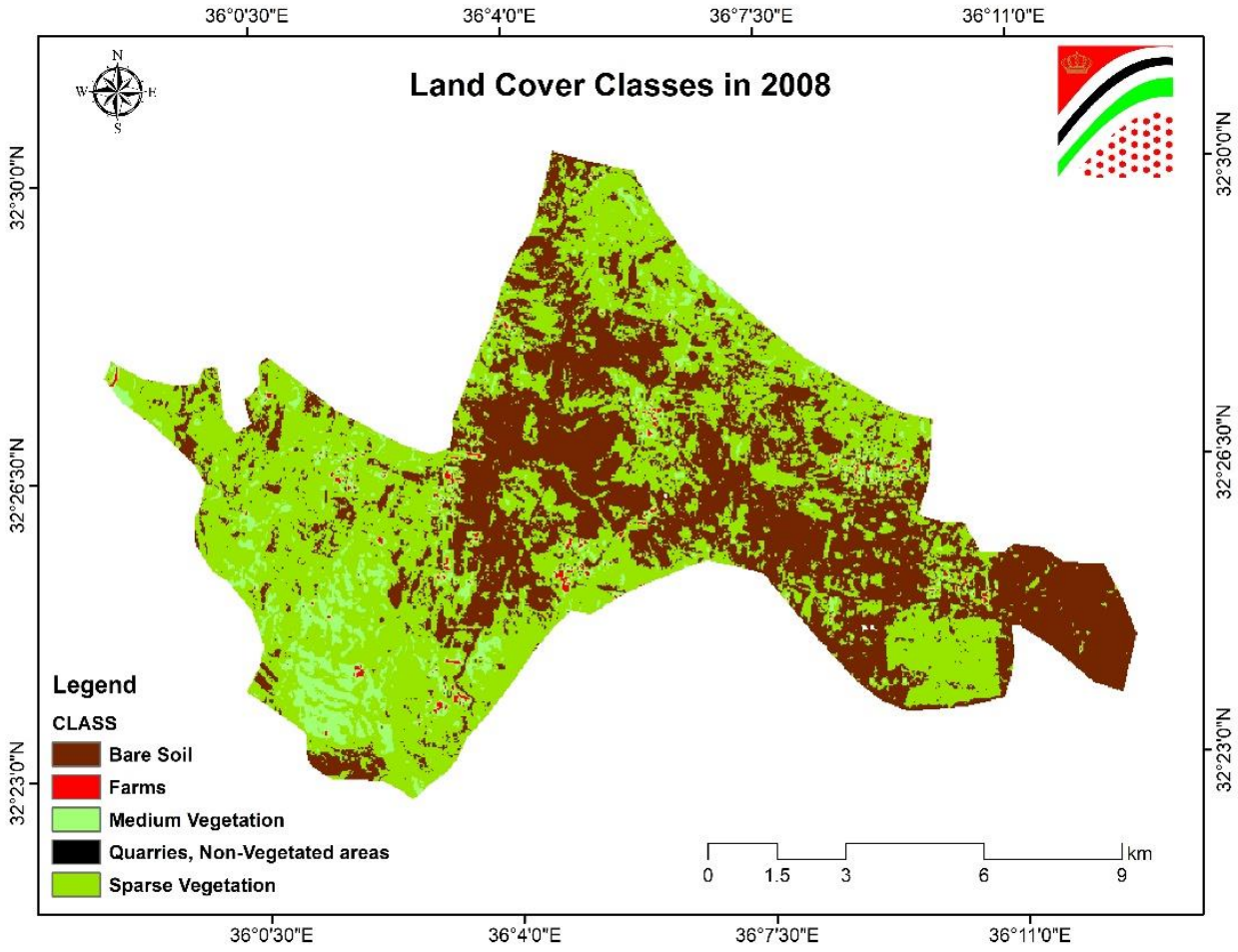

Figure 9: Land cover classes in 2008 in Sura Landscape

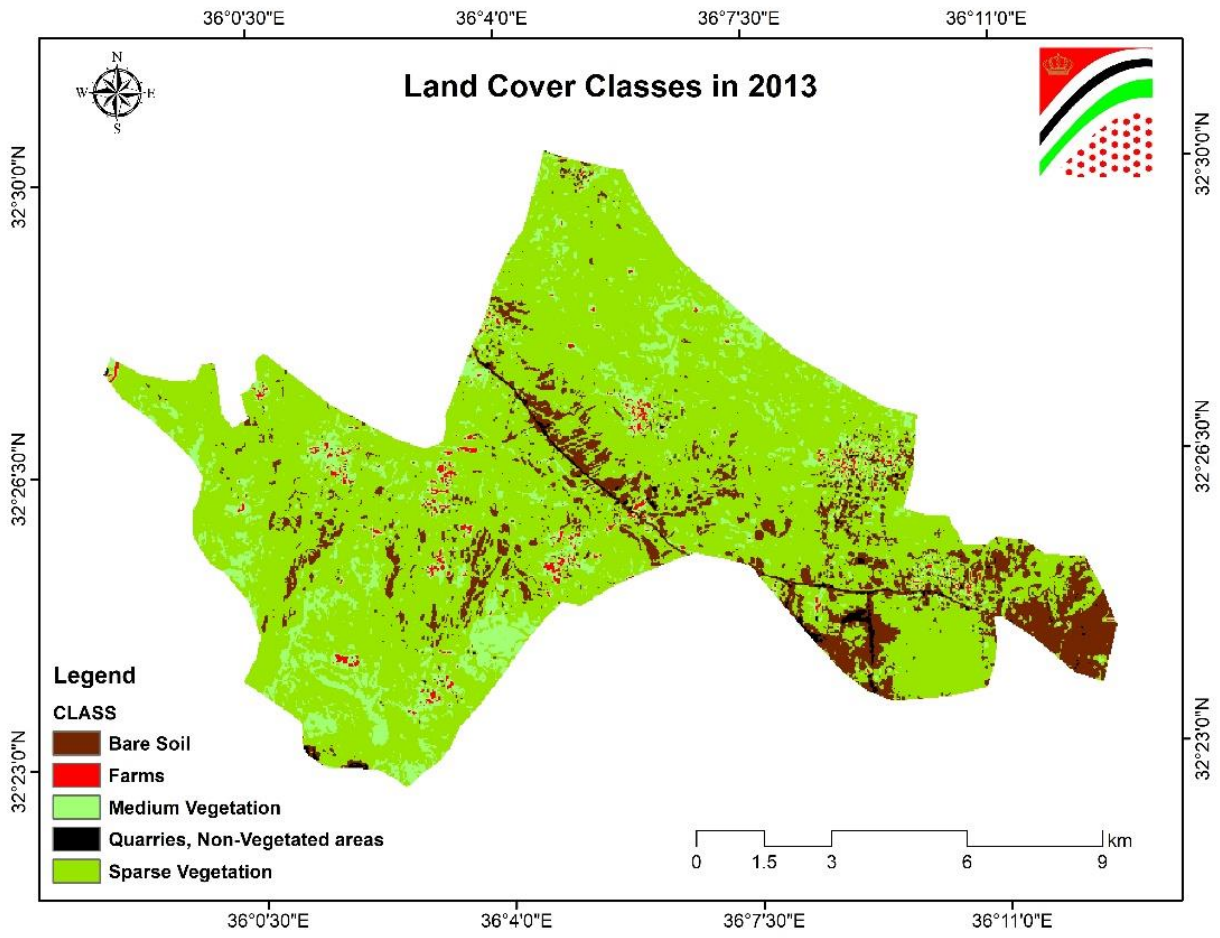

Figure 10: Land cover classes in 2013 in Sura Landscape

Satellite Images used for the period 2008 – 2018 showed that the degradation in the whole site was only 2%, while the greenness increased by 60% and the remaining 38% of the total area showed that there is no change in land cover class. (Table 8).

Table 7: Land Cover Classes in 2018 In Sura

No.	Class	Area (m^2)	Percent (%)
1	Quarries, Non-Vegetated areas	171,900	0.133
2	Bare Soil	8,264,700	6.413
3	Sparse Vegetation	72,752,400	56.448
4	Medium Vegetation	44,450,100	34.489
5	Farms	3,244,500	2.517
Totals		128,883,600	100

Table 8: Land Cover Change 2008 – 2018 In Sura

No.	Status (2008 - 2018)	Area (m^2)	Percent (%)
1	Negative Change	2,340,000	2%
2	No Change	49,001,400	38%
3	Positive Change	77542200	60%
Total		128,883,600	100%

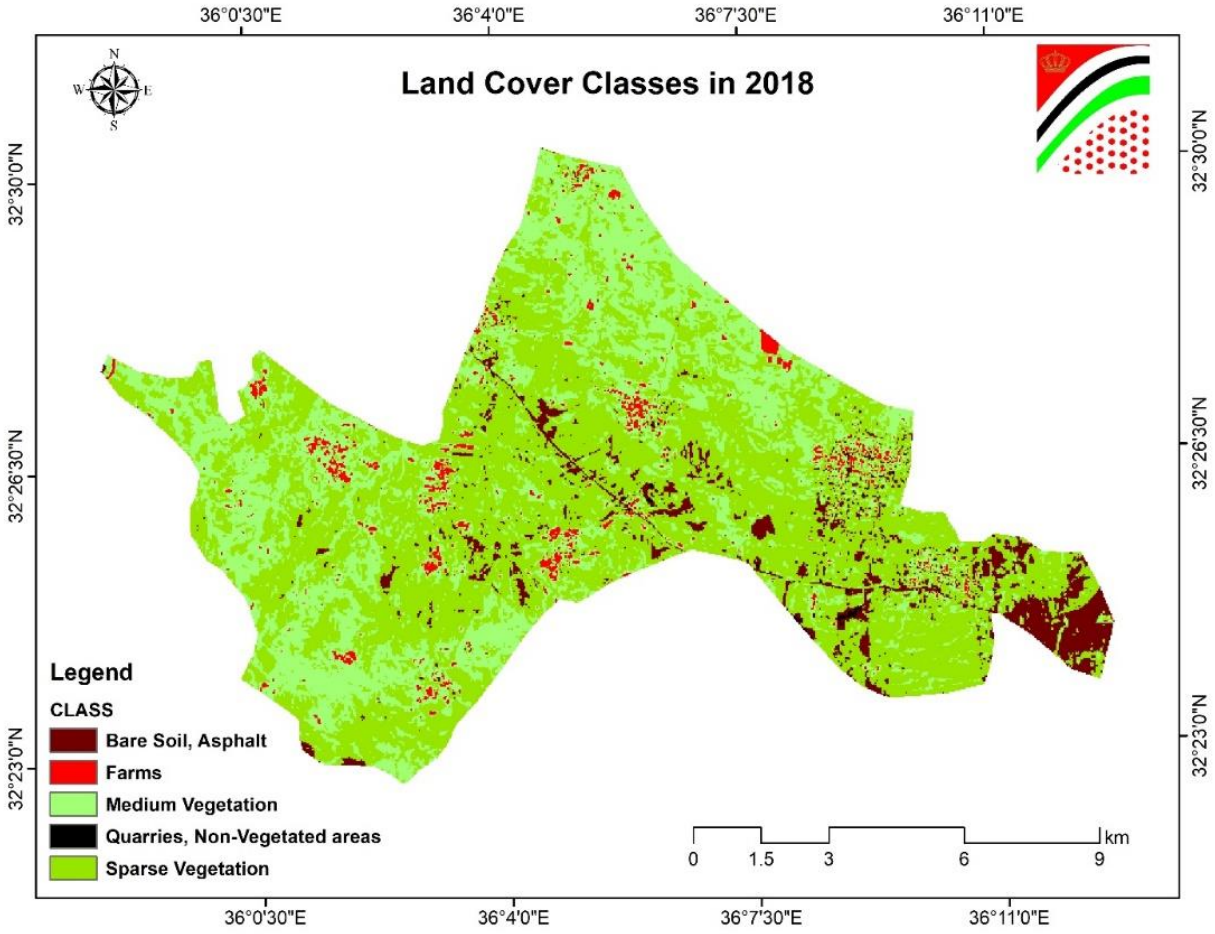

Figure 11: Land cover classes in 2018 in Sura Landscape

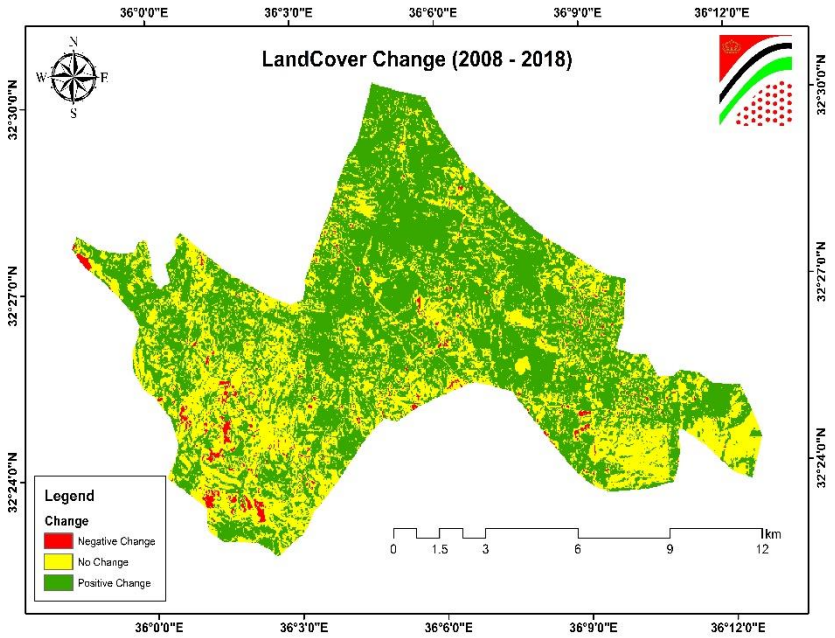

Figure 12: Landcover change (2008 - 2018)

Figure 13: Vegetation Cover in Sura Range Reserve

Figure 14: Water Harvesting structures in Sura Range Reserve

Al-Mansheyyeh

1- Topography and Geology

Al-Mansheyyeh landscape is a part of the Southern Highlands Dissected Limestone Plateau. The area has the coldest winters and most frequent snowfall of any part of Jordan. The rainfall at Al-Mansheyyeh averages 200 mm. The region lies largely within the xeric moisture regime and wholly within the thermic temperature regime. Xerochreptic soils constitute more than 73 % of this region with high stone content in the soil and at the surface; cultivated land has had to be cleared of stones to allow tillage. Along the eastern and southern margins, transitional subgroups of calciorthids and camborthids are found.

altitudes vary in Al-Mansheyyeh landscape between 1035 meters in the east and 1425 meters in the west (Figure 15). An altitude gradient is obvious across the east-west direction in the whole landscape

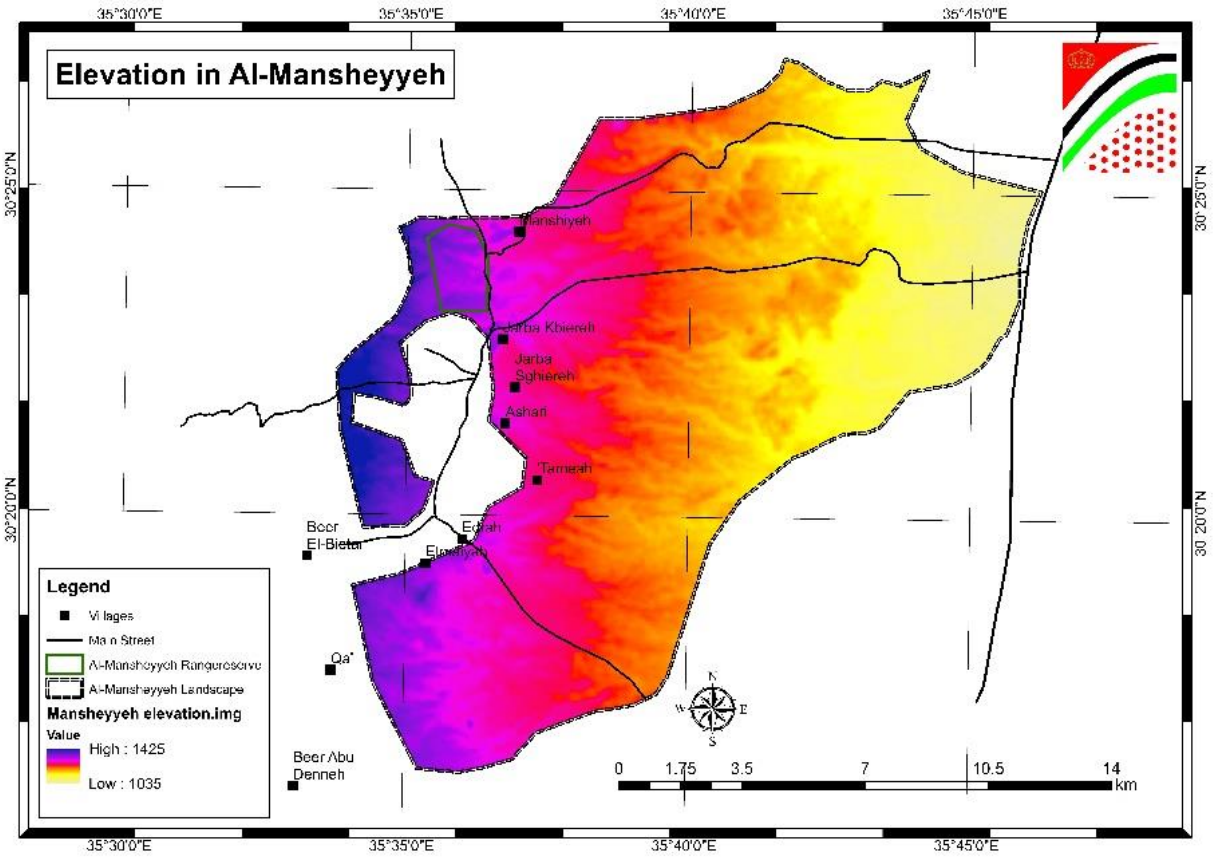

Figure 15: Altitude Variation in Al-Mansheyyeh

2- Climate

The area has a Mediterranean climate. A rainfall gradient is obvious across the east-west direction, where the mean annual rainfall is 200 mm in the west and 100 mm in the east. The rainy season starts in October and ends by early May. The mean annual minimum and maximum temperatures are 9.9 °C and 16.6 °C, respectively.

3- Vegetation and Landcover

Satellite Images for the years 2008, 2013 and 2018 were used to derive land cover classes based on NDVI. Visual interpretation was used to classify the NDVI classes to different classes (Table 9, Table 10, and Table 11), (Figure 16, Figure 17, and Figure 18) such as, Bare Soil, Very Sparse Vegetation, Rocks and Farms.

Table 9: Land Cover Classes in 2008 in Al-Mansheyyeh

No.	Class	Area (m^2)	Percent (%)
1	Bare Soil	60,229,800	28.78
2	Very Sparse Vegetation	82,045,800	39.21
3	Rocks	66,473,100	31.77
4	Farms	488,700	0.23
Total		209,237,400	100

Table 10: Land Cover Classes in 2013 in Al-Mansheyyeh

No.	Class	Area (m^2)	Percent (%)
1	Bare Soil	83,339,100	39.83
2	Very Sparse Vegetation	66,210,300	31.64
3	Rocks	58,913,100	28.16
4	Farms	780,300	0.37
Total		209,242,800	100

Satellite Images used for the period 2008 – 2018 showed that the degradation in the whole site was only 12%, while the greenness increased by 21% and the remaining 67% of the total area showed that there is no change in land cover class. (Table 10).

Table 11: Land Cover Classes in 2018 in Al-Mansheyyeh

No.	Class	Area (m^2)	Percent (%)
1	Bare Soil	57,248,100	27.36
2	Very Sparse Vegetation	67,969,800	32.48
3	Rocks	81,130,500	38.77
4	Farms	2,889,000	1.38
Totals		209,237,400	100

Table 12: Land Cover Change 2008 – 2018 in Al-Mansheyyeh

No.	Status (2008 - 2018)	Area (m^2)	Percent (%)
1	Negative Change	25,925,400	12%
2	No Change	139,399,200	67%
3	Positive Change	43,912,800	21%
Total		209,237,400	100%

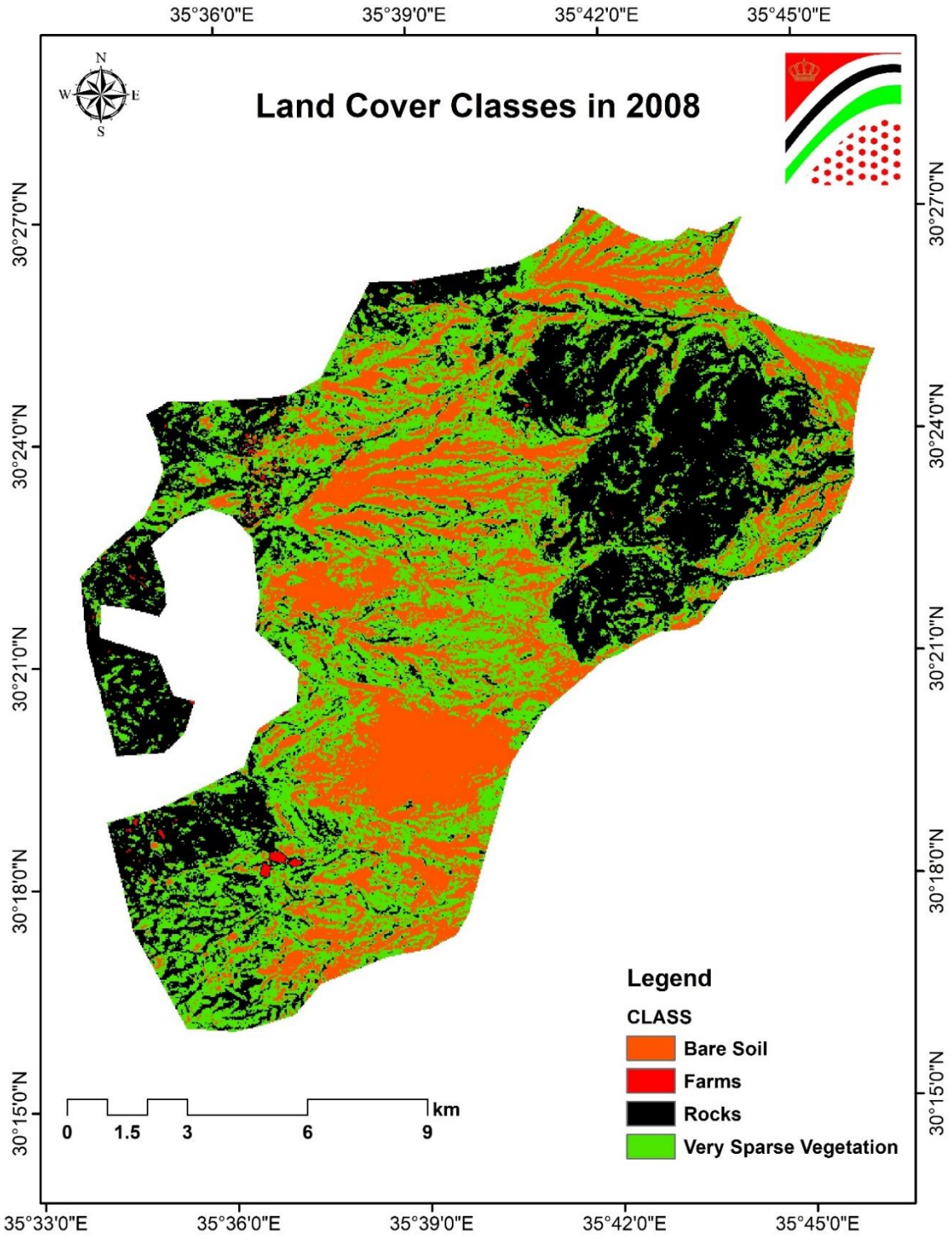

Figure 16: Land cover classes in 2008 in Al-Mansheyyeh Landscape

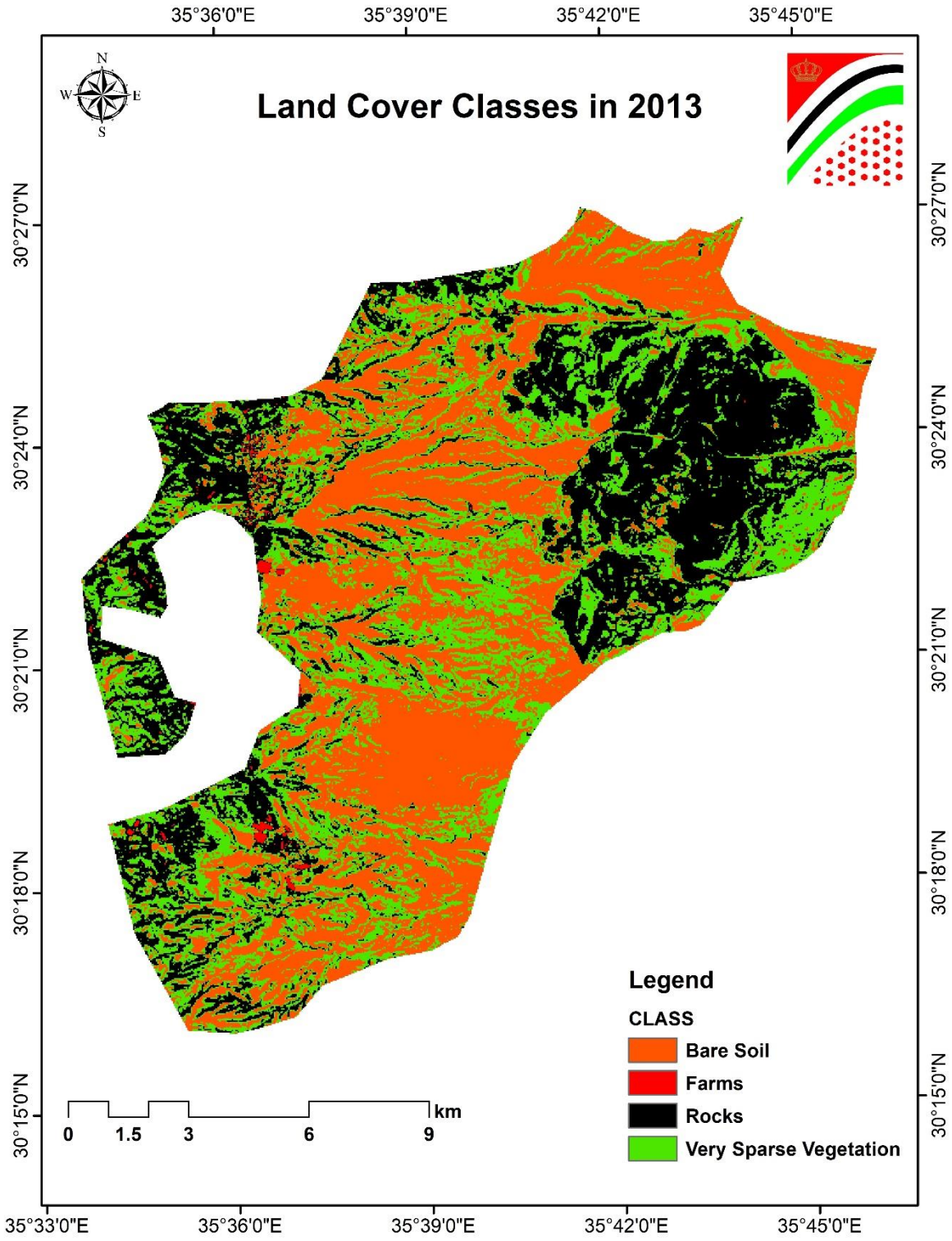

Figure 17: Land cover classes in 2013 in Al-Mansheyyeh Landscape

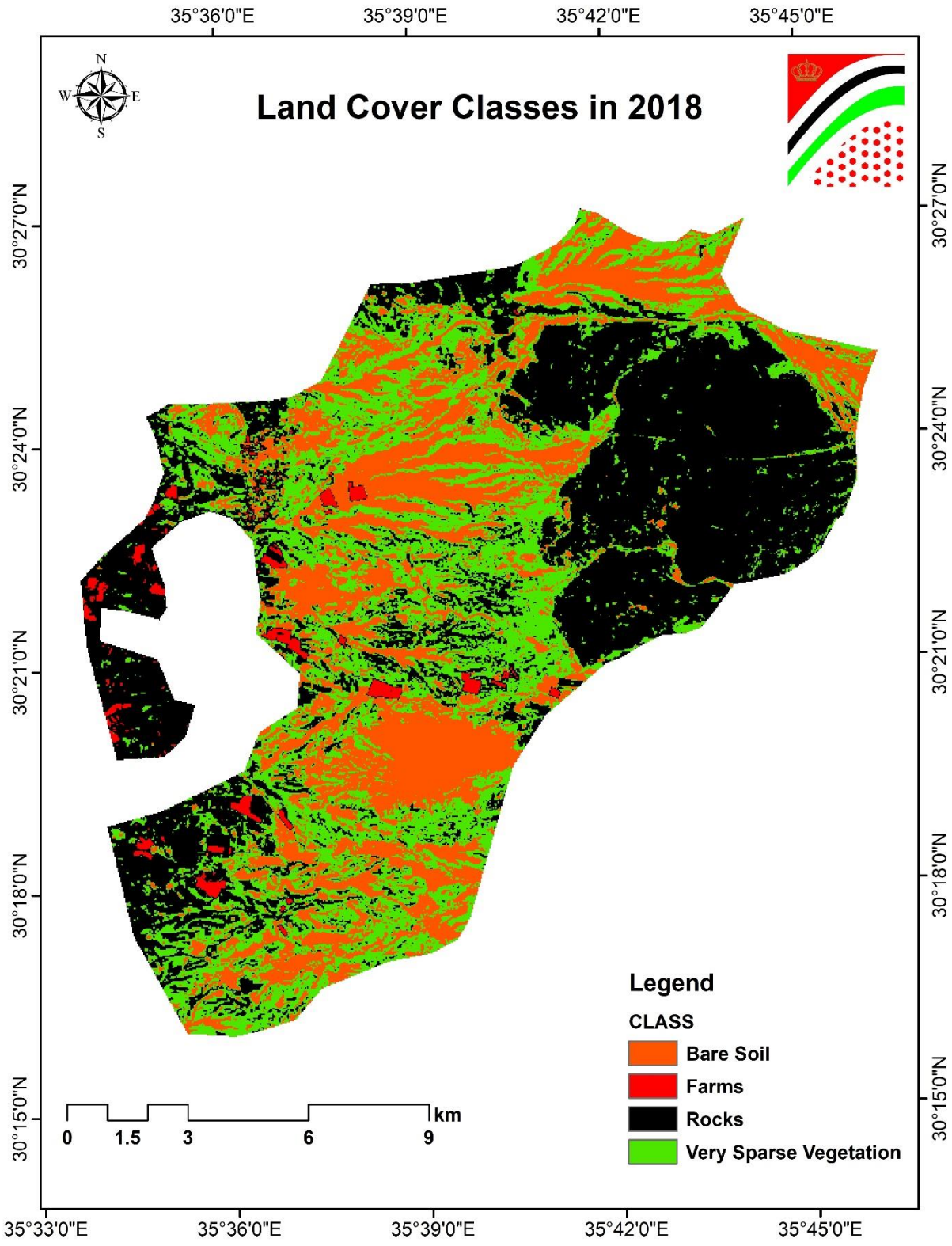

Figure 18: Land cover classes in 2018 in Al-Mansheyyeh Landscape

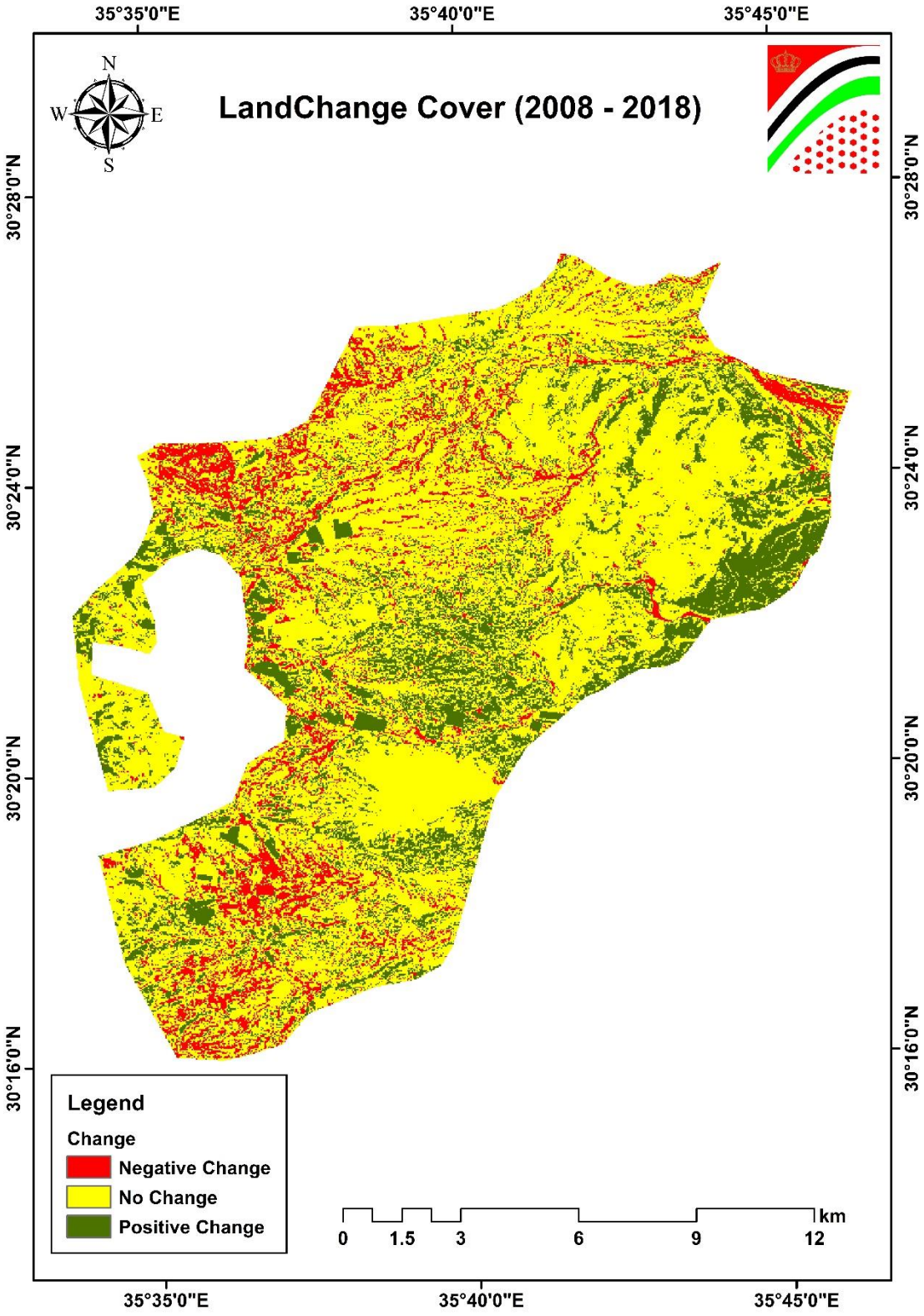

Figure 19: Landcover change (2008 - 2018)

Figure 20: Water Harvesting Structures in Al Mansheyyeh Range Reserve

Figure 21: Vegetation cover in Al-Mansheyyeh Range Reserve

Al-Hazeem

1- *Topography and Geology*

West parts of Al- Hazeem landscape is a part of the East Jordan Limestone Plateau. The largest of the regions and mainly consists of the highly dissected rocks of the Umm Rijam and Muwaqqar chalk and marl formations in the west (700-1000 m altitude range), with very gently undulating paleofans and limestone plateau to the east and north ; included are the sediments of the Azraq depression at 500 m altitude. A feature of the region is the large number of very broad, shallow wadi channels running eastward to the Azraq-Sirhan depressions. The region has arid moisture regime and hyperthermic temperature regime. Major soil subgroups are the typic camborthids and calciorthids. Gypsiorthids are the dominant soils in parts of the Azraq Basin and on the lowest gavel terraces around the Basin, with a horizon of I0-20 cm thickness with a high content of 'sugary' crystalline gypsum which lies immediately above the weakly weathered parent rock. Torriorthents and torrifluvents are found in the middle and lower reaches of the wadis. An important feature of the wadi soils of all subgroups is their relatively low salinity. The east part of the landscape is a part of the North – east Jordan Basalt Plateau which Includes the lava flows from Syrian border at altitude of 1100 m in the north to wadi Sirhan in the south at the border of Saudi Arabia with an elevation of 450 m. The region is entirely within the aridic moisture regime, thermic temperature regime in the north and hyperthermic temperature regime in the southwest. In the south, the area is less well defined with the basalts overlaying limestones and in turn overlain by aeolian sand. Depositional basins of up to 7 km^2 and volcanic cones are features of this region. Within these basins, the soil moisture regime is more properly xeric-aridic transitional. Typic Camborthids are the dominant soil subgroup followed by lithic torriorthents and typic calciorthids with dense calcic horizons which have the appearance of weathered chalked when first dug. The most saline areas of the region are usually dominated by cambic gypsiorthids in association with typic camborthids. Typic xerochrepts and xeric torriorthents occur around the margins of basins, and in the wadi alluvium of the lower reaches of the larger wadis. Important characteristics region is the shallow soil depth in almost 30% of the area.

altitudes vary in Al-Hazeem landscape between 485 meters in the east and 887 meters in the east parts near the Saudi borders (Figure 22). An altitude smooth gradient is obvious across the east-west direction in the whole landscape.

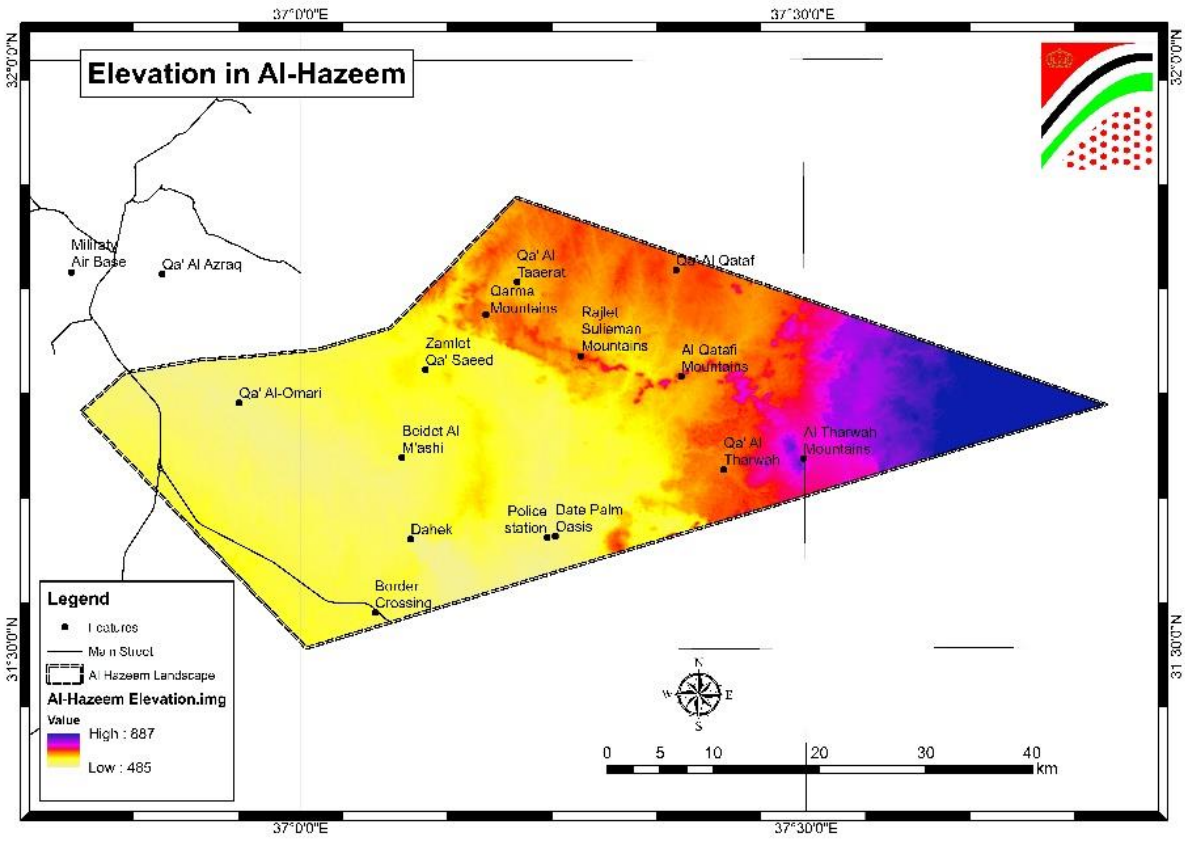

Figure 22: Altitude variation in Al-Hazeem

2- Climate

The area falls within a region recognized to form a transition zone between the climatic environment of the Jordan Valley and the arid interior desert of eastern Jordan. The climate is dominated by low precipitation (50–200 mm) and high potential evaporation (1500–2000 mm) and is generally characterized by hot dry summers and cold winters. Rainfall usually falls in the form of high intensity and short duration storms. Rainfall occurs mainly between November and May. Rainfall amount varies from one year to another and from decade to decade. There is a strong seasonal variation in temperature. In the summer season, mean annual maximum temperatures reach 35–38 °C in August but absolute maxima rarely exceed 40 °C. In winter, temperatures occasionally fall below freezing, with annual minimum temperatures as low as 2–9 °C.

3 – Vegetation and Landcover

Satellite Images for the years 2008, 2013 and 2018 were used to derive land cover classes based on NDVI. Visual interpretation was used to classify the NDVI classes to different classes (Tables 12, 13 and 14), Figures (11, 12, and 13) such as Water, Rocks, Sparse Vegetation and Farms.

Table 13: Land Cover Classes in 2008

No.	Class	Area (m^2)	Percent (%)
1	Water	110,700	0.01
2	Rocks, Qa'	381,503,700	19.72
3	Bare Soil	1,420,541,100	73.43
4	Sparse vegetation	131,857,200	6.82
5	Farms	486,900	0.03
Total		1,934,499,600	100

Table 14: Land Cover Classes in 2013

No.	Class	Area (m^2)	Percent (%)
1	Water	175,500	0.01
2	Rocks, Qa'	190,715,400	9.86
3	Bare Soil	674,776,800	34.88
4	Sparse vegetation	1,066,349,700	55.12
5	Farms	2,482,200	0.13
Total		1,934,499,600	100

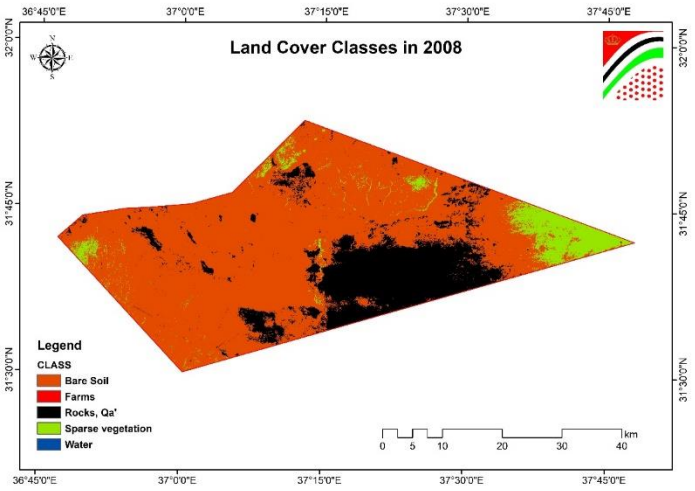

Figure 23: Land cover classes in 2008 in Al Hazeem Landscape

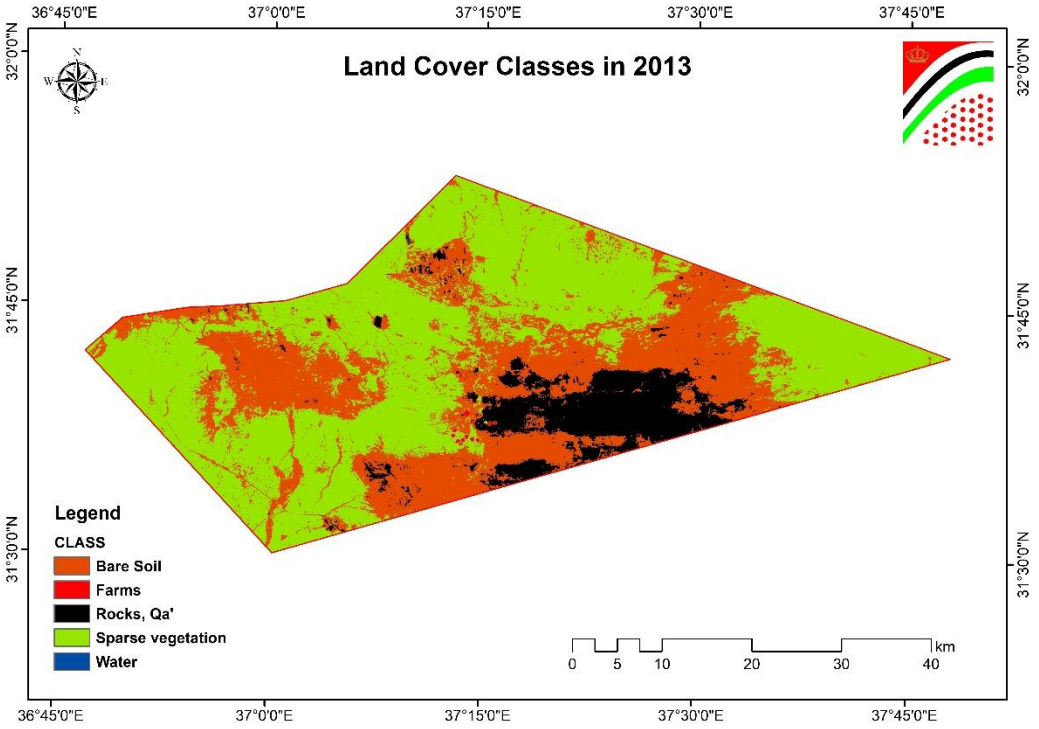

Figure 24: Land cover classes in 2013 in Al Hazeem Landscape

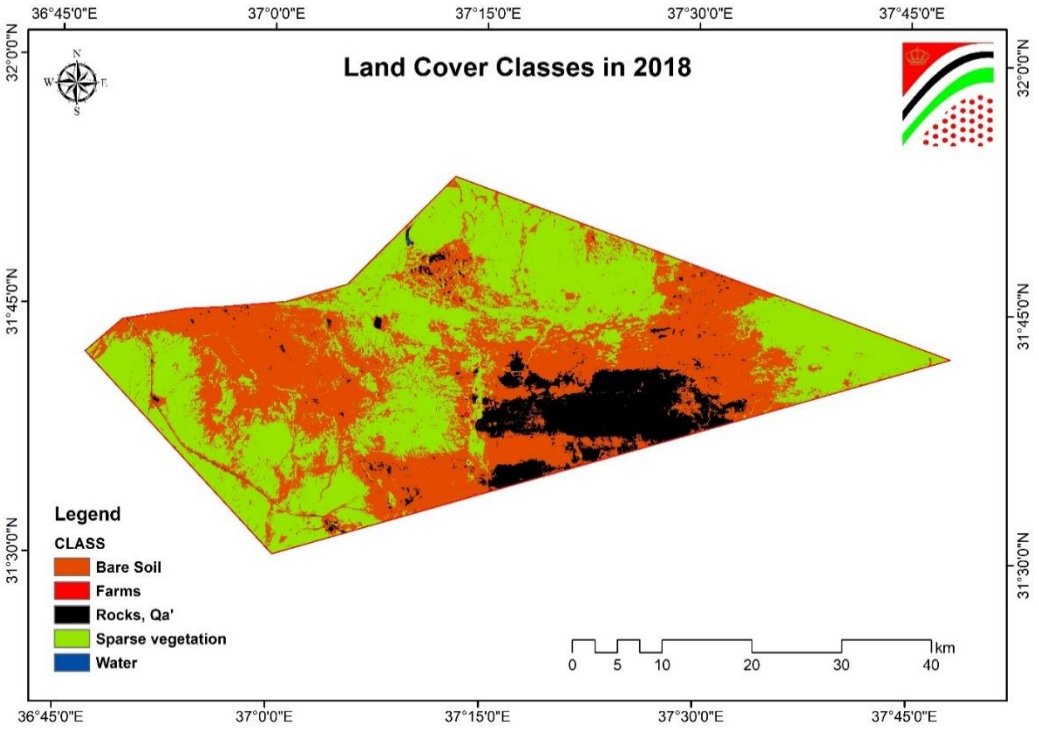

Figure 25: Land cover classes in 2018 in Al Hazeem Landscape

Satellite Images used for the period 2008 – 2018 showed that the degradation in the whole site was only 0.02%, while the greenness increased by 49% and the remaining 51% of the total area showed that there is no change in land cover class. (Table 15).

Table 15: Land Cover Classes in 2018

No.	Class	Area (m^2)	Percent (%)
1	Water	399,600	0.02
2	Rocks, Qa'	196,871,400	10.18
3	Bare Soil	838,554,300	43.35
4	Sparse vegetation	897,396,300	46.39
5	Farms	1,278,000	0.07
Total		1,934,499,600	100

Table 16: Land Cover Change 2013 – 2018

No.	Status (2013 - 2018)	Area (m^2)	Percent (%)
1	Negative Change	229,210,200	11.85%
2	No Change	1,653,190,200	85.46%
3	Positive Change	52,099,200	2.69%
Total		1,934,499,600	100%

Figure 26: Native Palm Trees in Al-Hazeem Landscape

Figure 27: Vegetation Cover in Al-Hazeem Landscape

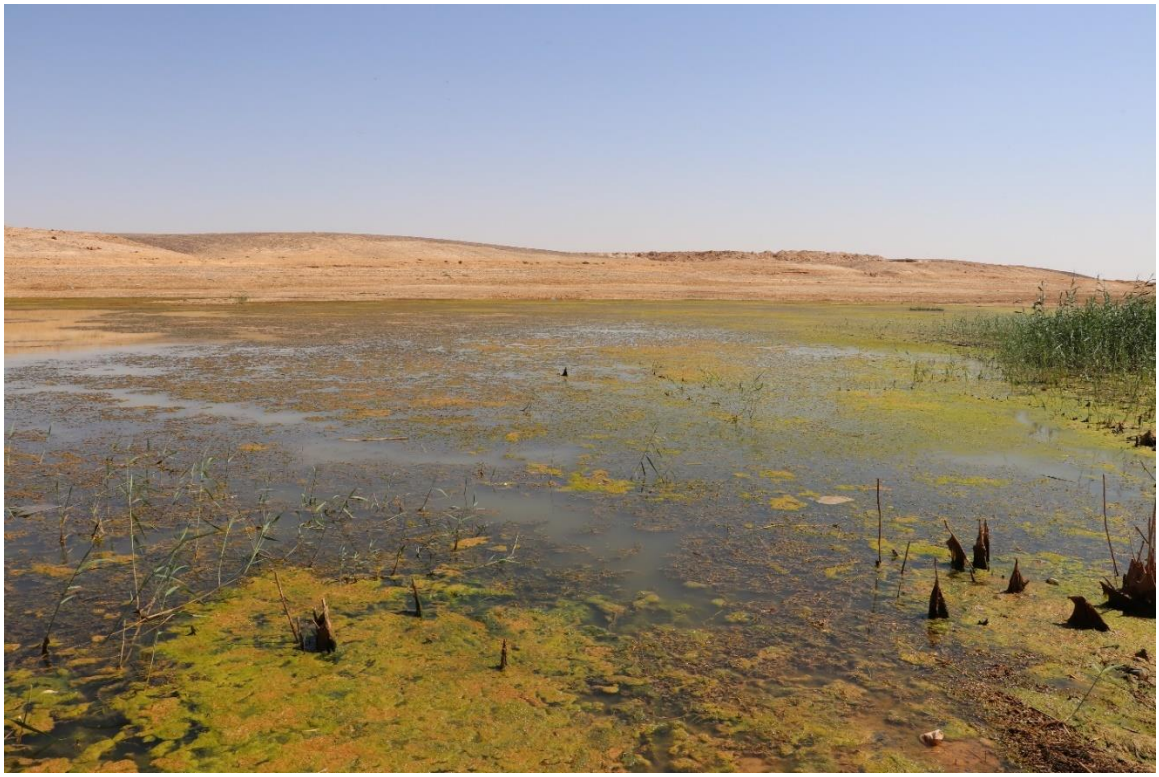

Figure 28: Water as a small pool near a water well

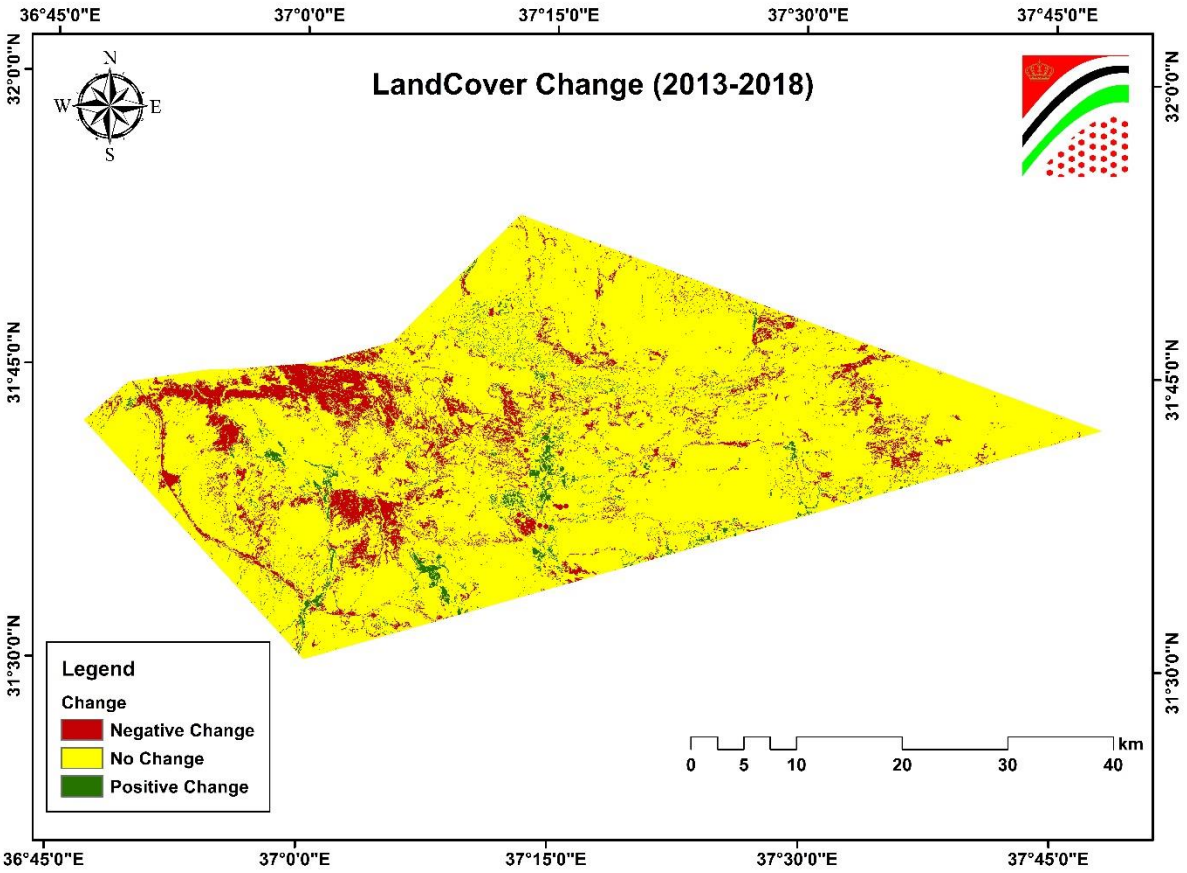

Figure 29: Landcover change (2013 - 2018)

Sites Baseline Reviews

1.1 Introduction:

Jordan is located in the dry and semi-arid regions package, where the dry lands in which the rates of rain fluctuate to less than 200 mm annually, represented by the Jordanian Badia region (82)% of the area of Jordan, which in turn includes (90)% of the area of rangelands in Jordan[1], providing most of the natural pasture lands in Jordan, whose area is estimated at about (80) million dunums, and thus constitutes what it produces from everything an important source to cover the free food needs of the Bedouin and pastoral breeders of livestock despite the deterioration experienced in the pasture areas Over the past five decades, when the natural pasture lands provide the nutritional needs of fodder between (3-2) months during the year without supplementary feeding or the equivalent of (30)% of the nutritional needs of livestock[2].

