

Integrated Watershed Development Project in Mihassa

Socioeconomic Research Report (Follow-up Stage)

Prepared by

Ahmed Mazid and Mustafa Darwish

**ICARDA
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Detailed Summary

This report summarizes the results obtained during 1998/99 season related to the socioeconomic research component of Integrated Watershed Development Project in Mihassa. The Project aims at developing sustainable practices of water harvesting and water spreading techniques, under very arid conditions, to produce sustainable increases in the amount of forages, and to improve grazing and range lands available for sheep and goats. In 1989, the Syrian Government established, as a part of this project, Mihassa Research Station, which is located at about 130 km to the northeast of Damascus City. The Directorate of Irrigation and Water Use (DIWU) of the Syrian Ministry of Agriculture and Agrarian Reform is undertaking this Project.

The Project includes a socioeconomic research component that has the objective of integrating the knowledge, perspectives, and aspirations of land users into the formulation of resource management strategies in the target area. The Natural Resource Management Program (NRMP) at ICARDA, in collaboration with DIWU, and with financial support provided by IDRC, has carried out socioeconomic research in Mihassa area. The first stage of socioeconomic research that implemented during 1995/96 season covered two topics: (1) Economics of water harvesting and storage in the Mihassa watershed, and (2) Socioeconomic study of land users in the Mihassa watershed. Because there was a continuing need for socioeconomic research component to complement the technical work as the project develops, the DIWU and NRMP at ICARDA agreed to collaborate in the follow-up stage of research related to the socioeconomic aspects of the Project. The objectives were to understand the opinions and perceptions of the land users regarding technologies of rangeland management and optimal methods of land use for Mihassa project, and to make preliminarily recommendations for an integrated strategy for rangeland and water management based on the land users' participation and acceptance.

The 1998/1999 season was characterized as whole "very dry", the total rainfall precipitation in Mihassa Research Station during the season was 40 mm only, where the average annual rainfall rate at that station is about 115 mm. The effect of this drought on land users was very negative in terms of forage and pasture availability, or in diseases diffusion among flocks which increased the rate of death.

This study was based on extensive fieldwork with participation of the land users in Mihassa. The fieldwork included a field day in the research station where about 30 pasturelands users were invited, followed by a farm survey. The first stage of the farm survey was informal, followed by a formal survey for a sample of 46 households of land users, who usually come from Qalamun villages. The analysis indicated that this sample represented about a half of the land users in the study area. The main household income in the sample was obtained from their activities in livestock husbandry, followed by the income from their small pieces of land in their villages where the majority is planted with trees. When the household moves from the village to Mihassa area for livestock grazing, only about a half of the family members move and the other half stay behind to look after the house and take care of the land and the garden. In many cases, it was found that

family members alternate in coming to Mihassa. Women had an important role in the production process. Although this role is productive, and men did not ignore it, still the financial return to the women for to their contribution in the production process is very limited.

Historically, the majority of pastoralists who are using the Mihassa area now have residence and home bases in villages in the Qalamun area. Although these pastoralists owned a small land in their villages, but many of them still have activity related to sheep husbandry by a permanent base with seasonal migrations to Mihassa area. Most rangeland users come to Mihassa as groups, each group stays in specific area identified according to pasture and water availability around it; this area changes from year to year. Create farming group of pastureland users is based on many factors, the most important factors were: the family relationship and/or coming from the same village. Although land users graze the rangeland by their animals in Mihassa as a group, but there is a complete separation in flocks ownership. The main purpose in farming groups, for grazing, as mentioned by land users is the collaboration among group members'; talking, and socializing life during their stay in the grazing area.

The average flock size in the sample was 444 heads, with ewes as the most important component in the flock and represent about 68% of the flock size, followed by yearlings (22%). Rams were 5%, lambs were 3%, and goats were 2% of the flock. Comparison between the mean values of ewes and yearlings in the sample were calculated based on the data collected in the survey carried out during 1995/96 season and the current survey. It was noticed that there were increases in the number of ewes by 21%, and 6% for yearlings, but the statistical analysis of the mean values did not show significant differences between the two means.

Providing supplemental feeding to sheep flocks while in the steppe (*Badia*) is presently a common practice by pastoralists due to depleting natural vegetation that led to range degradation. The *Badia* can not provide at present enough range and pasture due to the increasing numbers of sheep that graze at that area. Because the 1998/99 season was very dry, the study indicated that the pastoratists paid about double the amount of money. They usually pay in normal years for purchasing supplemental feeds for their flocks. The value of feeds provided by rangelands in normal years was estimated to be around 536 Syrian Lira per head per year.