For long periods that lasted until the middle of the last century, i.e .before the year (1950) AD, the pastoral areas in the Jordanian Badia were characterized by effective systems of land tenure and grazing rights that were associated with the tribal establishment that in turn preserved the natural resources within its lands and organized its exploitation in a way that helped protect and sustain its production[3]. whereby the prevailing economic and social lifestyle in the Jordanian Badia at that time was based on nomadic life during the seasons of the year in order to feed and water, which limited the process of unfair exploitation of the pasture lands and gave them sufficient opportunity to regenerate, recover and restore their productive capacity and plant diversity before exploiting them. Once again, in light of the fact that the land uses in the Jordanian desert were then restricted to grazing and livestock .

However, after the different lifestyle in the Jordanian Badia, and the limited range of rangelands available for grazing due to border demarcation operations, the extension of the state's influence over pasture lands and its declaration that they are state-affiliated areas and available to all, and the subsequent resettlement operations, both planned and spontaneous, the emergence of population concentrations in the Jordanian Badia, and the decrease in the importance of pasture

[1] The Hashemite Fund for Jordan Badia Development database
[2] Ministry of Environment, the State of the Environment in Jordan Report (Second Report), Chapter Two : Environmental Issues .Amman, 2016 pp.(216-220)
[3] Ministry of Agriculture, the National Program for the rehabilitation and development of pasture : pasture management in Jordan, Amman, 2005 m

lands for the population As a result of the majority of the inhabitants of the Badia regions, as a result of alternative options for making a living from agriculture and jobs in the public and private sectors, new patterns of overgrazing pasture have emerged without regard to their needs for sustainability and restoration of their Productive in terms of the emergence of many negative human practices, such as overgrazing, depletion of groundwater, soil, vegetation, logging and overfishing that contributed to the further degradation of rangelands.

In addition to the succession of drought years to which the Jordanian Badia regions were affected by climate change processes and the fluctuation of rainfall during the past decades, the deterioration of rangelands in this way is increasingly considered a serious threat to the livelihood of a large segment of families who depend on natural resources due to the lack of alternative options for earning a living The absence of the catalyst that encourages nomads and pastoralists to rationalize the use of their pasture resources, as well as the forms of biological diversity that have been greatly affected by environmental factors, urban activity and the overexploitation of natural resources .Which consequently led to the slow deterioration of the natural resources of pastoral and farming over the past decades that it was the results bring a significant change in soil properties and characteristics of the plant collections and density which case t in turn, without the benefit of natural resources and pasture areas for the benefit of the community s local of .

Accordingly, and as a result of the deterioration of the environmental systems in Jordan and the Jordanian Badia region in particular , the project (**Sound Environmental Systems for rangeland development: sustainable rangeland management practices and strategies**) emerged within the series of projects of the United Nations Environment Program funded by the Global Environment Facility with goals and activities that seek to reduce this deterioration in all Jordan and Egypt , with a focus on the issue of desertification , which primarily affects the pastures in the two countries, so that this project aims to promote rangeland rehabilitation and management in a sustainable manner in partnership with the community s local of in order to provide ecosystem services and annexation Protect biodiversity , so that this project is a catalyst for regional and international expansion .

And given the importance of knowing the social and economic environment of the project's targeted sites, which constitute a focal point for understanding the local communities in the project sites and knowing their needs and requirements for their development and the extent of success of the development projects in them or their failure, in addition to the need for a method to assess

the extent to which the project will contribute to making a remarkable development on the aspects Environmental, social and economic areas targeted in the project , this study came with the aim of providing the project management and all concerned with details of the social, economic and environmental facts of the project sites in its current reality through variables and sensors indicators A measurable foundation for comparison with the conditions that will prevail in the targeted areas in the future in various social, economic, and environmental fields .... etc.

Specifically, this study aims to:

1. Learn the natural environment of the project sites and determine the most important phenomena and features of the surface of the earth, climate, water resources and land uses that are useful in understanding human practices and activities.

2. Determining the social, economic, educational and health facts in an attempt to diagnose and analyze them to highlight the impact of rangeland and forest degradation on the characteristics of local communities in the project sites, in addition to identifying socio-economic and demographic indicators that reflect the living reality of these societies in order to measure the variables that will result from the project's activities in the future.

3. Learn the reality of the sectors of social development (education, health and infrastructure) and the extent to which the local community depends on ecosystem services .

4. Evaluating the development needs of the project areas by coming up with recommendations that will necessarily benefit the reality and requirements for project success.

1.2 Scope of the study:

The project work areas in Jordan include the scope of three administrative regions (Ma'an Governorate, Mafraq Governorate, Zarqa Governorate) .For the purposes of identifying specific sites as a model experimental retractable expansion and dissemination of the experience of the project activities, has been selected three sites within the areas of project management scope and within the administrative boundaries of the area Badia North (Central, South) with an area

of (73.133) km^2 located within the dry land dry and semi The area represents the pastoral societies (Bedouins) in Jordan, based on several criteria summarized the most important of them are as follows:

- A centralized site and representative of other sites within the overall geographical scope of the region in a way that makes it as a comparable region that other societies can visit and learn from, in terms of the nature of the geographical terrain, climate, soil, water, plants and living organisms …. etc.

- A site where communities can be identified and jointly restored rangeland management activities undertaken.

- The nature of rangelands and the challenges of degradation by being the habitat of many plant species necessary for the continuous flow of ecosystem services, especially pastoral plants, in addition to the site's ability to restore healthy pastures in terms of their high indicators for the potential for measuring vegetation changes.

Accordingly, three main sites were identified as sites representative of the total geographical scope of the project's work areas in each of the three Jordanian valleys (North, Central, and Southern) as follows:

1.2.1 The Sura Reserve site:

The Western Northern Badia region's area (669.4) km^2 representing (0.9%) of the Jordanian Badia area and (2.5%) of the Northern Badia area, and includes (39) combines a population divided into four administrative units (eliminate monsters, spend Sarhan, Brigade Northwestern Badia, Khalidiya District) has a total population of (133,912) people.

And due to the necessity of identifying a centralized site representative of other sites within the overall geographical scope of the region, during which local communities can be identified and involved in the activities of the sound management of rangelands, as well as the nature of the topography of the geographical area that the target naval reserve site can represent as an experimental model, the geographical area and the target population in The northwestern Badia region in the areas located on the Yarmouk surface basin as an area representative of the total

Figure (1):Details of the geographical area and the target population

(Sura Reserve site)

Site	Governorate	Badia		The targeted area in the overall	The Targeted Population Centers Within the Overall Geographical Scope of The Site		
Sura Reserve	**Al-Mafraq**	**Northwestern**		**(260) Km^2**	**District/ Sub-District**	**Number of Population centers**	**Population**
					Hawshah	**11 (All of Population centers)**	**25,530**
					Northwestern Badia	**2 The following regions:** (Sura, Mansoura)	**5,809**
					Sarhan	**9 All of Population centers)**	**26,305**
					Total	**22**	**57,644**

geographical range of the site of the protected navel targeted in the project, as shown in the following figure No. (1):

1.2.2 Location of the Defeat / Blue Zone:

It constitutes Al-Hazeem area located on the border between Jordan site and Saudi Arabia , the northern part of the basin and Wadi Al - Sarhan water surface and geographical extension of the natural and administrative region Blue , which lies in turn on the water blue surface basin, representing the lowlands east of the Central Badia area administrative up to (3953) Km^2 represent (41%) of the area of the Central Badia and (5.4%) of the area of the Jordanian Badia.

The importance of Al-Azraq and the Al-Hazeem area, as an extension of the northern part of the Al-Sarhan Valley, shows that since ancient times they represented the pastoral winter areas of the nomadic nomads that they intended to spend the winter season coming from their summer pasture areas in the western highlands of the Azraq depression, which is still ongoing until now, but on a large scale .Narrowing after nearly five decades have passed since most of the nomadic pastoral societies settled in population centers in the Jordanian Badia, so that the total geographical range of the Al-Hazeem site (the low-blue area) constitutes the geographical areas it provides in which the rangelands are the most important areas Z Jordanian desert where Bedouin practiced nomadic Bedouin from the north and pastoralists of the population of the blue area of pastoral especially in their activities , winter and spring season .This distinguishes the total geographical range of the Al-Hazeem area site from the overall scope of the other project sites (the site of the Sura Reserve and the location of the Mansheya Reserve) that were ancient and still represent the geographical areas that the nomadic nomads intended to spend the summer season only .

Within this description, the overall scope of the Al-Hazeem area can be determined within the administrative region of Azraq district, which the site can represent as an experimental model

Figure (2): Details of the geographical area and the target population (Al-Hazeem Site)

Site	Governorate	Badia		The targeted	The Targeted Local Communities Within the Overall Geographical Scope of The Site	
					Communities	**Population**
Al-Hazee Site	**Zarqa**	**Central Badia**		**(3,953) Km^2**	**Azraq (All of Population centers)**	**17,051**
					Bedouin nomads (15) nomadic families traveling on the site during the month of April2018	**103**
					Total	**17,154**

due to the nature of the terrain and as a geographical extension of the Azraq area to the south, as well as the local communities of nomads who move in the overall geographical range of the site and population groups within Azraq district, for the purpose of its participation in the activities of the sound management of rangelands, as shown in the following figure (2):

1.2.3 The Mansheya Reserve site:

Representing Mansheya protected site southern desert region ,which is characterized by geographical breadth with an area of up to (37,569) km^2 and represent 51% of the Jordanian Badia area, in addition to the diversity of topography and geographical areas of the Hammad (low Jafr, the land of flint), and dunes and mountain areas Ramlieh (Badia Hisma, Al-Mudawara, Wadi Araba) and Al-Sharaa Heights area.

The Southern Badia region has provided various terrain terrain areas suitable for the transportation of nomadic tribes between their winter and summer pasture areas and as it used to in the past before the stage of settling most nomads in population centers, so that the Al-Sharaa Heights region along its length from Tafila in the north to the Ras Negev cliffs in the south with a distance (105) How many permanent summer areas are for the nomadic Bedouins due to their mild climate in the summer, and they are similar to the forum for the various nomadic clans coming from their summer pasture areas in Wadi Araba in the west and Al-Hammad areas in the east (low Al-Jafr, Ard Al-Sawan), and Badia H Mei in the south.

Within this description, the site of Al Manshia Reserve is located within the chain of the eastern Sharaa heights located within the surface water basin of Al-Jafr, and these highlands that extend from the area of Al-Husayniyyah in the north to the area of Al - Mureigha and Ras Al- Naqab in the south - which are almost mediated by the site of Al-Manshia Reserve within the region of Adhrah - The western area of Al-Jafr is fed by rain water through several valleys descending from it to the east .And therefore can determine the area of geographical representative geographical scope of the total site are protected Mansheya areas of the heights of purchasers that fall within the basin water Jafr surface and within the administrative boundaries of the southern region of geographic area of up to (1679) km^2 form (4.4%) of the southern desert area and (2.2) From the area of the Jordanian Badia.

It is also possible to define the targeted communities for the purposes of the proper management of rangelands in a joint manner with all the population centers within the geographical area of the number of (8) Adrah districts , with a population of **(8,374)** people, as shown in the following figure No. (3):

Figure (3): Details of the geographical area and the target population

(Al-Mansheya Reserve Site)

Site	Governorate	Badia	The Target Area of the Site	The targeted area in the overall geographical scope of	The Targeted Population Centers Within the Overall Geographical Scope of The Site		
					District/ Sub-District	Number of Population centers	Population
Al-Mansheya Reserve	**Ma'an**	**Southern Badia**	**( ) Km²**	**(294) Km²**	**Adhruh**	**Adhruh**	**1,700**
						Mansheya	**3,956**
						الجرباء الكبيرة	**1,068**
						Al Mohamdy	**969**
						الطميعة	**152**
						الجرباء الصغيرة	**311**
						Bear Abu Al-Alaq	**42**
						Al-Ash'ari	**176**
					Total		**8,374**

For the purposes of accurately describing the living conditions of the families of the targeted areas in the project and expressing it quantitatively in the form of digital data in the various demographic, social, economic, educational and health sectors, a random sample was chosen from all the target groups in the project with regard to the representation of the women and youth sector, livestock breeders, farmers and those with a relationship Directly in Al-Marai, where data was collected for a family and for a group of individuals reach as shown in the following figure No. (4):

Systematic construction of a study:

The methodology of this study was built based on the descriptive analytical approach and its tools for collecting anthropological and demographic field information , which in turn is one of the most prominent approaches adopted in modern anthropological studies especially for the relatively homogeneous nomadic pastoral societies , so that anthropological studies mean when studying any phenomenon with geographical, environmental and historical characteristics in addition to Social and economic characteristics ... etc.[4] ,which thus serves the interest of society through the availability of basic information for those working in the development sector on the nature of the targeted communities in various sectors, especially if these societies have special circumstances both in terms of the geographical environment and their socio-economic reality , and knowing the extent to which the nature of development plans and programs is

[4] See :

- Deacon, Isa, Introduction to Anthropology (Anthropology (, a reference earlier, p.38 .
- Morsi, Mohamed Abdel-Maaboud . General anthropology :an introduction to research in the anthropological field in terms of subject and method .Knowledge House University, Alexandria, 1987 m .

appropriate to the nature of these characteristics And not inconsistent with the inclinations and trends of the target communities.

The methods and tools for collecting data related to the anthropological approach are also the most important effective tools in the field work from "interviews and observation with participation", which is the basis of field anthropological studies to record all evidence and live descriptive facts to provide accurate results on the studied community as it is in reality, as well as the use of "news" And developing" statistical forms "to collect quantitative data in order to obtain more accurate, objective and reliable quantitative information and indicators to represent the study community[5].

And based on this approach, which will be based on the study in the construction of its work methodology, you can study through several stages of achieving operational requirements of a data qualitative and quantitative trending then to characterize, analyze, discuss and output the results of the come into existence:

First: the preparatory stage (reference review) :This stage includes the formation of the objective framework of the study and its objectives, the design of the study tools and procedures, in addition to collecting initial data on the targeted sites in the project and examining the available information and studies in the available office references and data of the official authorities from various sectors .

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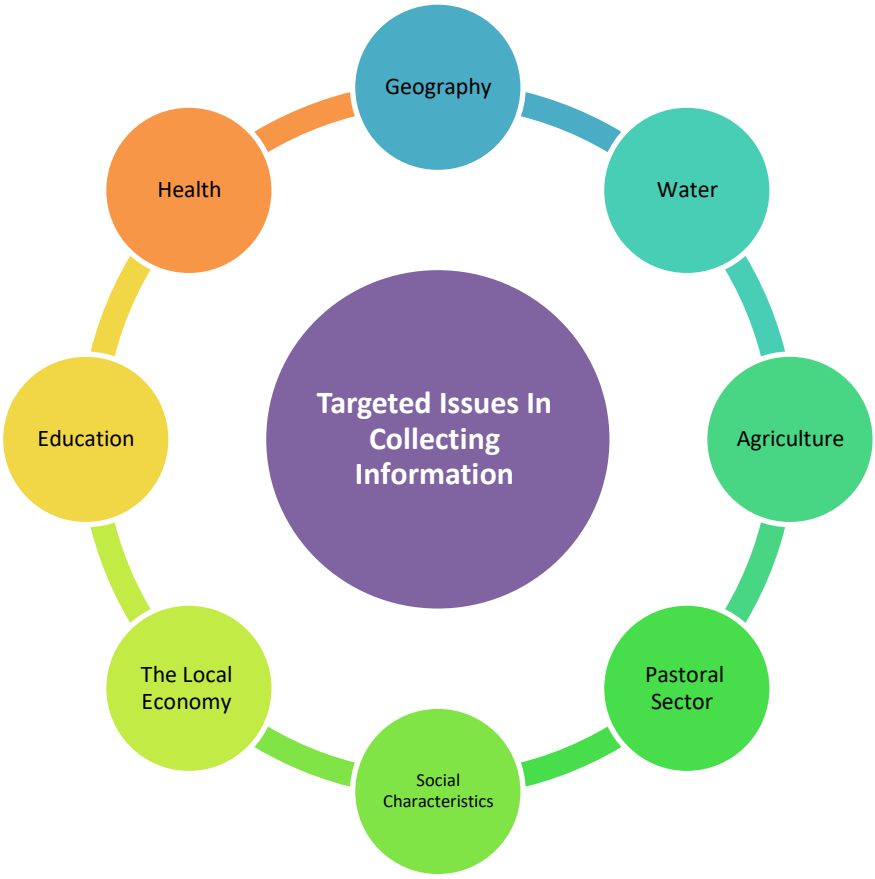
[5] See :

- Deacon, Isa, Introduction to Anthropology) Anthropology , (the Union of Arab writers, Damascus, , 2004 pp.133-130 .
- Ismail, Farouk Mustafa, Change and Development in the Sahrawi Society,2 nd Floor , Dar Al-Maarefa Al-Jamiia, Alexandria, , 1983 pp.33-32 , 22-21 .
- Abu Zaid, Ahmad, The Social Construction : An Introduction to Community Study, Part , 1The National Printing and Publishing House, Cairo, , 1965 p.58 .
- Muhammad, Muhammad Ali, Sociology and the Scientific Method : A Study in Research Methods and Techniques,2 nd edition, University Knowledge House, Alexandria, , 1981 p.301 .

Second: the field work stage : This stage included the collection of field data through a specialized work team of males and females during the period from) m , (during which everything related to aspects of life was recorded in the project work areas, with the aim of showing the true dimension of the environmental and water reality and agricultural pastoral, in addition to the reality of living for the families of the project sites and demographic characteristics of the social, economic and education of the health of .



The field work also aimed at enhancing cooperation and coordination frameworks between local communities and official local institutions on the one hand and with project management on the other hand for the purposes of implementing project activities to restore pastures, through the application of the principle of sound participatory management of rangelands towards defining societal priorities for investment in ecosystem services in line with With its sustainability and with with the developmental tendencies and aspirations of the local communities.

The study data was collected based on the following field tools:

- **Interviews and panel discussions:**

The aim of the interviews was to know the views of the local communities and their way of looking at things and the change they are looking for in a way that is consistent with their preferences and needs, especially related to environmental aspects and frameworks of work in a joint manner in the activities and plans for restoring pastures. In addition, the aim of the interviews was to collect demographic statistical information Social and economic families .

Accordingly, interviews and discussion sessions were conducted in all areas of the project that included families of the project work areas, especially

livestock breeders, farmers and the women sector, in addition to employees of government departments and institutions, in a way that ensures the participation of all parties concerned with the problem of pasture degradation and joint planning towards restoring rangelands and sustaining ecosystem services For the benefit of future communities.

- **Statistical form:**

A statistical form has been developed to suit the requirements and objectives of the study[6], which was used to collect data for the study sample from the families of the targeted population in the project in the form of digital data in various demographic, social, economic, educational and health sectors, so that () a statistical form was distributed in all areas of the project that included obtaining accurate information depicting the living reality of the communities Local characterization and analysis of phenomena on which the theoretical perception is based, as is the case.

Third: the result of the study:

[6] Appendix containing the form of the statistical form

2. Geographical characteristics of the project work areas

The project work areas within the region pastoral in Jordan represented by the Jordanian Badia region, which includes 90 % of the pasture area in Jordan constitute 82% of the total area of Jordan with an area of (73.133) km.^{2}

And extends the Jordanian Badia region to the east of a series of mountains West adjacent to the Valley Jordan, and characterized by its presence at altitudes ranging between (1100 - 700) meters from the surface of the sea, and high degrees of heat during the day and low at night, and the variation in the amounts of precipitation rainfall between seasons and during the season one .

And although the desert areas of ecologically considered areas of dry and semi - dry , with less precipitation rate of about 200 mm per year, but they contain a lot of natural resources , mineral, agricultural: plant and animal, and available groundwater, so It accounts for 70% of the groundwater reserves in Jordan, and the total area of waterfalls in the Badia is about (67) thousand square kilometers , in addition to the Badia regions containing promising developmental elements such as oil shale , renewable energy and uranium , in addition to its contribution to (60%) From the production of red meat .

The three project work areas are distributed within the administrative boundaries of the three Jordanian Badia regions (North, Central, and Southern), so that they were chosen as centralized sites and representative of other sites comparable within the overall geographical range of each of the three valleys, which the following paragraphs will address in terms of their natural and geographical characteristics:

2.1 Geographical characteristics of Al - Manshia protected area site - Southern Badia :

Protected site Mansheya is located in the southern desert area that stretches south of Jordan with an area of up to (37.569) Km^2 equivalent to 51% of the Jordanian Badia area .The distribution of the southern desert areas administratively four administrative provinces is the governorate of Aqaba spend Alqoirh , spend Disi, spend Wadi Araba, and the Governorate of Ma'an: spend Odhirh, spend deer, spend Jafr, spend Marri g of , Brigade Husseiniya, Governorate Tafilah: Brigade Al - Hasa, and the province Karak: Qatraneh Brigade.

The southern Badia region is characterized by its geographical expansion due to the diversity of its geographical topography ,from the lands of Al-Hammad represented by the low-al-Jafr regions, the areas of Ard al-Sawan, and the dunes and sandy mountains represented by the areas of the Badia Hisma, Al-Mudawara, Wadi Araba, in addition to the highland areas represented by the Shariah heights.

Within this description, the site of the Mansheya Reserve is located from the administrative point of view in the Adrah region, located to the northwest of Ma'an Governorate, with an air distance of (15) km .And geographically located within purchasers Heights , which is the longest Heights chain in Jordan chain stretching from the area north Tafeileh until Grove Ras Negev in the south , a distance of 105 km, which constitutes Bartvaatha overlooking of the lowland areas in the east and the west boundary of the streams of the valleys sloping eastward towards the basin Jafr Surface waterfalls and valleys sloping to the west towards the northern Wadi Araba basin, where the terrain of elevated slopes to the east towards the low -cliff valley is easily characterized by its slopes, clear of rocks and cliffs , and its long valleys as valleys of "Abu Hammam, Abu Jarzan and Ruwaida " that feed on rainy waters from the high At the areas Adhirh Weill and Amartigh trundling slowly towards the east , as characterized by the topography of the heights of purchasers sloping west towards Wadi Araba Banhaddarat Behold the narrow and the sharp and what can I get short as Wadi "Ghuwair" in the north "and valleys "Dlagh and good and Wadi Musa "in the southern part .

Accordingly, the limited geographical scope of the overall site is protected Mansheya target in the project in accordance with management to spend Adhirh of the province of Ma'an border, which is part of the East of purchasers Heights ,which is located within the basin water Jafr surface, which thus represents a wide geographical area amounted to about (294) km^2 forms (% 0.7)of the southern Badia area, and at elevations whose levels ranged between (1200-1500 m) above sea level.

2.2 Geographical characteristics of the area of Al-Hazeem / Azraq - Central Badia :

Hazeem area site is located in the eastern part of the central Badia ,which is located in the center of the Kingdom between the Northern Badia, South Badia a geographical area of up to (9634) km^2 equivalent (13%) of the Jordanian Badia area, groupings administratively and

distributed in the capital Amman Governorate: Al-Muwaqqar, Giza, and Zarqa Governorate: Al-Azraq District, Al-Dhlail District.

The geography is a site Hazeem area located on the border between Jordan and Saudi Arabia , the northern part of the basin and Wadi Al - Sarhan water surface and geographical extension of the natural and administrative area blue in the eastern part of the Central Badia representing the eastern lowlands of the Central Badia, located on the water blue surface, basin of y j is In turn, it is one of the twelve most important basins in Jordan and the five most important basins that lie wholly or partly in Jordan .The low-blue area is also characterized by the abundance of water in the winter and spring, with a sub-humid sub-climate, especially the oases in the depression, which is one of the most important wetlands in the world and contains many types of animals, plants and birds, whether migratory or settlemen[7].

Also the area of Hazeem site represents as an extension of normal for a low blue western lowlands of South for the free basaltic Jordanian , which is characterized by easy territory and the spread of groups of marabat and bottoms dry clay that are formed along the valleys sloping from the free basaltic for ending in blue bottom and the bottom of the Hazeem , forming the land that provides pastures in the sewage canals and ranches in which some clans practice pastoral and agricultural activities .

Within this description, the overall scale of the site Hazeem area actually confined to the basin and Wadi Al - Sarhan water surface as an extension of a natural low area blue within the administrative boundaries of the Blue to spend that follow the blue of the province, thus forming an area of up to (3953) K m^2 representing 41 % of the area The Central Badia and (5.4)% of the area of the Jordanian Badia, whose proportions range between (500-600 m) above sea level.

2.3 Geographical characteristics of the area of the Sura - Northern Badia protected area :

Protected site Sarra is located in the western part of the Northern Badia , which occupies in turn , the greater part of Mafraq governorate with an area of up to (25.930) Km^2 equivalent to %35

[7] Fariz, Ghaith and others, Azraq Basin - Land Resources Toward Optimal Use, The Third Jordanian International Week, Volume VI (Scientific Papers - Multiple Knowledge Cases), Royal Cultural Center, Amman, Jordan ,1995 , .8-6

of the Jordanian Badia area, and divided the Northern Badia administratively to three brigades, namely: Northeastern Badia Brigade : It includes the Salihiya District, the Sobha District, Umm Al Jamal District, Umm Al Qutin District, Deir Al Kahf District, and the Northwestern Badia District :it includes the Northwestern Badia District, the Sky Sarhan District, the Hasha District , the Khalidiya District , and the Ruwaishid Brigade .

For the long geographical extension of the northern Badia region along the border with Syria, the northern Badia regions varied in terms of geographical topography and surface water basins, as follows:

- The flat lands of al-Hammad, which are covered with gravel and stones located on the surface water basin of Hammad, as is the case of the Ruwaishid district.

- Basalt free lands that are characterized by the presence of volcanic mountains, plateau hills and flat lands that are covered with basaltic stones. These lands represent the northeastern Badia brigade areas that are located on the surface blue water basin, and the lands of the eastern part of the northwestern Badia brigade that are located on the Zarqa water surface basin.

- The lands located in the northwestern part of the northwestern Badia brigade, which represents the transitional zone between the northern Badia regions in the east and the highlands in the west and form the southeastern part of the Yarmouk surface water basin.

Within this description, the site of the protected area of Sarrah is located in the northwestern part of the Northwestern Badia Brigade, which represents the areas located on the Yarmouk surface water basin and part of the plains north and east of Ajloun Mountains that are characterized by the level of its surface, and represents the beginning of the lands of the Jordanian Hamad in the northern Badia from the side Al-Gharbiyya, just like the Mansheya Reserve site, in the Southern Badia.

Accordingly, it limited overall scope of the site hub of a protected area within the areas of the Yarmouk Basin water surface of areas to spend monsters, spend Sarhan, the area of Mansoura, a problem that an area of up to (260) K m^2 represents (1%) of the Northern Badia area, and heights Her levels ranged between $(600- 700$ m$)$ above the sea .

3. Climatic characteristics of the project work areas

The Jordanian desert region prevails in the arid and semi-arid climate, high temperatures during the day and their decrease at night, and the variation in the amounts of rain and its fluctuation, which led to successive waves of drought that reflected negatively on the economic activities of the inhabitants of the Jordanian Badia that were mainly dependent on pastoral activities and the availability of pasture lands so that climate changes have led to reduced amounts of rainfall and high annual temperatures to high evaporation rates , and low moisture in the soil and air to provide adequate moisture during the season to complete the cycle of plant growth, thus resulting in a Z natural vegetation areas decrease in pasture and desertification and decreasing area of rain - fed land, increasing the use of limited sources of water sources.

Accordingly, the following paragraphs will address the climatic characteristics of the project work areas by analyzing trends of change in climatic elements such as airport precipitation rates, temperatures, humidity and solar brightness rates, as follows:

3.1 Rain statistical distribution:

The Alhto' s rain of the most important climatic elements that affected the productivity of natural pastures in the project sites, so as to their importance in providing moisture to the soil, plants and water storage support groundwater.

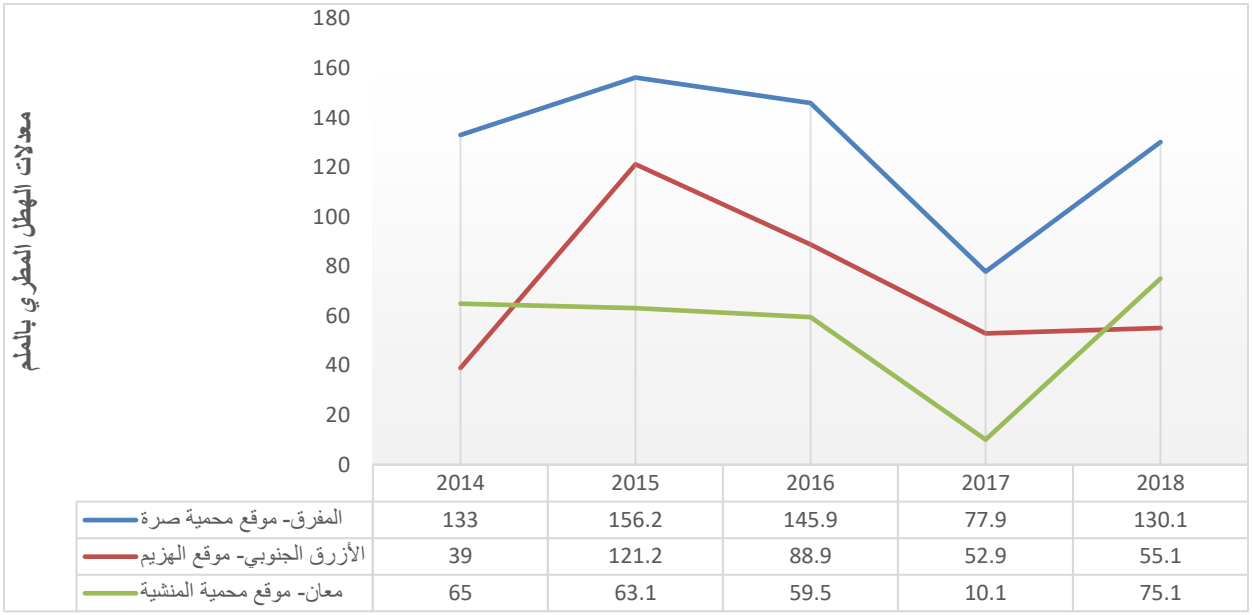
Figure No. (5) shows the variation in the annual rainfall rates in which the periods of moisture and drought balance, while the highest rainfall rates recorded in the project work areas in (2014) reached (133) mm in the Mafraq Governorate Station - Sura Reserve and (39) Mm in Azraq station - Al -Hazeem site and (65) mm in Ma'an station - Al-Manshia reserve. Rainfall rates increased significantly in the following year (2015) to reach 156.2, 121.2 and 63.1 mm in Project work areas respectively.

In the years (2016-2017), the rainfall rates decreased very significantly, while the rain rates recorded in the water year (2015) at the Mafraq station - the Sura Reserve at (156.2) mm, returned to end at (77.9) mm in the water year. (2017) CE, and the same applies to both the Azraq station - the location of the defeat, where the rainfall rates ended at (52.9) mm and the Ma'an station - the Mansheyah Reserve at (10.1) mm in the water year (2017) and as shown in Figure No. (5), thus indicating that the water cycle of the water years (2015-2017) was

heading towards drought, which affected the productivity of the rangelands in terms of providing the appropriate humidity for the completion of the growth of water .Ataat and breed.

It is also clear from Figure No. (5) That the rainfall rates started to rise in the water year (2018) to return and the rainfall rates close to the water year (2015) M.

Figure No. (5) Shows the variation in the annual rainfall rates:



	2014	2015	2016	2017	2018
المفرق- موقع محمية صرة	133	156.2	145.9	77.9	130.1
الأزرق الجنوبي- موقع الهزيم	39	121.2	88.9	52.9	55.1
معان- موقع محمية المنشية	65	63.1	59.5	10.1	75.1

3.2 Temperatures:

Temperature levels are no less important than rain, as they directly affect the efficiency of rains on the one hand, and the diversity and intensity of vegetation on the other hand, due to the increased amount of moisture losses resulting in gradual and varied types of vegetation groups.

As important to show degrees rates of heat in determining the changes process by changes in vegetation by the thermal changes that help to determine the appropriate periods for the cultivation of each type of plant or show crop or support and relevance of the growth of knowledge of the adverse times that lead to stop the plants or growth Zbolha and kill her , Thus reducing the economic productivity of farmers and pastoralists.

The following figures No. (6), (7), and (8) show the basic values of the upper and lower temperatures recorded in (2015) at monitoring stations within the project work areas[8], whose main indicators we will show as follows:

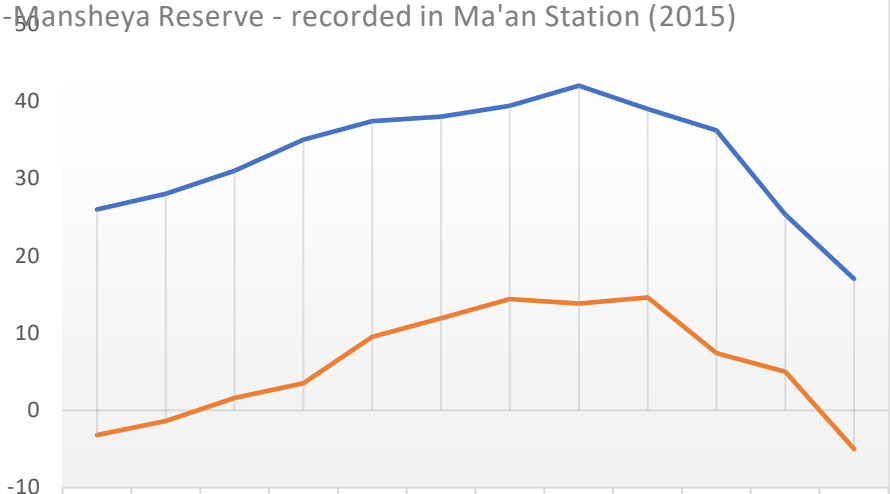
1,2,3 rates of upper and lower temperatures at the site of a protected area Mansheya:

Despite the location of the Mansheya Protected Area site within the chain of the Badges heights, which is characterized by a mild climate in summer and very cold in winter , and high precipitation rates , its location which represents the beginning of the southern Badia borders to the east and its relatively low surface levels compared to the rest of the Sharia heights and its relative height from the rest of the areas The Southern Badia, distinguished by a mountainous and flat geographical nature, the levels of which ranged - as we have shown previously - between (1200 - 1500 m) from the sea level, with a semi-desert climate that is relatively hot in summer and cold in winter, so that temperatures rise in summer to reach (42) degrees Celsius and fall in winter to below zero percent to (-5) degrees Celsius.

[8] Jordanian Annual Statistical Book, N.,69 Department of Statistics,.2018

[9] Bulletin of Environmental Statistics , 2015-2014 the Department of Statistics

Figure No. (6)
Show the basic values of the upper and lower temperatures
Al-Mansheya Reserve - recorded in Ma'an Station (2015)



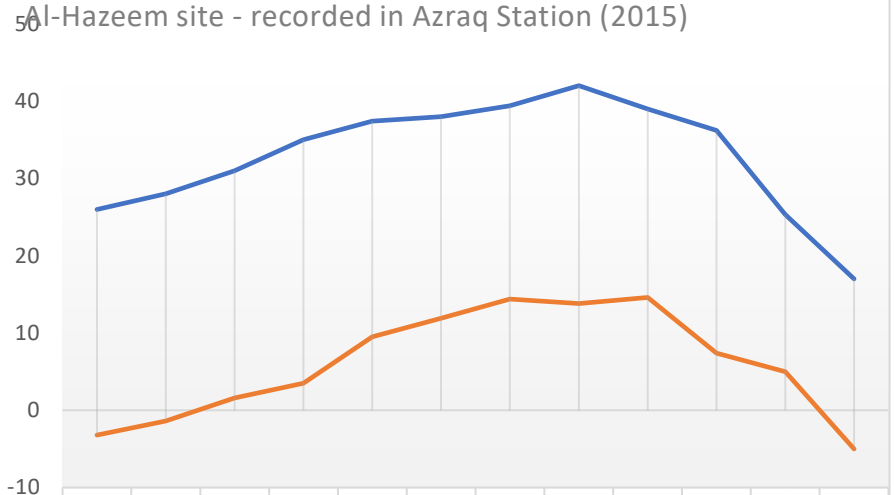
	كانون ثاني	شباط	آذار	نيسان	أيار	حزيران	تموز	آب	أيلول	تشرين الأول	تشرين الثاني	كانون الأول
القيم الأساسية لدرجة الحرارة العليا	26	28	31	35	37.4	38	39.4	42	39	36.2	25.3	17
القيم الأساسية لدرجة الحرارة الدنيا	-3.2	-1.4	1.6	3.5	9.5	11.9	14.4	13.8	14.6	7.4	5	-5

2.2.3 rates of upper and lower temperatures in the Hazeem site area / Blue:

Climatic indicators in Figure (7) show that the highest average summer temperature in the Al-Hazeem site - Low Blue has reached (45.5) degrees Celsius to record the highest temperature levels at the level of the legislator's work areas, as well as lower temperatures in a season The winter records rates ranging between (-3.1 (4.5 - degrees Celsius, and these rates indicate the relative warmth of the Blue Low area from the rest of the project's work areas in the winter, which was distinguished by the most important areas in which pastoralists and nomadic people practice their pastoral activities in the winter.

Despite the climatic indicators of the Azraq low area - the location of al-Hazeem indicates the semi-dry desert climate, high temperatures in the summer, and fluctuations in rainfall rates - as we have shown in the previous part - the low-blue area was distinguished in winter and spring by the sub-humid sub-climate .This is due to the abundance of water that collects in the depression through many valleys , especially in the oases in the depression, which is one of the most important wetlands in the world.

Figure No. (7)
Show the basic values of the upper and lower temperatures
Al-Hazeem site - recorded in Azraq Station (2015)



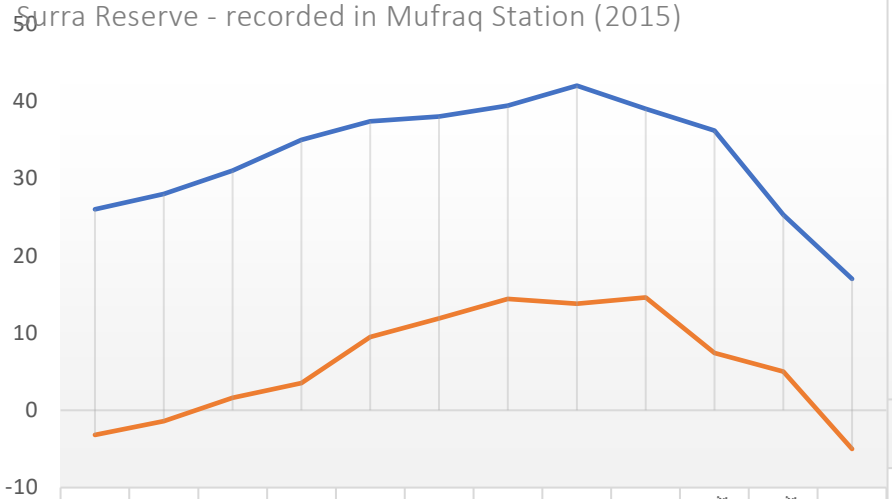
	كانون ثاني	شباط	آذار	نيسان	أيار	حزيران	تموز	آب	أيلول	تشرين الأول	تشرين الثاني	كانون الأول
القيم الأساسية لدرجة الحرارة العليا	26	28	31	35	37.4	38	39.4	42	39	36.2	25.3	17
القيم الأساسية لدرجة الحرارة الدنيا	-3.2	-1.4	1.6	3.5	9.5	11.9	14.4	13.8	14.6	7.4	5	-5

High and low temperatures in the Sura protected area:

As in the case of Al Manshia Reserve and Al Hazeem Site, climatic indicators indicate the upper and lower temperatures recorded in Al Mafraq Station - Sura Reserve, that the climate is characterized by a semi-dry desert climate, where temperatures rise in the summer to reach (44) degrees Celsius And it drops in the winter to less than zero percentile, where it reached the lowest degree (-7) degrees Celsius, and thus constituted the lowest temperatures recorded in the project work areas.

Accordingly, the climatic indicators about the temperature levels in the project work areas, whose heights reached between (42−44) degrees Celsius, reflect important challenges over the efficiency of the annual rains in the production of the annual biomass of the rangelands and the degradation of pastoral lands in the project areas, where the rise in Temperatures in this way increased the amounts of losses of moisture, which led to the gradual and diversity of the types of vegetation groups and the drying of large areas of pastoral lands.

Figure No. (8)
Show the basic values of the upper and lower temperatures
Qurra Reserve - recorded in Mufraq Station (2015)



	كانون ثاني	شباط	آذار	نيسان	أيار	حزيران	تموز	آب	أيلول	تشرين الأول	تشرين الثاني	كانون الأول
القيم الأساسية لدرجة الحرارة العليا	26	28	31	35	37.4	38	39.4	42	39	36.2	25.3	17
القيم الأساسية لدرجة الحرارة الدنيا	-3.2	-1.4	1.6	3.5	9.5	11.9	14.4	13.8	14.6	7.4	5	-5

3.3 Solar brightness:

The importance of solar brightness appears in terms of the calorific value per square meter in each dunum, which is a value that has its benefits and harms on natural pastures as it contributes to increasing the growth of plants and herbs on the one hand and increases the evaporation rates from the soil and plants on the other hand, which loses them a large percentage of moisture required for plant growth.

Thus, as shown by the following figure No. (9), the highest annual rates of solar brightness hours at the project sites amounted to about (9.1) hours in the Mansheya Reserve, where they rise in the summer season by about (11.8) hours while they decrease in the winter season to about

(6.4) An hour, and the matter also applies to each of the project's work sites, but with lower brightness rates, which led to an increase in the calorific value per acre, which increases the temperature rates , and with a decrease in the amount of rain and the percentage of moisture remaining in the soil and air, this led to low growth of plants In the project work areas.

Figure No. (9)

Rates Hours of Solar brightness in project areas of 2015 [10].

	Al-Mansheya Reserve	Al-Hazeem Site	Sura Reserve
Annual Rates for Hours of Solar Brightness	**9.1**	**8.1**	**7.9**
Max. Hours of Solar brightness / July	**11.8**	**10.3**	**10.7**
Min. Hours of Solar brightness / July	**6.4**	**5.5**	**4.7**

3.4 Relative Humidity Rates:

The annual humidity rates are affected mainly by the amounts of rain and temperature levels, as the amount of relative humidity available in the soil and air is inversely proportional to the temperatures and the decrease in rainfall amounts due to the high evaporation processes, where we find that the low amounts of rain precipitation and high temperature rates at project sites during the year (2015) As it was shown previously, it has led to a decrease in the quantities of available moisture and the extent of their stay on or in the soil and plants due to the effect of tractor degrees on raising evaporation rates, for example, as shown in the following figure No. (10), while the annual rates of Heat in the Mansheya Reserve site is about (42) degrees Celsius In the month of August, the relative humidity percentage decreased to about (37.6)%. Consequently, the effect of negative temperatures appears on the productivity of rangelands in terms of raising evaporation rates and low amounts of available moisture and their extent of remaining on or in the soil. Which negatively affects the biomass and its density in the pastoral areas in terms of providing the required humidity for the times required for plant growth

Figure No. (10) A comparison of temperature and relative humidity in the project work areas in year 2015 [9]						
Projet Site	**Basic values for higher temperatures (° C)**			**Relative Humidity Rates**		
	July	**Aug**	**Sep**	**July**	**Aug**	**Sep**
Al-Mansheya Reserve	**39.4**	**42**	**39**	**35.7**	**37.6**	**37.5**
Al-Hazeem Site	**43.1**	**45.5**	**42.5**	**38.1**	**41.9**	**38.5**
Sura Reserve	**38.6**	**44**	**41.2**	**60.8**	**64.2**	**57.2**

4. Water resources for the project work areas

The project areas and the Jordanian desert are generally considered among the poorest areas in their water resources, whether surface or groundwater, like the rest of Jordan, which suffers from a scarcity of this vital resource, which in turn negatively affected the decline in agricultural and pastoral activities and low levels of living for the population.

On the other hand, the Jordanian Badia containing groundwater basins and surface major in Jordan , as shown in Figure (11), and the most important basin Blue basin Disi, which is pumping water for agriculture and drinking to the major cities in the capital , Amman , Zarqa Governorate, and in addition to water basins Others, such as Al-Jafr Basin, Al-Hammad Basin,

and Al-Sirhan Basin, the Jordanian Badia contains (70)% of the groundwater reserves in Jordan, which are exploited by more than (3133) an underground well[10] ,which appears extensively in the Azraq Basin and the Amman Zarqa Basin , where this percentage reached (49)% of the total underground wells in Jordan, and these wells are used for the purposes of supplying the main cities with drinking water, and are also used for irrigation of crops in the irrigated areas in the Badia.

Dependent sources of water basins renewable in the whole desert of Jordan on rain water, which most due quantities to evaporation and the rest is distributed to the flood water form and feeding ground water , for example During the rainy season (2014-2015) amounted to amounts of rain (8884.0) million m^3 was including due to evaporation (8154.0) million m^3 ie 91.8%) of the size of the amounts of rain, and the rest of the amount of rain distributed between the floods that reached its size (245.0) million m^3 and (485.0) million m^3 of the amount of rain I went to the groundwater recharge so that The percentage of groundwater recharge from rain water reached (505%)[11]

Accordingly, and in lost low amounts of water recharge from rain water during the previous seasons, the over pumping of water basins has led to a decline in the level of water and low quality , reaching quantities of drain water from subterranean basins in (2017) (-223.36) millionwhich poses a threat to water),and (12)As shown in the following figures No. (11[12] security in Jordan in the long term.

((الشكل رقم (11): خريطة تبين الاحواض المائية في البادية الأردنية، المصدر: وزارة المياه والري، 2017

Figure 11: Water Basins map in the Jordan Badia, MOWI (2017)

[10] Environmental Statistics Bulletin , 2015-2014 Department of Statistics,2018
[11] Environmental Statistics Bulletin , 2015-2014 Department of Statistics,.2018
[12]Environmental Statistics Bulletin , 2015-2014 Department of Statistics,2018.

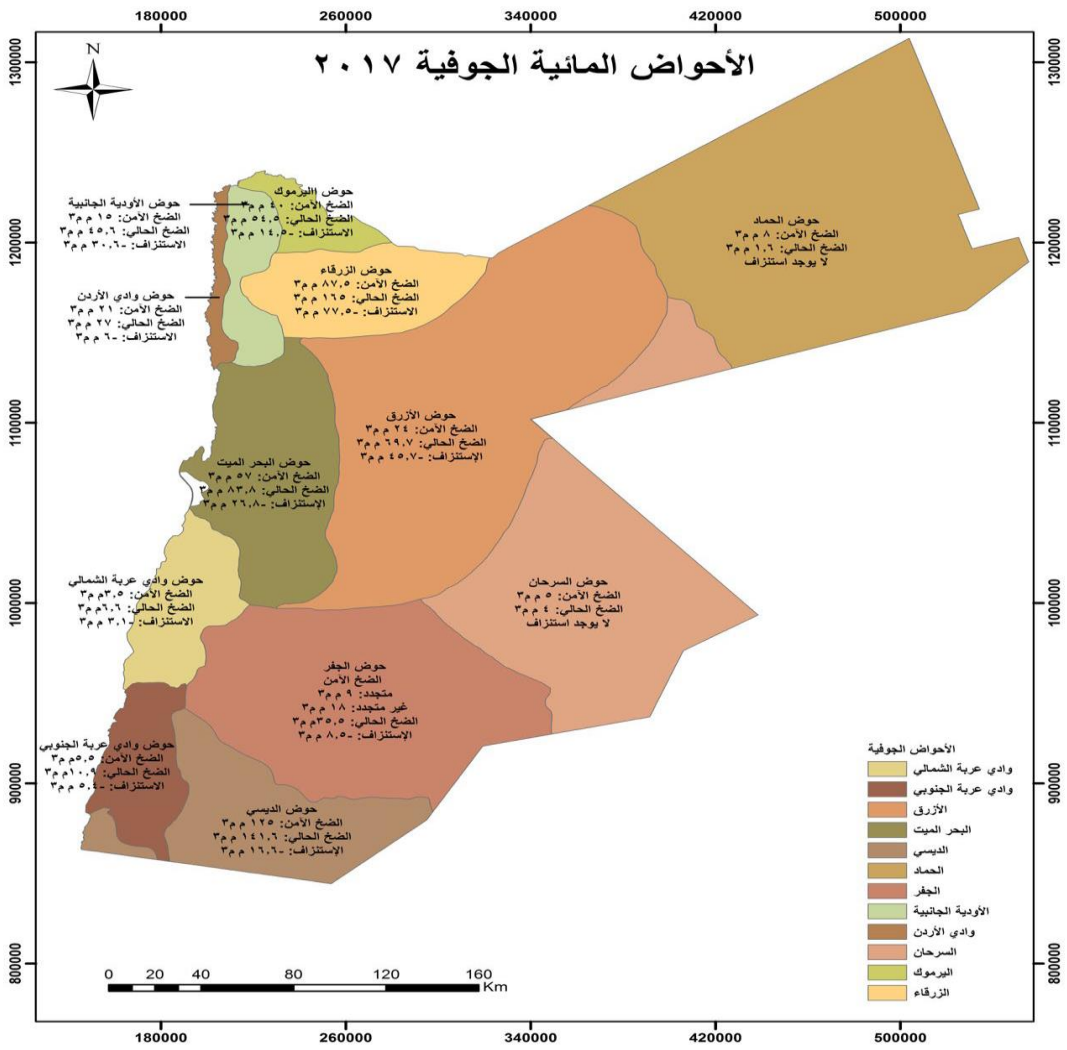


Figure No. (12): A table showing the groundwater basins, Safe pumping form it, the Quantities of extraction for the year (2017), and The amounts of attrition

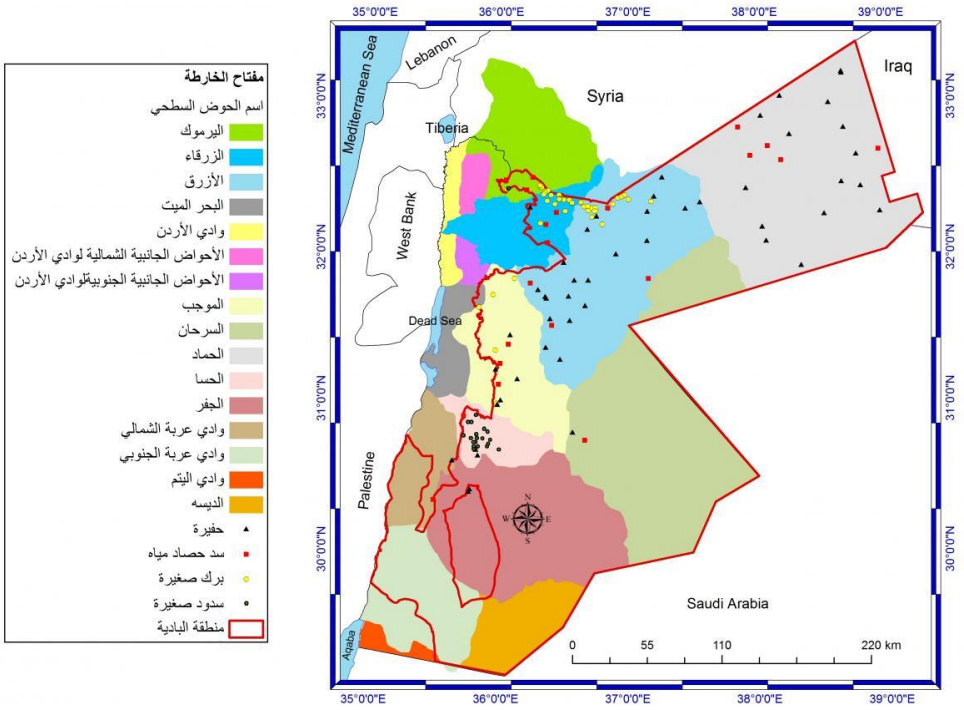
Name of Underground Water Basin	Safe Pumping ($M M^3$)	Quantities of Extraction ($M M^3$)	The Amounts of Attrition ($M M^3$)
Al Diysi and Al-Mudawira	125	141.58	16.58-
Amman Zarqa	87.5	164.98	77.48-

Yarmouk	40	54.53	14.53-
Side valleys	15	45.64	30.64-
Azraq	24	69.66	45.66-
Al-Jafr	27	35.53	8.53-
Jordan Valley	21	27.04	6.04-
The Dead Sea	57	83.85	26.85-
Southern Wadi Araba	5.5	10.90	5.40-
Hammad	8	1.59	6.41
Al-Surhan	5	00.0	5.00
Northern Wadi Araba	3.5	6.56	3.06-
Total	418.5	641.86	223.36-

With regard to surface water , the total area of the watershed in the Badia is about (67) thousand square kilometers , which makes the subject of surface water exploitation in the Jordanian Badia a top priority, especially with the recurrence of drought years in the last two decades . Water harvesting techniques are an important means that efforts must be made to expand their geographical reach and spread them in the various Badia regions in order to benefit from rain water .It is also worth noting that the Jordanian Badia contains dozens of archaeological ponds , and Figure (13) shows the most important water harvesting sites in the Jordanian Badia, as these sites include dams, excavations, and ancient ponds[13].

[13] Environmental Statistics Bulletin , 2015-2014 Department of Statistics,2018

Figure (13): A map showing the water basins in the Jordanian Badia. Source: The Hashemite Fund for Badia Development database



Based on the above, the following paragraphs will address the characterization of the study site areas in terms of their water resources, as follows:

4.1 Al-Manshia protected area site - Southern Badia:

Includes the southern desert area of the total area of the basin water Jafr surface of an area (12,067) km ,² in addition to a large portion of the basins Disi, Al - Sarhan, the Valley of the South cart, Wadi Al - Hasa, in addition to part of the basins and the valley of the southern cart and Wadi Mujib.

Within this description, the area of the Mansheya reserve site constitutes the western highlands of the surface water basin of Al-Jafr, which separates the streams of the valleys feeding the Al-Jafr Basin from the streams of the valleys sloping west towards the Wadi Araba basin and the valleys of the slopes southward towards the southern Wadi Araba basin.

And due to the location of the Al-Manshiyya site in the eastern part of Al-Sharah heights, it represented the pastoral areas of the pastoral nomads in the summer for its mild climate and the availability of springs and collecting wells, where the demand for water was low in relation to the available sources, which were mainly dependent on the spring water whose numbers reached to

(120) A spring in the Al-Sharaa Heights area in general, which includes the areas of Al-Shoubak and Petra, its water pouring ranged between $0.002-2.5$ million m ^{3} per year[14].In addition to a number of collection wells that numbered (4) wells, the most important of which are the "Abu Al-Alaq" well and the "Abu Makhtoub" well in the areas adjacent to the area of the Al-Mansheya Reserve site, which were used for drinking, agriculture and watering livestock without compromising the groundwater reserves Thus weakening the discharge capacity of the springs .However, as a result of changing climatic conditions, fluctuation in rainfall rates and the unjust use of groundwater from drilling wells in the region in general, especially wells of apple farms in the area adjacent to the Mansheya Reserve, which numbered (34) underground wells, the drainage capacity of the springs decreased after it had reached (94) m ^{3} in the region since (1965) A.D., most of them are dehydrated, and the rest of the discharge quantities of the rest threatened with drought have also decreased due to the unfair consumption and increase of pumping from the underground wells in a manner that does not correspond to the storage capacity of the underground basins of rain water, where the quantities of feeding the Al-Jafr water basin reached In the year A .For Water (2014-2015) (10) million m^3 only[15], which led to a decrease in the groundwater level and consequently lower levels of the water bearing layer than the spring exits .This is shown by the previous forms No. (11) and (12), which show the quantities of pumping from the underground wells in (2017) AD, where it was found that the quantities of depletion of groundwater in the total geographical range of the Manshiyya protected area located on the Al-Jafr Basin (- 8.53) million m ,^{3} and reached amounts drain groundwater from the basin and the valley of the northern vehicle adjacent to the area Mansheya from the west (-3.06) million m ,^{3} and (-5.40) million m^3 amounts drain groundwater from the basin and the valley of the southern vehicle adjacent to the protected area Manshia from the south[16].

As for the surface runoff water, the directions of the wadis in the area of the Mansheya Reserve site fall within the range of the wadis heading east towards the Al-Jafr Basin, which are characterized by its tree-type, elongation and simple slopes, as well as wide and low-depth valleys that run over dry areas where the rainfall rates do not exceed 150 mm/ Years, causing a large part of the water to evaporate[17], reaching quantities of feed basin Jafr water during

[14] water sector in Jordan : Facts and Figures, the Ministry of Water and Irrigation, 2017
[15] The Hashemite Fund for Jordan Badia Development database.2018 .
[16] Al- Shabatat , Ali . Environmental degradation and land management in Petra - Shoubak (Jordan) , PhD thesis , University of Jordan, 2004
[17] Environmental Statistics Bulletin , 2015-2014 Department of Statistics,2018

the season of water (2014−2015) accounted for 2.2 % of the volume of rainfall , which amounted to 481 million m ,³ while the rest were distributed among quantities of rain constituting (97.8%) Lost due to evaporation and flooding.

4.2 Location of Al-Hazeem / Azraq - Central Badia:

The area of Al−Hazeem site is located on two water basins, where the southern part of the Al−Hazeem area adjacent to the Saudi−Jordanian borders, known as the Al−Nakheel area, is the northern part of the Al−Sarhan water basin, while the northern part of the Al−Hazeem area, which is known as the bottom of Al−Hazeem or Al−Omari, is located within the Low Blue Region which is the lowest spot in the northern region of the Jordanian Badia, located on a closed water basin is located 95 % of it in Jordanian territory with an area of (11205) km[18] ² It extends from the Jabal al−Arab region in Syria in the north to the Jordanian−Saudi border in the south.
While the height of the Azraq depression reaches (500) m above the sea level, the height of Jabal al−Arab, the main feeder of the Azraq depression with surface runoff water, has reached (1500) m above sea level, meaning that the difference between the two elevations has reached (1000) m, which made rain water The fall on Mount Arabia descends directly through several valleys to the Azraq depression, the most important of which is the Rajel Valley.

The Azraq depression also feeds from the streams of valleys descending from the highlands in southern and eastern Amman, in addition to the valleys coming from the southern part of the Jordanian Badia, thus forming the valleys of the valleys that surround the Azraq depression in a semi−circular manner, gathering in the depressions and filling the blue bottom and many small bottoms with water during the winter the problem of a series of lakes, reaching amounts of rain water during the rainy season (2014−2015) m (938) million m³ and fed at a rate of groundwater is about 53 million m³ per feed amounted to.[19]%(5.6)

[18] Minstry of Water
[19] Al- Shabatat , Ali . Environmental degradation and land management in Petra - Shoubak (Jordan) , PhD thesis , University of Jordan, 2004,2018

Therefore, and multiple streams sadis feeder for low blue, it was the region a year ago (1989) is characterized because of the abundance of water Balanabe p permanent flow and the extension of green oases and ponds of water, making it one of the most important wetland land in the world and contain many species of animals, plants and birds ,both migratory Or the settlement[20]. However, after the springs dried up since 1989 due to over-pumping of underground wells and climatic changes from successive seasons of droughts, the Azraq Depression region became drought-affected [21].as the effect of over pumping of groundwater wells in quantities ranging in previous years between (50-47) million m^3 per year and reached a year (2017 m) to (69.66) million m^3 on falling water levels in the groundwater that lost water feed rate groundwater amounted to 53 million m^3 per year, and therefore the deficit between the extracted water and the rate of groundwater recharge amounts of water has reached (-16.66) million m^3[22] also reached the quantities drain underground water over the pumping line security of water blue basin resulting from the over pumping of groundwater wells (-45.66) million m^3 year (2017 m) as shown in the previous forms number (11), (12) , suggesting high attrition indicators , especially if added amounts of attrition from the basin Amman blue water amounting to (77.48) million mZarqa Basin are -as it is clear that the Azraq Basin and the Amman[23] among the most abundant underground water basins that are exposed to depletion at high

[20] Environmental Statistics Bulletin , 2015-2014 Department of Statistics,2018

[21] Environmental Statistics Bulletin , 2015-2014 Department of Statistics,2018

[22] See:

- Freeze, Ghaith et al., Azraq Basin - Earth Resources toward Optimal Use, The Third Jordan International Week, Sixth Volume (Scientific Papers - Multiple Knowledge Cases), Royal Cultural Center, Amman, Jordan 1995, 6-8.
- Abu Ajamiyeh, Iris, population shifts and changes in environmental oasis Blue, Master, Supervisor) a . Dr .Qais Al - Nouri , (Yarmouk University,1999)

[23] Abu Ajamiyeh, Iris, population shifts and changes in environmental oasis Blue, Master, Supervisor) a . Dr .Qais Al - Nouri , (Yarmouk University, 1999)

quantities amounting to (123.14) million m ,3 and thus the safe pumping quantities exceeded by (50)%, which is due Directly, the density of underground wells located on both the Zarqa Basin and the Azraq Basin, which reached in 2015 (1535) wells, is mainly used to pump water to major cities in addition to agricultural and industrial work.

The following are the most notable developments in the unjust pumping in the Azraq district:

1. The pumping of the Azraq water into the city of Irbid began in the 1960s, which lasted until the early 1970s, after which the water will be pumped to the capital, Amman, and Zarqa Governorate.

2. The drought began in Azraq after approximately 1975 AD, that is, after the construction of a water line from Azraq to the capital, Amman, and digging wells in 1980, but after the interception of several international organizations at that time considering that Azraq is a natural reserve and its features may not be changed. Alternative sources of water were searched and the government excavated (27) wells and it turned out to be located on the same water basin, then (14) wells were drilled until 1989 AD in Al-Anqiya area, north of Azraq, and water continued to be pumped to Amman and Zarqa cities .The number of wells located on the Azraq basin increased with successive years to reach (547) wells in (2014) and (580) wells in (2015).

Accordingly, this pumping of groundwater in the Azraq region caused the water level to decrease and the springs dried up gradually until drought started in the main water pools in Azraq, where the ponds dried up in the northern part of Azraq in 1987 AD and then the pond dried out the southern part of Azraq in general. 1990 AD.

4.3 Site area of the Sura - Northern Badia protected area:

Protected site area is located within the south - eastern regions of the Yarmouk Basin water surface, of the total area (1438) km^{24} 2 The region also constitutes the plain lands located north and east of the highlands and mountains of Ajloun, which in turn are located in the southern part of the Yarmouk Basin, and together they form the highlands that separate the Yarmouk water basin from the Zarqa basin surface water.

[24] Environmental Statistics Bulletin , 2015-2014 Department of Statistics,.2018

As for water runoff, and on the contrary , from the mountains of Ajloun Heights , which is characterized by streams Oaudettha quickly supplied the main neighbors and the Yarmouk River Basin and fed at a rate of 39 million m SuraThe nature of the flat terrain of the [25] [3] protected area site has limited the flow of water in it, in addition to the rainfall rates compared to the rest of the areas located on the Yarmouk surface water basin.

On the other hand, like the Azraq Basin and the Al-Jafr Basin in the project's work areas that are exposed to depletion from the over pumping of the underground wells, the quantities of depletion from the Yarmouk water basin, as shown in figures No. (11), (12), (−14.53) million m[263] and given the amount of water extracted from groundwater wells amounting to (54.53) million m [3] per year and the quantities of water recharge amounting to 39 million mWe find that the [27] [3] deficit between the quantities of water abstracted and the rate of groundwater recharge in the Yarmouk Basin has reached (−15.53) million m ,[3] but at lower rates than the deficit amounts in the Blue Aquifer and the Amman Basin − the underground water directly adjacent to the Yarmouk Basin, which The deficit rate reached (−92.98) million m ,[3] which is mainly due to the limited density of underground wells compared to the Azraq and Amman-Zarqa basins, where the number of underground wells located in the Yarmouk Basin in 2015 reached (203) an underground well used (70.4% of them are for agricultural purposes, and (29)% are for human consumption, while the number of underground wells located on the Amman Basin Meet (955) an underground well[28].

5 .The pastoral agricultural dimension of the project work areas

Terre T CZ activities Agricultural in the Jordanian desert areas almost entirely on crops irrigated by groundwater wells, where the active cultivation of vegetables and fruit , especially in the areas

[25] Ministry of Water, Water Sector in Jordan : Facts and Figures, 2017
[26] Environmental Statistics Bulletin , 2015-2014 Department of Statistics,.2018

[27] Ibd
[28] Ministry of Water, Water Sector in Jordan : Facts and Figures, 2017
[29] Bulletin of Environmental Statistics , 2015-2014 the Department of Statistics
[30] Bulletin of Environmental Statistics , 2015-2014 the Department of Statistics, .2018 and the Ministry of Water, Water Sector in Jordan : Facts and Figures, 2017

of the Northern Badia, in addition to some field crops of rainfed wheat and barley that depend on rain water.

As for livestock, the Jordanian Badia is an important source for the production of livestock and their products from milk, red meat and wool, as it constitutes a source of (60)% of red meat production at the level of Jordan, especially Awassi sheep, which are characterized by their adaptation to the environment of the Jordanian Badia.

This section will address characteristics of characteristics related to agricultural activities and livestock in the project work areas, as follows:

5.1 Agriculture:

The Bedouin tribes and clans in the Jordanian Badia until the late period after the establishment of the Emirate of Transjordan in (1923) A.D., were characterized by pure Bedouin values and joint economic activities based on livestock raising which the permanent movement required in search of pasture and water, but at the beginning of the first half of the last century The interruption phase began in the nomadic pattern based on permanent migration and the pursuit of food gradually, to define the life of the Bedouins after that ascending change in terms of stability and meeting the requirements of development and change, as a result of the developmental approach adopted by the Jordanian governments to encourage the tribes and nomadic clans at He left the life of deportation and urged them to settle down, which was through encouraging agricultural settlement in terms of establishing agricultural projects, digging artesian wells and building roads to link the Jordanian Badia regions with cities and villages, so that projects with a dual purpose were included that included agriculture and settlement in the southern region as was done in the northern part From the Jordanian Badia, digging artesian wells to encourage agricultural settlement of the Bedouins by granting the necessary licenses and land ownership .This encouraged the Bedouins to settle in light of the successive years of droughts, fluctuations in rainfall rates, and the limited availability of grazing areas due to border demarcation operations[29].

Accordingly, the agricultural activity has become one of the local supportive productive activities in the project work areas, where agriculture has emerged as an organized activity that attracts a number of stable and semi-settled local families beginning the establishment of agricultural

[31] Database of the Hashemite Fund for Jordanian Badia Development

projects to settle the Bedouins, so that the Bedouin families in the Jordanian Badia regions witness a new production pattern in the transition from dependence The pastoral production mainly depends on entering agriculture as a new production pattern, and although the agricultural activity is not the main activity, in recent years there has been a clear growth of agriculture in the Jordanian Badia regions and has become a magnet for investors in agricultural projects and Zt turn into productive activity is marketed vegetables and fruit trees that have become the Jordanian desert areas of the most important agricultural areas in Jordan, especially in the summer cultivation.

Based on the above, the following paragraphs will address the most important characteristics of agricultural activity in each of the project's work areas in terms of areas, agricultural land and the nature of crops that characterize each region, as follows:

5.1.2 Area of Al-Hazeem / Azraq - Central Badia:

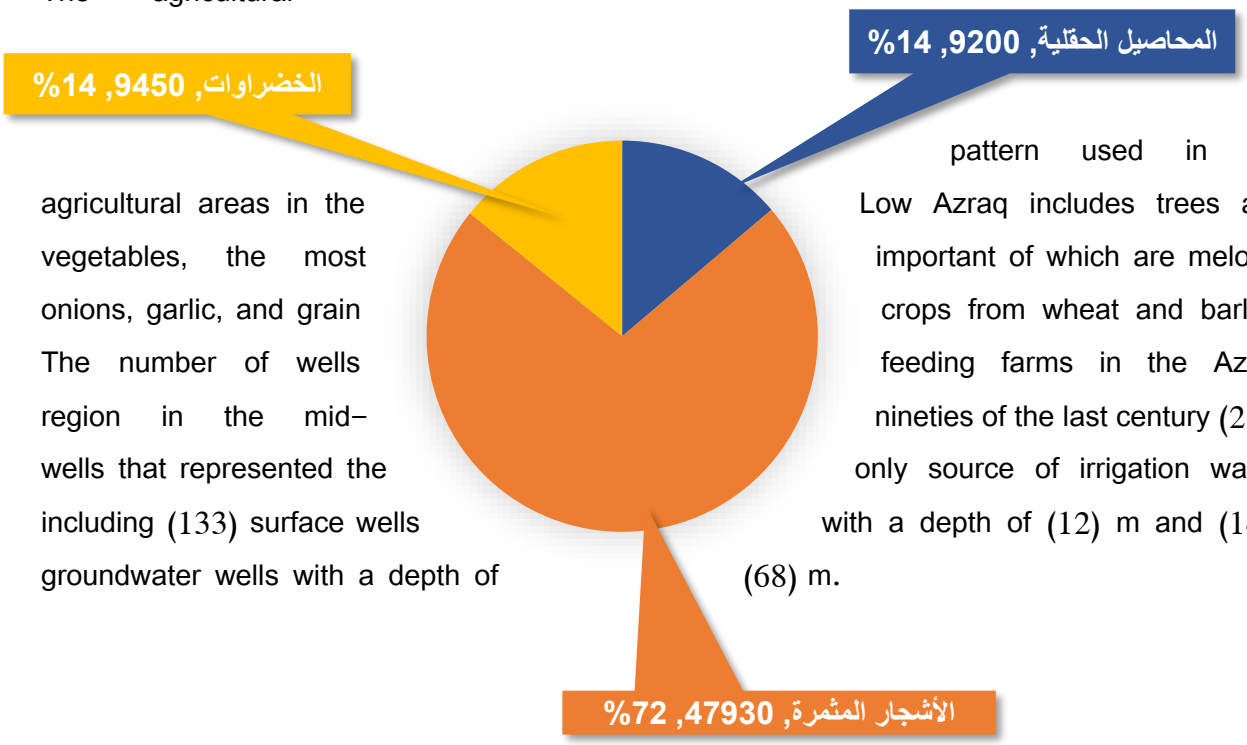
The cultivation process actually began in Azraq in the 1950s on a small scale in terms of gardening, tree planting, and vegetables. At the end of the sixties and seventies of the last century, the Azraq region witnessed the largest transformation in agriculture in terms of drilling deep artesian wells and the establishment of modern large farms in the "Al Daghailia" area east of the Azraq region, then large farms appeared in the "Al Ain Al Bayda" area north of the Azraq region in the seventies of the last century That led to a significant qualitative and quantitative development in agricultural products and began import and export operations to local and international markets. The "melons" product was one of the most important crops exported to Europe.

In the eighties of the last century, farms appeared in the south of Azraq, and the increase in drilling of artesian wells led to the progress of agriculture in the Azraq region and its development, but agriculture began to deteriorate after the pumping of Azraq water to the city of Amman and Zarqa, where the level of groundwater decreased and the salinity level increased in surface and deep well water.

As for the nineties of the last century, and specifically after the Gulf War, great changes and a qualitative shift in agriculture occurred, as some investors from the Gulf countries came and set up huge agricultural projects based on the latest agricultural methods and machinery, which led to an increase in the area of agricultural lands northeast of the Azraq region until it reached an area In the year (1994) AD to (25,250) dunums distributed over four areas in the Azraq

depression (Al-Rutama, Al-Ashaq, Al-Ain Al-Baida, and Dagheila), all of which are located north of the Al-Hazeem site, and they are owned by people from outside the Azraq region. The large and largest farm for the people of Azraq does not exceed (100) acres.

الشكل رقم (14): توزيع المساحات الزراعية في منطقة منخفض الأزرق حسب نوع المحصول البالغة (66580) دونم



The agricultural pattern used in the agricultural areas in the Low Azraq includes trees and vegetables, the most important of which are melons, onions, garlic, and grain crops from wheat and barley. The number of wells feeding farms in the Azraq region in the mid-nineties of the last century (281) wells that represented the only source of irrigation water, including (133) surface wells with a depth of (12) m and (148) groundwater wells with a depth of (68) m.

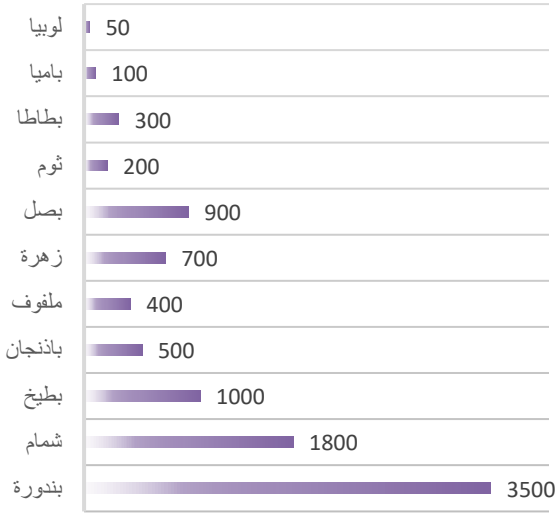
Today, the agricultural areas in the Azraq Low area amounted to (66580) acres distributed between the lands planted with field crops by (14)%, in addition to the lands planted with fruit trees by (72)%, and the lands planted with vegetables by (14)%, as it appears In the following figure No. (14). It is noted that farmers are interested in tree plantations, especially olive trees, as the area of land planted with olive trees reached 57% of the total cultivated area in Azraq.

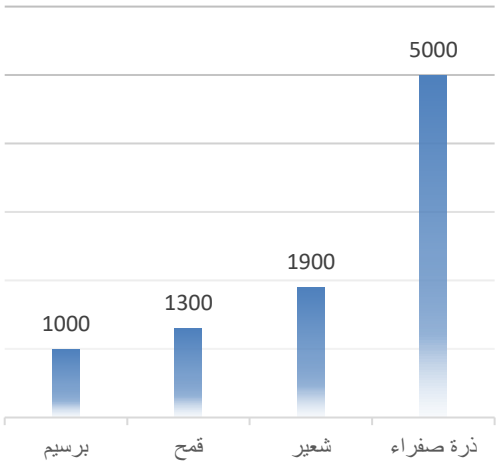
It is also noted that the crops in Azraq are distinguished by their quality in terms of the presence of (6) varieties of fruit trees and (11) vegetables, as well as field crops, the most important of which are yellow corn.

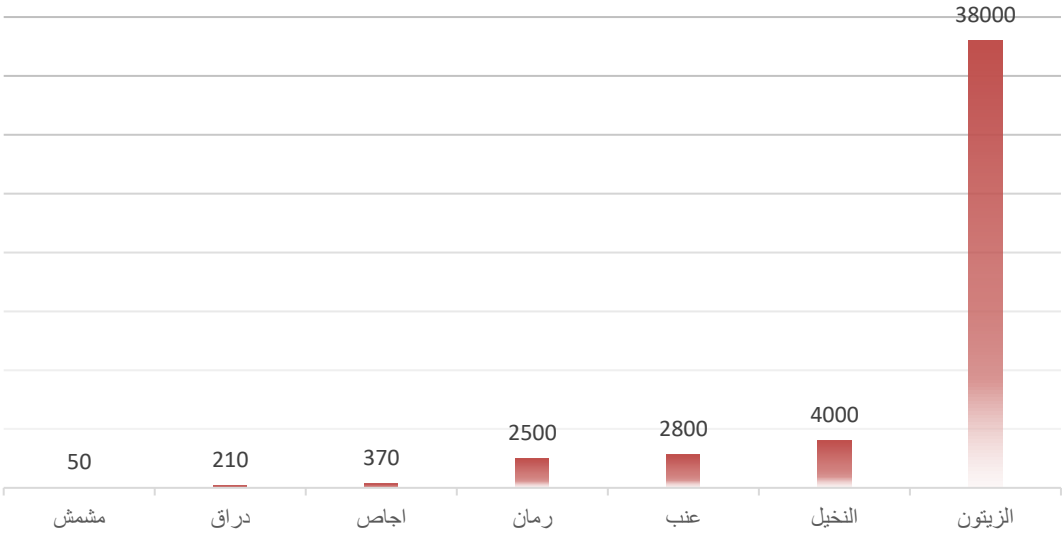
On the other hand, the Azraq region is considered an exceptional case, where there are approximately 450 farms, of which more than half are owned by their owners under the arguments

of owning and they exist and are productive at the same time and their owners are not allowed to officially own the land or even license existing wells, in addition to not delivering services from In terms of electricity, official agricultural services and expatriate workforce recruitment, the region also lacks a local market to market agricultural products as most of the production costs go as transportation wages due to the region's distance from the nearest central market with distances ranging from $(100-150)$ km.

Accordingly, it has been revealed through the foregoing that the Azraq oases as a distinct economic and environmental unit were not the only losers due to the unjust pumping of groundwater to the cities of Amman and Zarqa as a main reason, but rather investors in the agricultural sector as their crops face clear threats due to the low level of groundwater that Impact on increasing the costs of extracting it and declining its quality in terms of increasing salinity in water, in light of the fact that the soil is sandy and salty.







5.1.3 Site area of the Sura-Northern Badia protected area

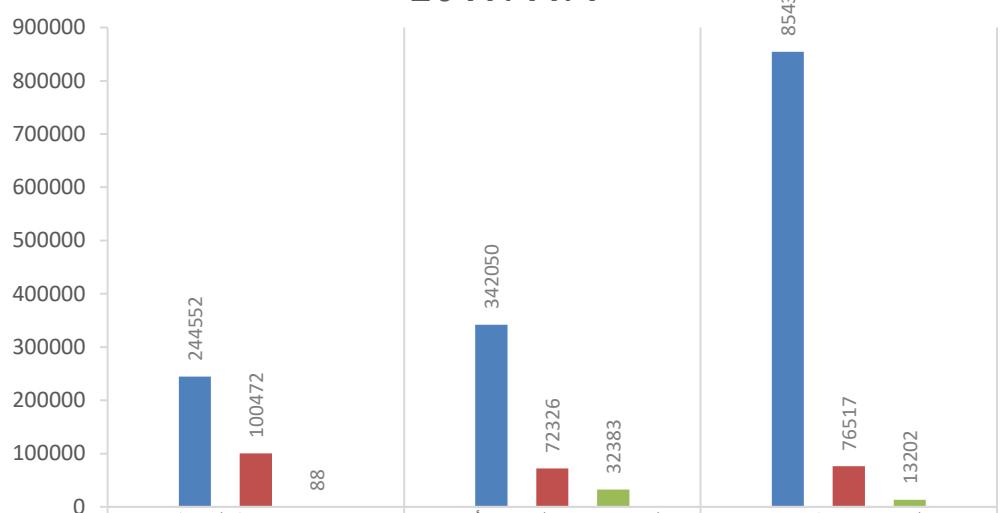
5.2 Livestock:

Pastoral activity was previously the dominant activity distinguished for the residents of the project work areas and the Jordanian desert in general, but due to changing climatic conditions and the consequent fluctuation of rainfall rates and the succession of droughts and the decline of pasture productivity in addition to high feed prices – as the residents of the project work areas emphasized through discussion seminars – The rates of dependence of the population of the project's targeted areas on these activities decreased as a basic activity for income, and some have abandoned it, and therefore signs of orientation have appeared for other productive activities and government and military jobs, which has thus resulted in the diversification of economic activities for the population of the areas .Target project as will be seen later in part on the demographic characteristics of the population of the economic work of the project areas, while this section will address the discussion of numbers of livestock during the last ten years , the provincial level administrative areas of the project according to the census of agricultural Jordanian for the year 2017[30]and the agricultural statistical bulletins issued by the Department of Statistics, as shown in the following forms No. (15), (16), (17), (18):

[32] Abu Ajamiyeh, Iris, population shifts and changes in environmental oasis Blue, Master, Supervisor) a . Dr .Qais Al - Nouri , (Yarmouk University, 1999)

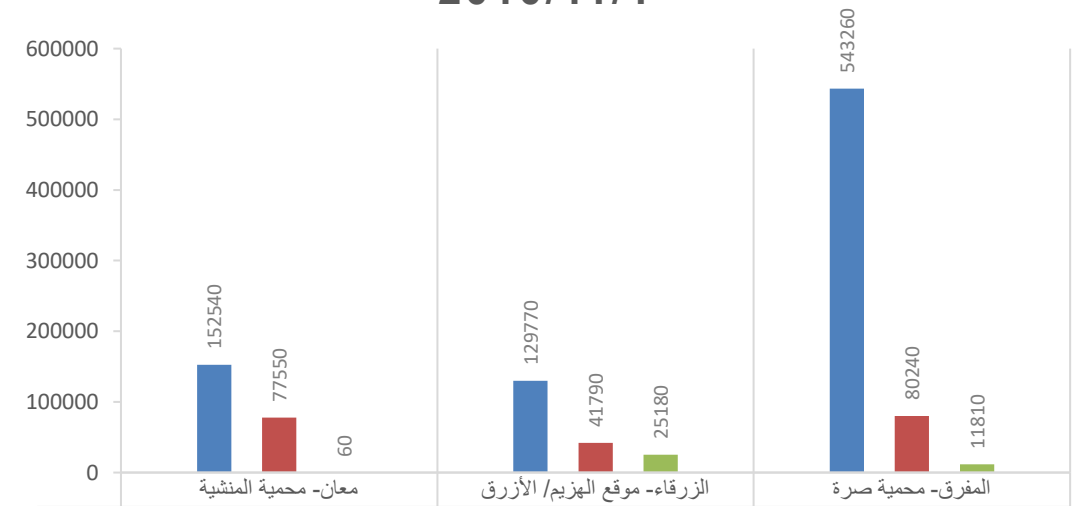
[33] Abu Ajamiyeh, Iris, population shifts and changes in environmental oasis Blue, Master, Supervisor) a . Dr .Qais Al -Nouri , (Yarmouk University, 1999)

الشكل رقم (15): تعداد الثروة الحيوانية عام 2017/11/1

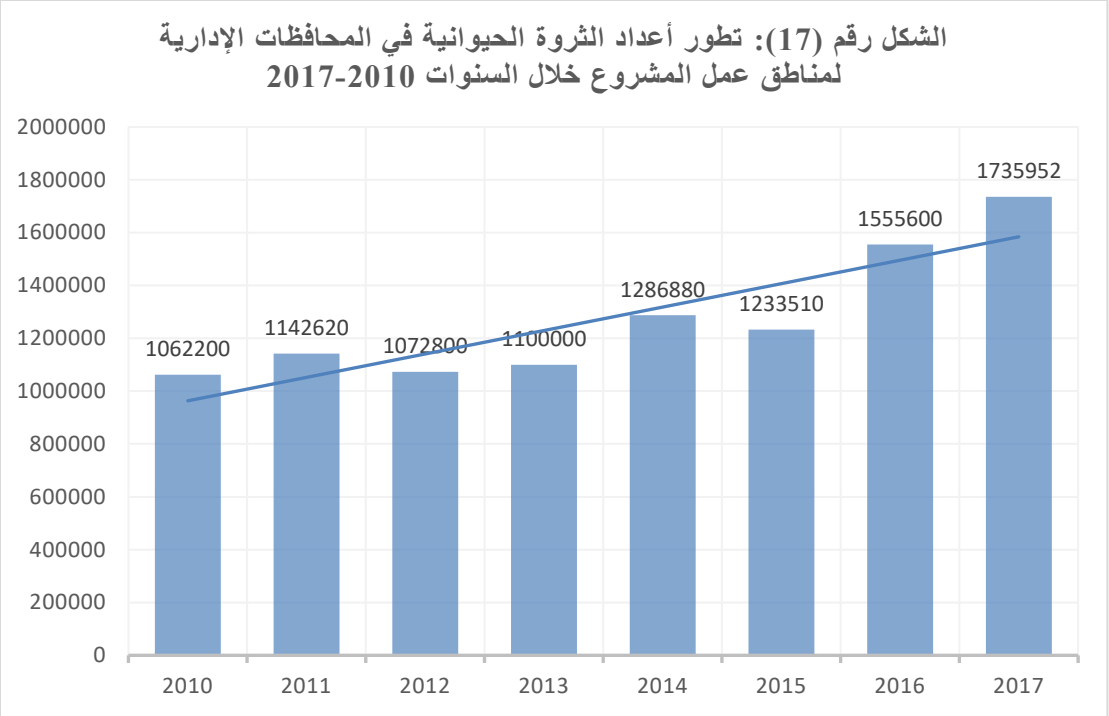


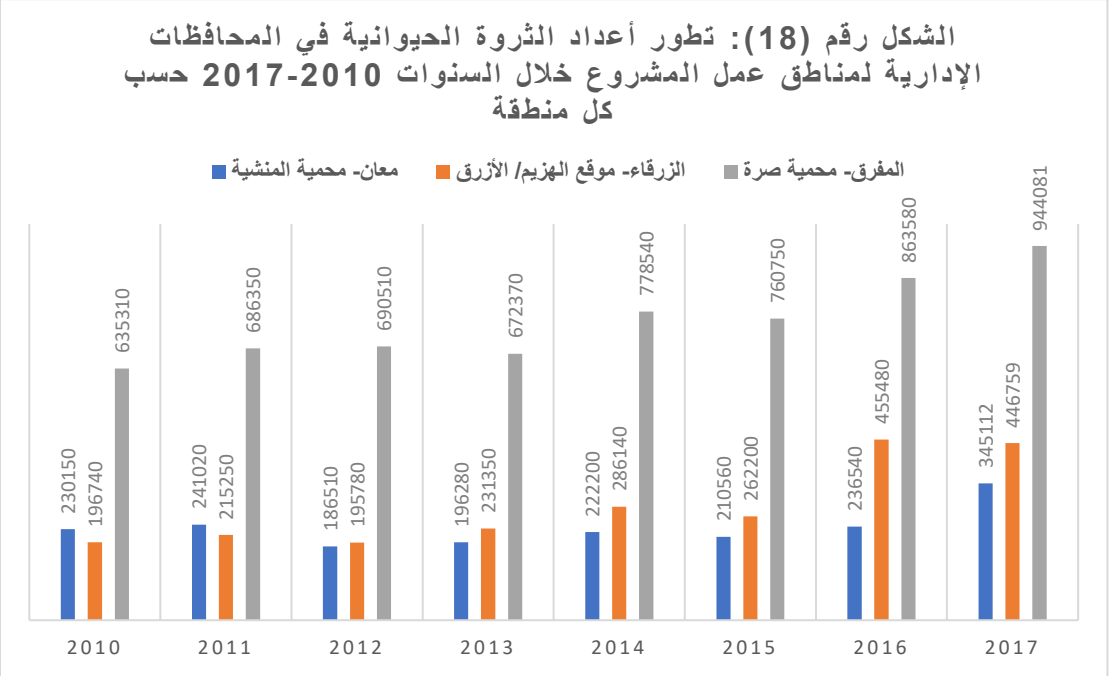
	معان- محمية المنشية	الزرقاء- موقع الهزيم/ الأزرق	المفرق- محمية صرة
الضأن	244552	342050	854362
الماعز	100472	72326	76517
الابقار	88	32383	13202

الشكل رقم (16): تعداد الثروة الحيوانية عام 2010/11/1



	معان- محمية المنشية	الزرقاء- موقع الهزيم/ الأزرق	المفرق- محمية صرة
الضأن	152540	129770	543260
الماعز	77550	41790	80240
الابقار	60	25180	11810





5.2.1 Numbers of livestock at the level of project sites work:

The number of livestock in the administrative governorates of the project work areas reached (1,735,952) at the head of a problem of (44.3%) of the numbers of livestock at the level of Jordan, which number (3,911,289) from sheep, goats and cows .It is noticed that the number of

livestock from sheep increased by (83 %)of the total number of livestock in the administrative governorates of the project work areas.

When comparing the preparation of livestock during the years (2010- 2017) m as shown in Figure (), we find that the numbers of livestock in the administrative provinces of the regions of the project work has increased over seven years (673,752) , the head of a rate (96,250) Ras / year.

5.2.2 Preparing Animal Resources for Ma'an Governorate - Al Manshia Protected Area website:

It is clear from the previous figure (), that the number of livestock in the administrative governorate of the Mansheya Reserve site has reached (345,112) head at the end of the year 2017 AD, forming a percentage of (%20) of the number of livestock at the level of administrative governorates for the project work areas and (9%)) on the level of Jordan.

Also, during the years (2010-2017), the number of livestock in Ma'an Governorate increased at a rate of (16,423) head / year, with a total increase of (114,961) head.

5.2.3 Preparing Livestock for Zarqa Governorate - Hazeem Site Area / Azraq:

The administrative governorate of the Al-Hazeem site / Azraq is the least administrative governorate of the project work areas in possession of livestock, as the percentage of livestock numbers reached (%) of the total number of livestock in the administrative governorates of the project work areas and (%) at the level of Jordan.

In spite of the low number of livestock, it is noted that the administrative governorate of the Al-Hazeem / Azraq site area is characterized by an increase in the number of holdings of cows from the other administrative governorates of the project work areas, where the number of cows reached () Ras, which constitutes (%) of the total number Cows in the administrative provinces of the project work areas.

On the other hand, it is worth noting here that the area of the Low Blue in particular was distinguished from ancient times as representing the most important pastoral areas for the pastoral Bedouins that the nomadic tribes meant in the winter and spring, which is still continuing until now and is concentrated in the part extending south of the "Southern Blue" area Along the border strip with Saudi Arabia, these areas are characterized by the most important inhabited areas in which pastoralists and nomadic Bedouins carry out their pastoral activities, the most

important of which are “immersion” including the site of Al-Hazeem, “Al-Qasha ,”Hassidat , and “Al-Ghadaf”, up to the Al-Jafr region of the governorate Maan in the south[31]

5.2.4 Preparing Livestock for Al-Mafraq Governorate - Sura Protected Area Site Area:

The administrative governorate of the Sura (Mafraq) Reserve site is distinguished by having the highest percentage of livestock numbers at the level of Jordan, followed directly by the capital region of Amman, where the number of livestock in Mafraq Governorate reached (944,08)Ras, and thus constitutes (24.1)% of the wealth numbers The animal population in Jordan, and will account for more than half of the livestock population in the administrative governorates of the project work areas, at a rate of (54.3.%)

It is also noticed through the previous figure (), the evolution of the numbers of livestock in the administrative governorate of the Sura Reserve during the years (2010-2017), where it maintained a rate of acquisition of the highest proportion of the numbers of livestock on the one hand, and on the other hand the high numbers of livestock During the seven years until I approached a million head at a rate of (44110)head / year and with a total increase of (308,771) head, especially for the livestock from lamb that accounted for (90.4)% of the numbers of livestock in the administrative governorate of the Sura Reserve and %(49.2) of Preparing livestock in the administrative governorates of the project work areas, as shown in the previous figure.

5.3 Pastoral sector challenges in the project work areas:

After discussing the facts of the agricultural pastoral dimension of the project work areas, and despite the development that revealed agricultural and pastoral statistical numbers, now this sector suffers from many problems and challenges in the project work areas that the study extracted through discussion seminars with the people of local communities and representatives of institutions and bodies The governmental sector concerned with the agricultural pastoral sector, foremost of which is the decline in pasture productivity and drought that has affected the project work areas and led to many problems that can be identified as follows:

1. The size of natural pastures has decreased, and a large dependence on fodder for feeding livestock in addition to grazing, which has reduced the feasibility of pastoral activity in the project

[34] Jordan Agricultural Census 2017: Detailed Results, Volume One, Department of Statistics, 2018.
[35]Study of nomads

work areas and the economic returns and income of families, especially those who have a small number, where the deterioration of rangelands in the project work areas led to the following:

- High feed prices and insufficient availability, and the scarcity and scarcity of water sources, especially in the summer, forcing pedestrian farmers to purchase them at high prices.

- The sovereignty of the sale of a number of the herd of livestock breeders holdings small to secure supplies remaining numbers of feed and water.

Also, livestock farmers suffer from the difficulty of marketing their products of meat, milk and dairy.

2. High costs of agricultural production requirements and energy costs for the purpose of pumping water, which reduced the financial return for agriculture.

3. The lack of capital for those wishing to set up agricultural projects because of the lack of donors or lending to agricultural projects.

4. Lack of private water wells or water harvesting projects for agricultural and animal husbandry uses.

5. The problem of overgrazing and the failure to organize the grazing process by the Ministry of Agriculture and the estimation of pastoral load, due to the lack of activation of legal controls to prevent human assault on rangelands, whether by overgrazing or logging.

6. Lack of private holdings of agricultural lands in the project work areas in general.

7. The high rate of expatriate labor in the agricultural sector, especially in the fruit farms adjacent to the Mansheya Reserve site and the Azraq region farms, in addition to the weak tendency of the male local population to work on the farms due to low wages, and the lack of job security for women working in agricultural projects, especially in the Manshia protected area and the Azraq area For example, the women from the local community in the Al Manshia Reserve site, who work on apple farms and whose number is estimated at more than (150) women, work at a rate of (9) hours per day for a low wage of (5) Jordanian dinars per day.

8. The problem of marketing the products that farmers suffer due to the lack of local or near central markets, which reduces the economic return to agricultural production in light of the large part of

production going as wages of transportation, and also stressed that this problem is one of the most important problems facing them in the areas of agricultural and pastoral production.

The Baseline study Report on the socio-economic status of the local communities in HERD sites

Summary

This report summarizes collected data about the socio-economic situation in selected areas of Jordan's Badia; northern, middle and southern Badia, which will form baselines for impact evaluations of HERD project "Healthy Ecosystems for Rangeland Development" at the study sites in Jordan. The future evaluation based on this report is expected to illustrate the interrelatedness of issues: i) poverty leads to unsustainable utilization of the rangeland resources and ii) their overutilization leads to increased poverty.

More than 90% of the Jordanian area is classified as arid areas, locally called “Jordanian Badia”, its covers all land receiving annual rainfall of 50 to 200 mm annually. The Badia is dividing into three parts: northern, middle and southern Badias, they form major natural rangeland that meets a considerable part of feeding requirements for livestock. The objective of this study is to provide the baseline information representing the socio-economic status of the local communities in the Badia that is divided into three areas: (1) the northern Badia, (2) the middle Badia, and (3) the southern Badia. The baseline includes information on the status of the current socio-economic information of the local communities at the household level, livestock and rangeland resources, water and energy resources, which will form the basis for any management and restoration planning process.

A sample of 150 respondents from the local community was considered as convenient for representing the local communities for each area (north, middle, and south), besides the respondents were targeted randomly and data collected using a face to face method. A structured questionnaire was developed to cover specific topics, such as the household characteristics and family health and socio-economic characteristics for the head of the household, and information on water resources, governmental services, and information on land and livestock ownership. Quantitative techniques were used to generate baseline information based on the respondents' information and perceptions; therefore, the analysis was applied using SPSS and Excel sheets.

The results in this report provide the most important features that could act as benchmarks of similarities and differences between the project sites and act as areas of interventions for achieving the overall objective of the HERD project. Nevertheless, several results from this survey demonstrated a high level of harmony among different households at the three study sites, where it turned out the clear consistency of household properties such as the age of household head and income sources, and other services as water, health, educational services.

The families in the three Badia's reflected approximate average age of the household age ranged from 45.4 – 48.1 years, and all of the respondents had stated for not having any kind of disabilities or/and chronic diseases. Moreover, most of the respondents were working in the public sector, specifically either retired or still working at the military forces, or working in the private sector or their own private businesses. This reflects the working ability of the household head as they were mainly in middle age and many of them had retired at an early age, which reflects an opportunity to involve them in additional work opportunities for enhancing livelihood.

The respondents reflected common livestock management plans, the livestock depends on fodder and grazing, livestock flocks were not traveling far distance for grazing, and respondents had complained about the cost of fodders and limited grazing plants. In conclusion, the respondents had reflected a common level of governmental services in the three regions, besides common joint livestock management plans.

The households in the three regions owned both goats and sheep, with a high variations in the flock size in the same region and the other regions, as in the Northern Badia the flock size of goats = 17, and of sheep = 3), the middle Badia the flock size of goats = 1, and of sheep = 51), and the southern Badia the flock size of goats = 22, and of sheep = 63). The main breeding system is closed in Northern and middle Badia. Women took different roles in livestock management, like milking, dairy products production, grazing, and marketing. The problems related to agriculture were different: in northern Badia, the main problems were: water shortage, livestock prices, the lack of agricultural lands for cultivation, and the high fodder prices. For the middle Badia, the main problems were: water shortage, the lack of agricultural land for cultivation, overgrazing, and lack

of pastures. For those from southern Badia the main problems were: water shortage, high fodder prices, the lack of agricultural lands for cultivation and low selling prices of livestock.

The respondents from the three Badia's proposed development projects for each region, which were as the following: northern Badia: support fodder prices and wells drilling, for those from the middle Badia the proposed projects were: wells drilling, and establishing reserves, and for the southern Badia the proposed projects were: wells drilling, and provide mobile veterinary clinics.

1. Introduction

More than 90% of the Jordanian area is classified as arid areas, locally called “Jordanian Badia”, which derived its name from the land where Bedouins live and practice seasonal browsing. This area includes all lands receiving annual rainfall of 50 to 200 mm annually and has general characteristics of seasonal contrasts in temperature with high variations in rainfall within and among years. Badia in Jordan forms major natural rangeland that meets a considerable part of feeding requirements for livestock. The Badia extends from north to south along the eastern portion covering about 90 percent of the country’s total area (Image 1). Badia of Jordan can be subdivided into three main sub-geographical areas:

- The northern Badia, comprising 26,000 km².
- The middle Badia, comprising 10,000 km².
- The southern Badia, comprising 38,000 km².

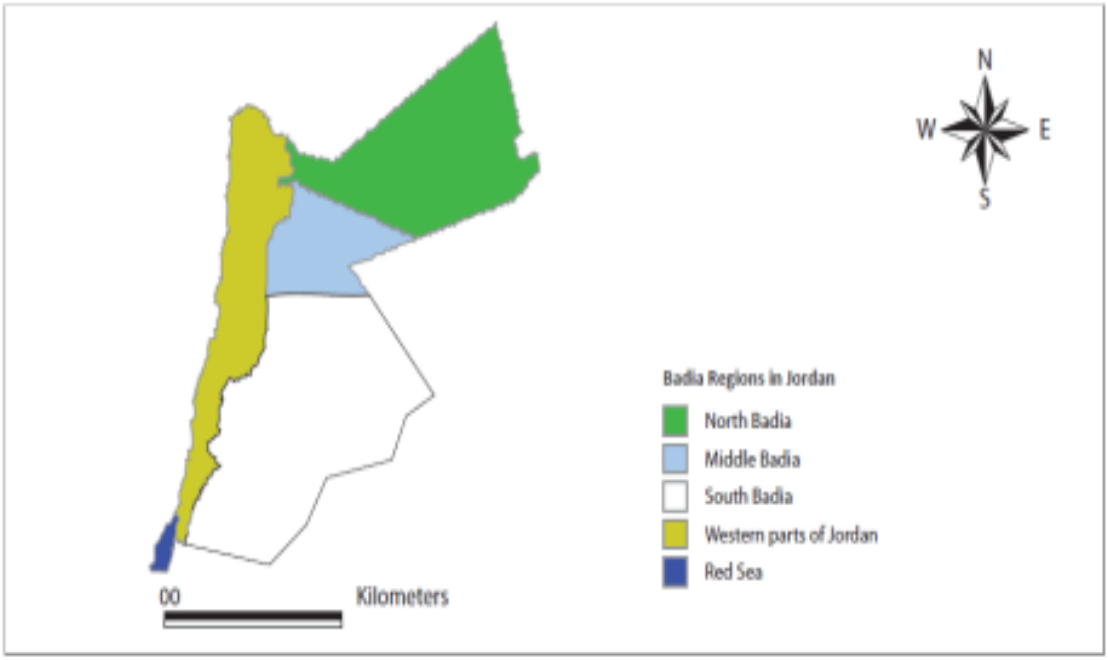


Image 1: Distribution of Jordanian Badia, Source: ICARDA 2012

In Jordan, a significant proportion of the rangelands are degraded, although estimates of the extent and nature of degradation may vary. As a result of rangeland degradation, it is believed that overall welfare to society has declined due to the reduction in ecosystem services. If rangelands are restored it is further believed that ecosystem functionality will be rehabilitated, leading to an increased supply of ecosystem services and an overall increase in welfare. Valuation of rangeland ecosystem services provides a means of estimating the total benefit of rangeland restoration and it is, therefore, a tool for identifying investment opportunities and incentive mechanisms for restoration and can be useful for influencing national policy agendas.

2. Objectives of the study

The objective of this study is to provide the baseline information representing the socio-economic status of the local communities in the Badia that is divided into three areas: (1) the northern Badia, (2) the middle Badia, and (3) the southern Badia. The baseline includes information on the status of the current socio- economic information of the local communities at the household level, livestock and rangeland resources, water and energy resources, which will form the basis for any management and restoration planning process.

3. Methodology

3.1. Sampling and data collection

The survey aimed at collecting information from the local communities within Jordan Badia, therefore respondents were interviewed from Al-Mansoora village in the northern Badia; from Al-Azraq city in the middle Badia, and from Al-Manshiyeh village in the southern Badia. A sample of 150 respondents from the local community was considered as convenient for representing the local communities for each area (north, middle, and south). The communities were considered having homogenous and there was no specific profile for selecting respondents beyond their willingness to participate in this study; therefore the respondents were targeted randomly and data collected using a face to face method. A structured questionnaire was developed and pre-tested. The questionnaire aimed to collect information and capture the local community's socio-economic status with special focus on the quality of different services they receive within their community.

The questionnaire was divided into 5 parts, which were revolved over the following topics:

- Detailed information on the household type
- Family health and socio-economic characteristics for the head of the household, wife(s) and children
- Household income sources
- Detailed information on water resources, health services, educational services, energy sources, and food requirements
- Detailed information on land and livestock ownership, in case respondents own agricultural or/and pastoral land and livestock.

3.2. Statistical analysis

Specific data sheets were designed and coded based on the questionnaire parts and questions. Data were entered and analyzed using a program of "Statistical Package for the Social Sciences" (SPSS version 20). Quantitative techniques were used to generate baseline information based on the respondents' information and perceptions. Several tables synthesized the information regarding specific parameters on average, standard deviation, max and min values. While other parameters were generated based on the respondents' answers on open questions, these parameters will be presented in frequencies and percentages. These parameters are expected to visualize the current socio-economic status of the local communities in Badia, besides reflecting the current used resources and services. Nevertheless, the output of using mixed methods of quantitative and qualitative methods strongly recommends that future studies should be supplemented by interviews and focus group discussion in order to provide additional detail in the findings.

4. Results and discussion

In this section, the results reflecting the socio-economic status of the local communities will be provided based on the three areas of Badia, whereas the last section will provide a comparison of the socio-economic status between the three areas of Badia

Each section is divided into the following subsections:

- Detailed information on the household residency
- Family health and socio-economic characteristics
- Household income sources
- Detailed information on resources and services provided to the local community
- Detailed information on land and livestock ownership

The information provided in the following subsections demonstrates what we deem to be the most interesting and relevant findings. For further information and additional details, annexes (A-1, A-2, A-3) provide complete sets of tables' that represent the descriptive analysis of the questionnaire.

4.1 Northern Badia

4.1.1. Detailed Information on the Household characteristics

The sample had provided general information on their household characteristics. Most of the respondents' are residents of Al-Mansoora village representing 63.3 % of the sample. The respondents' residency type was mostly a permanent residency rather than temporary (92.7%), and their homes were mainly made of brick material (68.0%). About 74.7% of respondents homes contain 3-4 rooms and 94% of them don't own other houses rather than the one they live in. Besides, most of the respondents don't share their houses with other families except for 5.3% of the sample who share their household with their married children (4%), their married siblings (0.7%) or with their parents (0.7%).

Table 1: Household characteristics of families in Northern Badia

	Type	Number	Percentage %
Family residency type	Permanent	139	92.7
	Non-permanent	7	4.7
Residence type	Stone house	42	28
	Brick house	102	68
Do you own other houses	No	141	94
	Yes	5	3.3
Do you share your home with another family	No	138	92
	Yes	8	5.3
With whom do you share residency	My married	6	4
	My married	1	0.7
	My parents	1	0.7
Number of rooms	One room	1	0.7
	Two rooms	9	6
	Three rooms	57	38
	Four rooms	55	36.7
	Five rooms	22	14.7

4.1.2. Family Health and Socio-economic Characteristics

This section of the questionnaire collected information about the head of the family, wife (s) and children on the following: (1) Age (2) Educational level (3) Health status (4) type of sickness or/and disability (5) Does he/she work (6) type of work (if he/she works).

The average age of the family's heads in the northern Badia is 47.7 years (±12.06). About 41.3% of the sample has a secondary educational level, while more than 18 % of the household head had earned undergraduate and graduate degrees. Besides, 81.3 % of the head of the family was healthy, while about 16% stated for having chronic diseases (i.e. high blood pressure, diabetes, etc), besides other 1% reported for having disabilities. Moreover, 70.7% of the heads of houses are currently

working, mostly at the military (23.3%), retired (24%), and free business (10.0%). The majority of the male respondents have one wife (92.6%), while only 6.4% are married to a second wife. The majority of the first wife had an average age of 45.4 years (±12.34) and only 22.7% work mostly as teachers or as a governmental employee.

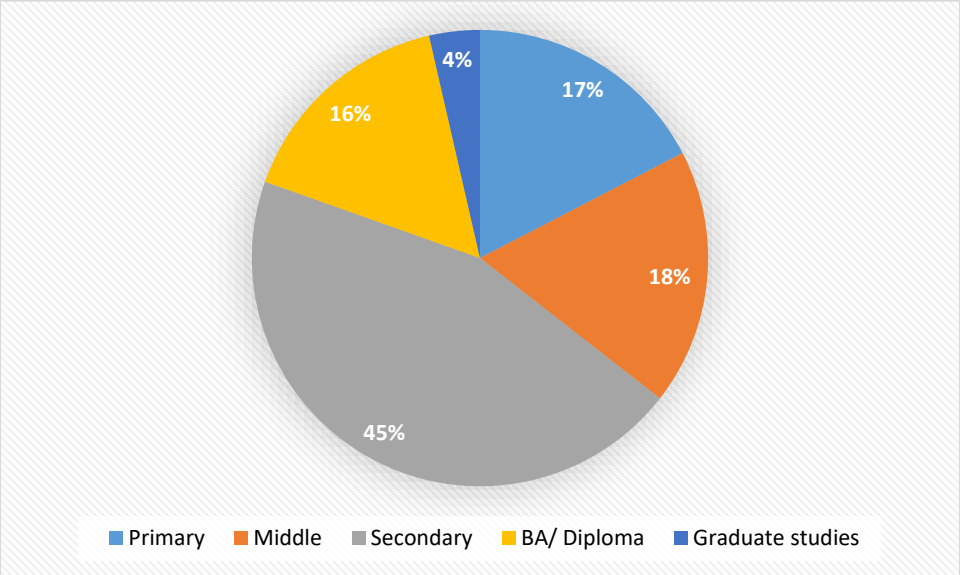


Figure 1: The education level of the household head in Northern Badia

Furthermore, specific questions were aimed to gather information about the family members and relevant characteristics of education and health status. The analysis of this section is introduced in annex A-1, as the questions in this section did not specify the order of children, so this database of children for each family could not generate general results or conclusions about family members of age more than 18 years or less. Nevertheless, each family in this region had one up to nine children. For further information and additional details, annex (A-1) provides a complete set of tables represent the health and socio-economic characteristics of the head of the family, first and second wife and all children.

For further information and additional details, annex (A-1) provides a complete set of tables represent the health and socio-economic characteristics of the head of the family, first and second wife and all children.

4.1.3. Household income

In this section, the income was defined in three types: public sector, private sector, and private business. Moreover, the income sources were investigated based on the type of agricultural practices: farming or/ and livestock breeding. Later, the respondents were asked about any type of domestic business at the household level. The household monthly income ranged from 50 JD to 2500 JD, thus the average monthly income is about 662.3 JD (± 503.6JD). The Majority of the respondents depend on jobs from the public sector as main income source (66.9%) mostly in Military (35.3%) and as retired (14.7%), while the other 11.5% depends on jobs in private sector and 10.8% depend on free business and breeding as main income sources (Table 2). None of the respondents had reported any type of domestic business at the household level.

Table 2: Respondents Sources of Income in Northern Badia

Question	Percentage %
Family income sources	
Public sector job	66.9
Private sector job	11.5
Free business job	10.8
Breeding	10.8

4.1.4. Detailed Information on Resources and Services Provided to the Local Community

This section aimed to collect information, and respondents' opinions on the different set of governmental services provided to the local community within the northern Badia, as follows:

Water Resources

This section aimed to indicate the availability, accessibility and quality of water sources in this region, which reflects the water source security of the local community in northern Badia.

The average monthly water consumption among the respondents is about 10.7 m^3 (±14.6), and the average received invoice for water consumption is about 34.7014 JD (±34.40769). Moreover, about 72.3% of the respondents are getting their water supply from the domestic water network that is operated by the water company in the northern area of Jordan, while the rest of the households are forced to obtain water supply from private tanks that cost higher than the domestic network. In addition, the local community is still facing some problems and setbacks regarding their water supplies due to several reasons, mainly for the shortage in water supply for the whole area (29.9%) and the high prices which reflect additional burden on the living costs (Figure 2).

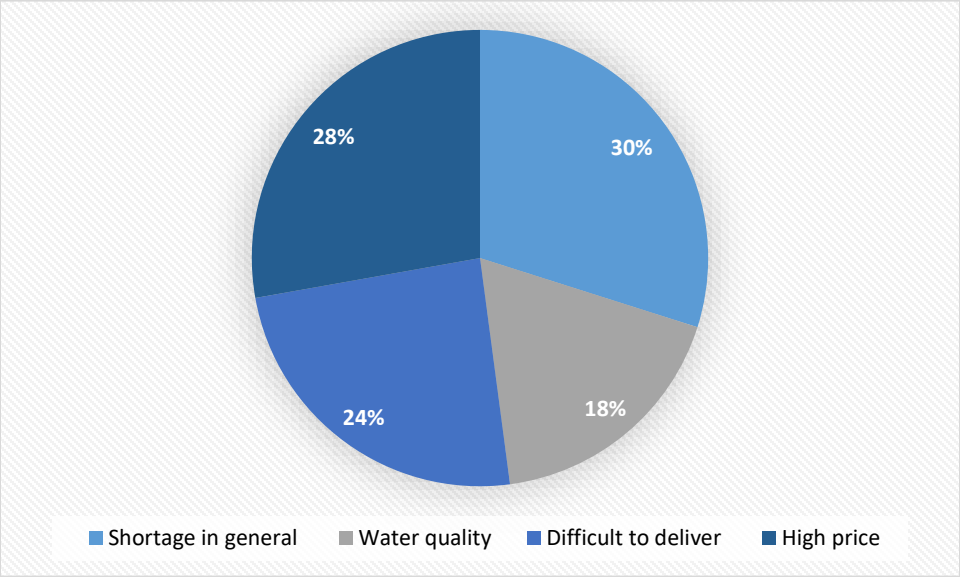


Figure 2: Problems Faced about Water Resources in Northern Badia

Health Services

This section deals with information relevant to health insurance, services type and location, the most provable treatment and the most important obstacles they face in this sector. The majority of the respondents' families have health insurance, where 60.7% receive their health services through military insurance at hospitals, and the other 23% receive their own governmen health insurance. The closest nearby hospital was around 19.1 km (±9.0), while the average distance to the closest health center was about 4.2 km (±3.5). Respondents also faced problems related to health services, mostly the lack of monthly treatments (35%), lack of medical staff (11%), among others as presented in Figure 3 and with additional details in annexA-1.

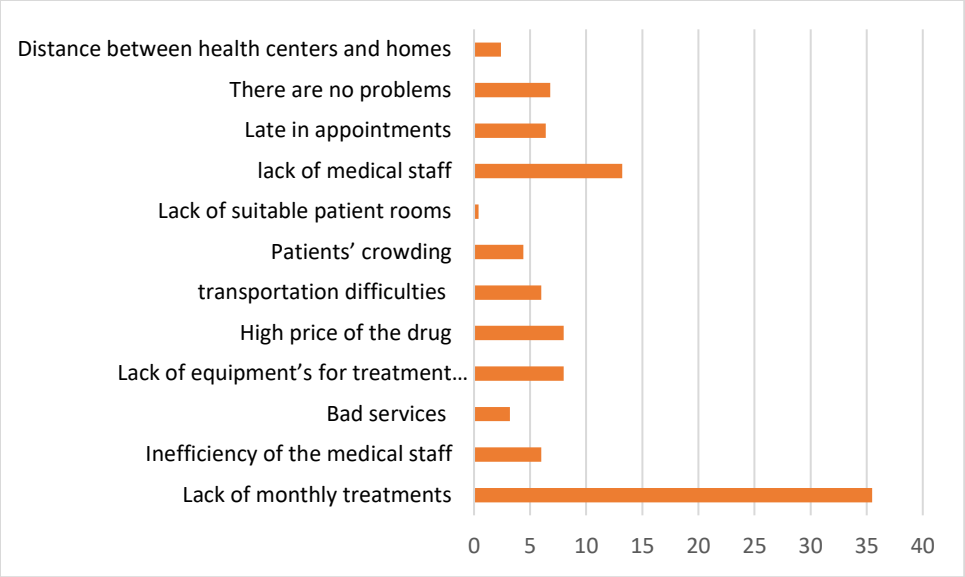


Figure 3: Problems Faced about Health Services in Northern Badia

Educational Services

This section is aimed to provide information about the educational services provided by different institutions for the school level. Where 59.3% of the respondents indicated that their children receive education at public school and the other 10% at the private schools, while the rest of them did not provide any information about this service. The average distance of nearest male schools is 4.3 km (±4.9), as only 35.3% of these male schools are comprehensive schools and the rest are up to the 10th grade only. On the other hand, the nearest female school is about 3.1 km (±2.4) average distance, and only 35.3% of these schools include grade levels; from level 1 till twelfth grade. The educational services in northern Badia face many problems and obstacles as indicated by the respondents. Some of the main problems are that some of the schools are rented buildings, and there is a lack of appropriate educational services (15%), the rented building as a location of the school (18.4%), besides to the decrease in the quality of the overall education level (13.8%), besides other obstacles as presented in figure 4.

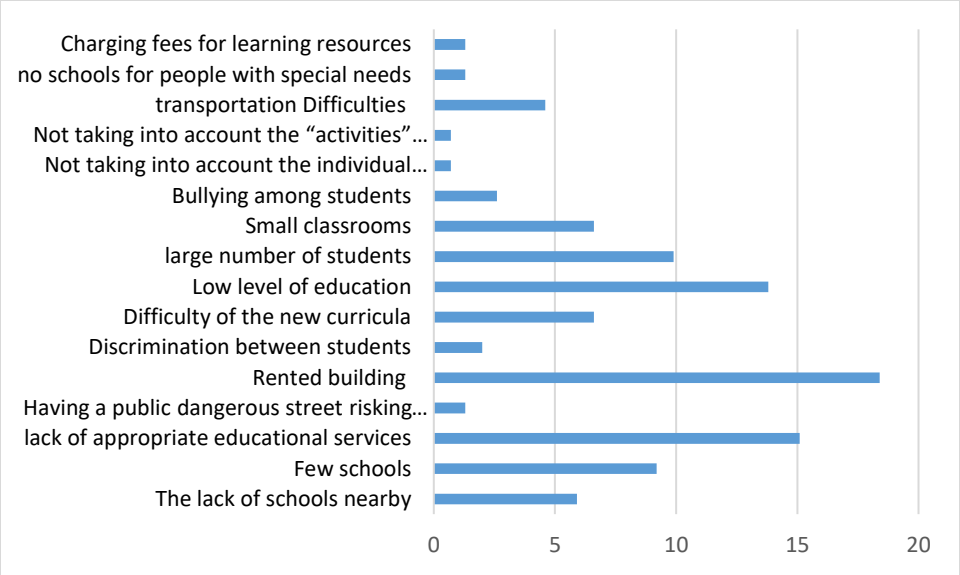


Figure 4: Problems Faced about Educational Services in Northern Badia

Energy Resources and food needs

This section deals with the main energy sources of the households for different uses; heating, cooking, and lighting. The results show that 98% of the respondents use electricity as the main light source. As for heating purposes, 67.3% use gas heaters, while 14.7% use firewood and another 6.7% use pressed olive residues for heating in the winter season. Finally, gas stoves are used for cooking purposes by 89.3% of the respondents.

On the other side, the majority of the respondents get their daily food needs from the nearest local market (98.7%) that about all the needs of vegetables and groceries, while very few depend on-farm production, especially for animal products. The local community within this study depends mostly on many food products for their daily consumption such as vegetables (20.5% of the respondents) that is brought from local markets, and bread (18.6% of the respondents) that is mainly bought also from the local bakeries as 90.7%, while still few depend on homemade bread. Other food products such as meat consist of 16.5% of the samples, besides, followed by rice and legumes that consist of about 13.5% and 10.8% of the community, respectively. This section is aimed to provide information about the educational services provided by different institutions for the school level. Where 59.3% of the respondents indicated that their children receive education at public school and the other 10% at the private schools, while the rest of them did not provide any information about this service. The average distance of nearest male schools is 4.3 km (±4.9),

as only 35.3% of these male schools are comprehensive schools and the rest are up to the 10th grade only. On the other hand, the nearest female school is about 3.1 km (±2.4) average distance, and only 35.3% of these schools include grade levels; from level 1 till twelfth grade. The educational services in northern Badia face many problems and obstacles as indicated by the respondents. Some of the main problems are that some of the schools are rented buildings, and there is a lack of appropriate educational services (15%), the rented building as a location of the school (18.4%), besides to the decrease in the quality of the overall education level (13.8%), besides other obstacles as presented in figure 4.

Table 3: Food products widely used by the respondents from Northern Badia

Food product	Frequency	Percent %
Rice	**71**	**13.5**
Bread	**98**	**18.6**
Meat	**87**	**16.5**
Fish	**8**	**1.5**
Vegetables	**108**	**20.5**
Dairy products	**35**	**6.7**
Legumes	**57**	**10.8**
Fruits	**31**	**5.9**
Poultry	**25**	**4.8**
Oil	**3**	**0.6**
Olives	**3**	**0.6**

4.1.5. Detailed Information on Land and Livestock Ownership

This section was designated to collect information in case the either respondents own (1) Agricultural or/and pastoral land and (2) Livestock.

Agricultural or/and Pastoral Land Owned by the Respondents

The respondents from northern Badia had an average of 12.36 dunum (±20.9) owned land; an average of 10.28 dunum (±4.7) of which is used for agricultural purposes and an average of 47.7 dunum (±49.2) is used as a pastoral land for livestock grazing. Respondents cultivate their land mainly for the purpose of using the land as a pasture for livestock they own (8%) or for trading (1.3%).

Lands owned and cultivated by the respondents are mainly planted with barley, wheat and olives (75%, 12.5%, and 12.5%, respectively). The crops are planted in rainfed cropping systems (8.7%). Respondents prefer these crops rather than other crops to be used as pasture (48%), followed by for their direct economic profit (32%), and for the sake of preserving the land (20%). However, some areas of owned lands are not entirely cultivated mainly due to the shortage of water, soil infertility and financial ability besides other reasons as described in Table 4.

Table 4: Reasons behind not Planting the Entire Owned Lands in Northern Badia

Reason	Percentage %
Lack of financial sources	18.4
Soil infertility	30.6
water shortage	38.8
Overgrazing	12.2

Livestock Owned by the Respondents

Ten percent of the respondents own sheep with an average of 16.6 head (±29.6), while 9.3% own goats with an average of 222.0 heads (±2.5). The ownership types of this livestock are 16%

individual ownership and 1.3% shared ownership. The breeding style is 9.3% in a closed barn and 7.3% in an open filed. Grazing and fodder is the main source of livestock feed.

The most common months of grazing are spring (10.7%) and winter (0.7%). 8% of the respondents tend to do their livestock grazing in their own lands, 5.3% in rented lands and 4.7% in communal pasture lands. While few owners don't travel a lot with their livestock flock during the grazing season, 10.7% of the respondents move around with their livestock during the grazing season, especially in winter. Thus, grazing is widely carried among the respondents for especially the limited availability of grazing plants besides other reasons described in Figure 5.

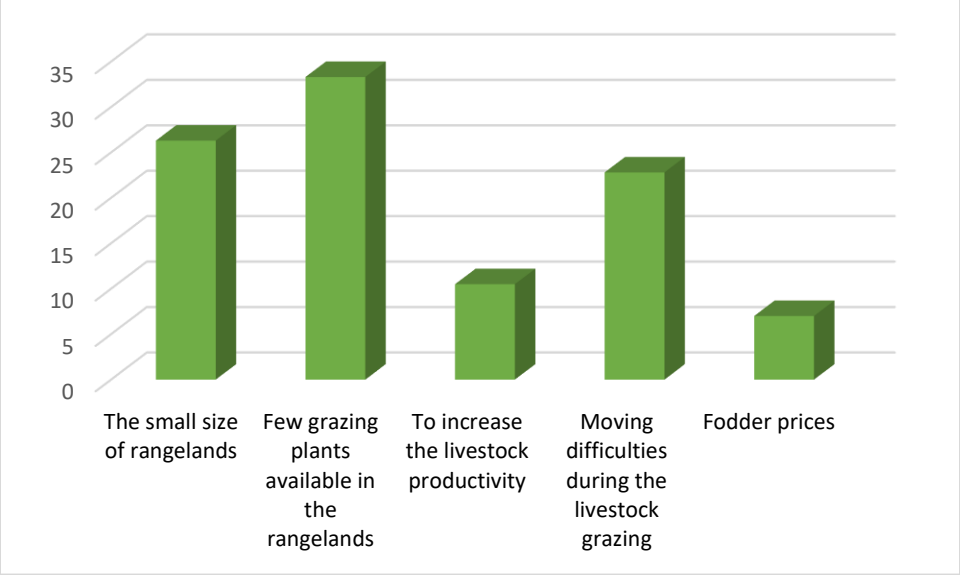


Figure 5: Grazing Preference Reasons in Northern Badia

Respondents also use fodder as a supportive source of feeding their livestock flocks. The livestock depends on barley, hay, bran, corn, wheat, and bread for fodder supplements. Fodder types used and their average amount and price at the local market are described in Table 5. The results of this section reflect high variations of the amount and the price of fodder used in the northern Badia region; therefore, the data used in this section should be used with care.

Table 5: Used Fodder Amounts and Prices per Season in Northern Badia

Question	Amount Mean (±SD)	Price Mean (±SD)	Percent %
Type of fodder used			
Barley	3.4 (937.1)	1.0 (1964.6)	45.2
Hay	1.2 (2111.3)	1.4 (2140.6)	22.6
Bran	5.9 (1087.2)	1.1 (1791.64)	21.0
Corn	30.0 (18.2)	20.0 (0.0)	6.5
Crusty bread	2.0(0.0)		3.2
Wheat	20.0	20.0)	1.6

Besides livestock feeding, other financial burdens posed on the livestock owners for the treating animal common diseases. Such common diseases reported by the respondents are mostly intestinal poisoning. The livestock owners, therefore, tend to inseminate the livestock either naturally (81.8%) or artificially (18.2%). But if the livestock gets sick, they mostly treat them at veterinarians (16.7%) or through the agricultural foundations and institutions (2%).

Female members of the local community have a vital role in raising livestock, where 33.8% they milk the sheep and goats, the other 26% produce dairy products, 19.5% graze with the livestock, 15.6% take care of the newborns and 5.2% help in marketing.

Livestock owners with the local community of Northern Badia face some obstacles with the agriculture and livestock raising sector. The prioritized obstacles recognized by the respondents are the water shortage (27.1%), the high prices of livestock (17.3%), lack agricultural areas and lands for cultivation (16.9%) and the high prices of fodder (14.9%). Some of the proposed projects by the respondents reported several suggestions especially the reduction in fodder prices and digging wells, additional suggestions and opinions are described in Table 6.

Table 6: Projects Proposed by the Respondents to Overcome Obstacles with the Agriculture and Livestock Sector in Northern Badia

Proposed project	Frequency	Percent %
Donors help and provide animal and agricultural production	7	5.3
Wells drilling	30	22.7
Reducing livestock prices	21	15.9
Reducing fodder prices	24	18.2
Livestock care	4	3.0
Opening projects for women to manufacture dairy products	1	0.8
Barley production and improving the chances of its uses	4	3.0
Increasing farmers' income by increasing production capacity	7	5.3
Supporting the efforts of the concerned national programs and agencies, especially scientific research	4	3.0
Establishing reserves	5	3.8
Providing mobile veterinary clinics	11	8.3
Opening factories for dairy marketing	4	3.0
Crop cultivation according to climate	4	3.0
Provide jobs	3	2.3

4.2 Middle Badia

4.2.1. Detailed Information on the Household characteristics

The sample had provided general information on their household characteristics. Most of the respondents' are residents of Al-Azraq representing 95.7 % of the sample. The respondents' residency type were mostly permanent residency (76.8%) rather than temporary (18.1%), and the buildings were mainly made of brick material (76.8%), while few were living in stone houses or tents. All respondents had between 1-5 rooms in their homes, 94.2% of which don't own more than one house except they were living in. Besides, most of the respondents didn't share their houses with others, while only 15.9% of the sample shared their houses with married children, parents or married siblings.

Table 7: Household characteristics of families in Middle Badia

	Type	**Number**	**Percentage %**
Family residency type	Permanent	**106**	**76.8**
	Non-permanent	**25**	**18.1**
Residence type	Stone house	**14**	**10.1**
	Brick house	**106**	**76.8**
	Tent	**15**	**10.9**
Do you own other houses	No	**130**	**94.2**
Do you share your home with another family	No	**111**	**80.4**

4.2.2. Family Health and Socio-economic Characteristics

This section of the questionnaire aimed to collect information about the head of the family, wife (s) and children regarding the following aspects: (1) Age (2) Educational level (3) Health status (4) type of illness or/and disability (5) employment (6) type of work (if he/she works).

The average age of the family's heads in the middle Badia was about 48.1 years (±12.9). About 39.9% of the sample had a secondary educational level, while about 14.4 % of the household head had earned undergraduate and graduate degrees. Besides, about 79.7% of the head of the family admitted to being healthy people, whilst about 15.9% stated for having chronic diseases (i.e. high blood pressure, diabetes, etc) and none have reported having any disabilities. Moreover, 65.9% of the heads of the house were currently working mostly were retired (5.2%), independent business (9.4%), and military (8.7%). The majority of the male respondents had one wife, while few are married to a second wife and none of the wives had been working.

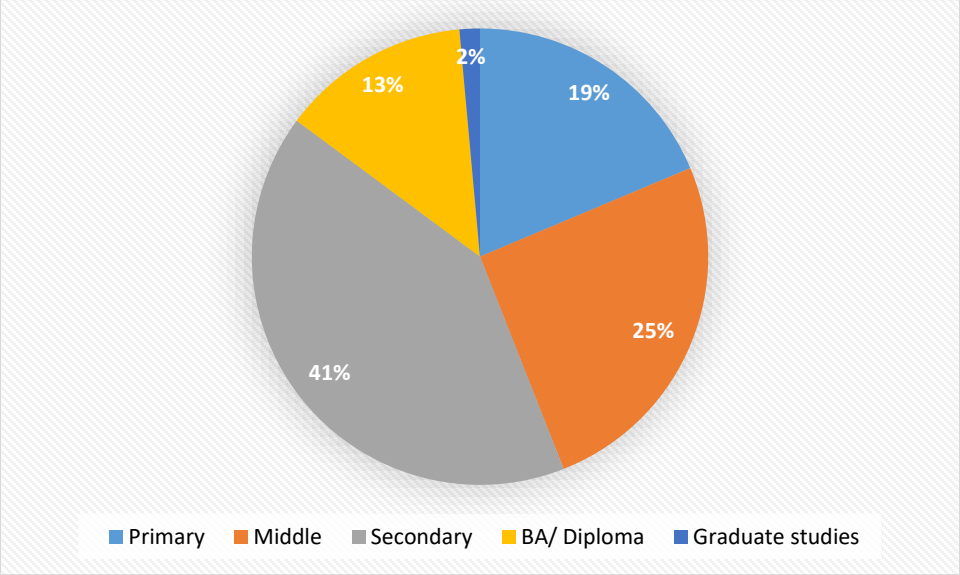


Figure 6: The education level of the household head in middle Badia

Furthermore, specific questions were aimed to gather information about the family members and relevant characteristics of education and health status. The analysis of this section is introduced in annex A-2, as the questions in this section did not specify the order of children, so this database of children for each family could not generate general results or conclusions about family members of age more than 18 years or less. Nevertheless, each family in this region had one up to nine children. For further information and additional details, annex (A-2) provides a complete set of

tables represent the health and socio-economic characteristics of the head of the family, first and second wife and all children.

4.2.3. Household Income

The household monthly income ranged from 50 JD to 900 JD, thus the average monthly income is about 319.1 JD (± 139.3 JD). The Majority of the respondents depend on jobs from the public sector as the main income source (49.2%), while other (11.6%) retired and the other 8.7% worked at the Military. While other 26.6% depended on private business and 3.3% depending on jobs in the private sector as the main income sources (Table 8). Moreover, about 5.1% of the respondents had reported "Diary processing" as a domestic business at the household level, while 0.7% reported jams production. Very few households depend on agricultural activities for income.

Table 8: Respondents Sources of Income in Middle Badia

Question	Percentage %
Family income sources	
Public sector job	**49.2**
Private sector job	**13.3**
Free business job	**26.6**
Agricultural practices	**3.1**
Breeding	**7.8**

4.2.4. Detailed Information on Resources and Services Provided to the Local Community

This section aimed to collect information and respondents opinions on the different sets of governmental services provided to the local community within the middle Badia region, as follows:

Water Resources

This section aimed to indicate the availability, accessibility, and quality of water sources in this region, which reflects the water source security of the local community in the middle Badia region.

The average monthly water consumption among the respondents is about 26 m3 (±21.7), and the water cost ranged from 5JD per month up to 213 JD per month, thus the average received an invoice of water consumption is about 31.1 JD (±46.4), which reflects high variation in water costs among all households. Moreover, about 85.1% of the respondents received their water supply from the domestic water network, while the other 12.7% of the households obtain their water supply from private tanks and 2.2% depending on water springs. The local community highlighted several problems and setbacks regarding their water supplies, mainly for the high prices of water (35.2%) besides the low water quality and other problems (Figure 7).

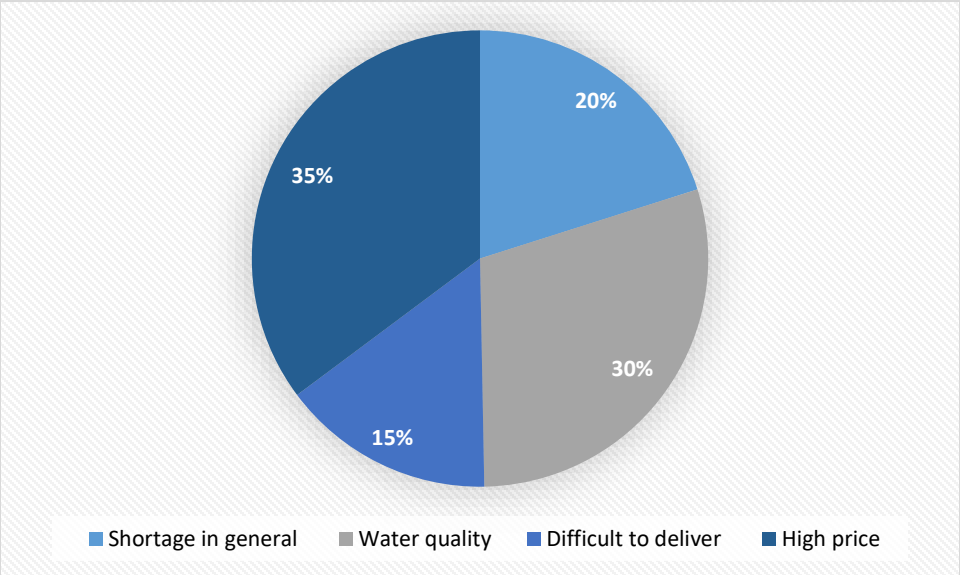


Figure 7: Problems Faced about Water Resources in Middle Badia

Health Services

This section deals with information relevant to health insurance, services type and location, the most desired treatment and the significant obstacles that respondent faces in this sector. As reported most of the respondents' families have health insurance, where 78.3% receive their health services by public hospitals, and the other 11.6% receive their own governmental health treatments. The closest nearby hospital was around 68.5 km (±32.7), while the average distance to the closest health center was about 6.6 km (±8.9). Respondents also faced several problems related to health services, most were about the lack of specialist doctors (22.7%), and lack of treatments of chronic diseases (20.5%), besides additional problems as presented in Figure 8 and with additional details in Annex A-2.

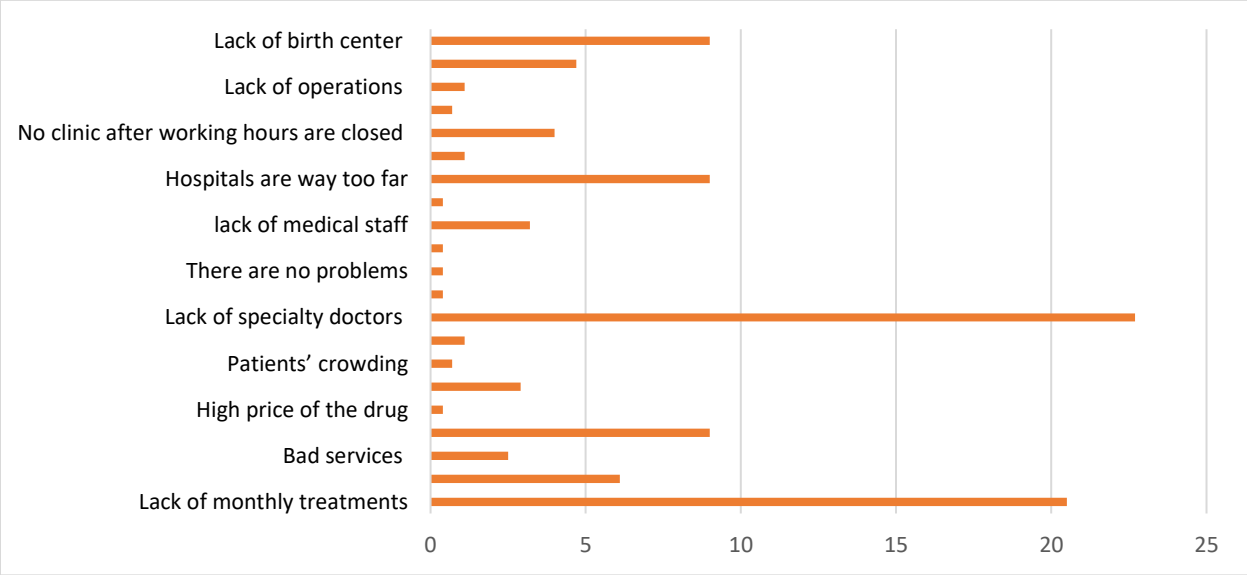


Figure 8: Problems Faced about Health Services in Middle Badia

Educational Services

This section is aimed to provide information about the educational services provided by different institutions for the school education services. Where, 81.2% of the respondents indicated that their children received education at public schools and the rest at the military schools (1.4%), besides, few respondents did not provide any information about this service. The average distance of nearest male students schools was about 3.0 km (±7.3), as only 32.6% of these male schools were classified as comprehensive schools and the rest were elementary schools that admitted only students up to the 6th grade only. On the other hand, the nearest female school is about 1.7 km (±2.7) average distance, and only 34.1% of these schools included all grade levels. The

educational services in Middle Badia faced many problems and obstacles as indicated by the respondents. Some of the main problems were the lack of appropriate educational services (17.4%), limited school capacities compared with the number of students (13.7%), a limited number of teachers (11.8%), besides other obstacles as presented in figure 9.

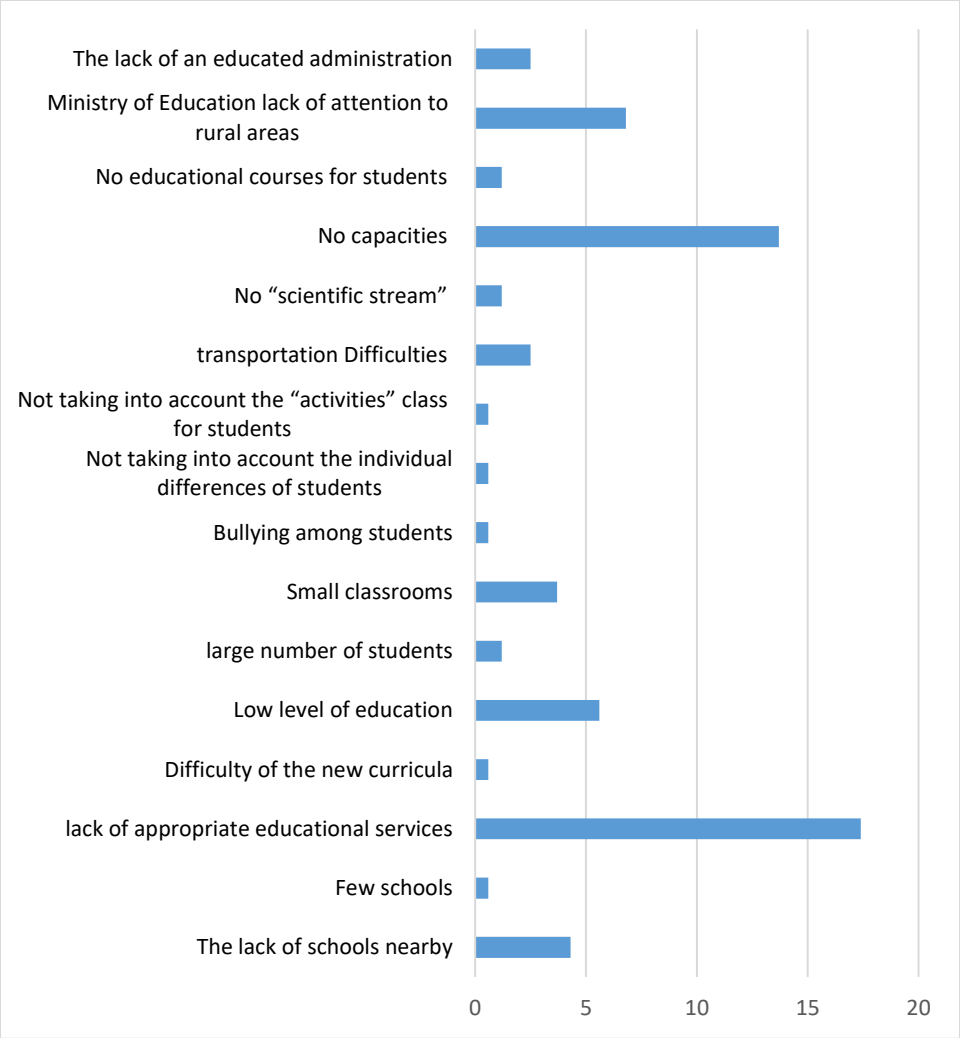


Figure 9: Problems Faced about Educational Services in Middle Badia

Energy Resources and food needs

This section deals with the main energy sources used by households for different uses; heating, cooking, and lightning. The results showed that 79.0% of the respondents use electricity as the main light source, while only 8.0% use electricity generators and the other 2.2% use solar energy.

As for heating purposes, 66.0% use gas heaters, while 13.3% use firewood, and other 4.0% of which depend on pressed olive residues. Finally, gas stoves are used mostly for cooking purposes by 44.9% of the respondents, while 21.0% use diesel gas heaters, 15.2% use firewood for cooking, and 8.7% use electric heaters.

On the other side, the majority of the respondents get their daily food needs from the nearest local market (89.1%) that about all the needs of vegetables and groceries, while very few depend on-farm production, especially for animal products. The local community within this study depends mostly on many food products for their daily consumption such as vegetables (25.4% of the respondents), and legumes (12.2% of the respondents). Other food products such as meat were consumed by 11.9% of the samples and followed by rice and poultry (10.5%, for each).

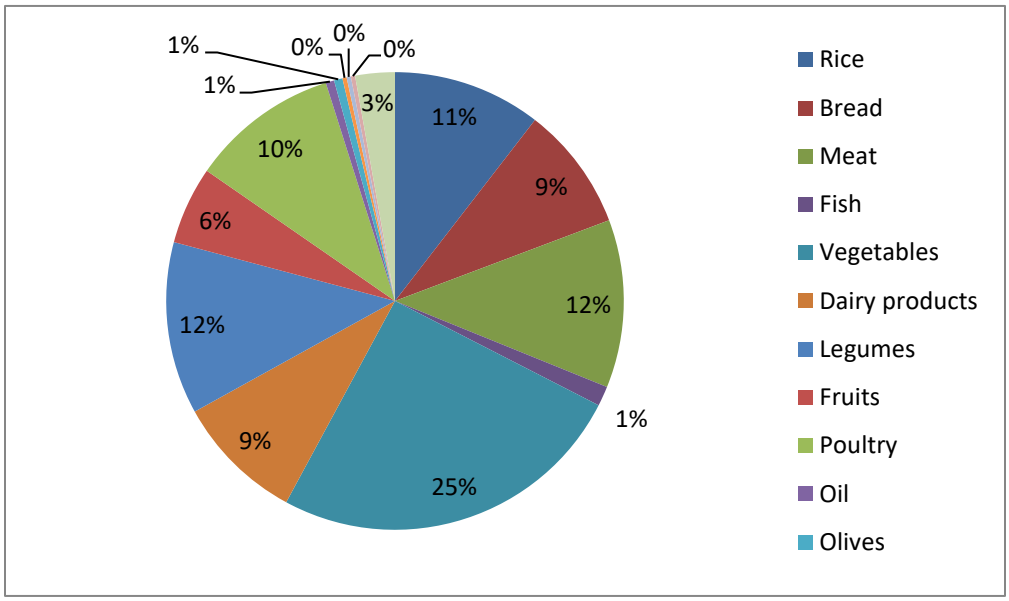


Figure 10: Food products widely used by the respondents from Middle Badia

4.2.5. Detailed Information on Land and Livestock Ownership

This section was designated to collect information in case the either respondents own (1) Agricultural or/and pastoral land and (2) Livestock.

Agricultural or/and Pastoral Land Owned by the Respondents

The respondents from the middle Badia owned land in an average of 6.4 dunum (±11.1); and about 17.2 dunum (±31.6) of agricultural land, furthermore the respondents reported that they use

pastoral land for livestock grazing, which was in average about 8.7 dunum (±7.3). The land owned by the households in this region showed high variations sizes. Respondents cultivated their land mainly for the purpose of family consumption of agricultural products (10.1%), and for using the land as a pasture for livestock they own (1.4%) or for trading (.7%).

Lands owned and cultivated by the respondents were mainly planted with olive, vegetables, clover, and Pomegranate (43.8%, 18.8%, 12.5%, and 12.5%, respectively). The crops were mostly planted in rainfed cropping systems (7.2%), while few are irrigated using groundwater (2.9%). Respondents prefer these crops rather than other crops for their high and quick economic profit (42.9%), and for livestock consumption and family consumption (28.6% each). But some areas of owned lands remain not entirely cultivated mainly due to the limited financial ability, shortage of water, soil infertility besides other reasons as described in Table 9.

Table 9: Reasons behind not utilizing the households' owned land in Middle Badia

Reason	Percentage %
Financial inability	**39.3**
Soil infertility	**25.0**
water shortage	**32.1**
Overgrazing	**3.6**

Livestock Owned by the Respondents

Fifty-seven percent of the respondents own goats with an average of 1.3029 heads (±252.2), which reflects high variation among livestock numbers among respondents. While about 35.7% of the families owned sheep with an average of 51.7 heads (±29.5) and only one respondent own 1 camels (7.1% of the sample). The respondents pointed out that all livestock ownership was individual ownership and there was no shared livestock among families. The breeding style is 4.3% in a closed barn and 2.2% in an open barn. Grazing and fodder is the main source of livestock feed.

Only one respondent from middle Badia reported the common grazing months and it was the spring season. About 5.8% of the respondents tend to do the livestock grazing in communal pasture lands, while 0.7% in their own lands. Moreover, 4.3% of the respondents' owners don't travel a lot with their livestock flock during the grazing season, but 2.2% of the respondents move around with their livestock during the grazing season mostly either by vehicle or foot. Thus, grazing is widely carried among the respondents, especially the small size of rangelands beside other reasons described in Figure 11.

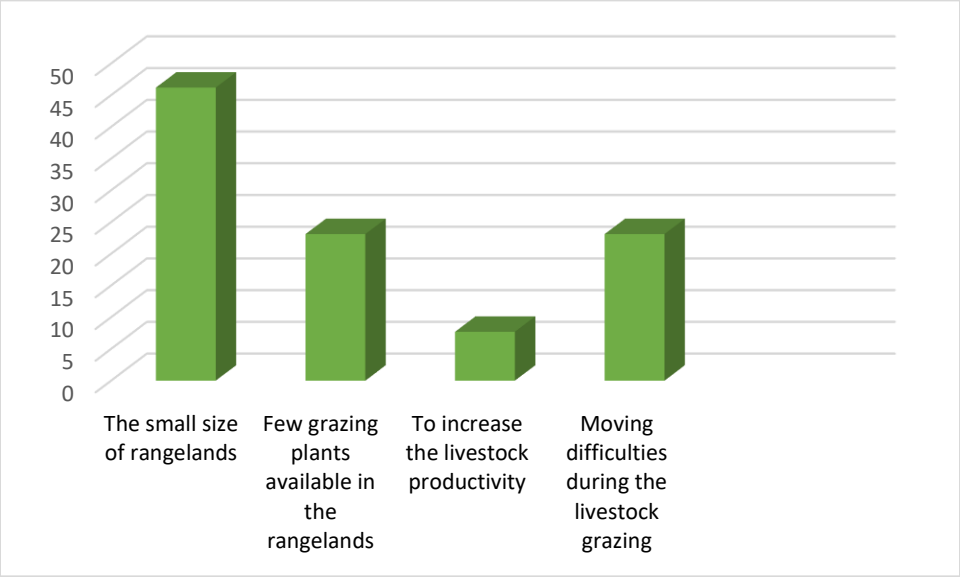


Figure 11: Grazing Preference Reasons in Middle Badia

Respondents also use fodder as a supportive source of feeding their livestock flocks. The livestock depends on barley, bran, and clover for fodder supplements. Fodder types used and their average amount and price at the local market are described in Table 10. The results of this section reflect high variations of the amount and the price of fodder used in the middle Badia region, therefore, the data used in this section should be used with care.

Table 10: Used Fodder Amounts and Prices per Season in Middle Badia

Question	Amount Mean (±SD)	Price Mean (±SD)	Percent %
Type of fodder used			

Barley	**2.5 (1.2)**	**3.4 (84.1)**	**40.0**
Bran	**6.6 (4.6)**	**1.0(153.0)**	**30.0**
Clover	**24.2 (15.0)**	**35.0 (0.0)**	**30.0**

Besides livestock feeding, other financial burdens posed on the livestock owners for treating animal common diseases. Such common diseases reported by the respondents are mostly poisoning. The livestock owners therefore fully tend to inseminate the livestock naturally (6.5%). But if the livestock gets sick, they mostly seek treatments form the Ministry of Agriculture services (3.6%), the agricultural foundations and institutions (1.4%), or private veterinarians (0.7%). Female members of the local community have a vital role in raising the livestock, where 35.0% milk the sheep and goats, 30.0% produce dairy products, 20.0% take care of the newborns, 10.0% graze with the livestock and 5.0% help in fattening the cattle.

Livestock owners with the local community of middle Badia face some obstacles with the agriculture and livestock raising sector. The prioritized obstacles recognized by the respondents are the water shortage (21.8%) and the lack of agricultural areas and lands for cultivation (14.1%), overgrazing (11.5%) and lack of pasture (10.3%). Some of the proposed projects by the respondents reported several suggestions especially digging wells for water supply and establishing rangeland reserves, additional suggestions and opinions are described in Table 11.

Table 11: Projects Proposed by the Respondents to Overcome Obstacles with the Agriculture and Livestock Sector in Middle Badia

Proposed project	Frequency	Percent %
Donors help and provide animal and agricultural production	**2**	**5.6**
Wells drilling	**9**	**25.0**

Reducing fodder prices	**2**	**5.6**
establishing reserves	**8**	**22.2**
Opening factories for dairy marketing	**2**	**5.6**
Fodder distribution	**3**	**8.3**
Pastures cultivation	**4**	**11.1**
Training and rehabilitation	**2**	**5.6**

4.3 Southern Badia

4.3.1. Detailed Information on the Household characteristics

The sample from this region provided general information on their household characteristics. Most of the respondents' were residents of Al-Manshiyeh village representing 64.7 % of the sample. The respondents' residency types were entirely permanent residency rather than temporary (100%), and their homes were mostly made of brick material (82.0%). All respondents have at least two rooms in their homes and they didn't own other houses rather than the one they live in. Besides, most of the respondents didn't share their houses with other families except for 2% of the sample who share their household with their married children, married siblings or with the parents (0.7% each).

Table 12: Household characteristics of families in Southern Badia

	Type	**Number**	**Percentage %**
Family residency type	Permanent	**150**	**100.0**
	Non-permanent	**0**	**0**
Residence type	Stone house	**25**	**16.7**

	Brick house	**123**	**82.0**
	Tent	**2**	**1.3**
Number of rooms	One room	**0**	**0**
	Two rooms	**8**	**5.3**
	Three rooms	**57**	**38.0**
	Four rooms	**64**	**42.7**
	Five rooms	**18**	**12.0**

4.3.2. Family Health and Socio-economic Characteristics

This section of the questionnaire aimed to collect information about the head of the family, wife (s) and children on the following: (1) Age (2) Educational level (3) Health status (4) type of sickness or/and disability (5) employments (6) type of work (if he/she works). The average age of the family's heads in the southern Badia was 45.4 years (±11.4). About 47.3% of the sample had passed the secondary educational level, while more than 8% of the household head had earned undergraduate and graduate degrees. Besides, 87.3% of the head of the family was healthy, while about 11.3% declared the fact of having chronic diseases (i.e. high blood pressure, diabetes, etc) and none have reported having any disabilities. Moreover, 80.7% of the heads of the houses were currently working. The household heads were retired (33.3%), working at the military forces (10.7%), and private business (6.7%). The majority of the male respondents were married to a single wife (95.3%), while only 7.7% were married to a second wife, and one respondent to a third wife. 20% of the first wives were working, mostly as teachers, while only 1.3% of the second wife's work as either a teacher or in the local municipality.

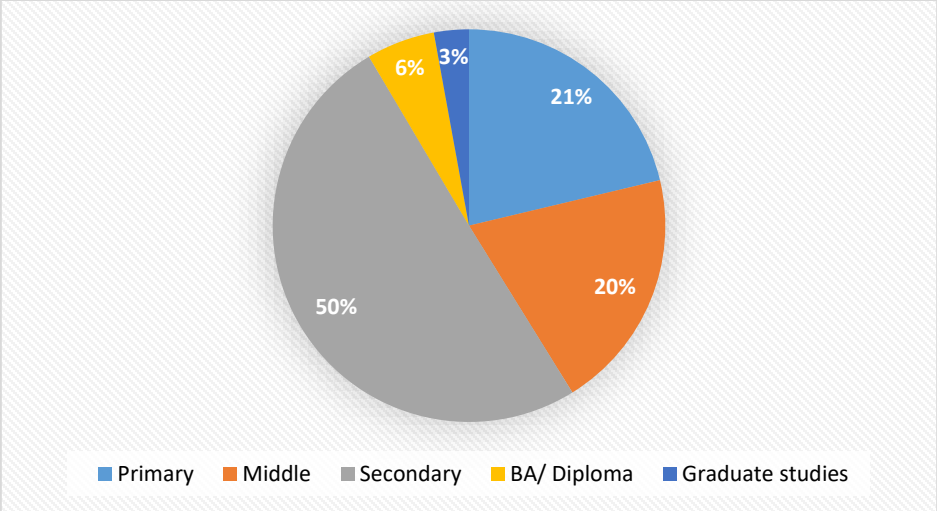


Figure 12: The education level of the household head in southern Badia

Furthermore, specific questions were aimed to gather information about the family members and relevant characteristics of education and health status. The analysis of this section is introduced in annex A-3, as the questions in this section did not specify the order of children, so this database of children for each family could not generate general results or conclusions about family members of age more than 18 years or less. Nevertheless, each family in this region had one up to nine children. For further information and additional details, annex (A-3) provides a complete set of tables represent the health and socio-economic characteristics of the head of the family, first and second wife and all children.

For further information and additional details, annex (A-3) provides a complete set of tables represent the health and socio-economic characteristics of the head of the family, first and second wife and all children.

4.3.3. Household income

In this section, the income was classified into three types: public sector, private sector, and private business. Moreover, the income sources were investigated based on the type of agricultural practices: farming or/ and livestock breeding. Later, the respondents were asked about any type of domestic business at the household level. The household monthly income ranged from 90 JD to 2000 JD, thus the average monthly income is about 459.7 JD (± 330.1 JD). The Majority of the respondents depend on jobs from the public sector as main income source (68.0%) mostly retired

(21.3%) and worked at the Military forces (20.7%), while the other 11.4% depends on jobs in private sector and 7.3% depend on farming as main income source (Table 14). About 4.7% of the respondents had reported "Processing of dairy products" as a domestic business at the household level.

Table 13: Respondents Sources of Income in Southern Badia

Question	Percent %
Family income sources	
Public sector job	**68.0**
Private sector job	**11.4**
Free business job	**8.0**
Agricultural practices	**.6**
Breeding	**12.0**

4.3.4. Detailed Information on Resources and Services Provided to the Local Community

This section aimed to collect information and respondents opinions on the different set of governmental services provided to the local community within the southern Badia region, as follows:

Water Resources

This section aimed to indicate the availability, accessibility, and quality of water sources in the southern Badia region, which reflects the water source security of the local community in southern Badia. The average monthly water consumption among the households was about 95.4 m3 (±309.3), and the average received invoice for water consumption was about 19.0 JD (±15.8). Moreover, about 93.4% of the respondents were getting water supplies from the domestic water network, while 6% of the households depended on water springs and the rest of households obtain the water supply from private tanks. The local community is still facing some problems and

setbacks regarding their water supplies, mainly for the shortage in water supply for the whole area (32.0%) and the high prices which reflected additional burden on the living costs (Figure 13).

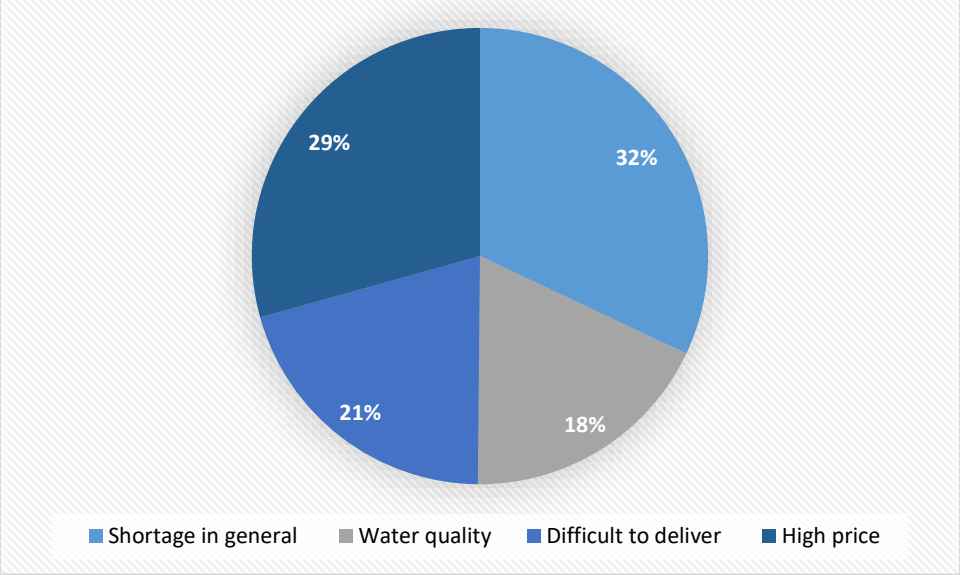


Figure 13: Problems Faced about Water Resources in Southern Badia

Health Services

his section deals with information relevant to health insurance, services type and location, the most desired treatment and the most important obstacles families faced in this sector. The majority of the respondents' families have health insurance, where 48.0% receive their health services by military insurance at hospitals, and the other 36.7% receive their own government health insurance. The closest nearby hospital was around 21.9 km (±11.6), while the average distance to the closest health center was about 5.7 km (±6.5). Respondents also faced problems related to health services, mostly the lack of monthly treatments (23.6%), lack of medical staff (14.3%), additional to other problems as presented in Figure 13 and additional details in Annex A-3.

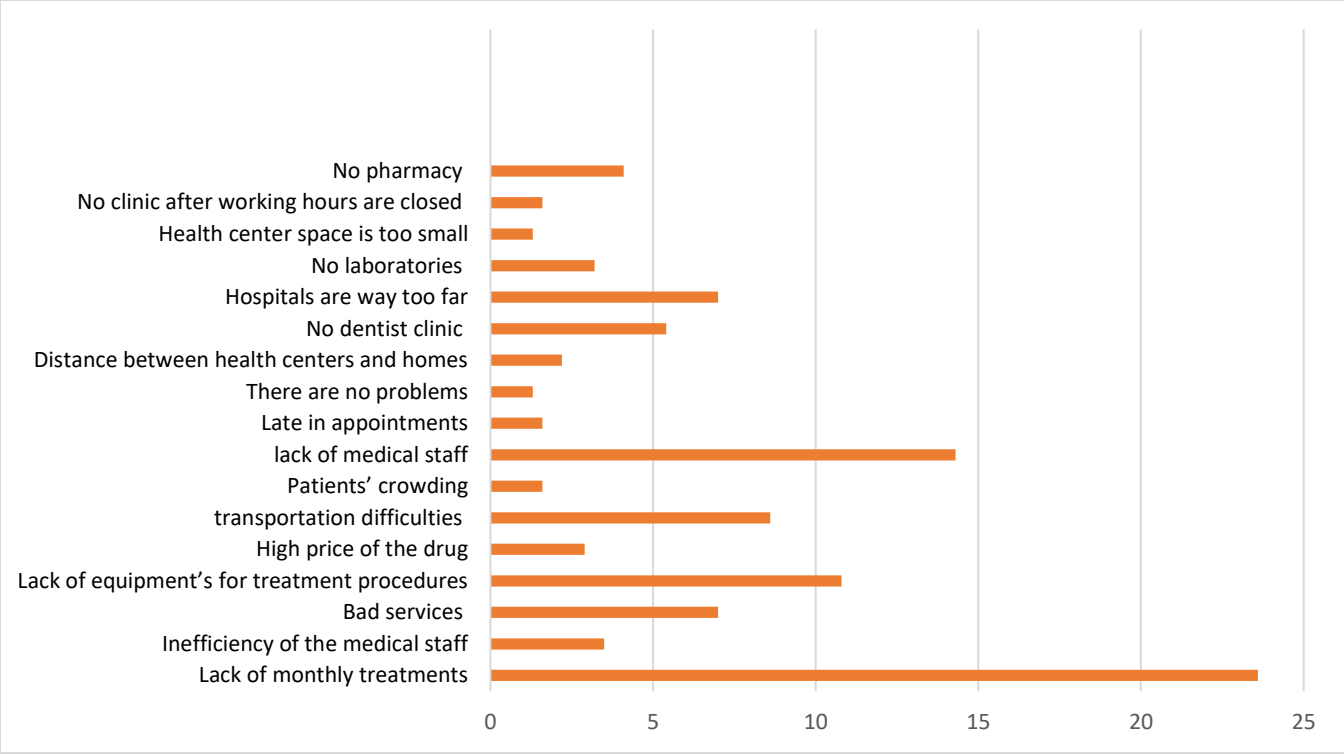


Figure 14: Problems Faced about Health Services in Southern Badia

Educational Services

This section is aimed to provide information about the educational services provided by different institutions for the school level. Where 79.3% of the respondents indicated that their children receive education at public school and the remaining either at the private schools (4.7%) or military schools (0.7%). Few respondents, however, did not provide any information about this service. The average distance of nearest male schools is 3.7 km (±4.2), as only 45.3% of these male schools were comprehensive schools and the rest were schools till the 10th grade only. On the other hand, the nearest female school was about 3.2891 km (±3.2) average distance, and only 44.0% of these schools include all grade levels. The educational services in the southern Badia region were suffering from many problems and obstacles as indicated by the respondents. Some of the main problems were are the lack of appropriate educational services (19.4%), the fact that there is no "scientific stream" (11.2%), and limited nearby schools (10.7%), besides other obstacles as presented in figure 15.

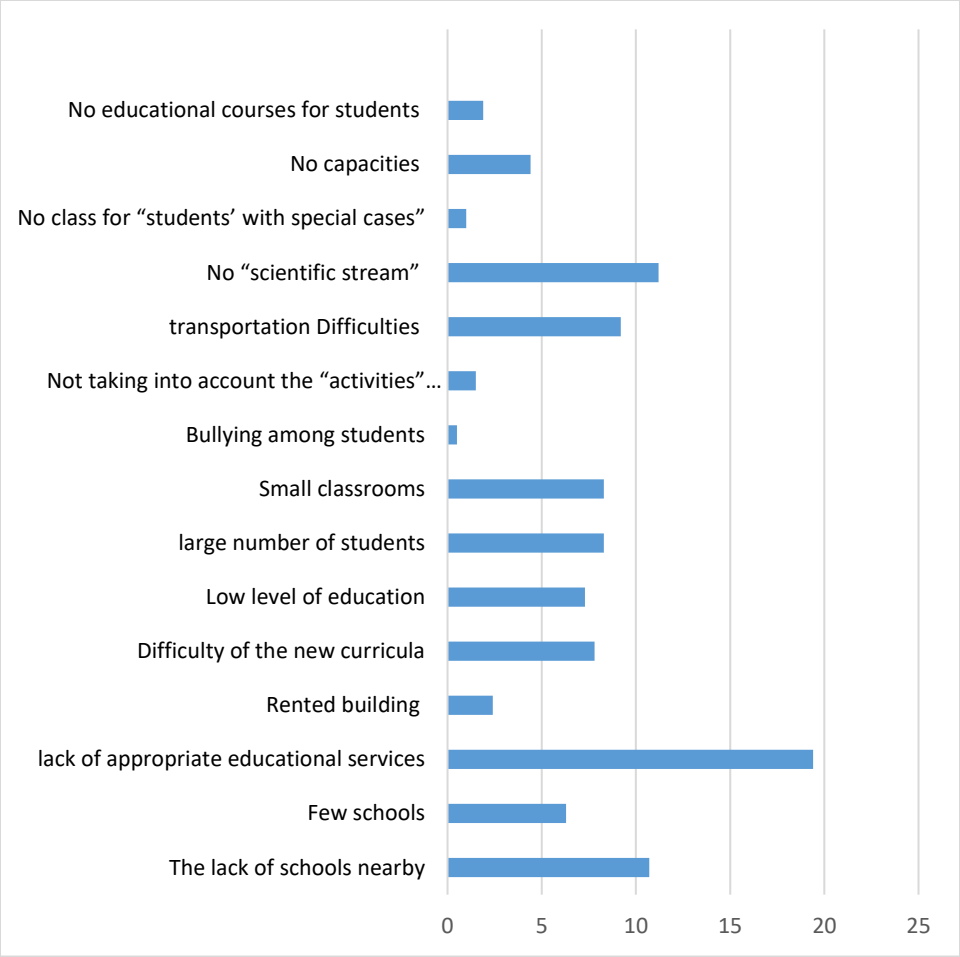


Figure 15: Problems Faced about Educational Services in Southern Badia

Energy Resources and food needs

This section provides information about the main energy sources of the households for different uses; heating, cooking, and lightning. The results showed that 95.3% of the respondents used electricity as the main light source, while only 1.3% used gas lamps. As for heating purposes, 66.0% used gas heaters, while 13.3% used firewood, 4.0% of which were pressed olive residues. Finally, gas stoves were used mostly for cooking purposes by 92.7% of the respondents, while other 3.3% still used firewood for cooking.

On the other side, the majority of the respondents get their daily food needs from the nearest local market (88.0%) that about all the needs of vegetables and groceries, while very few depend on-

farm production, especially for animal products. The local community within this study depended mostly on many food products for their daily consumption such as vegetables (22.2% of the respondents), and bread (13.9% of the respondents) that mainly bought also from the local bakeries as 91.3%, while still few depended on homemade bread. Another food product such as rice was consumed by 13.4% of the samples, followed by meat that consisted of about 12.3% of the community (Figure 16).

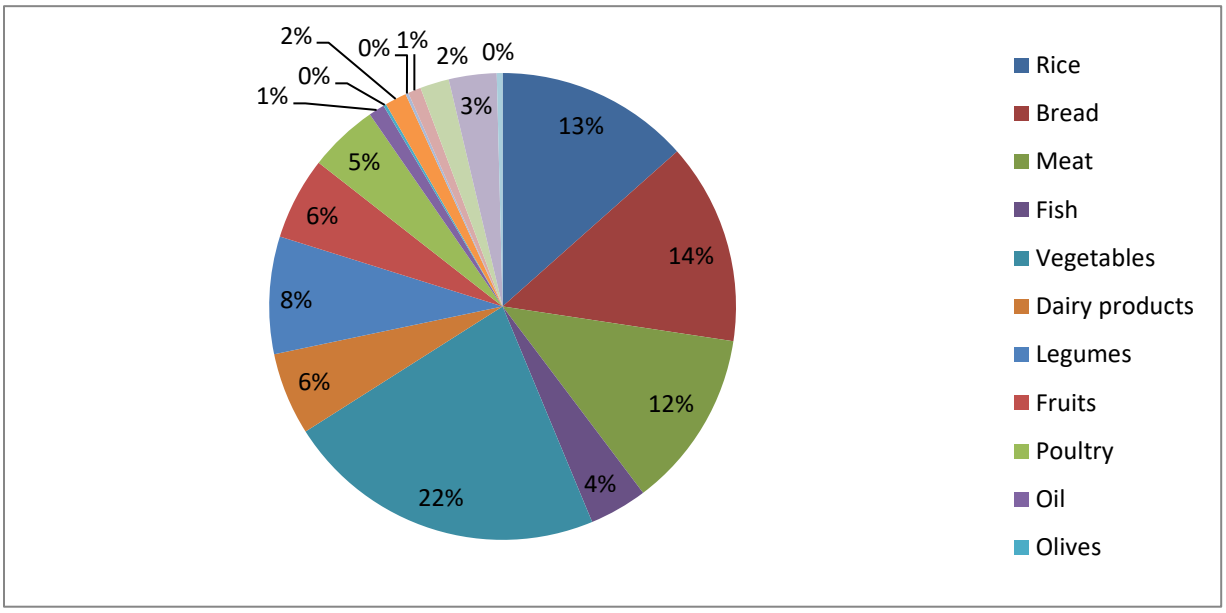


Figure 16: Food products widely used by the respondents from Southern Badia

4.3.5. Detailed Information on Land and Livestock Ownership

This section was designated to collect information in case the either respondents own (1) Agricultural or/and pastoral land and (2) Livestock.

Agricultural or/and Pastoral Land Owned by the Respondents

The respondents from southern Badia had an average of 19.6 dunum (±29.3) owned land; an average of 13.3 dunum (±20.76) of which is used for agricultural purposes and an average of 17.7 dunum (±37.3) is used as a pastoral land for livestock grazing. Respondents cultivated their land mainly for the purpose of using the land as a pasture for livestock they own (16.7%) or for family consumption of agricultural products (12%) or for trading (4.7%).

Lands owned and cultivated by the respondents were mainly planted with barley, wheat and, clover (40.2%, 23.0% and 17.2%, respectively). The crops are mostly planted in rainfed cropping systems (20.7%), while few were irrigated either from wells (6%) or from groundwater (2.7%). Respondents preferred these crops rather than other crops to be used as pasture (50%), followed by for preserving the land (28.6%) and for their direct economic profit (21.4%). However, some areas of owned lands are not entirely cultivated mainly due to the shortage of water, the lack of machines to plow the land and limited financial ability besides other reasons as described in Table 14.

Table 14: Reasons behind not planting the Entire Owned Lands in Southern Badia

Reason	Percentage %
Financial inability	**15.0**
Soil infertility	**5.6**
water shortage	**34.6**
Lack of machines to plow the land	**27.1**
Unavailability of seeds	**5.6**

Livestock Owned by the Respondents

Fifty percent of the respondents own goats with an average of 22.3 heads (±29.7), while 48.9% own sheep with an average of 63.1 heads (±49.5) and only one respondent owns 4 camels (1.1% of the sample). The ownership type of this livestock was 33.3% individual ownership and 1.3% was shared ownership. The breeding style was 18.0% in an open barn and 15.3% in a closed barn. Grazing and fodder were the main sources of livestock feed in this region.

Livestock in this region mainly depended on grazing as reported by 10% of the respondents. As 19.3% of the respondents tended to do the livestock grazing in communal pasture lands, 18.7% in

their own lands, and 4.0% in rented lands. While 22% of the respondents didn't travel a lot with their livestock flock during the grazing season, and 20.7% of the respondents move around with the livestock during the grazing season especially in winter and summer season. Thus, grazing is widely carried among the respondents, especially due to the limited availability of grazing plants besides other reasons described in Figure 17.

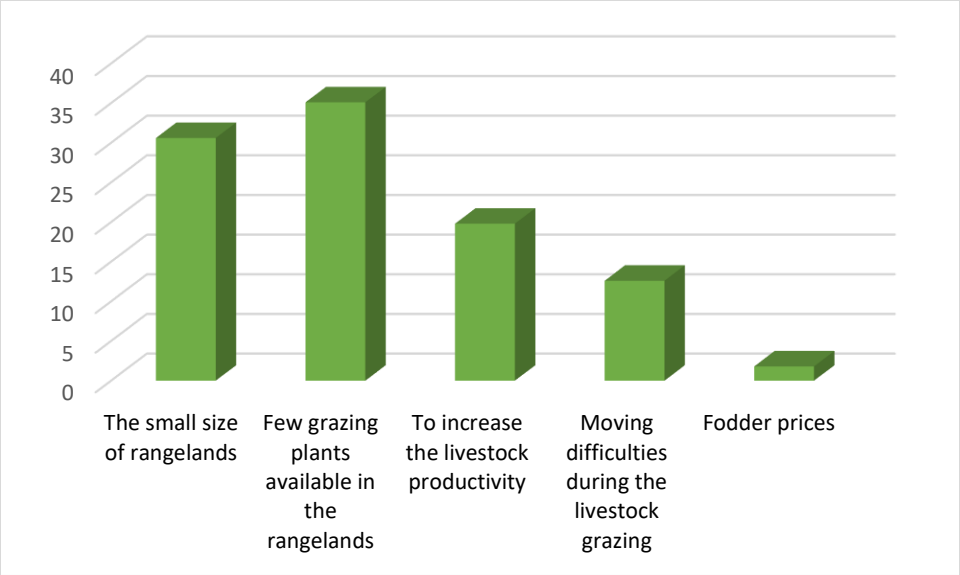


Figure 17: Grazing Preference Reasons in Southern Badia

Respondents also use fodder as a supportive source of feeding their livestock flocks. The livestock depends on barley, hay, bran, corn, wheat and clover for fodder supplements. Fodder types used and their average amount and price at the local market is described in Table 15. Nevertheless, the information provided in this section reflected high variance within responses, therefore, the amounts and prices of fodder types should be handled carefully.

Table 15: Used Fodder Amounts and Prices per Season in Southern Badia

Question	Amount Mean (±SD)	Price Mean (±SD)	Percent %
Type of fodder used			
Barley	(19.1)14.93	(311.9)1.8	**35.7**
Hay	(100.4)80.5	(257.01856)1.3	**19.2**
Bran	(17.4)11.9	(169.5)1.2	**29.1**
Corn	(19.0)19.8	(17.0)22.8	**3.3**
wheat	20.0	20.0	**.5**
Clover	(50.3)38.8	(108.1)83.5	**12.1**

Besides livestock feeding, other financial burdens posed on the livestock owners for the treating animal common diseases. Such common diseases reported by the respondents were mostly poisoning. The livestock owners, therefore, tended to inseminate the livestock either naturally (32.0%) or artificially (6.0%). But if the livestock gets sick, they mostly treated them at veterinarians' private clinics (13.3%) or through the agricultural foundations and institutions (6.0%).

Female members of the local community had a vital role in raising the livestock, where 40.4% of them were involved in processing dairy products, 34.2% involved in milking the sheep and goats, 6.7% took care of the newborns, 6.1% involved in livestock grazing, and 2.6% help in marketing.

Livestock owners with the local community of southern Badia confronted several obstacles within the agriculture and livestock breeding sector. The respondents prioritized the obstacles to be: the water shortage (30.9%), the high prices of fodder (13.2%), lack of agricultural areas and lands for cultivation (12.1%) and the low livestock selling prices (11.3%). Several projects were proposed

by respondents from this region, as establishing new wells, and providing mobile veterinary clinics, additional suggestions, and opinions are described in Table 16.

Table 16: Projects Proposed by the Respondents to Overcome Obstacles with the Agriculture and Livestock Sector in Southern Badia

Proposed project	Frequency	Percent %
Donors help and provide animal and agricultural production	**16**	**9.8**
Wells drilling	**39**	**23.8**
Reducing fodder prices	**25**	**15.2**
Livestock care	**8**	**4.9**
Increasing farmers' income by increasing production capacity	**7**	**4.3**
Supporting the efforts of the concerned national programs and agencies, especially scientific research	**6**	**3.7**
establishing reserves	**15**	**9.1**
Providing mobile veterinary clinics	**30**	**18.3**
Provide jobs	**6**	**3.7**

6. Conclusions

This report summarizes collected data about the socio-economic situation in selected areas of Jordan's Badia; northern, middle and southern Badia, which will form baselines for impact evaluations of HERD project "Healthy Ecosystems for Rangeland Development" at the study sites in Jordan. The future evaluation based on this report is expected to illustrate the interrelatedness

of issues: i) poverty leads to unsustainable utilization of the rangeland resources and ii) their overutilization leads to increased poverty. Thus, this section will provide the most important features that could act as benchmarks of similarities and differences between the project sites, and act as areas of interventions for achieving the overall objective of HERD project.

Several results from this survey demonstrated high level of harmony among different households at the three study sites, where it turned out the a clear consistency of household properties such as the age of household head and incomes sources, and other services as water, health, educational services. Moreover, the families in these sites were similar in how they manage livestock flocks. The families in the three Badia's reflected approximate average age of the household age that ranged from 45.4 – 48.1 years, and all of the respondents had stated for not having any kind of disabilities or / and chronic diseases. Moreover, most of the respondents were working at the public sector, specifically either retired or still working at the military forces, or working in private sector or they own private businesses. This reflects the working ability of the household head as they were mainly in middle age and many of them had retired in an early age, which reflects an opportunity to involve them in additional work opportunities for enhancing livelihood.

	Northern Badia	**Middle Badia**	**Southern Badia**
Household average age - Years	47.4	48.1	45.4
Household average monthly income. -JD	662.2	317	459.7

Moreover, most of the services of water, health, energy, and food, and education, were provided by governmental entities and offices. All respondents had identified two main obstacles related to water services, specifically: water shortages and high prices. Besides, all the three regions provided health and educational services in the same approximate level and distance. The respondents from the three regions had identified specific problems regarding the health services as a lack of staff, and lack of medications and treatments. The majority of the respondents depended on gas and firewood as the main sources of heating. The respondents reflected common livestock management plans, the livestock depends on fodder and grazing, livestock flocks were not traveling far distance

for grazing, and respondents had complained about the cost of fodders and limited grazing plants. In conclusion, the respondents had reflected a common level of governmental services in the three regions, besides common joint livestock management plans.

On the other side, the respondents had demonstrated specific differences between the three regions, which are presented in the following points, as:

1. A low percentage of respondents had gained the graduated/postgraduate level, 18% from northern Badia, 14% from middle Badia, and 8% from the southern Badia.
2. Most of the respondents stated that they were working at the time of collecting the information, as state by 70% from northern Badia, 66% from middle Badia, and 81% from the southern Badia, and the majority of them were married to one wife, and very few cases were married a second wife.
3. Few of the respondents were running domestic food processing workshops for dairy products and jam, as referred by 6% from middle Badia, and 5% from the southern Badia,
4. The monthly water consumption of the households varied between the three regions: 11 m^3 in the northern Badia, 25 m^3 in the middle Badia, and 95m^3 in the southern Badia.
5. The monthly water cost of the households varied between the three regions: 34 JD in the northern Badia, 31 JD in the middle Badia, and 19 JD in the southern Badia. It is most probable that the respondents were reflecting the cost of water supplies for their households besides the cost of water for drinking the livestock.
6. The families in the three regions seek health services from military hospitals and the public, while other respondents from the middle regions seek additional health services from private hospitals.
7. The distance of hospitals varied between communities at the three regions, which was about: 19 Km in the northern Badia, 68 km in the middle Badia, and 22 km in the southern Badia.
8. Even though the educational services are available in the three regions as high and elementary schools, still not all schools provide all grades as requested by some respondents.
9. The respondents stated that the educational services countered specified specific problems in all Badia's a, thus the problems in northern Badia were: Rented building, Lack of appropriate educational services, and low educational level. For the middle Badia, the main

problems were: lack of appropriate educational services, and no capacities/ staff. For the southern Badia, the main problems were: lack of appropriate educational services, no scientific stream, and lack of nearby schools.

10. The land owned by the respondents varied in the size, whereas land size was for: northern Badia (12.3) du, middle Badia (6.4) du, and southern Badia (19.6) du.
11. The average grazing utilized land was for each of the three regions as northern Badia (47.7) du, middle Badia (8.7) du, and southern Badia (17.7) du, according to the respondents' responses.
12. The respondents had identified different planted crops in each region as the dominant crops: northern Badia (Barley, Wheat, Olive), middle Badia (Olive, vegetables, clover, Pomegranate), and southern Badia (Barley, wheat, clover).
13. The respondents had specified specific problems countered when planting the land as in northern Badia the main problems were: Water shortage, soil infertility, and financial inability. For the middle Badia, the main problems were: financial inability, water shortage, and oil infertility. For the southern Badia, the main problems were: water shortage, lack of plowing equipments, and financial inability.
14. The households in the three regions owned both goats and sheep, with a high variations in the flock size in the same region and the other regions, as in the Northern Badia the flock size of goats = 17, and of sheep = 3), the middle Badia the flock size of goats = 1, and of sheep = 51), and the southern Badia the flock size of goats = 22, and of sheep = 63),
15. The respondents from northern and southern Badia follow the closed breeding system, while only those in southern Badia followed the open rearing system for livestock production.
16. The livestock practiced grazing in private land, rented land, and communal land as stated by respondents from northern and southern Badia and practice grazing in spring seasons. While those in middle Badia used communal and own land for livestock grazing.
17. Women took different roles in livestock management, while in northern Badia the main roles were: milking, dairy products production, grazing, baby care, marketing. For the middle Badia, the main roles were: milking, dairy products production, baby care, grazing, and fattening. For the southern Badia, the main roles were: dairy products production, milking, baby care, grazing, and marketing

18. The problems related to agriculture were different: in northern Badia, the main problems were: water shortage, livestock prices, the lack of agricultural lands for cultivation, and the high fodder prices. For the middle Badia, the main problems were: water shortage, the lack of agricultural land for cultivation, overgrazing, and lack of pastures. For those from southern Badia, the main problems were: water shortage, high fodder prices, the lack of agricultural lands for cultivation and low selling prices of livestock.
19. The respondents from the three Badia's proposed development projects for each region, which were as the following: northern Badia: support fodder prices and wells drilling, for those from the middle Badia the proposed projects were: wells drilling, and establishing reserves, and for the southern Badia the proposed projects were: wells drilling, and provide mobile veterinary clinics.

Gender Study:

Summary

The purpose of this study is to explore gender roles, relations, and internal overlap of responsibilities and activities in livestock production and rangeland management. The female and male respondents were interviewed from Al-Mansoora village in the northern Badia; from Al-Hazeem village in Al-Azraq city in the middle Badia, and from Al-Manshiyeh village in the southern Badia. A sample of 286 respondents from the local community was considered as convenient for representing the local communities for each area (north, middle, and south). Considering the objective of this study, the respondents were targeted to include males and females equally from interviewed households. A structured questionnaire was developed to collect information about the different roles of males and females in rangeland productivity and management and the productivity of livestock. Quantitative techniques were used to generate information on gender roles in rangeland management and productivity based on the respondents' information and perceptions.

The information revealed differences in activities taken by women in the three sites. Activities related to barn management, preparation, cleaning, and water supply, was mainly women's responsibility in all three areas. Women in the southern and middle Badia had reflected a higher participation level than women living in the northern Badia. Nevertheless, women in south Badia had reflected higher participation and involvement in activities related to grazing and fodder supply. Responses from women living in southern Badia bring to light the women's responsibilities in fodder supply for livestock.

The survey results reflect the importance of women's role in all activities related to livestock production. Women and men are working side by side in livestock production. especially women

living in the middle and northern Badia, as they have equal responsibilities with men in specific activities as sick animal care, care of regnant sheep, weaning, and livestock products sellings. Except for women living in the southern Badia had the highest knowledge among the three sites specifically in the care of pregnant sheep, newborn care, shear wool, and weaning. Regarding sheep selling, the women from southern Badia had a high level of participation in this activity. The results showed that women in southern Badia earn financial returns for their participation in livestock production and grazing management, as women in this area had received the actual highest returns in form of livestock heads; on average women get 62.6 head in the year in return for her efforts in livestock production and grazing.

In conclusion, the decision making in rangeland management and its productivity should move beyond gender stereotypes of women herders as helpers and housekeepers and identify women herders as partners in breeding and owners of livestock flocks. Besides, men and women should be seen as complementary and both important in rangeland sustainably. Empowerment should be seen as individuals building constructive relationships through joint efforts and mutual support for better livelihoods and development.

1. Introduction

The total area of Jordan is about 8.9 million hectares (MOA, 2003), where 80% of the land is receiving less than 200 mm average rainfall. This area is recognized as the rangelands (Jordanian Badia), which plays an important role in providing natural feed for livestock with minimal or no costs. Grazing is considered a way of life for 22% of the population living in these areas. The transhumance system was mainly followed in the last century that allowed for natural regeneration of the natural vegetation cover. Nowadays, this situation no longer exists, as traditional grazing rights are neglected due to the increasing livestock population over carrying and the weak natural forage. In the 19th century, the nomadic grazing system was the most commonly used in the production system. In this system, flocks used to move all over the year looking for forage and water, recently, the rangeland had been under stress due to climate change and successive waves of livestock coming from numbering countries as a result of political situations and wars.

The nomadic grazing system diminished and nomads settle in the marginal areas and stated to cultivate some parts of the rangelands, with the low- potential of production, using rain-fed or irrigated methods. Considering the unfavorable environmental factors and using inappropriate farming methods, the rangelands started degradation and declining productivity. This affected the welfare of the settled families and forced the family members to work in other jobs. Consequently,

many changes have occurred in the role of family members in herding sheep and taking care of the livestock all over the production process. Different tasks in rangeland and livestock management have been shifted among females and males of the same family, and other tasks were modified.

The current legislation in Jordan has contributed to the disappearance of the traditional common rangelands governance system, which has defined rangeland resting periods and access for entitled user groups in order to preserve resources. Changes in the traditional pastoral system had been reflected in the different roles and decisions made by the pastoral family. This requires exploring the changes in gender roles in pastoral and livestock management. Limited researches have been done on the knowledge and the roles of gender in rangeland governance and the integration of gender pivot in rangeland governance.

2. Objectives of the study

The purpose of this study is to explore gender roles, relations, and internal overlap of responsibilities and activities in livestock production and rangeland management. The local communities in Jordanian Badia divided into three areas: (1) the northern Badia, (2) the middle Badia, and (3) the southern Badia. Overall, there is very little research conducted on gender issues (such as roles, relations, and responsibilities) in rangelands in Jordan. The results and information provided by this study are considered an important step towards bridging gender issues across roles, decision-making power, participation, productivity, and adaptation to climate change in rangeland management.

3. Methodology

3.1 Study areas

More than 90% of the Jordanian area is classified as arid areas, locally called “Jordanian Badia”, which derived its name from the land where Bedouins live and practice seasonal browsing. This area includes all lands receiving annual rainfall of 50 to 200 mm annually and has general characteristics of seasonal contrasts in temperature with high variations in rainfall within and among years. Badia in Jordan forms major natural rangeland that meets a considerable part of

feeding requirements for livestock. The Badia extends from north to south along the eastern portion covering about 90 percent of the country's total area (Image 1). Badia of Jordan can be subdivided into three main sub-geographical areas:

• The northern Badia, comprising 26,000 km².

• The middle Badia, comprising 10,000 km².

• The southern Badia, comprising 38,000 km².

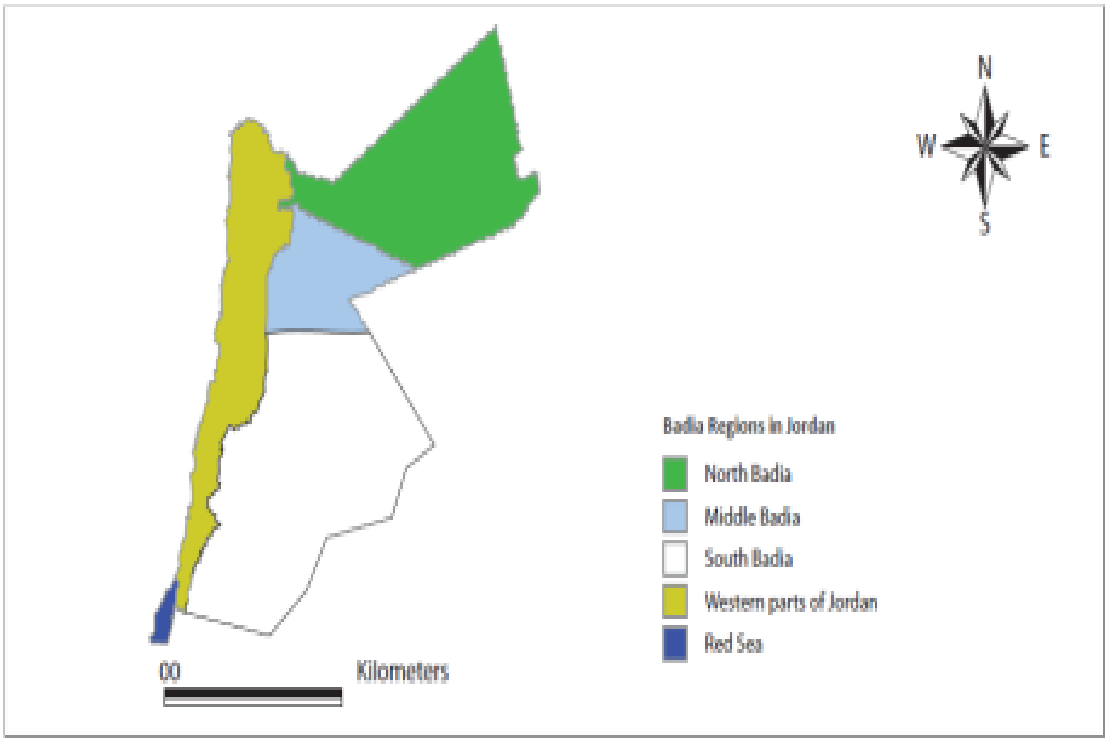


Image 1: Distribution of Jordanian Badia, Source: ICARDA 2012

3.2. Sampling and data collection

The survey aimed at collecting information from the males and females in the local communities within Jordan Badia, therefore respondents were interviewed from Al-Mansoora village in the northern Badia; from Al- Hazeem village in Al-Azraq city in the middle Badia, and from Al-Manshiyeh village in the southern Badia. A sample of 286 respondents from the local community was considered as convenient for representing the local communities for each area (north, middle,

and south). Considering the objective of this study, the respondents were targeted to include males and females equally from interviewed households.

The communities were considered having homogenous and there was no specific profile for selecting individual male and female respondents beyond their willingness to participate in this study; therefore the respondents were targeted randomly and data collected using a face-to-face method (Table 1). A structured questionnaire was developed and pre-tested. The questionnaire aimed to collect information about the different roles of males and females in rangeland productivity and management and the productivity of livestock.

Table 1: Sample size, distribution between project locations, and gender distribution.

Respondent Gender	North Badia Site 1	Middle Badia Site 2	Southern Badia Site 3	All sample
	(%) number	(%) number	(%) number	(%) number
Male	(51.1) 48	(52.6) 50	(51.0) 49	(51.6) 147
Female	(48.9) 46	(47.4) 45	(49.0) 47	(48.4) 138
Sample size	94	95	96	285

The questionnaire was divided into five parts, which were revolved over the following topics:

1. Detailed information on the **household** type, and socio-economic characteristics for the head of the household and wife, besides household income.

2. Detailed information **livestock size, competent and ownership**, and information about pasture characteristics.

3. Detailed information about **livestock management** and the different tasks are done by males and females, level of women participation, besides respondent's opinion about who is preferred to do these tasks.

4. Detailed information about **livestock production** and the different tasks are done by males and females, level of women participation, besides respondents' opinion about who is preferred to do these tasks related to livestock production.

5. Information about economic returns for women participation in livestock management, women participation in capacity buildings initiatives, and women knowledge about grazing areas and water sources.

3.2. Statistical analysis

Specific data sheets were designed and coded based on the questionnaire parts and questions. Data were entered and analyzed using a program of "Statistical Package for the Social Sciences" (SPSS version 20). Quantitative techniques were used to generate information on gender roles in rangeland management and productivity based on the respondents' information and perceptions. Several tables synthesized the information regarding specific parameters on average values. While other parameters were generated based on the respondents' answers to open questions, these parameters will be presented in frequencies and percentages. These parameters are expected to visualize the gender roles in rangeland in Badia. Nevertheless, the output of using mixed methods of quantitative and qualitative methods strongly recommends that future studies should be supplemented by interviews and focus group discussion in order to provide additional detail in the findings.

4. Results and discussion

In this section, the results reflecting the gender roles in rangeland management and its productivity will be provided based on the three areas of Badia, whereas the last section will provide a comparison between the three areas of Badia

Each section is divided into the following subsections:

- **Socio-economic characteristics for the household's head and housewife**
- **Grazing and herd management**
- **Pasture and livestock management**
- **Livestock production**
- **Economic returns for women participation in livestock management and capacity buildings.**

The information provided in the following subsections demonstrates what we deem to be the most interesting and relevant findings. For further information and additional details, annexes (A-1, A-2, A-3) provide complete sets of tables' that represent the descriptive analysis of the questionnaire.

4.1 Northern Badia

4.1.1 Socio-economic characteristics for the household's head and housewife

This section provides information about the household head and household wife as the following: (1) gender (2) Educational level (3) Health status (4) Age (5) work experience (6) income and income sources.

About 95 respondents were interviewed from the surrounding villages in the northern project site. The sample had provided general information on the socio-economic characteristics of the household head and housewife (Table 2). Most of the respondents' are residents in the Al-Mansoura village. Most of the household heads were males (85%), married (81.9%), and were declared to be in a healthy condition (92.6%), but few were having diabetes as a chronic disease. The average age of the household head was about 51 years old, and on average they had 16. 8 years of experience in livestock breeding and production. The average family sizes was about 7.3 people, and only on average 2.6 persons were working in livestock breeding and production.

Table 2: Socio-economic characteristics of the households

Socio-economic characteristics	Mean	Percent
Household Gender - male		85.1
Social Status for Household - married		81.9
Age (year s)	51.14	
experience in livestock breeding (year s)	16.85	
Average Monthly Income (JOD)	428.9	
Wife Age (Years)	44.87	

Both household heads and housewives were asked about their educational levels, the educational levels were ranked in 7 levels, from illiterate level till university degree. As shown in figure 1, where men had ranked the educational level mainly in three classes, about 27.7% of the sample has 7th -10th school grade, and other 20.2% had a high school degree. While women had relatively

similar education levels, 31.9% 7th -10th school grade, and 23% had a high school degree. Women were relatively low percentage as illiterate (3%) compared with men (5%).

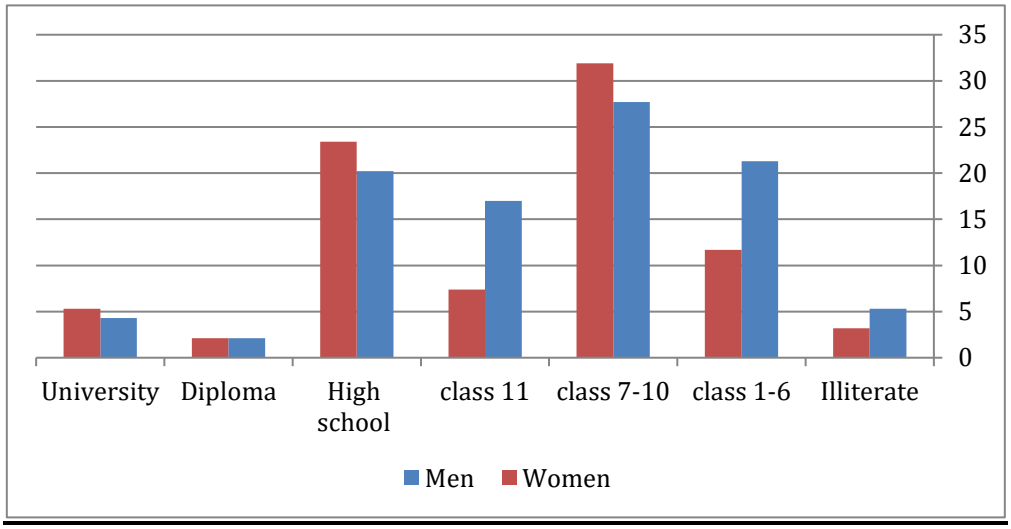


Figure 1: educational level of the household head and housewives

About 45.2 % of the heads of the household were retired and don't have additional jobs, while the other 13.1% were working in livestock breeding. Other 25% of the house heads were farmers, and just a few were working in military forces, private sector, and public sector. Moreover, the majority of the housewives were not working regardless of having an educational degree.

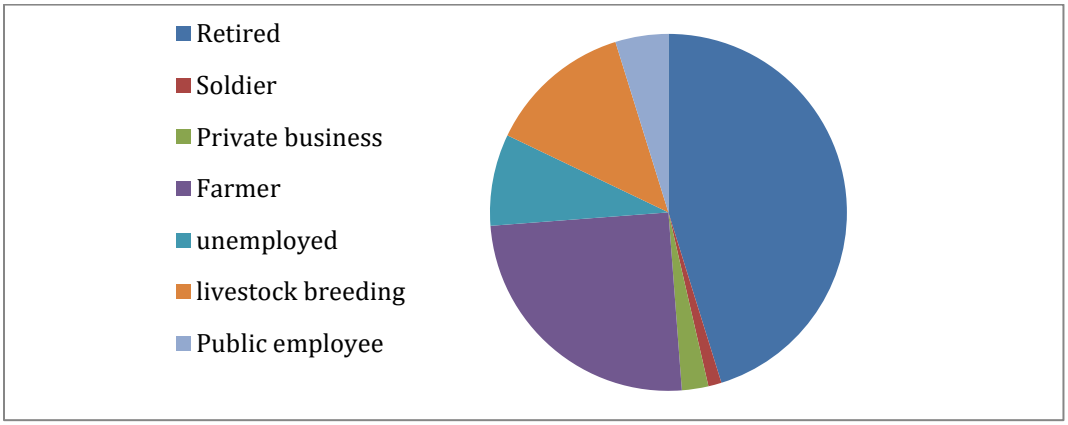


Figure 2: Work fields for the household heads.

4.1.2 Grazing and herd management

This section deals with the purposes of breeding livestock, ownership, and grazing management (Table 3). About 62% of the respondents work in livestock breeding for trading purposes, while the other 47% raise livestock for domestic consumption. The respondents had on average 71 heads as average livestock flock size, and according to their statements, the average flock size of sheep was about 71 heads, other had on average 15 heads of goats and none of the interviewed respondents raised camels during the period of the data collection for this report. The respondents were asked about the ownership of the livestock, most of the men (91%) said they own the herds, while other 61% of women had stated that they own the herd. Some of the respondents had referred for having share ownership of the livestock.

Table 3: The purpose of breeding livestock and the ownership

	Percentage %	**Mean**
The livestock is raised for the benefit for :		
Home consumption %	47.3	
Trade%	61.88	
Kind of livestock types:		Mean
Number of sheep (head)	71.69	
Number of goats (head)	15.01	
Number of Camels (head)	0	
Total(head)	70.85	
Herd Ownership		Mean
For Men %		91.81
For Woman %		61.96

The respondents from northern Badia were asked about the locations where the livestock flocks are settled, main fodder sources, and the locations of the areas. The respondents had stated that the livestock flock is settled in three places: Sheds beside the home 73.5 %, Privet farms 3.9%, and Open Region 22.5%. From another point, 64% of the respondents said that the livestock flock depends on feed bought from the market, besides other considered grazing as the second fodder source (27%). Most of the herd breeders depend on the rumored land (61.6%) and private grazing

land (30.3%) as the main grazing locations, a few of the respondents (8.%) use the common land, that is located far away from the livestock barn (figure 3).

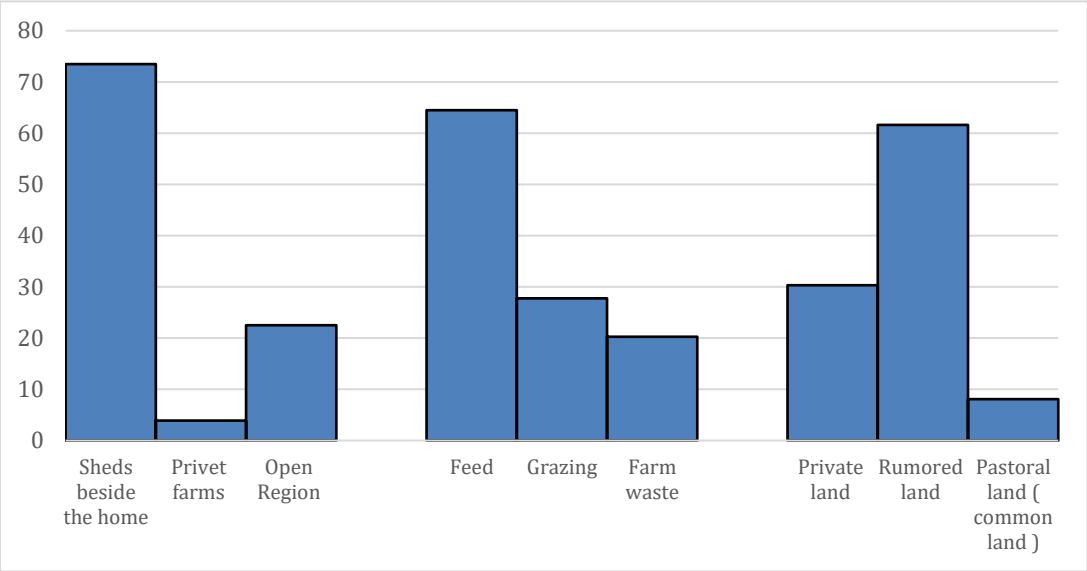


Figure 3: grazing and herd management

4.1.3 Gender role in grazing land and livestock management

This section deals with the pasture and livestock management and the women's participation in activities relevant to grazing and livestock management, which is measured the level of participation on a scale of 1- 10. Besides, how is taking the decision to do these activities, and finally respondents perception about how is preferred to do these activities (Table 4).

The respondents answered that women participate in barns preparations side by side of the men (figure 4), and men are the main decision-makers in this aspect as referred by 74%. While other 78.7% said that men should execute this activity. For cleaning barns, others said that they preferred that women participate in cleaning barns, and women and men (32%) share the process of making decisions about this activity. While 44.7% said that man should execute this activity.

Table 4: the management of the herd

tasks	decision maker (1.Woman 2.Man)	Who do you prefer to do these tasks : (1.Woman 2.Man)
	Number (Percent)	Number (Percent)
Preparing barns	Man:70(74.5)	Man:74(78.7)
Cleaning of barns	Man:37(39.4)	Man:42(44.7)
Buying the herd	Man:85(90.4)	Man:88(93.6)
Buying fodder	Man:71(75.5)	Man:85(90.4)
Collecting fodder / crop residue	Man:36(38.3)	Man:52(55.3)
Supervise grazing in nearby places	Woman:40(42.6) Man:52(55.3)	Woman:33(35.5) Man:55(58.5)
Supervise grazing in remote places	Man:79(84.1)	Man:82(87.3)
Supply water the flock	Man:36(38.3) Both:47(50.0)	Man:43(45.7) Both:46(48.9)

Regarding buying fodder or livestock heads, women had very low participation in these activities (2. 5 and 2.8, respectively as shown in figure 4). Accordingly, the man was the main person to take the decision in buying fodder and additional head of livestock (85%- 71%), and still men and women believe that man is the preferred person to do these activities (88%- 85%). Moreover, women were not fully participating in supervising grazing in remote places (2.4 as in figure 4), and the respondent had declared that the man is the one who is making the decisions about this task and is the preferred person for this activity as mentioned by the interviewed participants.

On the other side, women had higher participation in activities of collecting fodder/crop residue, supervise grazing in nearby places, and Supply water to the flock. Both women and men are currently participating in collecting fodder and crop residue from near farms (35% women, 36% men), but the respondents said that they prefer men to execute this activity (52%). Also, men and women were jointly supervising the grazing in near places; nevertheless, it is preferred to be done

by men as stated (55%). Regarding water supply for the clock, both men and women are responsible to do this activity, and the respondents said that both men and women can execute this task effectively.

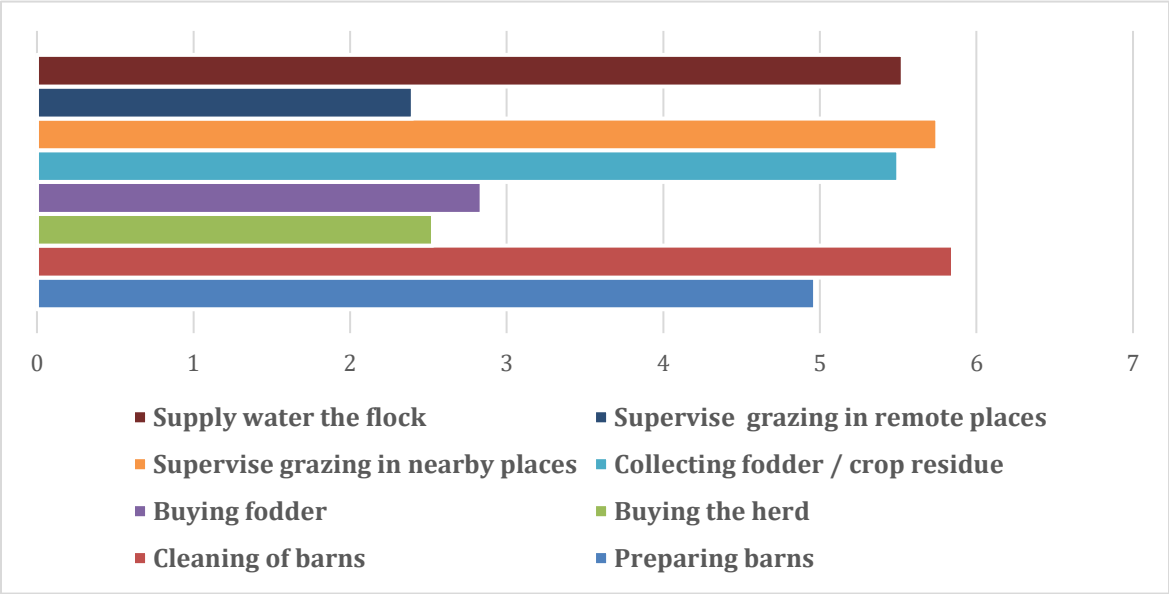


Figure 4: The level of women's participation in livestock-related activities

4.1.4 Gender roles in livestock production and products processing

This section deals with the tasks made for sustaining livestock productivity and the women's participation in activities relevant to livestock caring and production. This participation is measured on a scale of 1- 10. Besides, how is taking the decision to do these activities, and finally respondents perception about how is preferred to do these activities relevant to livestock production and caring (table 5).

The respondents preferred that women participate in caring for sick and pregnant sheep/goats (5.58, 5.98), besides taking care of the newborn animals (6.51) side by side of the men (figure 4), and men are the main decision-maker in this aspect as referred by 64%. While the other 74 % said that men should execute this activity. This probably due to the situations when animals need treatment and veterinarian consultations, in this situation men are prepared to make such contact and services. Others said that both men and women participate in any decisions related to taking care of the newborn animals, but respondents stated that men (36%) or both men and women (34%)are preferred to execute this activity more than women alone (figure 4). On the other hand,

women were participating more in t weaning the young animals (6.3), but men still taking participating in the decision making in this activity side by side with women (men 36%, women 35%), and the respondents emphasized that men (40.4%) and in other cases both men and women (37.2%).

Table 5: Gender roles in livestock production and product processing

tasks	decision maker (1.Woman 2.Man) Number (%)	Who do you prefer to do these tasks (1.Woman 2.Man) Number (%)
Caring for sick sheep	Man:61(64.9)	Man:71(75.5)
Care for pregnant females	Man:47(50.0)	Man:57(60.6)
Newborn care	Man:34(36.2)	Man:34(36.2)
Weaning	Man:34(36.2)	Man:38(40.4)
Wool sheer	Man:70(74.5)	Man:81(86.2)
Wool cleaning, making carpets, pillows..etc	Woman:47(50.0)	Woman:45(47.9)
Milking the sheep	Woman:53(56.4)	Woman:43(45.7)
Manufacturing milk products (dairy, cheese ....)	Woman:74(78.7)	Woman:70(74.5)
Products marketing	Both:45(47.9)	Both:45(47.9)
Selling the sheep	Man:79(84.1)	Man:83(88.3)
Financing / Loans	Man:58(61.7)	Man:57(60.6)

Another activity related to livestock production is wool sheer, this activity is one of the least executed or participated in by women (3.04), as many participants stated that men (70%) are responsible for taking most of the decisions related to shear wool, moreover, they prefer that men to keep responsible in this task (86%), which reflects that this task is inappropriate to be done by women. On the other side, women are mostly involved in wool cleaning and making wool-home products as carpets (7.5), where the interviewed respondents said that women (50%) are more

involved in taking the decisions in this activity, and they prefer maintaining women (47.9%) in the decision-making in this activity.

Regarding buying fodder or livestock heads, women had very low participation in these activities (2. 5 and 2.8, respectively as shown in figure 4). Accordingly, the man was the main person to take the decision in buying fodder and additional head of livestock (85%- 71%), and still men and women believe that man is the preferred person to do these activities (88%- 85%). Moreover, women were not fully participating in supervising grazing in remote places (2.4 as in figure 4), and the respondent had declared that the man is the one who is making the decisions about this task and is the preferred person for this activity as mentioned by the interviewed participants.

Regarding manufacturing milk products (milk, cheese...), women had very high participation in this activity (8.46 as shown in figure 4). Accordingly, the woman was the main person to take the decision in manufacturing milk products (78.7%), and still, participants believe that women are the preferred person to do these activities (75%). Moreover, women were not well participating in marketing the milk products (5.55 as in figure 4), and the respondent had said that men and women are favored to be involved in making the decisions about this task.

Regarding selling the animals, women had a very low participation level in this activity (2. 9 as shown in figure 4). Accordingly, the man was the main person to take the decision in selling the animal heads (84.1%), and still men and women believe that man is the preferred person to do the selling (88.3%). Moreover, women had well-established access to loans (4.2), and the respondents had declared that the man the one who is making the decisions about this task, and in other cases both men and women are involved in the decision making about taking loans (61%, 30.9% respectively), nevertheless, man and woman are the preferable people for this activity as mentioned by the interviewed participants (60% and 29% respectively).

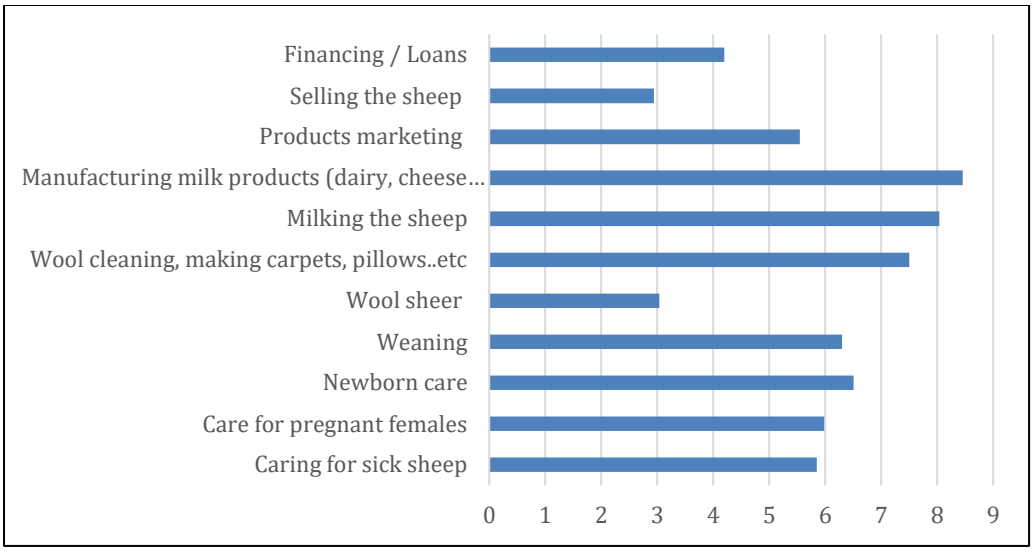


Figure 4: The level of women's participation in livestock production and products processing.

4.1.5 Women participation in financial returns, capacity building, and decision making

The respondents were asked about the financial returns that women can get for their participation in livestock production (Table 6). The interviewed respondents indicated that in 57% of cases women will not get direct financial returns for her participation in herd management and production. While other 42% of respondents pointed that women can get revenues for their given efforts in animal production and caring, and this type of return was said to be in cash as 66.7% of the respondents mentioned. But other women can get revenue as animal heads, and in these cases, the average returns were about 4.5 head/ year.

Moreover, respondents indicated that women in northern Badia don't participate in any activities for capacity building and initiatives for community developments (79%), and if they have such it where mainly through training courses and local committees and associations related to pasture. On the other side, respondents were asked to assess women's knowledge in grazing areas and the locations of water sources. The respondents pointed that woman was familiar with the grazing

areas at the level of (6.67 out of 10) and had given the same assessment for the level of knowledge about the location of water sources used for animal drinking while roaming in open grazing areas.

Table 6: Women participation in financial returns, capacity building, and decision making

	Mean	Percent
Does the woman get any return for her participation in managing and caring for the herd? %		
1. Yes		42.6
2.No		57.4
The nature of revenue		
1. Cash		66.7
2. Sheep heads		33.3
Number of Sheep heads	4.58	
Women participation		
1. Training courses		16.0
2. Local committees		1.1
3. Associations linked to pastures		3.2
4. Don't share		79.8
Determine (the nature of the sessions, committees, or associations in which women participate)		
1. Al-Jawhara Charitable Society		18.8
2. Dairy processing courses		8.3
Evaluate the **woman's level of knowledge** of the different grazing sites at the district level	6.67	
Evaluate the level of **woman's Knowledge of sources** for livestock drinking water	6.87	

4.2 Middle Badia

4.2.1 Socio-economic characteristics for the household's head and housewife

This section provides information about the household head and household wife as the following: (1) gender (2) Educational level (3) Health status (4) Age (5) work experience (6) income and income sources.

About 95 respondents were interviewed from the surrounding villages in the middle project site. The sample had provided general information on the socio-economic characteristics of the

household head and housewife (Table 7). Most of the respondents' are residents of the Al-Azraq district. Most of the household heads were males (88%), married (87%), and were declared to be in a healthy condition (87.6%), but few had stated they are having diabetes and high blood pressure as a chronic disease. The average age of the household head was about 48 years old, and on average they had 17.3 years of experience in livestock breeding and production. The average family sizes was about 5.4 people, and only on average 2.88 persons were working in livestock breeding and production.

Table 7: Socio-economic characteristics of the households

Socio-economic characteristics	Mean	Percent
Household Gender - male		88.4
Social Status for Household - married		87.4
Health Status for Household - healthy		87.4
Age (years)	48.38	
experience in livestock breeding	17.33	
Average Monthly Income	310	
Wife Age	41.52	
Number of family members	5.4	
Number of family members working in animal production	2.88	

Both household heads and housewives were asked about their educational levels, the educational levels were ranked in 7 levels, from illiterate level till university degree. As shown in figure 5, where men had ranked the educational level mainly in three classes, about 20 % of the sample were illiterate and other 20% were in class 7-10 grade, while other 25% had a high school degree. While women had relatively lower school education levels, 14% were in 7th -10th school grade, and 15 % had a graduate degree. Women had a relatively higher percentage of illiterate (30%) compared with men (20%), even though with such higher education, 84% of the women were not working.

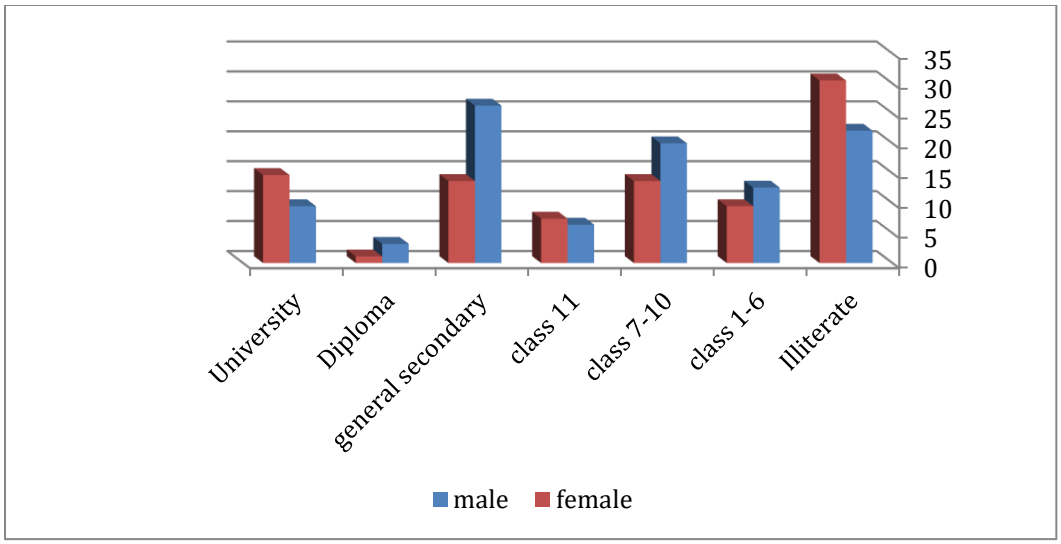


Figure 5: household head and wife education

About 25 % of the heads of the households were retired and don't have additional jobs, while the other 8.4% were working in livestock breeding. Other 10.5 % of the house heads were farmers, and just a few were working in military forces, private sector, and public sector. Moreover, the majority of the household heads were working in the governmental sector, and the other 10.5% were not working.

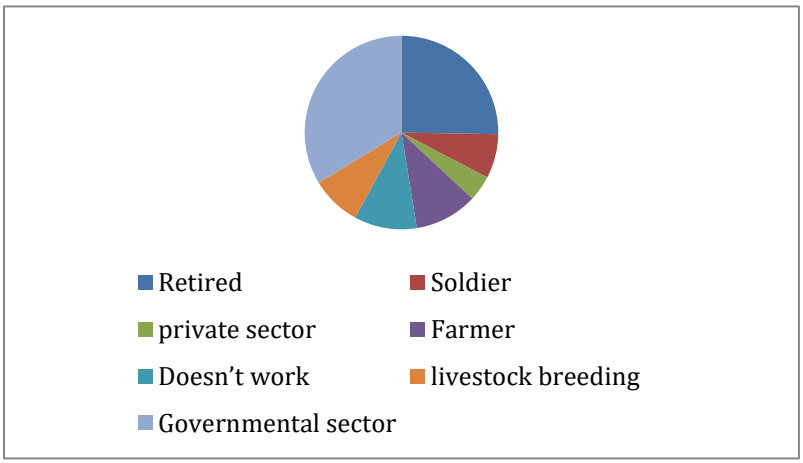


Figure 6: Households heads' jobs in the middle project site.

4.2.2 Grazing and herd management

This section deals with the purposes of breeding livestock, ownership, and grazing management (Table 8). About 54% of the respondents work in livestock breeding for trading purposes, while

the other 57% raise livestock for domestic consumption (some of the respondents raise livestock for both purposes). The respondents had on average 19 heads as average livestock flock size, and according to their statements, the average flock size of sheep was about 13 heads, other had on average 11 heads of goats, and about in average 4 heads of camels. The respondents were asked about the ownership of the livestock, most of the men (87%) said they own the herds, while other 63% of women had stated that they own the herd, some of the respondents had referred for having share ownership of the livestock.

Table 8: the purpose of breeding livestock and the ownership

	Percentage %
The livestock is raised for the benefit for :	
Home consumption %	57.60
Trade%	54.35
Kind of livestock types:	
Number of sheep (head)	12.67
Number of goats (head)	10.63
Number of Camels (head)	3.86
Total(head)	19.18
Herd Ownership	Number
For Men %	86.67
For Woman %	63.43

The respondents from middle Badia were asked about the locations where the livestock flocks are settled, main fodder sources, and the locations of the areas (figure 7). The respondents had stated that the livestock flock is settled in three places: Sheds beside the home 71%, Privet farms 13%, and Open Region 16%. From another point, 72% of the respondents said that the livestock flock depends on feed bought from the market, besides other considered grazing as the second fodder source (27%). Most of the herd breeders depend on the rumored land (43%) and private grazing land (51%) as the main grazing locations, a few of the respondents (6%) use the common land, which is located far away from the livestock barn.

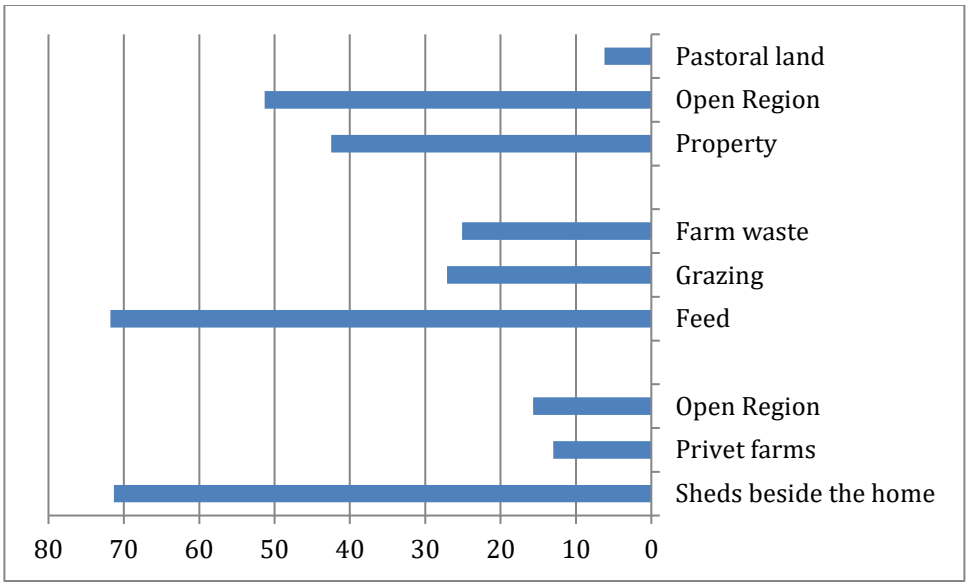


Figure 7: grazing and herd management

4.2.3 Gender role in grazing land and livestock management

This section deals with the pasture and livestock management and the women's participation in activities relevant to grazing and livestock management, which is measured the level of participation on a scale of 1- 10. Besides, how is taking the decision to do these activities, and finally respondents perception about how is preferred to do these activities (Table 9, figure 8).

The respondents preferred that women participate in barns preparations side by side of the men (figure 8), and men are the main decision-maker in this aspect as referred by 34%. While the other 41% said that women should execute this activity. Others said that they preferred that women participate in cleaning barns, and women and men (36%) share the process of making decisions about this activity. While the other 47% said that women should execute this activity.

Table 9: the management of the herd

tasks	decision maker (1.Woman 2.Man) Number(%Percent)	Who do you prefer to do these tasks (1.Woman 2.Man) Number(%Percent)
Preparing barns	Woman:33(34.7)	Woman:39(41.1)
Cleaning of barns	Woman: 34(35.8)	Woman:45(47.4)
Buying the herd	Man:72(75.8)	Man:84(88.4)
Buying fodder	Man:71(74.7)	Man:84(88.4)
Fodder / crop residue collection	Man:59(62.2)	Man:74(77.9)
Grazing in nearby places	Man:45(47.4)	Man:56(58.9)
Grazing in remote places	Man:52(54.7)	Man:69(72.6)
Water the flock	Both:48(50.5)	Both:39(41.1)

Regarding buying fodder or livestock heads, women had very low participation in these activities (2. 5 and 2.2, respectively as shown in figure 8). Accordingly, the man was the main person to take the decision in buying fodder and additional head of livestock (76%- 75%), and still men and women believe that man is the preferred person to do these activities (88%). Moreover, women were not fully participating in supervising grazing in remote places (2.7 as in figure 8), and the respondent had declared that the man is the one who is making the decisions about this task (55%) and also is the preferred person for this activity as mentioned by the 73% interviewed participants.

Moreover, women had low participation in activities of collecting fodder/crop residue, supervise grazing in nearby places, and but not for supplying water to the flock. Both men are currently participating in collecting fodder and crop residue from near farms (62 %), besides, the respondents said that they prefer men to execute this activity (78%). Also, men and women were jointly supervising the grazing in near places (48% men, and 33% women); nevertheless, it is preferred to be done by men as stated (59%). Regarding water supply for the flock, both men and women are responsible to do this activity (50%), and the respondents said that both men and women can execute this task effectively (41%) and also women as well (35%).

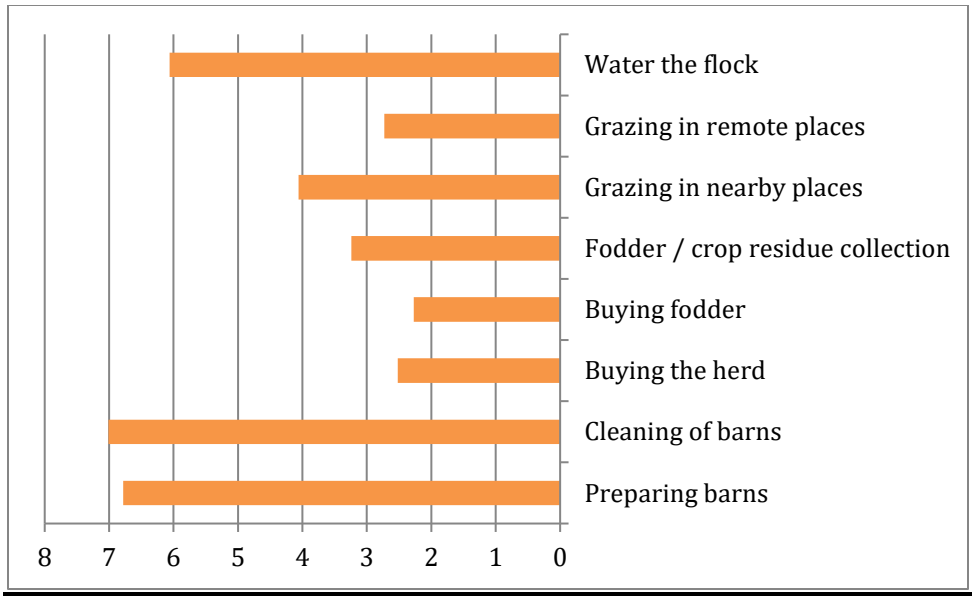


Figure 8: The level of women's participation in livestock-related activities

4.2.4 Gender roles in livestock production and products processing

This section deals with the tasks made for sustaining livestock productivity and the women's participation in activities relevant to livestock caring and production. This participation is measured on a scale of 1- 10. Besides, how is taking the decision to do these activities, and finally respondents perception about how is preferred to do these activities relevant to livestock production and caring (table 10).

The respondents preferred that women participate in caring for sick and pregnant sheep/goats (5.52, 5.93), besides taking care of the newborn animals (6.05) side by side of the men (figure 4), and women and men are the main decision-maker in this aspect as referred by 43%. While the other 38 % said that men should execute this activity, and as well by both men and women (33%). This probably due to the situations when animals need treatment and veterinarian consultations, in this situation men are prepared to make such contact and services. Others said that both men and women (41%) participate in any decisions related to taking care of the newborn animals, but respondents stated that women (43%) or both men and women (36%)are preferred to execute this activity more than men alone (figure 9). On the other hand, women were participating more in the weaning the young animals (6.2), but men still taking participating in the decision making in this

activity side by side with women (41%), and the respondents had emphasized that women (42%) and in other cases both men and women (36%).

Another activity related to livestock production is wool sheer, this activity is done by women (4.16), as many participants stated that men (44%) are responsible for taking most of the decisions related to shear wool, moreover, they prefer that men to keep responsible in this task (54%), which reflects that this task is inappropriate to be done by women. On the other side, women are mostly involved in wool cleaning and making wool-home products as carpets (6.44), where the interviewed respondents said that men and women (43%) are more involved in taking the decisions in this activity, and they prefer maintaining women (41%) in the decision-making in this activity.

Regarding milking and manufacturing milk products (milk, cheese...), women had very high participation in this activity (8.59 and 9.04, respectively as shown in figure 7). Accordingly, the woman was the main person to take the decision in milking and manufacturing milk products (52% and 60%), and still, participants believe that women are the preferred person to do these activities (75% -81%). Moreover, women were not well participating in marketing the milk products (4.35 as in figure 9), and the respondent had said that men are favored to be involved in making the decisions about this task (44%).

Regarding selling the animals, women had a very low participation level in this activity (2. 55 as shown in figure 9). Accordingly, the man was the main person to take the decision in selling the animal heads (70%), and still men and women believe that man is the preferred person to do the selling (78%). Moreover, women had well-established access to loans (4.0), and the respondents had declared that the man the one who is making the decisions about this task, and in other cases men are involved in the decision making about taking loans (61%), nevertheless, man and woman are the preferable people for this activity as mentioned by the interviewed participants (61% and 34% respectively).

Table 10: Gender roles in livestock production and products processing

tasks	decision maker (1.Woman 2.Man) Number &Percent	Who do you prefer to do these tasks (1.Woman 2.Man) Number &Percent
Caring for sick sheep	Both:41(43.2)	Man:36(37.9)
Care for pregnant	Both:40(42.1)	Woman:41(43.2)
Newborn care	Both:39(41.1)	Woman:41(43.2)
Weaning	Both:39(41.1)	Woman:40(42.1)
Shear wool	Man:42(44.3)	Man:51(53.7)
Wool cleaning, stretchy pillows	Both:41(43.2)	Woman:41(43.2)
Milk the sheep	Woman:50(52.6)	Woman:72(75.8)
Manufacturing (dairy, cheese)	Woman:57(60.0)	Woman:77(81.1)
Marketing of products	Man:42(44.2)	Man:48(50.6)
Sheep selling	Man:67(70.5)	Man:74(77.9)
Financing / Loans	Man:58(61.1)	Man:58(61.1)

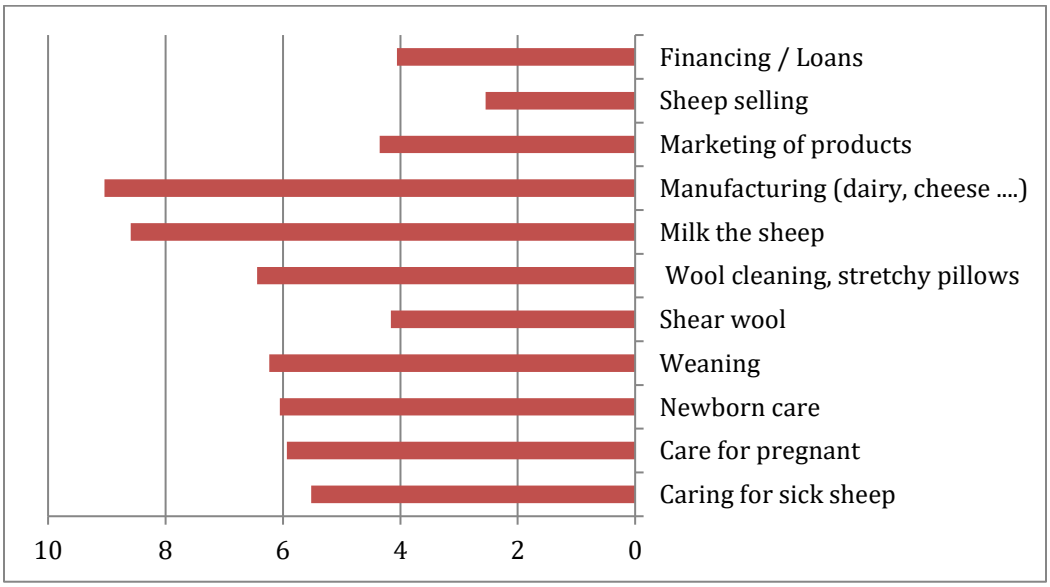


Figure 9: The level of women's participation in livestock-related activities of production and products processing

4.2.5 Women participation in financial returns, capacity building and decision making

The respondents were asked about the financial returns that women can get for their participation in livestock production (Table 11). The interviewed respondent had indicated that in 53.7% of cases women will not get direct financial returns for her participation in herd management and

production. While other 46 % of respondents pointed that women can get revenues for their given efforts in animal production and caring, and this type of return was said to be in cash as 69 % of the respondents mentioned. But other women can get revenue as animal heads, and in these cases, the average returns were about 14.5 head/ year.

Table 11: Women participation in financial returns, capacity building and decision making

	Mean	Percent
Does the woman get any return for her participation in managing and caring for the herd?		
1. Yes		46.3
2.No		53.7
The nature of revenue		
Cash		69.6
Sheep heads		30.4
Number of Sheep heads	14.5	
Women participation		
Training courses		22.5
Local committees		4.9
Associations linked to pastures		2.9
Don't share		69.6
Determine (the nature of the sessions, committees, or associations in which women participate)		
Al Irfan Charitable Society		1.1
Dairy processing courses		16.8
The herd care cycle		4.2
Evaluate the woman's level of knowledge of the different grazing sites at the district level	5.59	
Evaluate the level of woman's Knowledge of sources for livestock drinking water	6.33	

Moreover, respondents indicated that women in southern Badia don't participate in any activities for capacity building and initiatives for community developments (69.6%), and if they have such it where mainly through training courses and local committees and associations related to pasture.

On the other side, respondents were asked to assess women's knowledge in grazing areas and the locations of water sources. The respondents pointed that woman was familiar with the grazing

areas at the level of (5.59 out of 10) and had given about 6.33 on scale for the level of knowledge about the location of water sources used for animal drinking while traveling in open grazing areas.

4.3 Southern Badia

4.3.1 Socio-economic characteristics for the household's head and housewife

This section provides information about the household head and household wife as the following: (1) gender (2) Educational level (3) Health status (4) Age (5) work experience (6) income and income sources.

About 96 respondents were interviewed from the surrounding villages in the middle project site. The sample had provided general information on the socio-economic characteristics of the household head and housewife (Table 12). Most of the respondents are living surrounding Mansheya protected area Badia / Athrah district. Most of the household heads were males (84%), married (80%), and were declared to be in a healthy condition (87%), but few had stated they are having diabetes as a chronic disease. The average age of the household head was about 51 years old, and on average they had 18.6 years of experience in livestock breeding and production. The average family size was about 7.6 people, and only on average 3 persons were working in livestock breeding and production.

Table 12: Socio-economic characteristics of the households

Socio-economic characteristics	Mean	Percent
Household Gender - male		84.4
Social Status for Household - married		80.2
Health Status for Household - healthy		87.5
Age (years)	50.9	
experience in livestock breeding	18.68	
Average Monthly Income	360	
Wife Age	43.96	

Number of family members	7.63	
Number of family members working in animal production	3.02	

Both household heads and housewives were asked about their educational levels, the educational levels were ranked in 7 levels, from illiterate level till university degree. As shown in figure 10, where men had ranked the educational level mainly in three classes, about 27 % of the sample were illiterate and other 22% were in class 11 grade, while other 14% had a high school degree. While women had relatively lower school education levels, 10% were in 7th -10th school grade, and 7 % had a graduate degree. Women were relatively higher percentage as illiterate (33%) compared with men (27%), though with such lower education, 75% of the women were not working.

Figure 10: household head and wife education

About 50.6 % % of the house heads were retired and don't have additional jobs, while the other 1.1% were working in livestock breeding. Other 6.7 % of the house heads were farmers, and just a few were working in military forces, private sector, and public sector. Moreover, the 18% of the households' heads were working in governmental sector, and other 11.2% were not working.

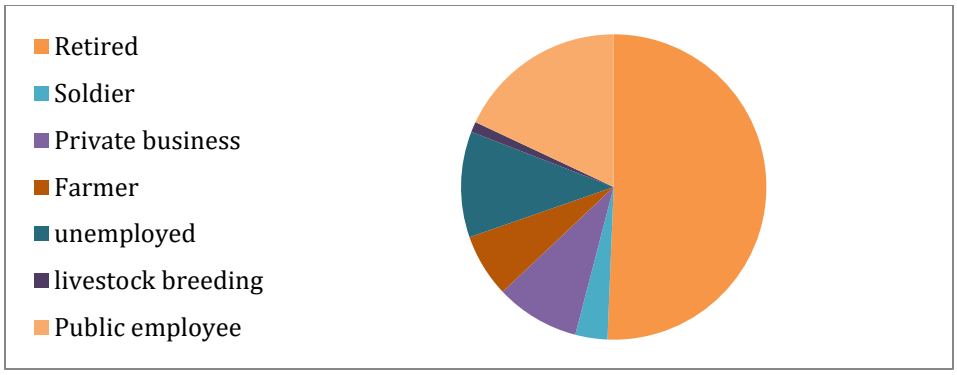


Figure 11: Households heads' jobs in south project site.

4.3.2 Grazing and herd management

This section deals with the purposes of breeding livestock, ownership, and grazing management (Table 13). About 57% of the respondents work in livestock breeding for trading purposes, while the other 53% raise livestock for domestic consumption (some of the respondents raise livestock for both purposes). The respondents had on average 206 heads as average livestock flock size, and according to their statements, the average flock size of sheep was about 97 heads, other had on average 84 heads of goats, and about in average 208 heads of camels. The respondents were asked about the ownership of the livestock, most of the men (82%) said they own the herds, while other 55% of women had stated that they own the herd, some of the respondents had referred for having share ownership of the livestock.

Table 13: purpose of breeding livestock and the ownership

	Percentage %
The livestock is raised for the benefit for :	
Home consumption %	57.07
Trade%	53.67
Kind of livestock types:	

Number of sheep (head)	97.46
Number of goats (head)	84.23
Number of Camels (head)	208.83
Total(head)	206.41
Herd Ownership	Number
For Men %	82.41
For Woman %	55.52

The respondents from southern Badia were asked about the locations where the livestock flocks are settled, main fodder sources, and the locations of the areas (figure 12). The respondents had stated that the livestock flock is settled in three places: Sheds beside the home 44%, Privet farms 15%, and Open Region 41%. From another point, 71% of the respondents said that the livestock flock depends on feed bought from the market, besides other considered grazing as the second fodder source (28%). Most of the herd breeders depend on the rumored land (45%) and private grazing land (11%) as the main grazing locations, a few of the respondents (44%) use the common land, that is located far away from the livestock barn.

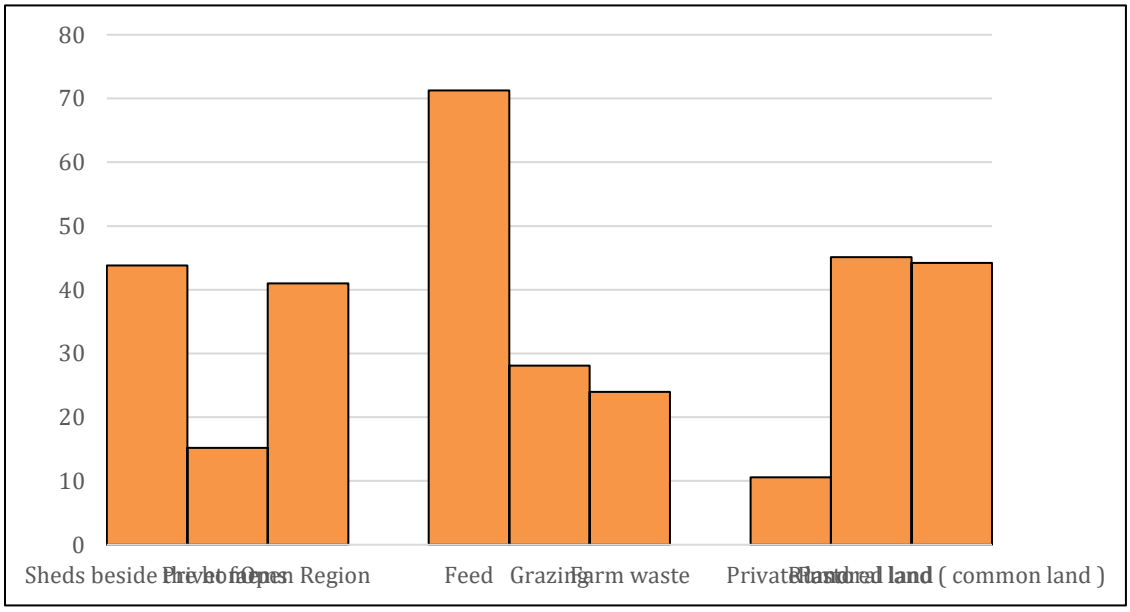


Figure 12: grazing and herd management

4.3.3 Gender role in grazing land and livestock management

This section deals with the pasture and livestock management and the women's participation in activities relevant to grazing and livestock management, which is measured the level of participation on a scale of 1- 10. Besides, how is taking the decision to do these activities, and finally respondents perception about how is preferred to do these activities (Table 14, figure 13).

The respondents preferred that women participate in barns preparations side by side of the men (figure 13), and men are the main decision-maker in this aspect as referred by 61%, and they should also execute this activity as referred by 55%. Others said that they preferred that women participate in cleaning barns, and the men (52%) to make decisions about this activity, beside women (40%).

Regarding buying fodder or livestock heads, women had very low participation in these activities (3.75 and 2.94, respectively as shown in figure 5). Accordingly, the man was the main person to take the decision in buying fodder and additional head of livestock (79%- 82%), and still men and women believe that man is the preferred person to do these activities (70%- 75%). Moreover, women were not fully participating in supervising grazing in remote places (3.9 as in figure 13), and the respondent had declared that the man is the one who is making the decisions about this task (74%) and also is the preferred person for this activity as mentioned by the 70% interviewed participants.

Table 14: the management of herd

tasks	decision maker (1.Woman 2.Man)	Who do you prefer to do these tasks (1.Woman 2.Man)
	Number &Percent	Number &Percent
Preparing barns	Man:59(61.4)	Man:53(55.2)
Cleaning of barns	Woman: 55(57.3)	Man:50(52.1)
Buying the herd	Man:76(79.2)	Man:68(70.8)
Buying fodder	Man:79(82.3)	Man:72(75.0)
Fodder / crop residue collection	Woman:42(43.8)	Man:57(59.4)

Grazing in nearby places	Woman:45(46.9)	Man:61(63.5)
Grazing in remote places	Man:71(74.0)	Man:67(69.8)
Water the flock	Man:52(54.1)	Man:50(52.1)

Moreover, women had high participation in activities of collecting fodder/crop residue, supervise grazing in nearby places, and but not for supplying water to the flock. Only women are currently participating in collecting fodder and crop residue from near farms (43 %), besides, the respondents said that they prefer men to execute this activity (60%). Also, men and women were jointly supervising the grazing in near places (48% men, and 33% women); nevertheless, it is preferred to be done by men and women as stated (43%- 47%). Regarding water supply for the flock, both men and men are responsible to do this activity (54%), and the respondents said that men can execute this task effectively (70%) and also women as well (21%).

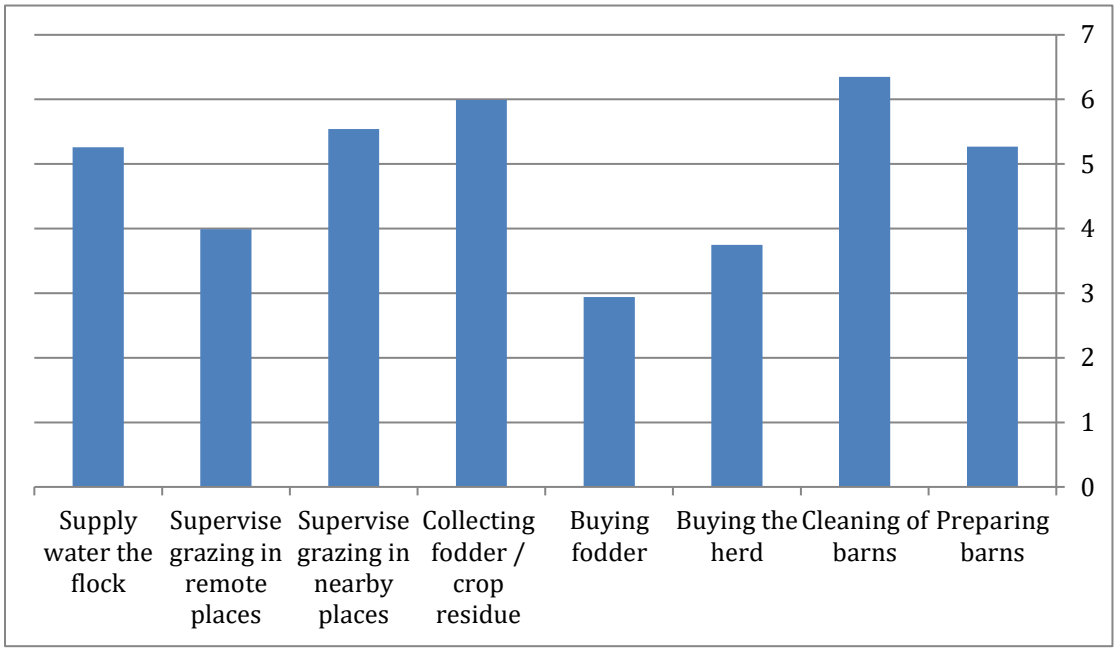


Figure 13: The level of women's participation in livestock-related activities

4.3.4 Gender roles in livestock production and products processing

This section deals with the tasks made for sustaining livestock productivity and the women's participation in activities relevant to livestock caring and production. This participation is measured on a scale of 1- 10. Besides, how is taking the decision to do these activities, and finally respondents perception about how is preferred to do these activities relevant to livestock production and caring (table 15, figure 14).

The respondents preferred that women participate in caring for sick and pregnant sheep/goats (6.26, 6.74), besides taking care of the newborn animals (7.2) side by side of the men (figure 13), and women are the main decision-maker in this aspect as referred by more than 50%. While the other 71 % said that men should execute caring of sick animals. This probably due to the situations when animals need treatment and veterinarian consultations, in this situation men are prepared to make such contact and services. Others said that only women (66%) participate in any decisions related to taking care of the newborn animals, but respondents stated that women (71%) are preferred to execute this activity more than men alone (figure 14). On the other hand, women were participating more in the weaning the young animals (6.7), but both women and men are taking the decision making in this activity side by side (51%- 45), and the respondents had emphasized that men (62%) are preferred to do this activity.

Another activity related to livestock production is wool sheer, this activity is done in by women (4.9), as many participants stated that men (59%) are responsible for taking most of the decisions related to shear wool, moreover, they prefer that men to keep responsible in this task (64%), which reflects that this task is inappropriate to be done by women. On the other side, women are mostly involved in wool cleaning and making wool-home products as carpets (7.9), where the interviewed respondents said that women (76%) are more involved in taking the decisions in this activity, and they prefer maintaining women (76%) in the decision-making in this activity.

Table 15: Gender roles in livestock production and products processing

tasks	decision maker (1.Woman 2.Man)	Who do you prefer to do these tasks (1.Woman 2.Man)
	Number &Percent	Number &Percent
Shear wool	Man:57(59.4)	Man:61(63.5)
Wool cleaning, stretchy pillows	Woman:70(72.9)	Woman: 73(76.0)
Milk the sheep	Woman:77(80.2)	Woman:70(72.9)
Manufacturing (dairy, cheese ....)	Woman:76(79.2)	Woman:68(70.8)
Marketing of products	Man:59(61.5)	Man:49(51.0)
Sheep selling	Man:82(85.4)	Man:75(78.1)
Financing / Loans	Man:60(62.5)	Man:71(74.0)

Regarding milking and manufacturing milk products (milk, cheese...), women had very high participation in this activity (8.28 and 6.33, respectively as shown in figure 14). Accordingly, the woman was the main person to take the decision in milking and manufacturing milk products (80% and 79%), and still, participants believe that women are the preferred person to do these activities (73% -71%). Moreover, women were participating in marketing the milk products (6.33 as in figure 7), but involved in decision making (61%), and the respondent had said that men are favored to be involved in making the decisions about this task (51%).

Regarding selling the animals, women had a very low participation level in this activity (3.7 as shown in figure 14). Accordingly, the man was the main person to take the decision in selling the animal heads (85%), and still men and women believe that man is the preferred person to do the selling (78%). Moreover, women had well-established access to loans (2.57), and the respondents had declared that the man the one who is making the decisions about this task, and in other cases

men are involved in the decision making about taking loans (62%), and also man woman are the preferable people for this activity as mentioned by the interviewed participants (78%).

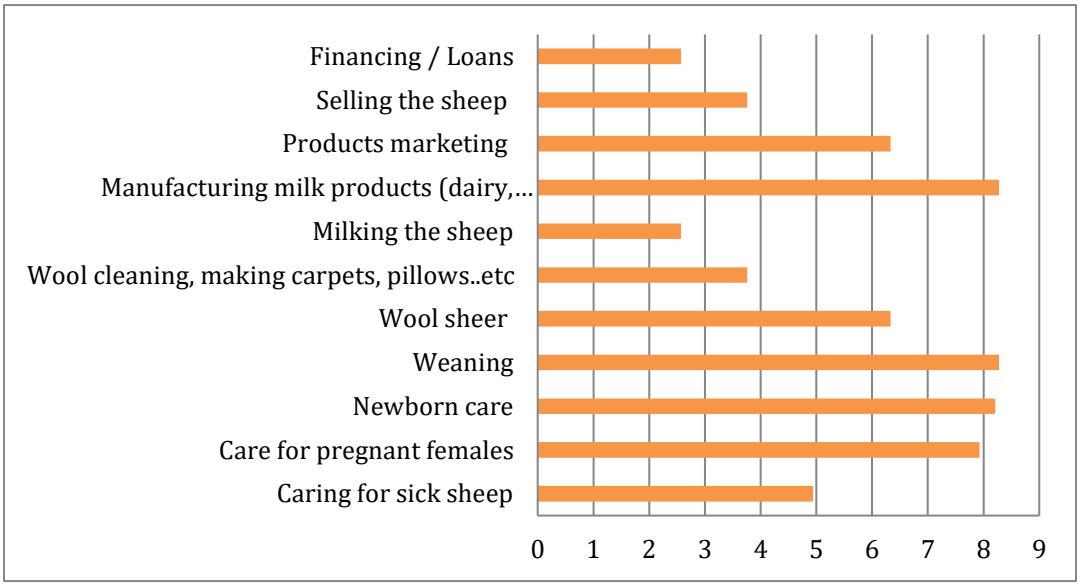


Figure 14: The level of women's participation in livestock production and products processing.

4.3.5 Women participation in financial returns, capacity building and decision making

The respondents were asked about the financial returns that women can get for their participation in livestock production (Table 16). The interviewed respondent had indicated that in 39% of cases women will not get direct financial returns for her participation in herd management and production. While other 61% of respondents pointed that women can get revenues for their given efforts in animal production and caring, and this type of return was said to be in cash as 81% of the respondents mentioned. But other women can get revenue as animal heads, and in these cases, the average returns were about 62 head/ year.

Table 16: Women participation in financial returns, capacity building and decision making

	Number	Percent
Does the woman get any return for her participation in managing and caring for the herd?		
1. Yes	58	61.1
2.No	37	38.9

The nature of revenue		
3. Cash	48	81.4
4. Sheep heads	11	18.6
Number of Sheep heads	mean	62.67
Women participation		
Training courses	9	9.1
Local committees	3	3.0
Associations linked to pastures	16	16.2
Don't share	71	71.7
Determine (the nature of the sessions, committees, or associations in which women participate)		
Al Irfan Charitable Society	18	18.8
Dairy processing courses	8	8.3
Evaluate the woman's level of knowledge of the different grazing sites at the district level	mean	7.69
Evaluate the level of woman's Knowledge of sources for livestock drinking water	mean	7.42

Moreover, respondents indicated that women in southern Badia don't participate in any activities for capacity building and initiatives for community developments (72%), and if they have such it where mainly through training courses and local committees and associations related to pasture.

On the other side, respondents were asked to assess women's knowledge in grazing areas and the locations of water sources. The respondents pointed that woman was familiar with the grazing areas at the level of (7.6 out of 10) and had given about 7.4 on scale for the level of knowledge about the location of water sources used for animal drinking while traveling in open grazing areas.

6. Comparison and Conclusions

This report summarizes collected data about the gender roles in rangeland management and its productivity, which will form a guide for HERD project "Healthy Ecosystems for Rangeland Development" to enhance rangeland development through identifying, and strengthen local communities at the study sites in Jordan. The

Livestock producers in Badia have traditionally adapted to various environmental and climatic changes by building on their in-depth knowledge of the environment in which they live. However,

the expanding human population, urbanization, environmental degradation, and increased consumption of animal source foods have changed and/or rendered some of those coping mechanisms ineffective. Thus, this section will provide the most important features that could act as benchmarks of similarities and differences between the project sites of gender roles in rangeland management and livestock production, and act as triggers for interventions for achieving the overall objective of the HERD project.

Gender responsibilities in rangeland management: The following figure (Figure 15) represents a comparison of the level of women's involvement in specific activities related to rangeland use. The information revealed differences in activities taken by women in the three sites. Activities related to barn management, preparation, cleaning, and water supply, was mainly women's responsibility in all three areas. Women in the southern and middle Badia had reflected a higher participation level than women living in the northern Badia. Nevertheless, women in south Badia had reflected higher participation and involvement in activities related to grazing and fodder supply. Responses from women living in southern Badia bring to light the women's responsibilities in fodder supply for livestock, either in collecting plant residues from agricultural land, supervising the grazing in nearby areas, and also in remote places, and in buying fodders from traders and markets.

Furthermore, the respondents for this study had reflected a strong belief that women have sufficient knowledge of the different grazing sites at the district level, whereas the level of knowledge ranged from 5.59 for those in the middle Badia and the highest level was for women living in the southern Badia (7.69). This also implies the knowledge of livestock drinking water; the women from southern Badia reflected a higher level of knowledge.

Gender responsibilities in livestock production: the results presented in Figure 16 demonstrated an adequate level of harmony among different respondents about women's participation in various activities of livestock production. The survey results reflect the importance of women's role in all activities related to livestock production. Women and men are working side by side in livestock production. especially women living in the middle and northern Badia, as they have equal responsibilities with men in specific activities as sick animal care, care of regnant sheep, weaning, and livestock products selling's. Except for women living in the southern Badia had the highest knowledge among the three sites specifically in the care of pregnant sheep, newborn care, shear

wool, and weaning. Besides that, women were more involved in activities related to milking and milk processing products, especially by women from southern Badia. Regarding sheep selling, the women from southern Badia had a high level of participation in this activity. The results showed that women in southern Badia earn financial returns for their participation in livestock production and grazing management, as women in this area had received the actual highest returns in form of livestock heads; on average women get 62.6 head in the year in return for her efforts in livestock production and grazing.

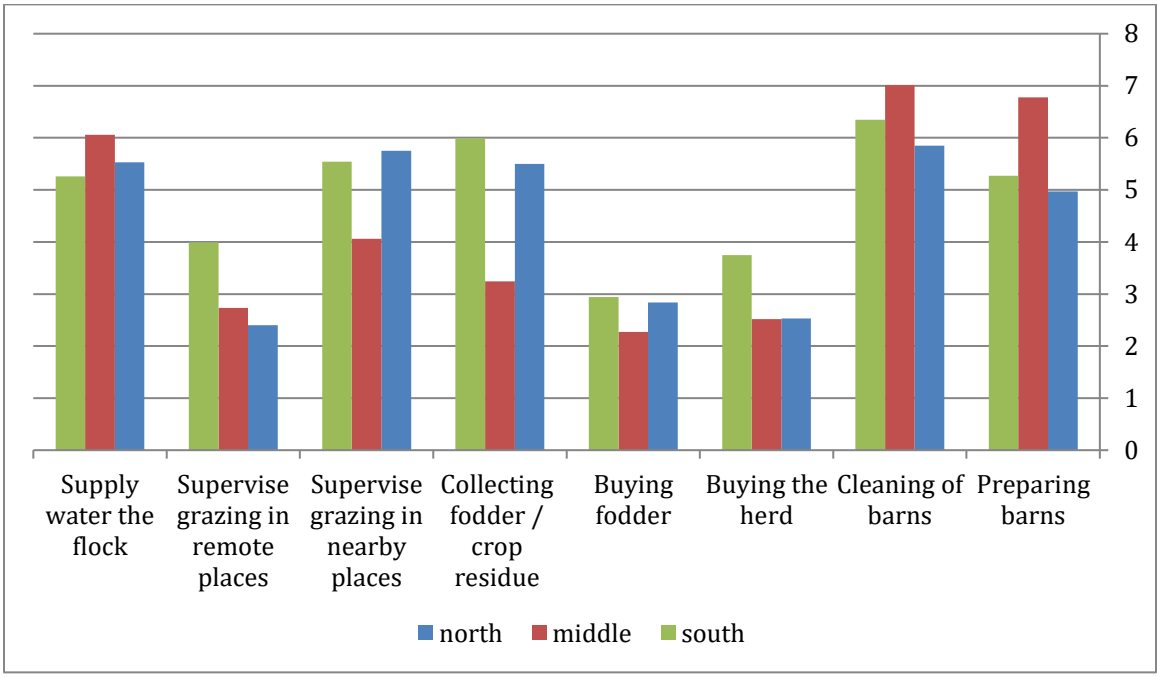


Figure 15: comparison of women role in rangeland- related activities

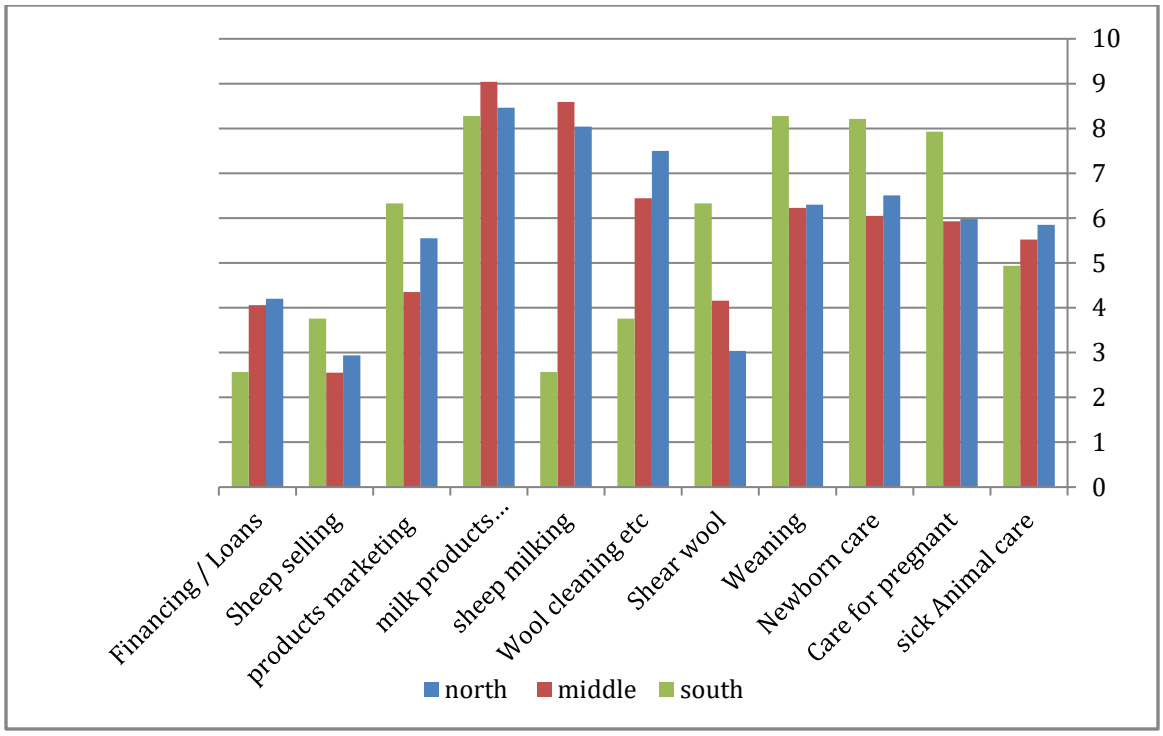


Figure 16: comparison of women role in livestock production- related activities

Finally, **several conclusions** could be gained from the results, which are presented in the following points:

- The decision making in rangeland management and its productivity should move beyond gender stereotypes of women herders as helpers and housekeepers and identify women herders as partners in breeding and owners of livestock flocks.

- Annual extension plans are an urgent need to enhance women's efficiency in livestock production and in the grazing process, which would affect the sustainability of rangeland areas, especially near the urban areas.

- Men and women should be seen as complementary and both important in rangeland sustainably. Empowerment should be seen as individuals building constructive relationships through joint efforts and mutual support for better livelihoods and development;

- For policy formulation, there is a need for gender-disaggregated and socio-economic data in the rangeland and livestock sector, and that to consider the gender-sensitive analysis of livestock

production and rangeland system. Different needs and roles of men and women require developing socio-gender sensitive investment strategies for rural areas and designing equitable rural development policies.

Annex A: Results of the Statistical Analysis

A-1: Al-Surra Reserve / Northwestern Badia

Respondent Gender	Region 1 (%) number	Region 2 (%) number	Region 3 (%) number	Total (%) number
Male	(51.1) 48	(52.6) 50	(51.0) 49	(51.6) 147
Female	(48.9) 46	(47.4) 45	(49.0) 47	(48.4) 138

The area of the Al-Surra Reserve / Northwestern Badia (Number of questionnaire 94)

Table 1: Characteristics of the households:

	Number	Percent
Household Gender		
(1) Male	80	85.1
(2) Female	14	14.9
Social Status for Household		
(1)Married	77	81.9
(2) Widower	15	16.0
(3) Divorced	2	2.1
Health Status for Household		
(1)Healthy	87	92.6

(2)Sick	7	7.4
Determined..... diabetes	7	7.4
Age	mean	51.14
Education level of the Household		
1. Illiterate	5	5.3
2. class 1-6	20	21.3
3. class 7-10	26	27.7
4. class 11	16	17.0
5. High school	19	20.2
6. Diploma	2	2.1
7. University	4	4.3
experience in livestock breeding (year s)	mean	16.85
Field or nature of work		
1. Retired	38	45.2
2. Soldier	1	1.2
3. Private business	2	2.4
4. Farmer	21	25.0
5. unemployed	7	8.3
6. livestock breeding	11	13.1
7. Public employee + teacher	4	4.8
Average Monthly Income (JOD)	mean	428.9
Wife Age (Years)	mean	44.87
Wife Education		
1. Illiterate	3	3.2
2. class 1-6	11	11.7
3. class 7-10	30	31.9
4. class 11	7	7.4
5. High school	22	23.4
6. Diploma	2	2.1
7. University	5	5.3
Wife's work		
1. Work	11	12.9
2. Doesn't work	73	85.9
Number of family members (Person)	mean	7.3
Number of family members working in animal production	mean	2.56

Table 2: grazing and herd management

1. The benefit for	Number	Mean
Home consumption %	94	47.3
Trade%	80	61.88
2. Kind of livestock	Number	Mean
Number of lambs (head)	82	71.69
Number of goats (head)	54	15.01
Number of Camels (head)	0	0
Total(head)		70.85
3. Herd Ownership	Number	Mean
For Men %	80	91.81
For Woman %	33	61.96
4. Herd settled in	Number	Percent
1. Sheds beside the home %	75	73.5
2. Privet farms %	4	3.9
3.Open Region %	23	22.5
5. Percentage of herd dependence %	Number	Mean
Feed	94	64.46
Grazing	83	27.77
Farm waste	51	20.29
The locations of grazing	Number	Percent
Private land	30	30.3
Rumored land	61	61.6
Pastoral land (common land)	8	8.1

Table 7.3: the management of herd

tasks	women's participation (10-1)	decision maker (1.Woman 2.Man)	Who do you prefer to do these tasks (1.Woman 2.Man)
	Mean	Number (Percent)	Number (Percent)
Preparing barns	4.97	Woman:18(19.1) Man:70(74.5) Both:6(6.4)	Woman:12(12.8) Man:74(78.7) Both: 8(8.5)
Cleaning of barns	5.85	Woman:25(26.6)	Woman:19(20.2)

		Man:37(39.4) Both:32(34.0)	Man:42(44.7) Both:33(35.1)
Buying the herd	2.53	Woman:8(8.5) Man:85(90.4) Both:1(1.1)	Woman:3(3.2) Man:88(93.6) Both: 3(3.2)
Buying fodder	2.84	Woman: 8(8.5) Man:71(75.5) Both:15(16.0)	Woman: 3(3.2) Man:85(90.4) Both:6(6.4)
Collecting fodder / crop residue	5.50	Woman:33(35.1) Man:36(38.3) Both:25(26.6)	Woman:22(23.4) Man:52(55.3) Both:20(21.3)
Supervise grazing in nearby places	5.75	Woman:40(42.6) Man:52(55.3) Both:2(2.2)	Woman:33(35.5) Man:55(58.5) Both:6(6.4)
Supervise grazing in remote places	2.40	Woman:9(9.6) Man:79(84.1) Both:6(6.4)	Woman:4(4.3) Man:82(87.3) Both:8(8.5)
Supply water the flock	5.53	Woman:11(11.7) Man:36(38.3) Both:47(50.0)	Woman:5(5.3) Man:43(45.7) Both:46(48.9)

Table 8: Herd productivity

tasks	women's participation (10-1)	decision maker (1.Woman 2.Man)	Who do you prefer to do these tasks (1.Woman 2.Man)
	Mean	Number &Percent	Number &Percent
Caring for sick sheep	5.85	Woman:15(16.0)	Woman:8(8.5)

		Man:61(64.9) Both:18(19.1)	Man:71(75.5) Both:15(16.0)
Care for pregnant females	5.98	Woman:28(29.8) Man:47(50.0) Both:19(20.2)	Woman:18(19.1) Man:57(60.6) Both:19(20.2)
Newborn care	6.51	Woman:27(28.7) Man:34(36.2) Both:33(35.1)	Woman:28(29.8) Man:34(36.2) Both:32(34.0)
Weaning	6.30	Woman:27(28.7) Man:34(36.2) Both:33(35.1)	Woman:21(22.3) Man:38(40.4) Both:35(37.2)
Shear wool	3.04	Woman:6(6.4) Man:70(74.5) Both:18(19.1)	Woman:3(3.2) Man:81(86.2) Both:10(10.6)
Wool cleaning, making carpets, pillows..etc	7.5	Woman:47(50.0) Man:20(21.3) Both:27(28.7)	Woman:45(47.9) Man:23(24.5) Both:26(27.7)
Milking the sheep	8.04	Woman:53(56.4) Man:10(10.6) Both:31(33.0)	Woman:43(45.7) Man:18(19.1) Both:33(35.1)
Manufacturing milk products (dairy, cheese ....)	8.46	Woman:74(78.7) Man:6(6.4) Both:14(14.9)	Woman:70(74.5) Man:10(10.6) Both:14(14.9)
Products marketing	5.55	Woman:28(29.8) Man:21(22.3) Both:45(47.9)	Woman:19(20.2) Man:30(31.9) Both:45(47.9)
Selling the sheep	2.94	Woman:8(8.5)	Woman:7(7.4)

		Man:79(84.1) Both:7(7.4)	Man:83(88.3) Both:4(4.3)
Financing / Loans	4.20	Woman: 7(7.4) Man:58(61.7) Both:29(30.9)	Woman: 9(9.6) Man:57(60.6) Both:28(29.8)

	Number	Percent
Does the woman get any return for her participation in managing and caring for the herd? %		
1. Yes	40	42.6
2.No	54	57.4
The nature of revenue		
5. Cash	26	66.7
6. Sheep heads	13	33.3
Number of Sheep heads	mean	4.58
Women participation		
5. Training courses	15	16.0
6. Local committees	1	1.1
7. Associations linked to pastures	3	3.2
8. Don't share	75	79.8
Determine (the nature of the sessions, committees, or associations in which women participate)		
1. Al-Jawhara Charitable Society	18	18.8
2. Dairy processing courses	8	8.3
3.		
Evaluate the **woman's level of knowledge** of the different grazing sites at the district level	mean	6.67
Evaluate the level of **woman's Knowledge of sources** for livestock drinking water	mean	6.87

A-2: Al-Hazeem site in the middle Badia / Al-Azraq district

Al- Hazeem site in the middle Badia / Al-Azraq district (Number of questionnaire 95)

Table 1: characteristics of family

	Number	Percent
Household Gender		
(2) Male	84	88.4
(2) Female	11	11.6
Social Status for Household		
(1)Married	83	87.4
(2) Widower	8	8.4
(3) Divorced	4	4.2
Health Status for Household		
(1)Healthy	82	87.4
(2)Sick	12	12.6
Determined:		
1. Kidney	2	2.1
2. Diabetes	4	4.2
3. Heart	2	2.1
4. Hemiplegia	1	1.1
5. Nerves	1	1.1
Age	mean	48.38
Education level of Household		
8. uneducated	21	22.1
9. Elementary	12	12.6

10. Junior secondary	19	20.0
11. Senior secondary	6	6.4
12. general secondary	25	26.3
13. Diploma	3	3.2
14. University	9	9.5
experience in livestock breeding	mean	17.33
Field or nature of work		
8. Retired	24	25.3
9. Driver	1	1.1
10. Teacher	5	5.3
11. Soldier	7	7.4
12. Free businees	3	3.2
13. Farmer	10	10.5
14. Doesn’t work	10	10.5
15. livestock breeding	8	8.4
16. Government employee	27	28.4
Average Monthly Income	mean	310
Wife Age	mean	41.52
Wife Education		
15. uneducated	29	30.5
16. Elementary	9	9.5
17. Junior secondary	13	13.7
18. Senior secondary	7	7.4
19. general secondary	13	13.7
20. Diploma	1	1.1
21. University	14	14.7
Wife's work		
3. Work	15	15.8
4. Doesn't work	80	84.2
Number of family members	mean	5.4
Number of family members working in animal production	mean	2.88

Table 2: grazing and herd management

6. The benefit for	Number	Mean
Home consumption	94	57.60
Trade	75	54.35

7. Kind of livestock	Number	Mean
Number of lambs	69	12.67
Number of goats	88	10.63
Number of Camels	7	3.86
Total		19.18
8. Herd Ownership	Number	Mean
For Men	84	86.67
For Woman	35	63.43
9. Herd live in	Number	Percent
1. Sheds beside the home	77	71.3
2. Privet farms	14	13.0
3.Open Region	17	15.7
10. Percentage of herd dependence	Number	Mean
Feed	95	71.79
Grazing	59	27.12
Farm waste	43	25.12
The region of grazing	Number	Percent
Property	48	42.5
Open Region	58	51.3
Pastoral land	7	6.2

Table 7.3: the management of herd

tasks	women's participation (10-1)	decision maker (1.Woman 2.Man)	Who do you prefer to do these tasks (1.Woman 2.Man)
	Mean	Number &Percent	Number &Percent
Preparing barns	6.78	Woman:33(34.7) Man:30(31.6) Both:32(33.7)	Woman:39(41.1) Man:34(35.8) Both: 22(23.2)
Cleaning of barns	7.01	Woman: 34(35.8) Man:27(28.4) Both:34(35.8)	Woman:45(47.4) Man:28(29.5) Both:22(23.2)
Buying the herd	2.52	Woman:7(7.4)	Woman:8(8.4)

		Man:72(75.8) Both:16(16.8)	Man:84(88.4) Both: 3(3.2)
Buying fodder	2.27	Woman: 8(8.4) Man:71(74.7) Both:16(16.8)	Woman:8(8.4) Man:84(88.4) Both: 3(3.2)
Fodder / crop residue collection	3.24	Woman:12(12.6) Man:59(62.2) Both:24(25.3)	Woman:11(11.6) Man:74(77.9) Both:10(10.5)
Grazing in nearby places	4.06	Woman:19(20.0) Man:45(47.4) Both:31(32.6)	Woman:20(21.1) Man:56(58.9) Both:19(20.0)
Grazing in remote places	2.73	Woman:10(10.5) Man:52(54.7) Both:33(34.7)	Woman:7(7.4) Man:69(72.6) Both:19(20.0)
Water the flock	6.06	Woman:26(27.4) Man:21(22.1) Both:48(50.5)	Woman:33(34.7) Man:23(24.2) Both:39(41.1)

Table 8: Herd productivity

tasks	women's participation (10-1)	decision maker (1.Woman 2.Man)	Who do you prefer to do these tasks (1.Woman 2.Man)
	Mean	Number &Percent	Number &Percent
Caring for sick sheep	5.52	Woman:20(21.1) Man:34(35.8)	Woman:28(29.5) Man:36(37.9)

		Both:41(43.2)	Both:31(32.6)
Care for pregnant	5.93	Woman:27(28.4) Man:28(29.5) Both:40(42.1)	Woman:41(43.2) Man:22(23.2) Both:32(33.7)
Newborn care	6.05	Woman:29(30.5) Man:27(28.4) Both:39(41.1)	Woman:41(43.2) Man:20(21.1) Both:34(35.8)
Weaning	6.23	Woman:30(31.6) Man:26(27.4) Both:39(41.1)	Woman:40(42.1) Man:21(22.1) Both:34(35.8)
Shear wool	4.16	Woman:12(12.6) Man:42(44.3) Both:41(34.2)	Woman:13(13.7) Man:51(53.7) Both:31(32.6)
Wool cleaning, stretchy pillows	6.44	Woman:25(26.3) Man:29(30.5) Both:41(43.2)	Woman:41(43.2) Man:21(22.1) Both:33(34.7)
Milk the sheep	8.59	Woman:50(52.6) Man:12(12.6) Both:33(34.7)	Woman:72(75.8) Man:8(8.4) Both:15(15.8)
Manufacturing (dairy, cheese ....)	9.04	Woman:57(60.0) Man: 12(12.6) Both:26(27.4)	Woman:77(81.1) Man:7(7.4) Both:11(11.6)
Marketing of products	4.35	Woman:19(20.0) Man:42(44.2) Both:34(35.8)	Woman:25(26.3) Man:48(50.6) Both:22(23.2)

Sheep selling	2.55	Woman:10(10.5) Man:67(70.5) Both:18(18.9)	Woman:16(16.8) Man:74(77.9) Both:5(5.3)
Financing / Loans	4.06	Woman22(23.2) Man:58(61.1) Both:15(15.8)	Woman: 32(33.7) Man:58(61.1) Both:5(5.3)

	Number	Percent
Does the woman get any return for her participation in managing and caring for the herd?		
1. Yes	44	46.3
2.No	51	53.7
The nature of revenue		
7. Cash	32	69.6
8. Sheep heads	14	30.4
Number of Sheep heads	mean	14.5
Women participation		
9. Training courses	23	22.5
10. Local committees	5	4.9
11. Associations linked to pastures	3	2.9
12. Don't share	71	69.6
Determine (the nature of the sessions, committees, or associations in which women participate)		
3. Al Irfan Charitable Society	1	1.1
4. Dairy processing courses	16	16.8
5. The herd care cycle	4	4.2
Evaluate the woman's level of knowledge of the different grazing sites at the district level	mean	5.59
Evaluate the level of woman's Knowledge of sources for livestock drinking water	mean	6.33

A-3: Mansheya protected area Badia / Athrah district/ Southern estern Badia

Mansheya protected area Badia / Athrah district/ Southern estern Badia (Number of questionnaire 96)

Table 1: characteristics of family

	Number	Percent
Household Gender		
(3) Male	81	84.4
(2) Female	15	15.6
Social Status for Household		
(1)Married	77	80.2
(2) Widower	14	14.6
(3) Divorced	5	5.2
Health Status for Household		
(1)Healthy	84	87.5
(2)Sick	12	12.5
Determined:		
1. Clot	1	1.0
2. Eyes	1	1.0
3. Diabetes	7	7.3
4. Hemiplegia	1	1.0
Age	mean	50.9
Education level of Household		
22. uneducated	25	27.2

23. Elementary	6	6.5
24. Junior secondary	15	16.3
25. Senior secondary	20	21.7
26. general secondary	13	14.1
27. Diploma	1	1.1
28. University	12	13.0
experience in livestock breeding	mean	18.68
Field or nature of work		
17. Retired	45	50.6
18. Driver	5	5.6
19. security	1	1.1
20. Teacher	11	12.4
21. Soldier	3	3.4
22. Free businees	2	2.2
23. Farmer	6	6.7
24. Doesn’t work	10	11.2
25. livestock breeding	1	1.1
26. Government employee	5	5.6
Average Monthly Income	mean	360
Wife Age	mean	43.96
Wife Education		
29. uneducated	32	33.3
30. Elementary	4	4.2
31. Junior secondary	19	19.8
32. Senior secondary	10	10.4
33. general secondary	8	8.3
34. Diploma	2	2.1
35. University	7	7.3
Wife's work		
5. Work	22	24.7
6. Doesn't work	67	75.3
Number of family members	mean	7.63
Number of family members working in animal production	mean	3.02

Table 2: grazing and herd management

11. The benefit for	Number	Mean
Home consumption	86	57.07

Trade	85	53.67
12. Kind of livestock	Number	Mean
Number of lambs	74	97.46
Number of goats	93	84.23
Number of Camels	23	208.83
Total		206.41
13. Herd Ownership	Number	Mean
For Men	83	82.41
For Woman	48	55.52
14. Herd live in	Number	Percent
1. Sheds beside the home	46	43.8
2. Privet farms	16	15.2
3.Open Region	43	41.0
15. Percentage of herd dependence	Number	Mean
Feed	88	71.25
Grazing	71	28.10
Farm waste	54	23.98
The region of grazing	Number	Percent
Property	12	10.6
Open Region	51	45.1
Pastoral land	50	44.2

Table 7.3: the management of herd

tasks	women's participation (10-1)	decision maker (1.Woman 2.Man)	Who do you prefer to do these tasks (1.Woman 2.Man)
	Mean	Number &Percent	Number &Percent
Preparing barns	5.27	Woman:31(32.3) Man:59(61.4) Both:6(6.2)	Woman: 31(32.3) Man:53(55.2) Both: 12(12.5)
Cleaning of barns	6.35	Woman: 55(57.3) Man:36(37.5) Both:5(5.2)	Woman:39(40.6) Man:50(52.1) Both:7(7.3)
Buying the herd	3.75	Woman:18(18.8) Man:76(79.2) Both:2(2.1)	Woman:20(20.8) Man:68(70.8) Both: 8(8.3)
Buying fodder	2.94	Woman: 13(13.5) Man:79(82.3)	Woman:19(19.8) Man:72(75.0)

		Both:4(4.2)	Both: 5(5.2)
Fodder / crop residue collection	5.99	Woman:42(43.8) Man:37(38.5) Both:17(17.7)	Woman:26(27.1) Man:57(59.4) Both:9(9.4)
Grazing in nearby places	5.54	Woman:45(46.9) Man:42(43.8) Both:9(9.4)	Woman:21(21.9) Man:61(63.5) Both:14(14.6)
Grazing in remote places	3.99	Woman:17(17.7) Man:71(74.0) Both:8(8.3)	Woman:20(20.8) Man:67(69.8) Both:9(9.4)
Water the flock	5.26	Woman:30(31.2) Man:52(54.1) Both:14(14.6)	Woman:30(31.2) Man:50(52.1) Both:16(16.7)

Table 8: Herd productivity

tasks	women's participation (10-1)	decision maker (1.Woman 2.Man)	Who do you prefer to do these tasks (1.Woman 2.Man)
	Mean	Number &Percent	Number &Percent
Caring for sick sheep	6.26	Woman:48(50.0) Man:42(43.8) Both:6(6.2)	Woman:23(24.0) Man:68(70.9) Both:5(5.2)
Care for pregnant	6.74	Woman:59(61.5) Man:32(33.3) Both:5(5.2)	Woman:42(43.8) Man:48(50.0) Both:6(6.2)
Newborn care	7.24	Woman:63(65.6) Man:29(30.2) Both:4(4.2)	Woman:37(38.5) Man:49(51.0) Both:10(10.4)
Weaning	6.71	Woman: 49(51.0) Man:43(44.8) Both:4(4.2)	Woman:30(31.2) Man:59(61.5) Both:7(7.3)
Shear wool	4.94	Woman:35(36.5) Man:57(59.4) Both:4(4.2)	Woman:30(31.2) Man:61(63.5) Both:5(5.2)
Wool cleaning, stretchy pillows	7.93	Woman:70(72.9) Man:24(25.0) Both:2(2.1)	Woman: 73(76.0) Man:18(18.8) Both:5(5.2)
Milk the sheep	8.21	Woman:77(80.2) Man:14(14.6) Both:5(5.2)	Woman:70(72.9) Man:21(21.9) Both:5(5.2)
Manufacturing (dairy, cheese ....)	8.28	Woman:76(79.2) Man: 12(12.5) Both:8(8.3)	Woman:68(70.8) Man:22(22.9) Both:6(6.2)

Marketing of products	6.33	Woman:35(36.5) Man:59(61.5) Both:2(2.1)	Woman:41(42.7) Man:49(51.0) Both:6(6.2)
Sheep selling	3.76	Woman:13(13.5) Man:82(85.4) Both:1(1.1)	Woman:16(16.7) Man:75(78.1) Both:5(5.2)
Financing / Loans	2.57	Woman23(24.0) Man:60(62.5) Both:13(13.5)	Woman: 18(18.8) Man:71(74.0) Both:7(7.2)

	Number	Percent
Does the woman get any return for her participation in managing and caring for the herd?		
1. Yes	58	61.1
2.No	37	38.9
The nature of revenue		
9. Cash	48	81.4
10. Sheep heads	11	18.6
Number of Sheep heads	mean	62.67
Women participation		
13. Training courses	9	9.1
14. Local committees	3	3.0
15. Associations linked to pastures	16	16.2
16. Don't share	71	71.7
Determine (the nature of the sessions, committees, or associations in which women participate)		
6. Al Irfan Charitable Society	18	18.8
7. Dairy processing courses	8	8.3
Evaluate the woman’s level of knowledge of the different grazing sites at the district level	mean	7.69
Evaluate the level of woman's Knowledge of sources for livestock drinking water	mean	7.42

SURA:

The number of affected people within the project boundary is as follows:

SITE	**Male**	**Female**	**Total**
Site 1 Bani Hashim	***8,500***	***6,500***	***15,000***
Site 2 SURA	*98*	*36*	*134*
Site 3 Hazeem	*45*	*25*	*70*
Site 4 Jafir-AlManshyah	*2,141*	*1,815*	*3,956*

Table () : number of affected people within the project boundary

What is landscape scale assessment?

Based on PRAGA and the site analysis of the indicators. The assessment will be extended to whole landscape based on further PRMP.

Step 5. Participatory mapping of target landscape

1- Aim

In this step of PRAGA the landscape participatory approach in the rangeland management was achieved through meeting with the community of Hima Bani Hashem in which the local knowledge was implemented and focused on the participatory maps.

2- Rationale for the participatory approach

A training on the bioindicators that are important in the site were explained to the local community and were defined to show how these are important to the rangeland and the existance of biodiversity on the site.

The local community were asked to draw and put all there knowledge on the map and show the main three bioindicators (water, vegetation, and soil) on the map.

The bioindicators and Participatory identification of criteria for defining zones:

1- Water: the existence of water resources on the site, direction of water flow, dams , wells, ground water reservoirs availability. All participants were asked to state any problem (Erosion, contamination, etc..) with the resources exist and what is needed to maintain such resources.

2- Soil: indicate the type of soil, the fertility, the slope, erosion, organic matter, salinity, roads, access to the site etc.

3- Vegetation: the existence of species and type as possible, distinct species, low density vegetation, overgrazing, endangered species, land use, the benefits of the vegetation to the locals.

After completion to add all information to the map a list problem and the suggested solution in the local's opinion are written of sheets and them a discussion is conducted.

Participant were divided in three groups and three participatory maps were created and each group was instructed to suggest the best three areas in this landscape to focus on the restoration activities.

3- Selection of participants

The participant was invited from the local community through the local COBS and through the Governate and municipality to ensure all are interested and have the knowledge to participate are invited.

4- Participatory landscape mapping and considerations

The participants were introduced to the bio-indicators in general and were asked to implement their knowledge in this practice. A presentation was given site map and three maps including borders of the landscape were printed on A3 paper and colors were used as indicators (Blue for water, Green for vegetation, Red for Soil, and black for roads).

5- Main steps in the mapping exercise:

Local community groups were formed to discuss the problems their landscape sites suffer from, and they proposed solutions based on their local knowledge.

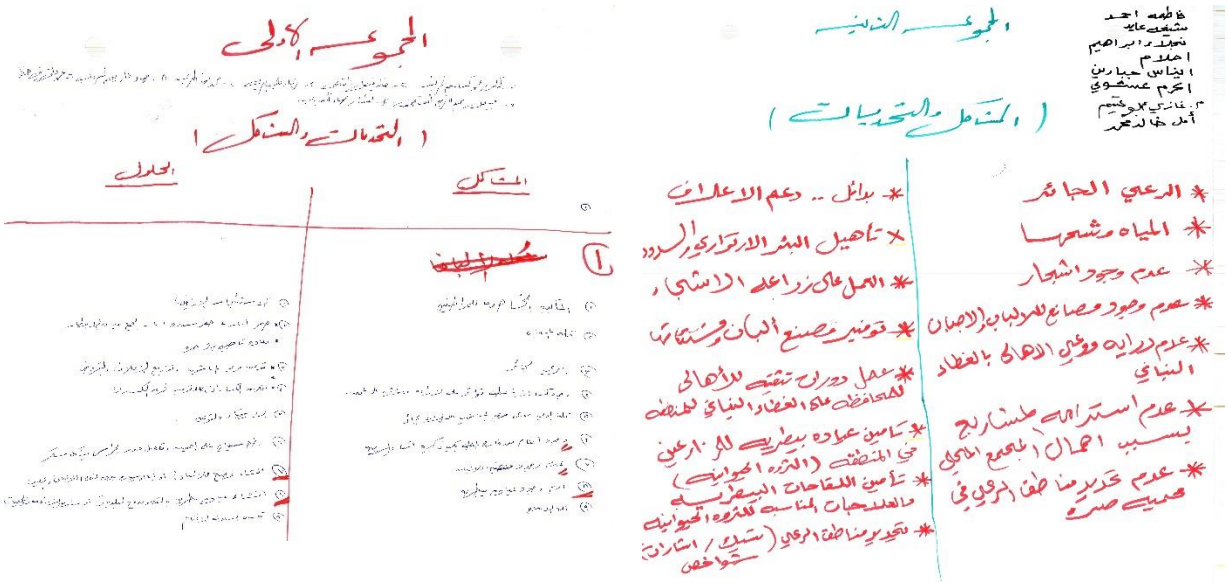
Summary of the problems defined by locals in Sura Landscape site were: -

- Private land properties which causes to reduce the land available for rangers.
- Lack of availability of water.
- Overgrazing.
- High prices for cattle feeds.
- Low prices of produced milk, and exploiting herders by cheese producers.
- The existing of quarries in the area that affects the agricultural activities and rangelands.
- Lack of awareness for the negative effects of overgrazing on rangelands and the natural restoration of plants.
- Grazing by herders from outside the area in springs.
- Lack of diary factory.
- Lack of veterinary clinic.
- Lack of production.
- Lack of vegetation cover in the area.
- Lack of sustainable projects in the area.
- Lack of grazing system and rotation in Sura range reserve.
- Inability to take any advantages of wools.

The proposed solutions (Figure 30) were:

- Renting lands for agricultural and grazing purposes.
- Drilling new water wells and establish new structures for rainwater harvesting.

- Rehabilitation of the existing well in Sura range reserve
- Raising awareness for herders for the importance of rangelands and their natural restoration processes and the negative effects of overgrazing on rangelands.
- Suspension and closure of existing quarries in the area.
- Fencing the existing range reserve and empowering the role of rangers.
- Establishment of diary factory and provide the cooperatives with a portable refrigerator facility (vehicle) for the transportation of milk products.
- Establishment of veterinary clinic in cooperation with MoA with providing the herders with the needed vaccines.
- Improvement of sheep breeds to increase the milk production.
- Allow the herders for grazing in Sura range reserve by using an appropriate grazing system.
- Allocating subsidized feeds for herders.



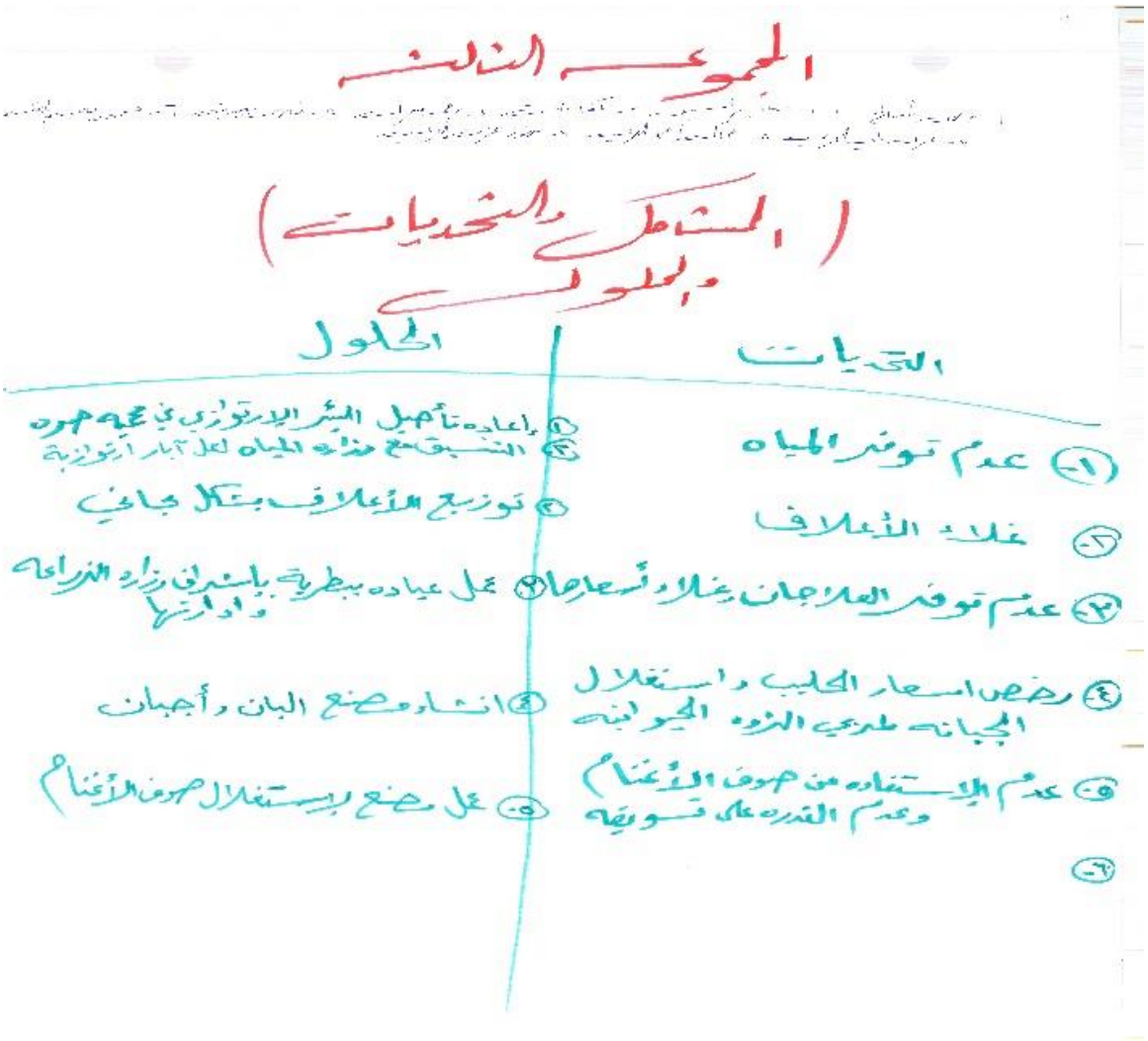


Figure 30: Problems and proposed solutions by locals in Sura Landscape

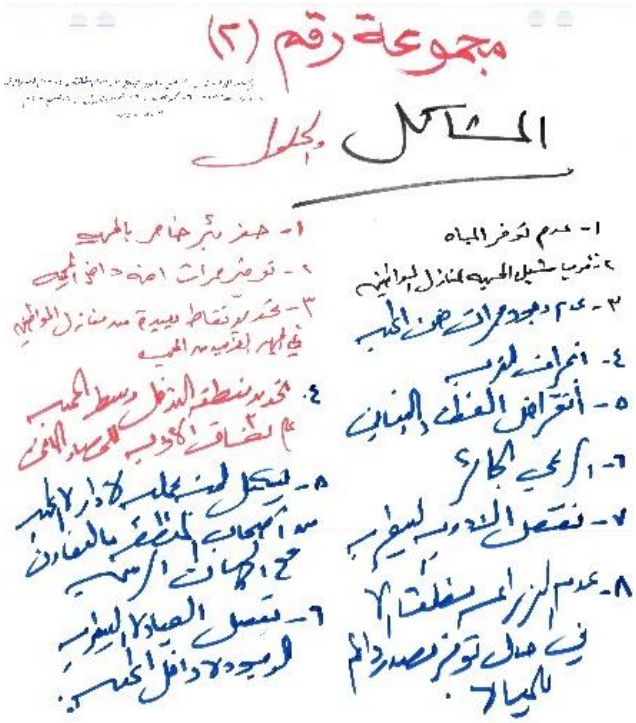
In Al-Mansheyyeh, three subgroups were developed to produce the participatory map (Figure 6) for the proposed sites for restoration activities, summary of problems and proposed solutions were defined as follows (Figure 31):

- Lack of water sources.
- The reserve fence is very close to some locals' houses.
- Lack of small routes and passages inside the reserve.
- Soil erosion.
- Lack of appropriate vaccines needed by herders.
- Lack of any structures for rainwater harvesting.
- Lack of vegetation cover and pastoral plants.
- Lack of irrigation water source in the area.
- Overgrazing.
- Lack of appropriate equipment for the transportation of produced milk.
- Inability to take any advantages of wools.
- The fence around the Al-Mansheyyeh range site is not appropriate to prevent any violations and overgrazing in the protected reserve.

The proposed solutions (Figure 31) were:

- Drilling new water wells and establish new structures for rainwater harvesting.
- Fencing the existing range reserve and empowering the role of rangers.
- Provide the cooperatives with a portable refrigerator facility (vehicle) for the transportation of milk products.
- Establishment of veterinary clinic in cooperation with MoA with providing the herders with the needed vaccines.
- Restoring the degraded land by re planting of pastoral trees in the area.
- Provide the locals with a permeant water source for irrigation purposes, with an appropriate vehicle for water transportation.
- Establishment of new nurseries in the area for restoration purposes.
- Establishment of a factory for wool treatment and production.

- Establishment of new routes and passages inside the reserve.
- Terraces to reduce soil erosion.
- Define a proposed site in the reserve for restoration activities.
- Development of a local community for local administration in cooperation with government.



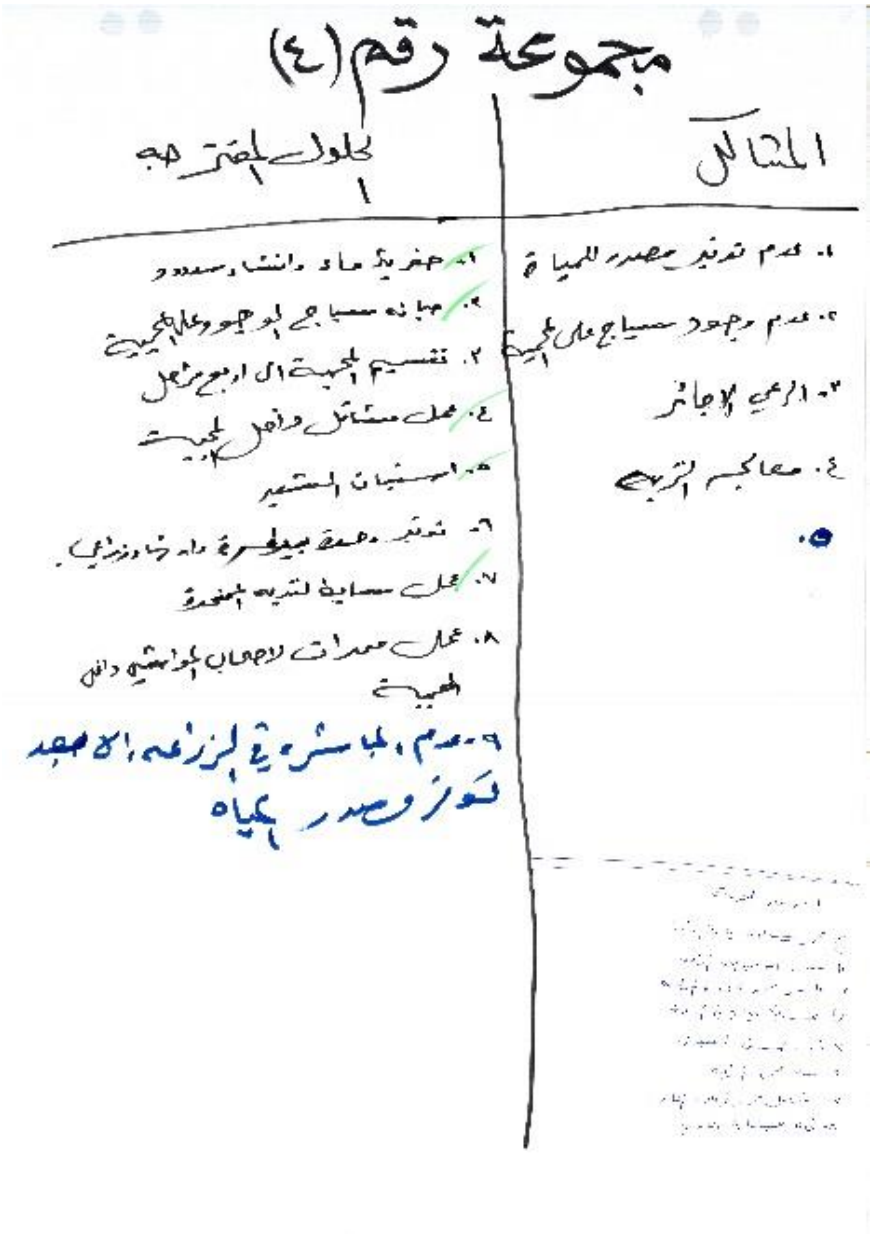


Figure 31: Problems and proposed solutions by locals in Al Mansheyyeh

In Al- Hazeem, three subgroups were also developed to produce the participatory map for proposed sites for restoration activities (Figure 7), summary of problems and proposed solutions were defined as follows (Figure 32 and Figure 33):

- Lack of water sources for irrigation purposes.
- Lack of any protection for native plants

- Lack of roads and streets.
- Soil salinity and erosion.
- Lack of any structures for rainwater harvesting.
- Lack of vegetation cover and pastoral plants.
- Overgrazing.
- Lack of awareness for the negative effects of overgrazing on rangelands and the natural restoration of plants.
- No regulations and governmental subsidies.
- The existence of quarries in the area

The proposed solutions (Figure 33) were:

- Establishment of protected areas for natural restoration for native pastoral plants.
- Establishment new structures for rainwater harvesting for the proposed protected area
- Establishment of new nurseries in the area for restoration purposes and collection of seeds.
- Establishment of new routes and passages inside the proposed protected area.
- Terraces to reduce soil erosion.
- Regulating of hunting activities in the area in cooperation with governments
- Plantation of salinity tolerant plants.
- Awareness of local communities for the importance of the optimum use of water, importance of native plants in reducing soil erosion and increasing vegetation cover.
- Rehabilitation of natural resources and stop any illegal drilling of new wells and random pumping.
- Define the borders for existing quarries and stop any extensions.

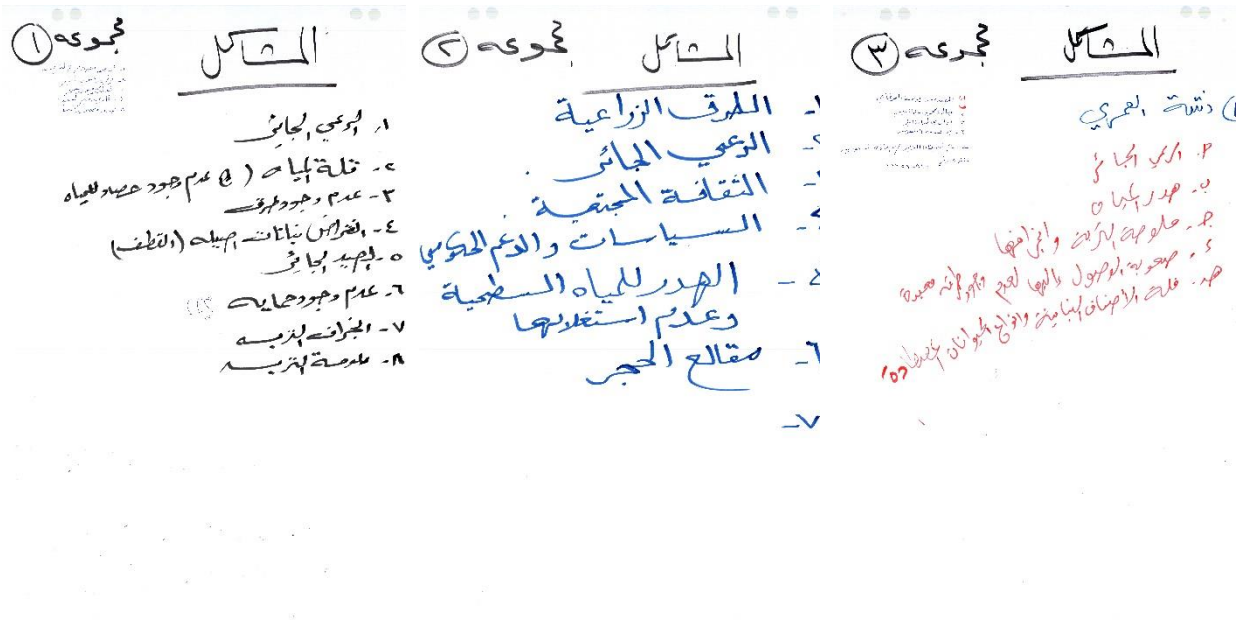


Figure 32: Problems defined by locals in Al Hazeem

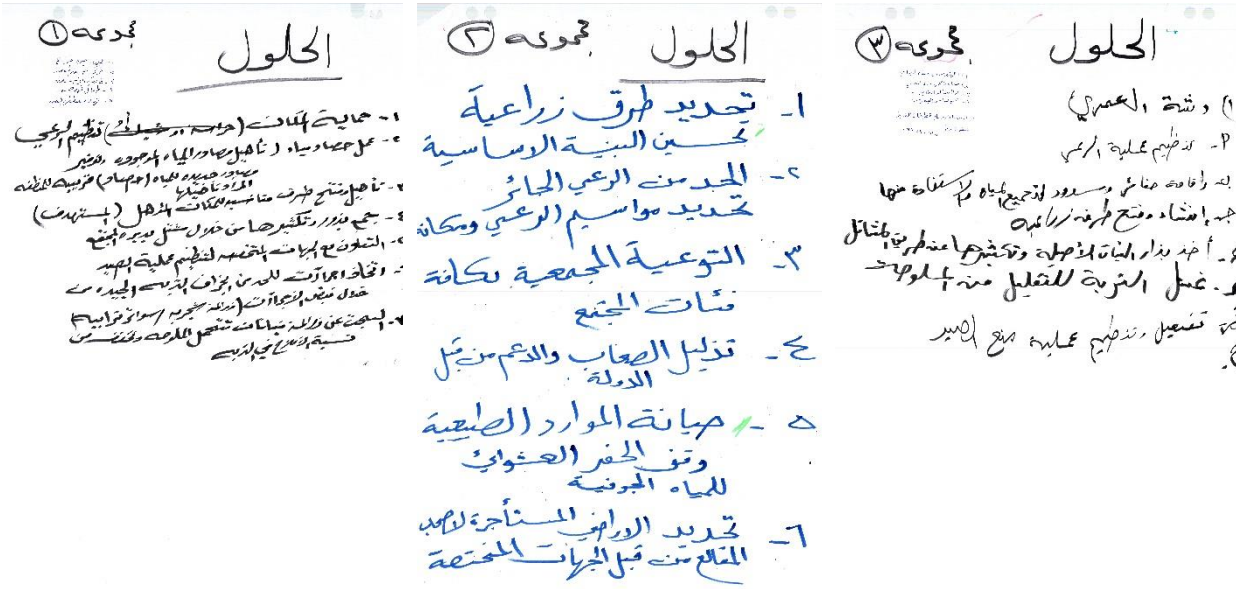


Figure 33: Proposed solutions by locals in Al-Hazeem

Step 6. Participatory indicator selection

1- Aim

The aim of this step is to select indicators in the site that is important and affect the management practices. The participatory approach is based on the several factors on the site affect the management especially in the rangeland. As a result of the participatory meeting with the local community, the following indicators were discussed and explain the effects on site and utilization in the healthy rangeland management.

The target from this practice is to identify natural landscape area by determining the geography natural landscape area, identifying the local communities, ecosystems of the area and shown in the participatory practices.

The indicators explained and also implemented on the map.

1.Abiotic factor Indicator:

1. Soil:
   A. Soil type (clay, loam,)
   B. Soil fertility

2. Water**:**

   A. Precipitation annual rainfall
   B. Number of Water well at area
   C. Water utilization from these well
   D. Water quality

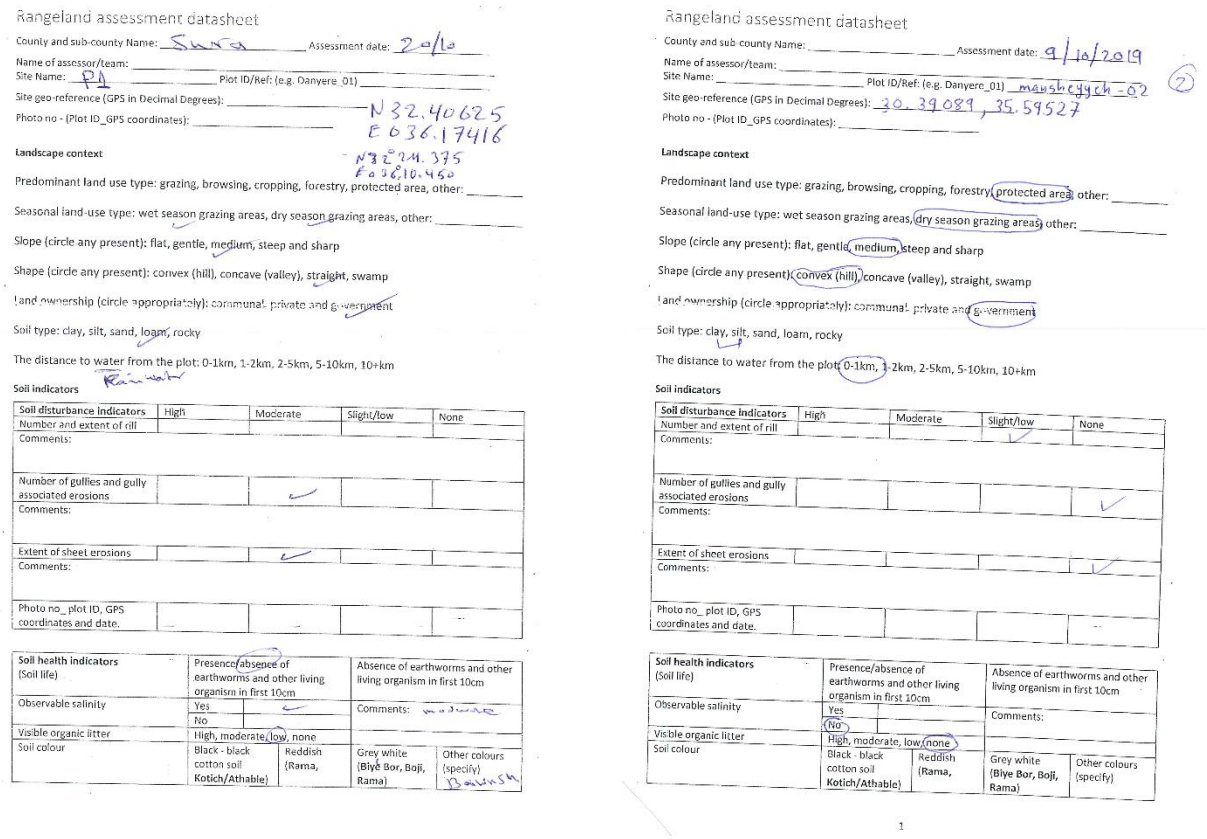
2. Biotic factor indicator (Biodiversity)

   A. Increase plant growth (Height and size)
   B. Increase medicinal plants at
   C. Increase flora diversity
   D. Increase fauna diversity (Birds)

The indicators were mapped on the participatory map based on the local knowledge and experience on the site.

Field Assessment

Many field visits were conducted to the three landscape sites in order to fill the rangeland assessment datasheet



Rangeland assessment datasheet

County and sub-county Name: Siwa Assessment date: 20/10

Name of assessor/team:

Site Name: PN Plot ID/Ref: (e.g. Danyere_01)

Site geo-reference (GPS in Decimal Degrees):

Photo no - (Plot ID_GPS coordinates): N 32.40625 E 036.17416 N32°24M.375 Fo36°10.450

Landscape context

Predominant land use type: grazing, browsing, cropping, forestry, protected area, other:

Seasonal land-use type: wet season grazing areas, dry season grazing areas, other:

Slope (circle any present): flat, gentle, medium, steep and sharp

Shape (circle any present): convex (hill), concave (valley), straight, swamp

Land ownership (circle appropriately): communal, private and government

Soil type: clay, silt, sand, loam, rocky

The distance to water from the plot: 0-1km, 1-2km, 2-5km, 5-10km, 10+km

Soil indicators

Soil disturbance indicators	High	Moderate	Slight/low	None
Number and extent of rill				
Comments:				
Number of gullies and gully associated erosions		✓		
Comments:				
Extent of sheet erosions		✓		
Comments:				
Photo no_ plot ID, GPS coordinates and date.				

Soil health indicators (Soil life)	Presence/absence of earthworms and other living organism in first 10cm		Absence of earthworms and other living organism in first 10cm
Observable salinity	Yes	✓	Comments: mulure
	No		
Visible organic litter	High, moderate, low, none		
Soil colour	Black - black cotton soil Kotich/Athable)	Reddish (Rama,	Grey white (Biye Bor, Boji, Rama) / Other colours (specify) Banash

Rangeland assessment datasheet

County and sub-county Name: Assessment date: 9/10/2019

Name of assessor/team:

Site Name: Plot ID/Ref: (e.g. Danyere_01) maysh eyych -02 (2)

Site geo-reference (GPS in Decimal Degrees): 30.39089, 35.59527

Photo no - (Plot ID_GPS coordinates):

Landscape context

Predominant land use type: grazing, browsing, cropping, forestry, protected area, other:

Seasonal land-use type: wet season grazing areas, dry season grazing areas, other:

Slope (circle any present): flat, gentle, medium, steep and sharp

Shape (circle any present): convex (hill), concave (valley), straight, swamp

Land ownership (circle appropriately): communal, private and government

Soil type: clay, silt, sand, loam, rocky

The distance to water from the plot: 0-1km, 1-2km, 2-5km, 5-10km, 10+km

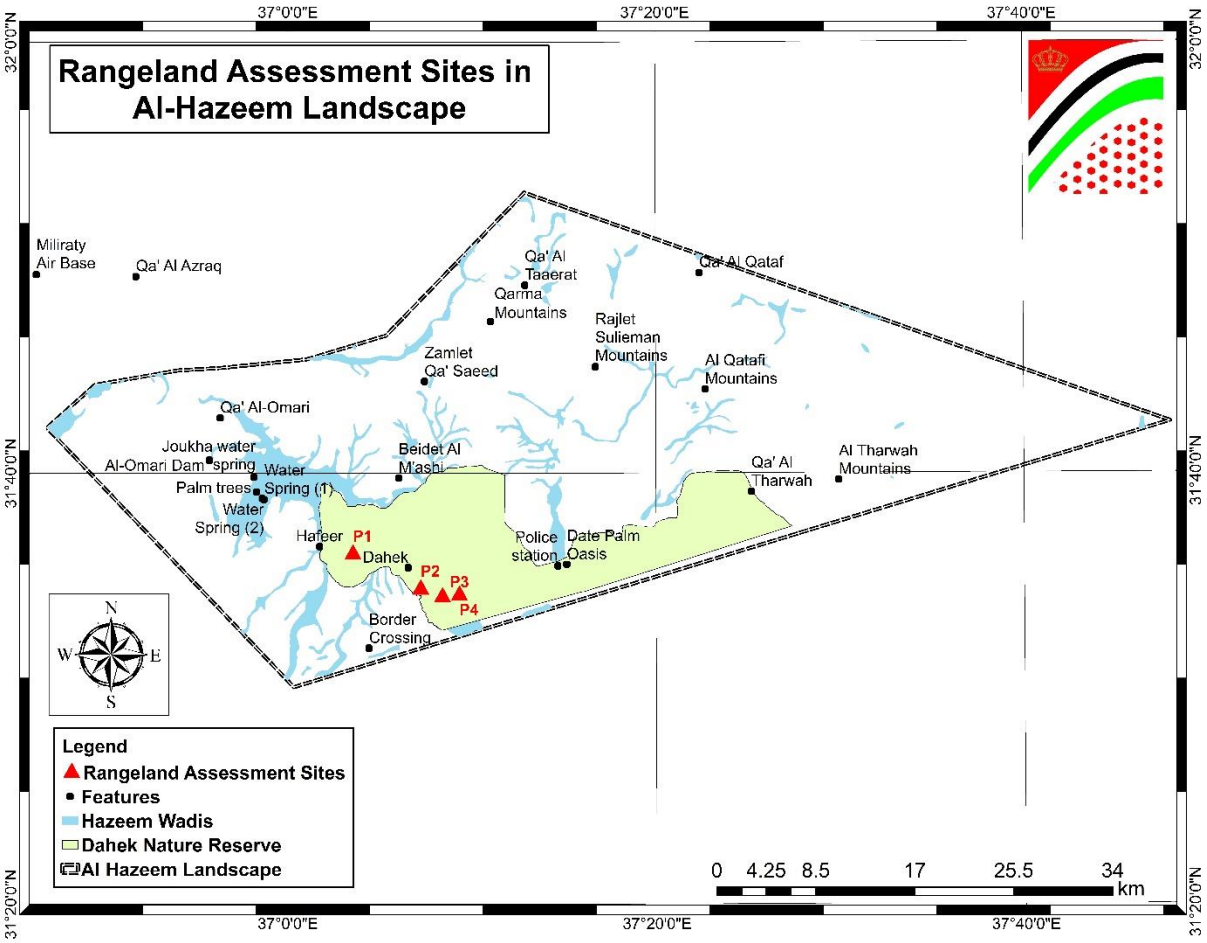
Soil indicators

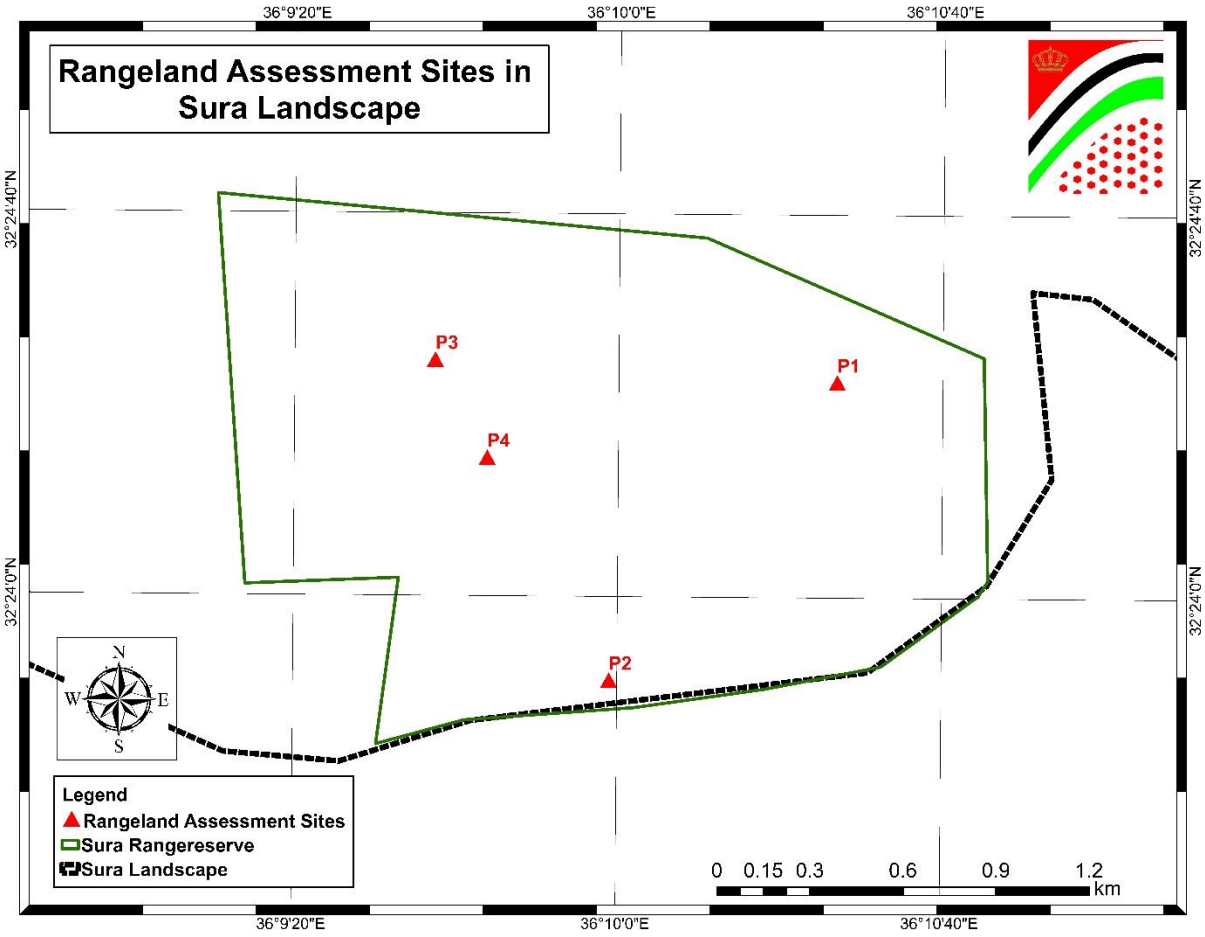
Soil disturbance indicators	High	Moderate	Slight/low	None
Number and extent of rill			✓	
Comments:				
Number of gullies and gully associated erosions				✓
Comments:				
Extent of sheet erosions				✓
Comments:				
Photo no_ plot ID, GPS coordinates and date.				

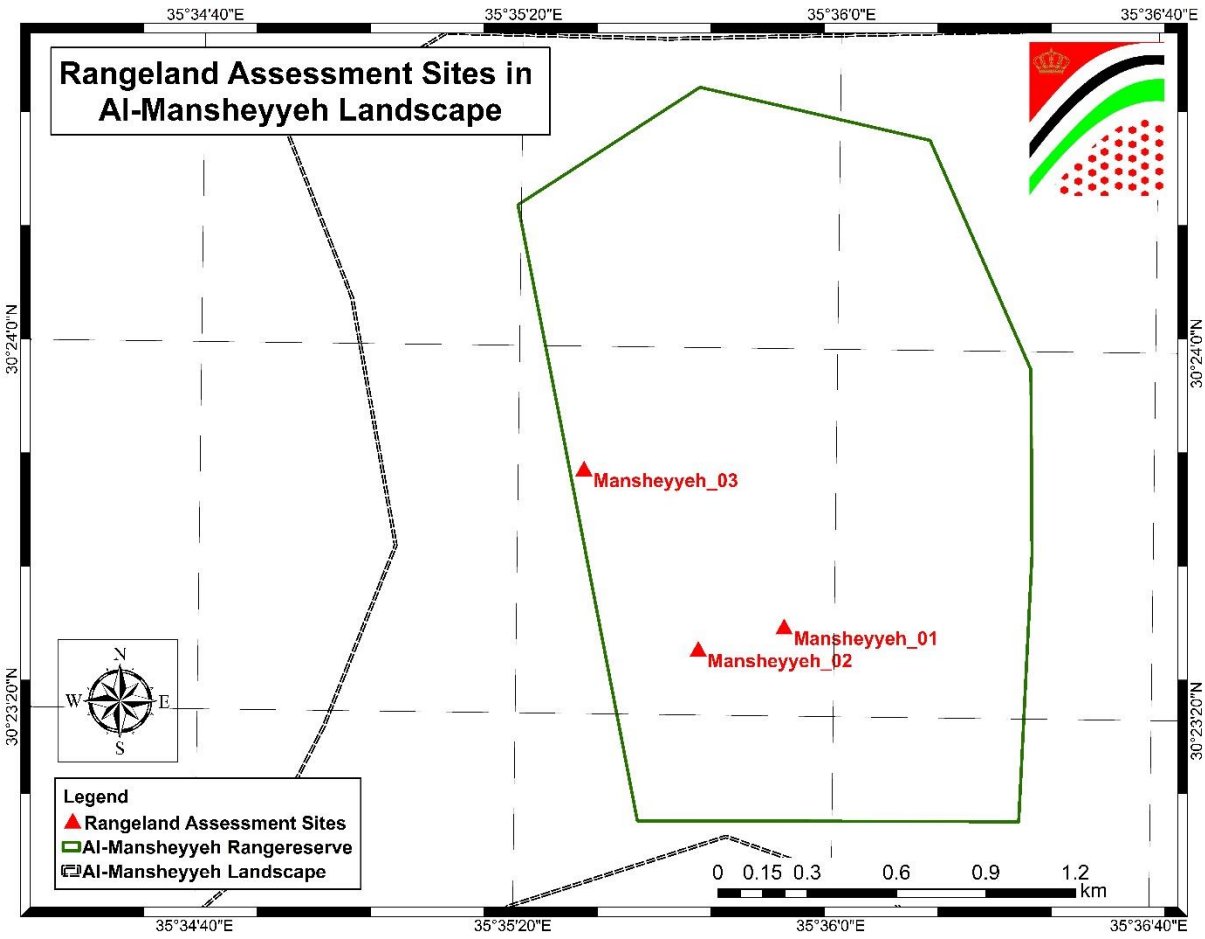
Soil health indicators (Soil life)	Presence/absence of earthworms and other living organism in first 10cm		Absence of earthworms and other living organism in first 10cm
Observable salinity	Yes		Comments:
	No ✓		
Visible organic litter	High, moderate, low, none ✓		
Soil colour	Black - black cotton soil Kotich/Athable)	Reddish (Rama,	Grey white (Biye Bor, Boji, Rama) / Other colours (specify)

1

Figure 34: Rangeland assessment datasheet


Rangeland Assessment Sites in Al-Hazeem Landscape
37°0'0"E
37°20'0"E
37°40'0"E
32°0'0"N
31°40'0"N
31°20'0"N
Miliraty Air Base
Qa' Al Azraq
Qa' Al Taaerat
Qarma Mountains
Qa' Al Qataf
Rajlet Sulieman Mountains
Al Qatafi Mountains
Zamlet Qa' Saeed
Qa' Al-Omari
Joukha water spring
Al-Omari Dam
Water
Palm trees
Spring (1)
Water
Spring (2)
Beidet Al Mashi
Qa' Al Tharwah
Al Tharwah Mountains
Hafeer
P1
Dahek
P2
P3
P4
Police station
Date Palm Oasis
Border Crossing
N
W
E
S
Legend
Rangeland Assessment Sites
Features
Hazeem Wadis
Dahek Nature Reserve
Al Hazeem Landscape
0 4.25 8.5 17 25.5 34
km


Rangeland Assessment Sites in Sura Landscape
36°9'20"E
36°10'0"E
36°10'40"E
32°24'40"N
32°24'0"N
P1
P2
P3
P4
N
W
E
S
Legend
Rangeland Assessment Sites
Sura Rangereserve
Sura Landscape
0 0.15 0.3 0.6 0.9 1.2
km

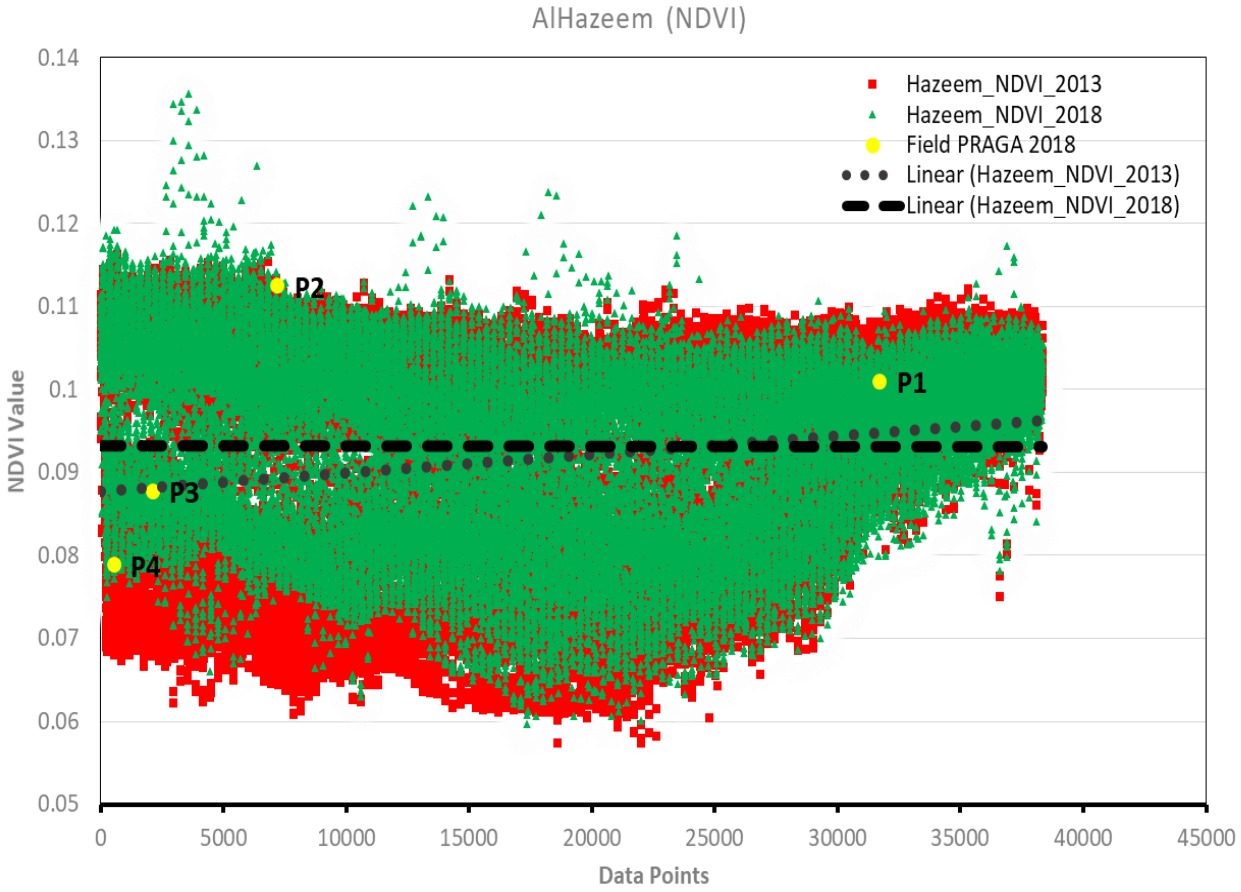

Rangeland Assessment Sites in
Al-Mansheyyeh Landscape
35°34'40"E
35°35'20"E
35°36'0"E
35°36'40"E
30°24'0"N
30°23'20"N
Mansheyyeh_03
Mansheyyeh_01
Mansheyyeh_02
N
W
E
S
Legend
Rangeland Assessment Sites
Al-Mansheyyeh Rangereserve
Al-Mansheyyeh Landscape
0 0.15 0.3 0.6 0.9 1.2
km

No.	Site name	Landscape	Assessment date	N	E	Predominant land use type	Seasonal landuse type	Slope	Shape	Land ownership
1	P1	Sura	20-10-19	32.41	36.17	-	wet and dry season grazing areas	medium	Straight	Government
2	P2	Sura	20-10-19	32.40	36.17	-	-	Gentle	Straight	Government
3	P3	Sura	20-10-19	32.41	36.16	Grazing, Browsing	dry season grazing	medium	concave valley	Government
4	P4	Sura	20-10-19	32.40	36.16	Grazing	dry season grazing	steep	concave valley	Government
5	Mansheyyeh 01	Mansheyyeh	09-10-09	30.39	35.60	Protected Area	dry season grazing	medium	convex hill	Government
6	Mansheyyeh 02	Mansheyyeh	09-10-09	30.39	35.60	Protected Area	dry season grazing	medium	convex hill	Government
7	Mansheyyeh 03	Mansheyyeh	09-10-09	30.40	35.59	Protected Area	dry season grazing	medium	convex hill	Government
8	P1	Hazeem	31-10-19	31.61	37.06	Grazing, Browsing	dry season grazing	flat	none	Government
9	P2	Hazeem	31-10-19	31.58	37.12	Grazing, Browsing	dry season grazing	flat	none	Government
10	P3	Hazeem	31-10-19	31.57	37.14	Grazing, Browsing	dry season grazing	flat	none	Government
11	P4	Hazeem	31-10-19	31.57	37.16	Grazing, Browsing	dry season grazing	flat	none	Government

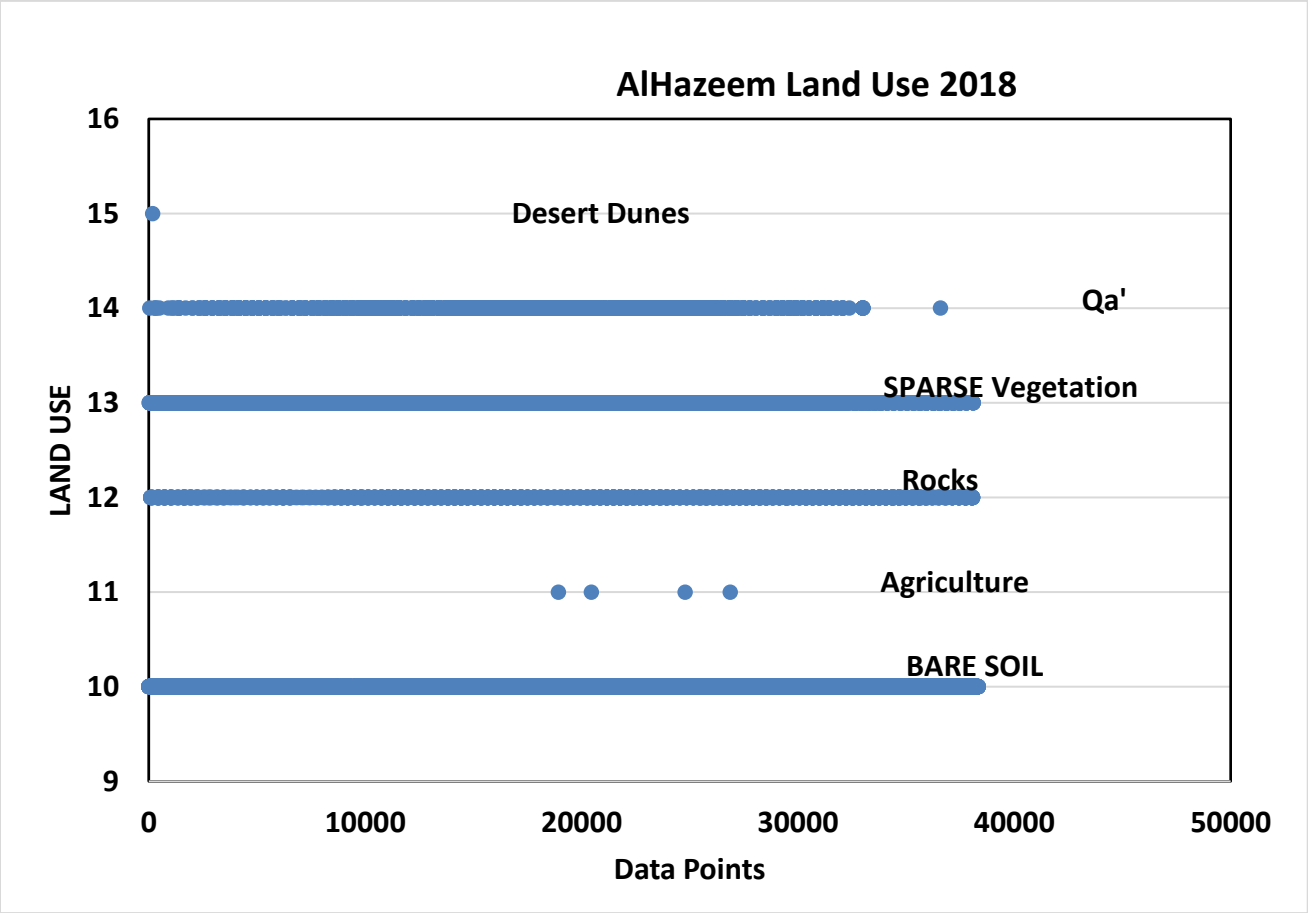
No.	Soil Type	Number of extents of rill	Number of gullies & gully associated erosion	Extent of sheet erosions	Presence of earthworms & other living organisms in first 10 cm	Observable salinity	Visible organic litter	Soil color	Soil structure	Grazing potential	Drying up of wells	Presence of trees showing high water table
1	Loam	-	moderate	Moderate	No	Yes, moderate	Low	Brownish	Loamy-clay		Yes	No
2	Loam	Slight/low	Slight/low	Moderate	No	Yes, moderate	Moderate	Brownish	Loamy-clay		No	No
3	silt, loam	-	Slight/low	Moderate	No	no	Moderate	light brown	Loamy-clay		-	-
4	Loam	high	high	high	No	-		Grey with large brown gravels	-		Yes	No
5	clay, silt	Slight/low	none	none	No	no	none	light brown		high	No	No
6	clay, silt	Slight/low	none	none	No	no	none	light brown		high	No	No
7	clay, silt	Slight/low	none	none	No	no	none	light brown		high	No	No
8	-	none	none	none	No	no	none	brown with small gravels		high	No	No
9	-	none	none	none	No	no	none	brown		high	No	yes
10	-	none	none	none	No	no	none	brown		high	No	yes
11	-	none	none	none	No	no	none	gray with small gravels		high	No	No

No.	% vegetation cover	% palatable species	% perennial species	% annuals grasses & forbes	% vegetation cover	Most abundant species	Range Utilization states	Presence of ecto parasites	Presence of Water structures
1	-	-	-	-	-	الروثا، العضو، القطف، الرتم	Modified	No	No
2	-	-	-	-	-	النيتول، العضو، الشيح، الحمض والروض، شوك	-	No	No
3	50 - 70%	50 - 70%	50 - 70%	50 - 70%	50 - 70%	الشيح،	Modified	-	Terraces
4	>10%	>10%	>10%	>10%	>10%	شيح، قيصوم	-	-	-
5	10-50%	10-50%	10-50%	>10%		عضو، شيح، قيصوم	Modified	No	No
6	10-50%	10-50%	10-50%	>10%		عضو، شيح، قيصوم	Modified	No	No
7	10-50%	10-50%	10-50%	>10%		عضو، شيح، قيصوم	Modified	No	No
8	>10%					none	intact	No	No
9	10-50%						intact	No	No
10	10-50%						intact	No	No
11	>10%					none	intact	No	No

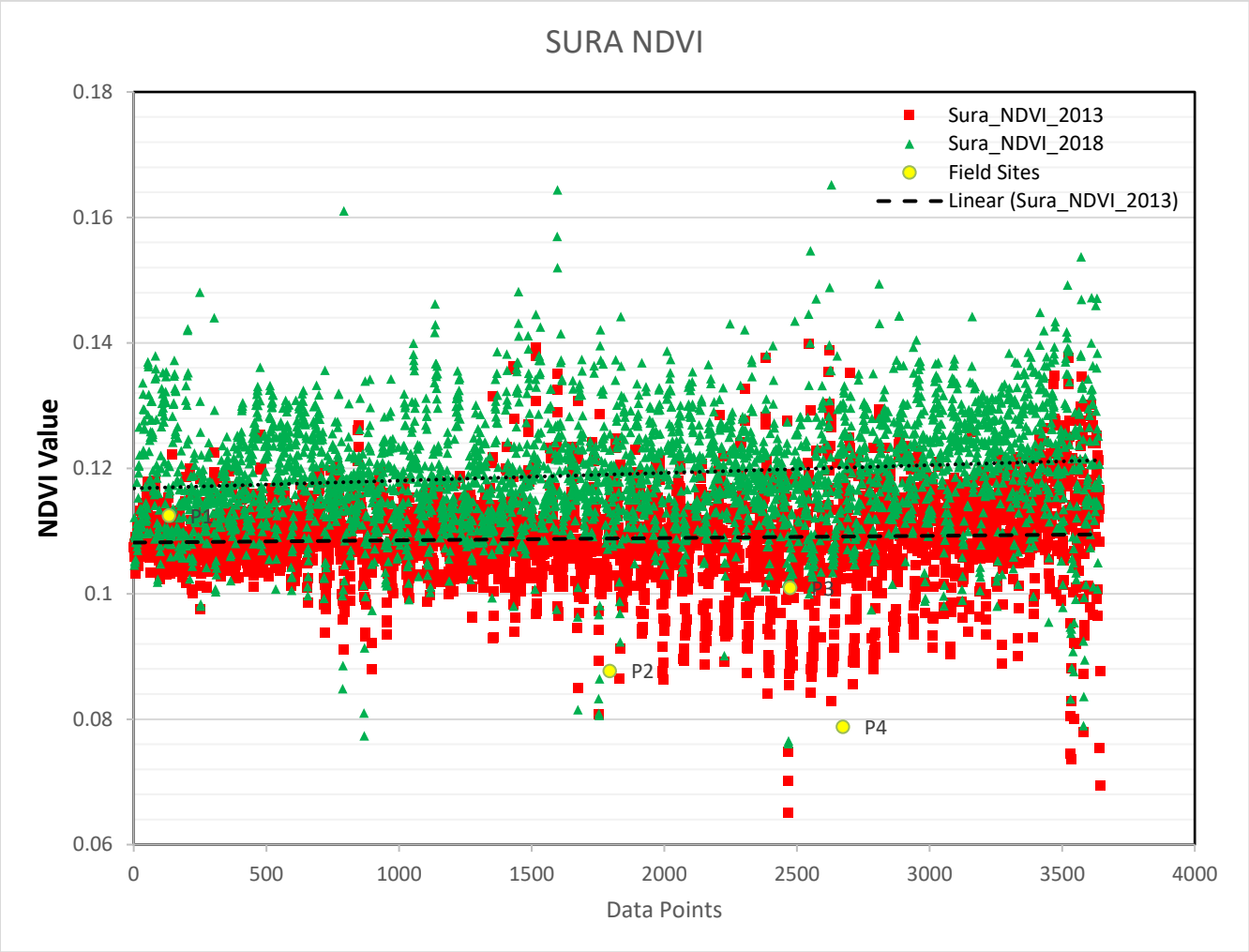
AlHazeem


AlHazeem (NDVI)
Hazeem_NDVI_2013
Hazeem_NDVI_2018
Field PRAGA 2018
Linear (Hazeem_NDVI_2013)
Linear (Hazeem_NDVI_2018)
P1
P2
P3
P4
NDVI Value
Data Points
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0.07
0.06
0.05
0
5000
10000
15000
20000
25000
30000
35000
40000
45000

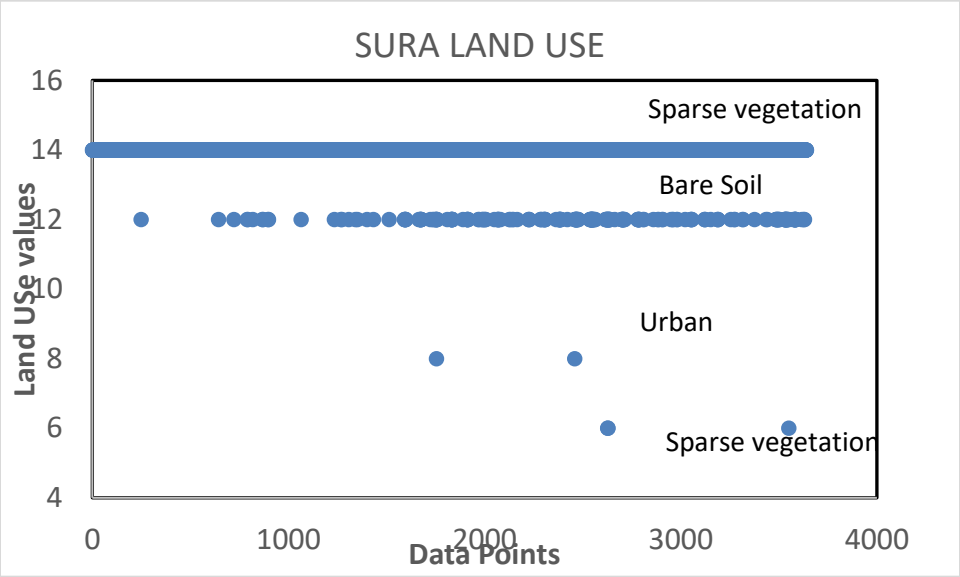
AlHazeem Land Use



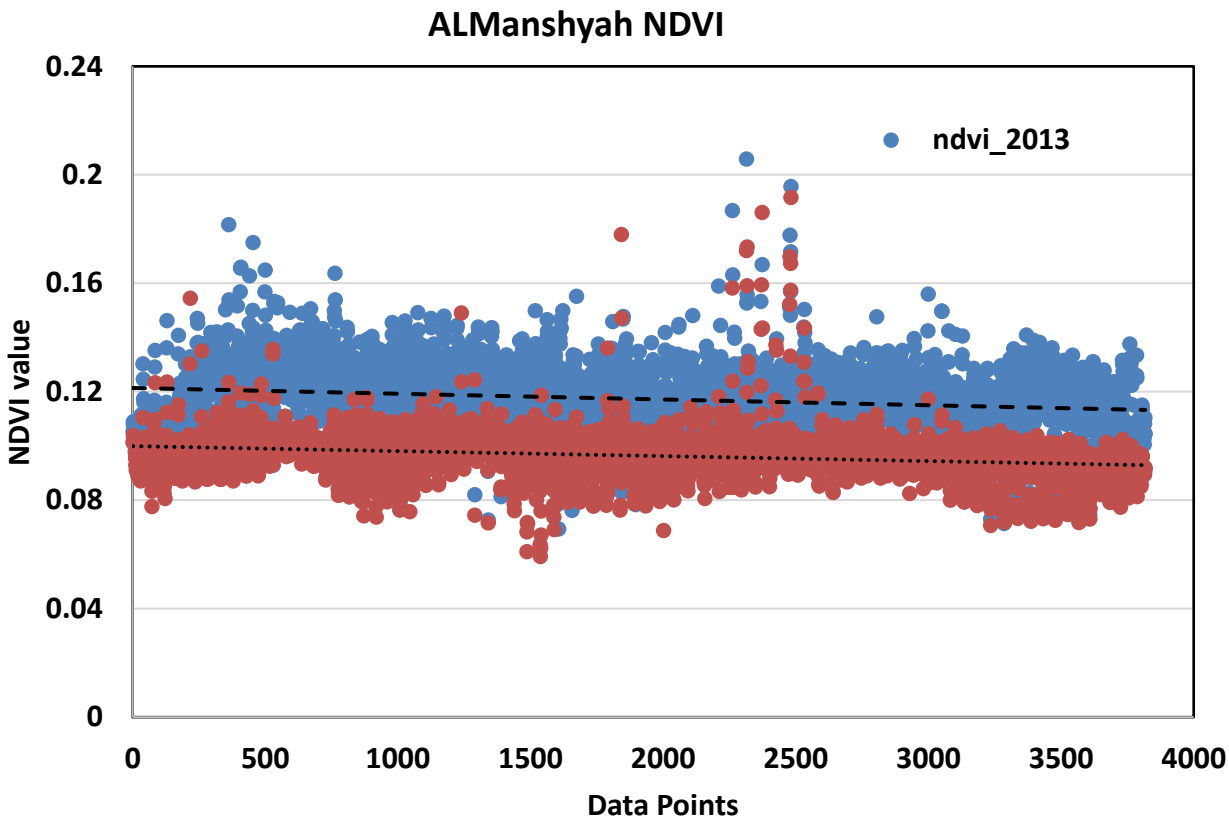
SURA NDVI


SURA NDVI
Sura_NDVI_2013
Sura_NDVI_2018
Field Sites
Linear (Sura_NDVI_2013)
NDVI Value
Data Points
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0
500
1000
1500
2000
2500
3000
3500
4000
P1
P2
P3
P4

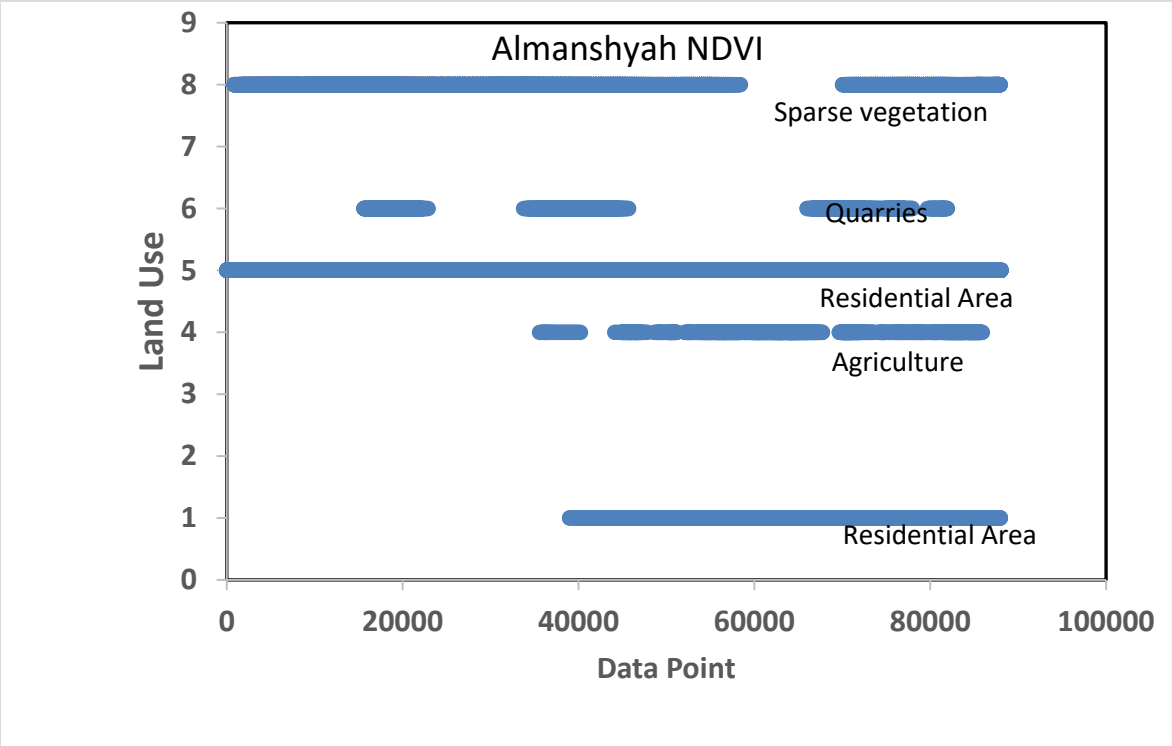
SURA Land Use 2018



Almanshyah NDVI



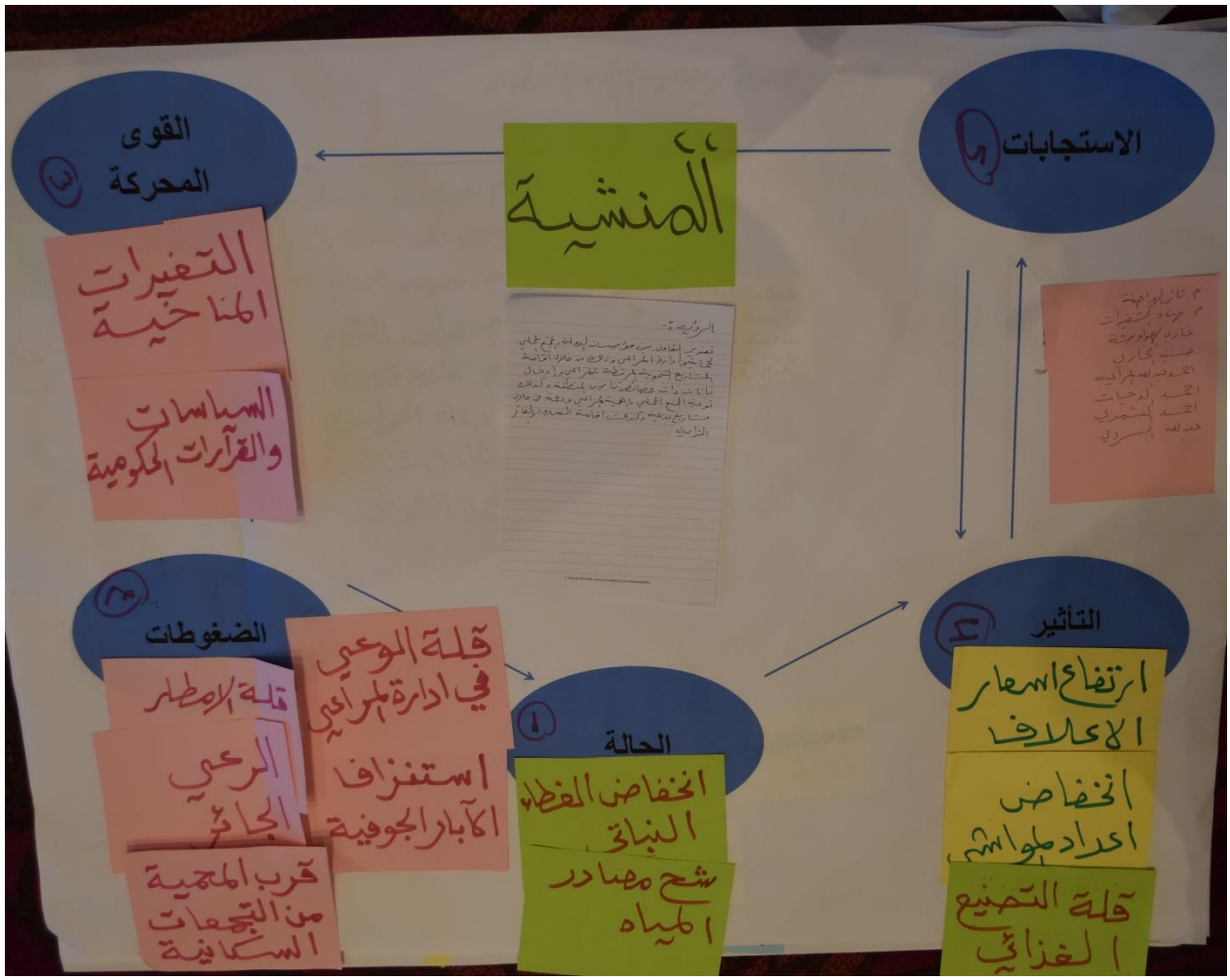
Almanshyah Land Use 2018



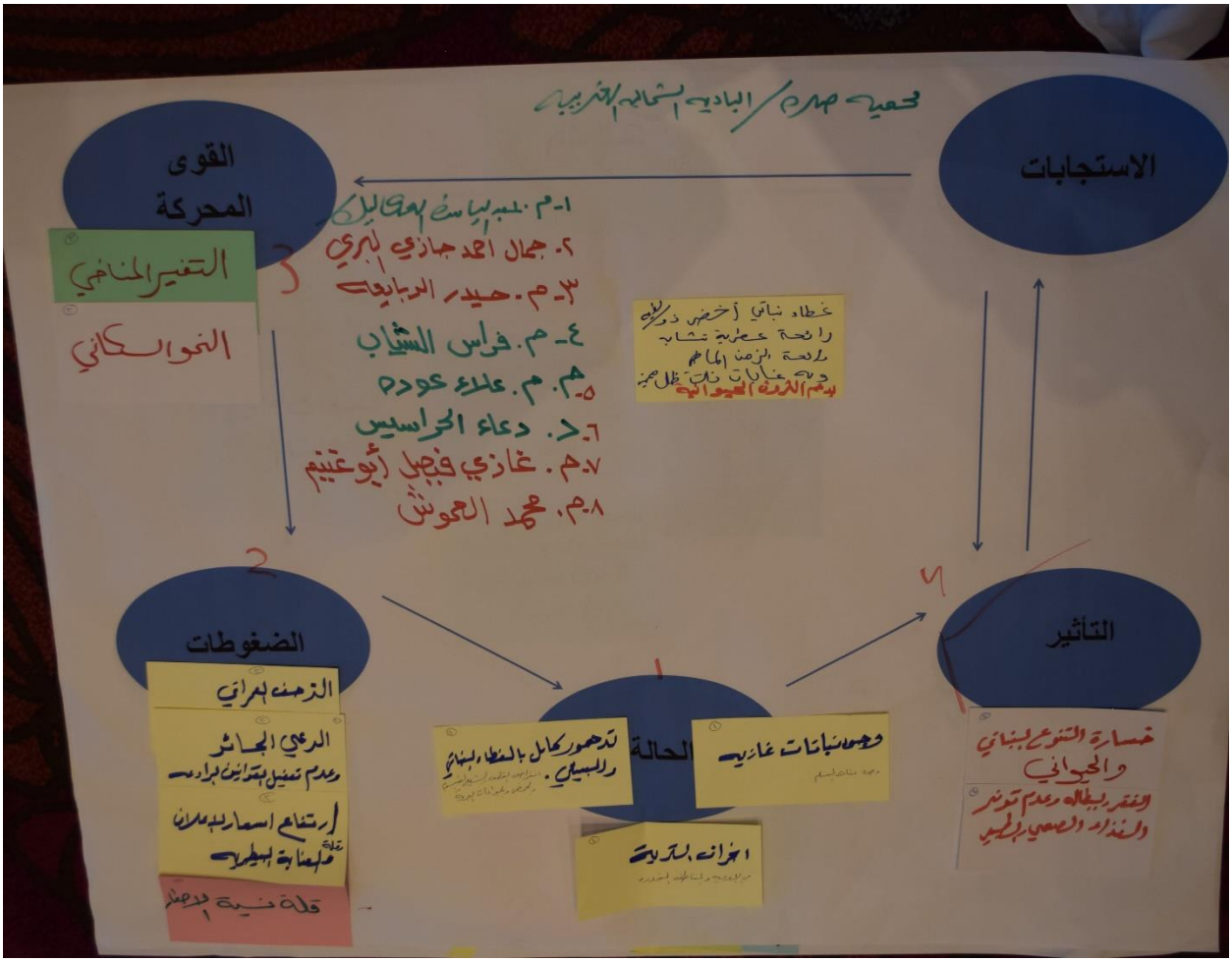
DPSIR Analysis

تحليل المشكلات (DPSIR)

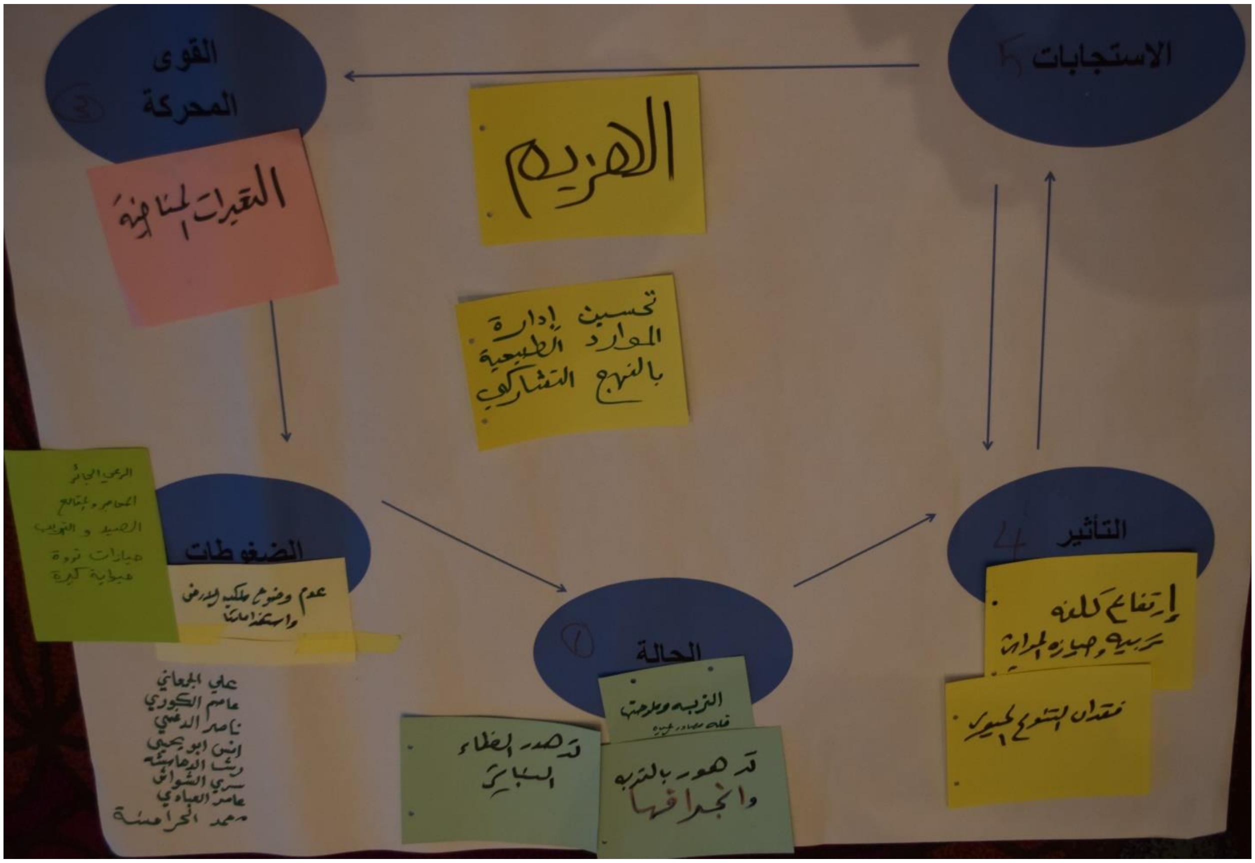
1- المنشية :



2- الصرة


القوى المحركة
التغير المناخي
النمو السكاني
الاستجابات
الضغوطات
الزحف العمراني
التأثير
الحالة
فقدان التنوع البيولوجي والحيواني

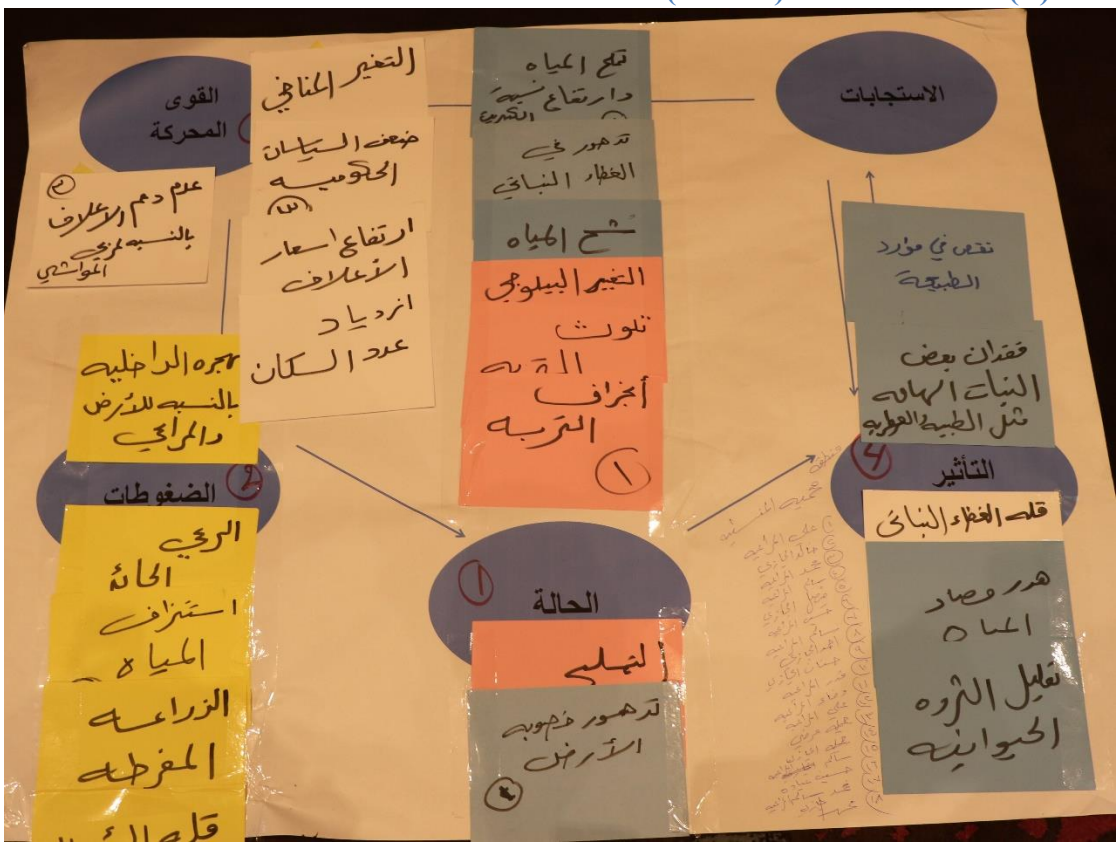
3- الهزيم



القوى المحركة
الاستجابات
الهزيم
التغيرات المناخية
تحسين إدارة الموارد الطبيعية بالنهج التشاركي
الضغوطات
عدم وضوح ملكية الأرض واستخداماتها
الحالة
تدهور بالتربه وانجرافها
التأثير
فقدان التنوع الحيوي
علي الجعاني
عاصم الكوري
ناصر الدعجي
انس ابو يحيى
ريشا الدهامشه
سري الشواش
عامر العبادي
محمد الحراحشة

مجموعة 1 (موقع محمية المنشية)

1. نشاط (1) أداة تحليل المشاكل (DPSIR)



2. نشاط (2) الرؤية

نحو محمية خضراء فيها تنوع نباتي ومياه متوفرة وإستخدامها بشكل مستدام.

3. نشاط (3) العوامل الداخلية والخارجية المؤثرة

جدول (1)

عوامل داخلية	عوامل خارجية
الرعي الجائر	1. التشريعات والقوانين
1. توعية المجتمع المحلي	2. التمويل
2. المشاركة المجتمعية	3. العوامل المناخية
3. وثائق شرف لحماية المحمية	4. إزدياد أعداد الثروة الحيوانية
4. تنظيم نظام الرعي	5. الرعي الجائر الخارجي
5. نقص الخدمات الزراعية	6. إزدياد اعداد السكان
6. عدم وجود مركز زراعي	
7. عدم وجود عيادة بيطرية	
8. ممارسات زراعية	
9. الزحف العمراني	

4. نشاط (4) تحديد العوامل المؤثرة بالرؤية

الشريحه غير متوفرة ولم تكن موجودة من ضمن ملف (scan).؟؟

5. نشاط (5) الإحتمالات

1. التمويل
2. التشريعات والقوانين

أ. وجود التمويل مع وجود التشريعات والقوانين التي تخدم المحمية

ب. وجود التمويل ولكن ضعف التشريعات والقوانين

ج. عدم وجود التمويل ولكن مع تفعيل التشريعات والقوانين

د. عدم وجود التمويل مع عدم تفعيل التشريعات والقوانين

6. نشاط (6) القصة (وجود التمويل ولكن ضعف التشريعات والقوانين)

من خلال التوعية والمشاركة المجتمعية يتم عمل وثيقة شرف والتي تنظم عمليات الرعي داخل المحمية وخارجها من الهجرة الداخلية لاصحاب المواشي من المناطق الاخرى وتحسين الممارسات والتدخلات الزراعية داخل المحمية من خلال عمل الورشات والندوات التوعوية للمجتمع المحلي وذلك نحو محمية خضراء مستدامة.

7. الأولويات

أ. صيانة السد (الحفيرة) الموجود في المنطقة.

ب. البدء بزراعة بعض الاشتال بمعدل ألف شتلة

ج. تأمين المزارعين بعيادة بيطرية وقروض ميسرة لشراء الاعلاف لأصحاب المواشي

د. تأهيل البئر المغلق في المنشية.

8. الإستراتيجيات

أ. صيانة السد الموجود

ب. حماية الموقع من الرعي الجائر والصيد

ج. زيادة الرقعة الزراعية والنباتات الرعوية

د. تفعيل العيادة البيطرية

ه. برامج توعوية وندوات ومنشورات خاصة بالمحمية

و. برامج تشاركية مع المجتمع

ز. تمكين الجمعيات والعمل على إئتلاف وتقسيم وتفعيل الأدوار داخل المحمية

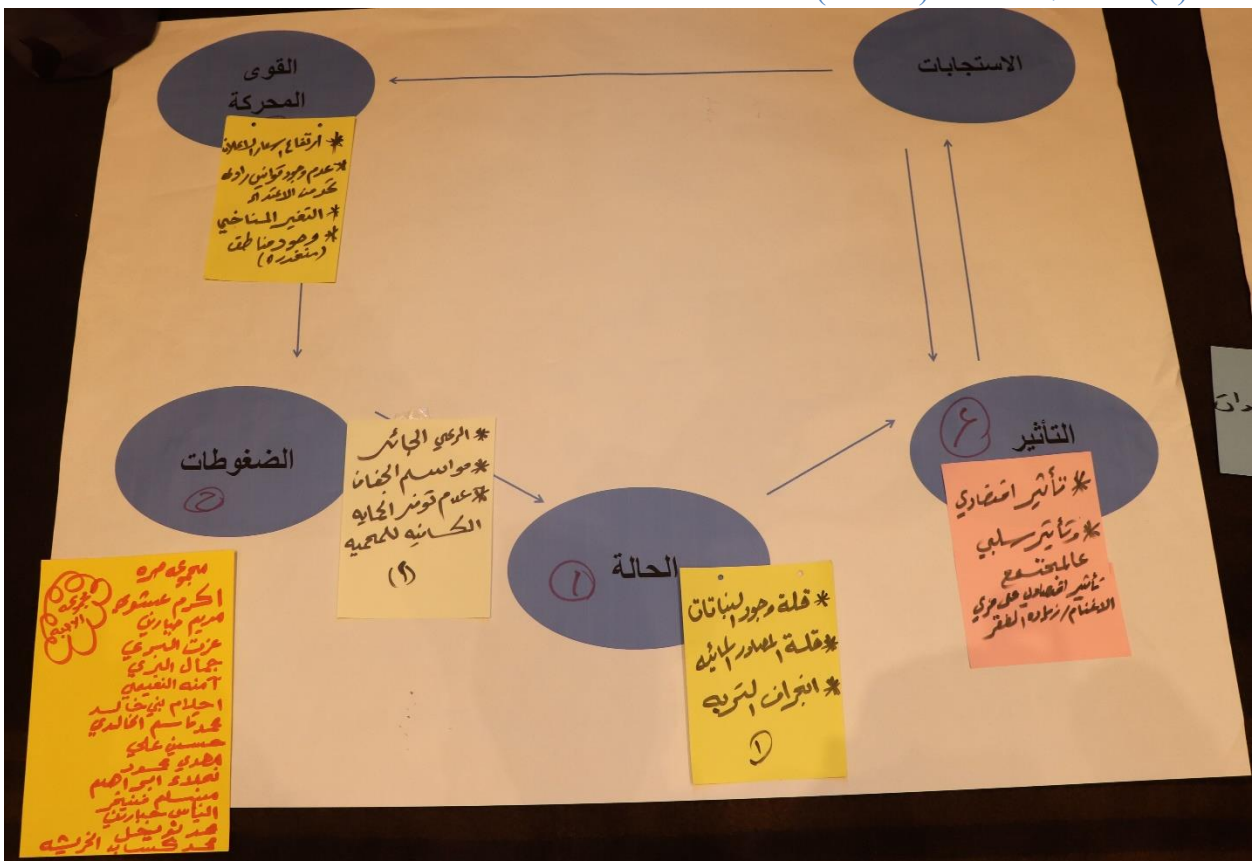
ح. عمل وثيقة شرف بين الجهات المشرفة والمجتمع المحلي

ط. زيادة طرق الحصاد المائي

ي. حفر بئر ماء

مجموعة 2 (موقع محمية صِرة)

1. نشاط (1) أداة تحليل المشاكل (DPSIR):



2. **نشاط (2) الرؤية**

محمية مميزة على مستوى المملكة ومراعي تخدم المجتمع المحلي إجتماعيا وإقتصادياً والتشبيك والتعاون مع صناع القرار والمؤسسات الحكومية والمنظمات الدولية

3. **نشاط (3) العوامل الداخلية والخارجية المؤثرة**

عوامل داخلية	عوامل خارجية
1. قلة الوعي في المجتمع	1. تغير المناخ (الامطار)
2. عدم تعاون افراد المجتمع	2. المناطق الوعرة والمنحدرة
3. لافتات تحذيرية وإرشادية للمناطق المحمية	3. القوانين والانظمة
4. عدم تعاون المؤسسات الحكومية داخل المنطقة (بناء القدرات)	4. التمويل والدعم
5. تشييك المحمية للحفاظ عليها من الثروة الحيوانية	5.
6. السيول والانجرافات	6.
7. خصوبة التربة (تدهور التربة)	

4. نشاط (4) تحديد العوامل المؤثرة بالرؤية

أكثر أهمية، أكثر تأكيد	أكثر أهمية، أقل تأكيد
1. السيول والانجرافات 2. تدهور خصوبة التربة 3. المناطق الوعرة والمنحدرة 4. زيادة الوعي بين افراد المجتمع 5. عدم تعاون المجتمع المحلي 6. تعاون المؤسسات الحكومية 7. توفير الاشتال والانواع 8. القوانين والانظمة	1. طرق الوصول للمحمية 2. تشييك المحمية 3. تغيير المناخ 4. التمويل والدعم
أقل أهمية، أكثر تأكيد	**أقل أهمية، أقل تأكيد**
1. آلات زراعية (المحراث) 2. دورات التعليم الزراعة	1. بناء سلاسل حجرية 2. ادوات وشبكات الري

5. نشاط (5) الإحتمالات

1. التمويل
2. التعاون

أ. **في حال وجد التمويل وجد التعاون**

ب. في حال وجود التعاون إحتمالية وجود التمويل

ج. عدم وجود تعاون من افراد المجتمع وعدم وجود تمويل

د. وجود التمويل وعدم وجود التعاون

6. نشاط (6) القصة (في حال وجد التمويل وجد التعاون)

رفع مستوى الوعي لأفراد المجتمع المحلي للوصول الى محمية ذات كفاءة عالية وطرق واشياك ولافتات تحذيرية للمحمية وتهيئة منطقة خاصة بدون رعي وإيجاد منطقة رعوية لتحقيق انتقال البذور الطبيعية الى أماكن أخرى لزيادة خصوبة التربة ومنع السيول والانجرافات.

وتفعيل الانظمة و القوانين للحد من الرعي الجائر والتشييك مع المؤسسات الحكومية من أجل تفعيل الانظمة المتعلقة بالمراعي واعادة تأهيلها مع إتباع الاساليب القديمة والحديثة لمنع الانجرافات وحفظ المياه عن طريق عمل سلاسل حجرية.

7. الأولويات

أ. عمل صيانة للخطوط الكنتورية للحصاد المائي

ب. تجهيز فريق الحماية من مجتمع محلي و وزارة الزراعة

ج. تجهيز الاشتال الجاهزة

8. الإستراتيجيات (من أجل خطة طويلة الامد لإستدامة ونجاح المحمية)

أ. تقسيم الادوار بين المعنيين من افراد المجتمع المحلي

ب. التدريب على كيفية ادارة المراعي من حيث الاستخدام والاستدامة

ج. زيادة الرقعة النباتية

د. مكافحة الاصناف الغازية

ه. التدريب والتوعية على كيفية قطف المحصول وتسويقه الى السوق المحلي

و. تطويق المحمية من الاحجار الموجودة فيها

ز. توعية وتثقيف افراد المجتع المحلي بكل ما يلزم لان الاصلاح يبدأ بالنفس

ح. أهمية وجود عيادة بيطرية

ط. صيانة الابار الجوفية للحصول عل اكبر كم من مياه الامطار وإقامة اماكن للحصاد المائي (سدود، سلسلة حجرية، قنوات مياه)

ي. اسباب النجاح والاستمرارية هي برامج التشاركية بين افراد المجتمع المحلي

مجموعة 3 (موقع محمية الهزيم)

1. نشاط (1) أداة تحليل المشاكل (مرفق خارجي)

2. نشاط (2) الرؤية

إدارة مستدامة للمراعي والمصادر الطبيعية من خلال تفعيل دور دور المجتمعات المحلية.

3. نشاط (3) العوامل الداخلية والخارجية المؤثرة

عوامل داخلية	عوامل خارجية
1. التركيبة المجتمعية	1. الانظمة والتشريعات
2. أنشطة الانسان (الصيد، التهريب، التعدين، الزراعة)	2. التغير المناخي
3. صعوبة التضاريس (البنية التحتية)	3. سياسات الدول المجاورة
4. حقوق الاستخدام	4. التلوث
5. الهجرة الداخلية	
6. التمويل (ضعيف)	
7. تدني خصوبة التربة	
8. فقدان بنك البذور	
9. قلة مشاريع الحصاد المائي	
10. ضعف المسؤولية المجتمعية (ضعف الوعي والطمع)	

4. نشاط (4) تحديد العوامل المؤثرة بالرؤية

أكثر أهمية، أكثر تأكيد 1. التمويل 2. ضعف المسؤولية المجتمعية (ضعف الوعي والطمع) 3. قلة مشاريع الحصاد المائي 4. التركيبة المجتمعية 5. أنشطة الانسان	**أكثر أهمية، أقل تأكيد** 1. التغير المناخي 2. سياسات الدول المجاورة **3.** حقوق الإستخدام (الاعراف)
أقل أهمية، أكثر تأكيد 1. التلوث 2. فقدان بنك البذور	**أقل أهمية، أقل تأكيد** 1. الانظمة والتشريعات 2. الهجرة الداخلية 3. صعوبة التضاريس 4. تدني خصوبة التربة

5. نشاط (5) الإحتمالات

1. حقوق الاستخدام (الاعراف)
2. التغير المناخي

أ. تغير مناخي جيد، حقوق الاستخدام جيد

ب. تغير مناخي سيء، حقوق الاستخدام جيد

ج. تغير مناخي جيد، حقوق الاستخدام سيء

د. تغير مناخي سيء، حقوق الاستخدام سيء

6. نشاط (6) القصة **(تغير مناخي جيد، حقوق الاستخدام جيد)**

إن تفعيل المسؤولية المجتمعية ستؤثر بشكل إيجابي على زيادة الفرص ومساعدة المجتمعات المحلية على إحداث التغيير المنشودوالإستدامة وهذا سيساعد على جلب التمويل، وهذا التمويل سيكون حافزاً للمجتمعات لتبني الانشطة والاجراءات التي من شأنها دفع عجلة التغيير العمل من تلبية إحتياجاتهم وحل مشكلاتهم وستذوب التركيبة المجتمعية وتصبح أكثر تألفاً من أجل تحقيق المصلحة العامة

وسيقوم المجتمع بإيجاد آليات لتنظيم أنشطته المتنوعة (من صيد وزراعة ورعي) بما يتلائم مع مصلحته واستدامة منفعته.

التغيير الايجابي الذي حدث نتيجة ما ذكر أعلاه، سيحد من التلوث ويساعد على شحن بنك البذور، وبالتالي سيكون هناك مثال واضح يحفز اصحاب القرار على تعديل الانظمة والتشريعات بما يتوافق مع المصلحة الوطنية والمحلية وذلك من خلال تكاثف الجهود وتكامل الادوار.

7. **الأولويات**

أ. تأهيل مصادر المياه المتوفرة (نبع الجوفة، حفيرة العمري، آبار ري المواشي الحكومية)

ب. زيادة الغطاء النباتي (زراعة نباتات رعوية وحمايتها)

ج. البدء بعمل لقاءات تشاورية مع المجتمع المحلي

8. **الإستراتيجيات** (توجهات إستراتيجية)

أ. تفعيل المسؤولية المجتمعية مع المعنيين (توعية، ورشات عمل، لقاءات، زيارات، عمل وثائق شرف)

ب. برامج توعية

ج. بناء قدرات، جمعيات، مجتمع محلي، شباب، تشبيك.

د. زيادة الغطاء النباتي (حماية، زراعة)

ه. تأهيل مصادر المياه وحصاد المياه (صيانة، وإنشاء حفئر وسدود)