Milk processing by pastoralists to produce cheese then sell it usually increases the income. Value added due to this process was estimated by around 13%. Although this process is profitable for these people, the results indicated that about 56% of the households in the sample sell part of their milk production to cheese makers as fresh milk. The estimations indicated that about one third of milk production usually sold as fresh milk and the other two thirds sold as cheese. It was noticed that there was a positive relationship between the percentage of sold fresh milk and flock size. The reasons mentioned by land users for selling fresh milk were not having enough time for milk processing due to looking after sheep for grazing, bringing water, purchasing feed, availability of labors, and marketing difficulties.

The study showed that most pastoralists in Mihassa area faced several problems every year such as degradation of vegetation, feed shortage, animal health, shortage of animal medicine, in addition to the plastic bags diffused in the steppe area and sheep occasionally eat one which stays in its stomach. The pastureland users do not know how to deal this problem. For the problems and difficulties faced by the land users in 1998/99 season, which were in general the same as those faced in other very dry seasons, they were various such as: animal diseases, especially the effect of FMD; degradation of vegetation; feed shortage; increase feed price; shortage of animal medicine; decrease market price of sheep; and increase rate of sheep mortality.

Although most of the land users in Mihassa area had an idea on the objectives of the Integrated Watershed Development Project and they believe that the project is useful in general, still the idea was not complete for most of them. The main reason of unawareness is that the potential pastureland users were relatively far away from the project, and that they did not participate in the planning and implementation of the project. Land users were questioned about usefulness of the components tested by the project such as water harvesting, shrubs planting, establishing protected area, and providing water for animals. There was acceptance among all land users on the benefit of providing water for animals. The majority (more than 90%) accepted the appropriateness of water harvesting and shrubs planting. For installing protected area to maintain the steppe and pasture lands, potential land users reported that this idea is not helpful. They believe that it will be unbalanced among land users when pasture land will be distributed for grazing, therefore, they prefer to continue applying the current grazing system which is based on the open-access regimes.

Many studies indicated that the problem of range degradation in the Syrian steppe was essentially due to the increasing number of small ruminants and the open-access grazing regimes. If this open-access prevails, it is expected that the range degradation will persist even if the results obtained from agricultural research were positive. Therefore, some researchers and specialists supported that the institutional dimension of range and management must be addressed for promoting any investment in range improvement, and under open-access regimes must first focus on this dimension.

There are several principle laws and policies in Syria that organize the property of grazing the natural pasture and range lands. The Syrian civil law divided the real estate in the country to five categories: (1) *Mulk* real estate, held in absolute freehold. Two sort of rights are involved the right of absolute ownership, and the usufruct right to make use of the real estate. With *Mulk* tenure, both rights belong to the individual, this type of real estate is located inside the cities and towns, and in the rural areas when lands are planted by trees, (2) *Amiri* real estate, of which the absolute ownership belongs to the state, but usufruct rights belongs to the individual. This is a form of heritable “ownership” through which the state leases land to the individual, (3) *Matrouka Morfaka* real estate, of which the absolute ownership belongs to the state, but there is a right for a community to use it, (4) *Matrouka Mahmiya* real estate, of which the absolute ownership belongs to the estate and reserved for public purposes such as roads, and (5) *Khalia Mobaha* or *Mawat* real estate, which is *Amiri* land belongs the state but this type of real estate includes undefined

and unspecified its borders, it is possible for the first person who occupied it to get authorization from the government for priority right as mentioned in the state land systems. However, since natural pasture and range lands are undefined its borders, which means that these lands are *Khalia Mobaha* real estate and the first person who occupies it has priority right to continue using it after having permission from the government. In fact, there were also several regulation, decrees, ministerial decisions, decision announced by high agricultural council, in addition to the state lands regimes, which organize the *Badia* affairs. Although there were many laws, decrees, and policies related to managing pasturelands, there was no actual control in practice. The Arab Organization for Agricultural Development (AOAD) mentioned that one of the main constraints of agricultural development in Syria is the weakness of special law political system to protect and save the natural pasture lands.

Property rights of the natural pasture and rangelands, in most cases, are essential for the success or failure of any project related to improvement of these lands. The current grazing system, which is dominant in Mihassa and in most other Syrian *Badia* areas and based mainly on open-access regimes, should be changed. It is possible to implement several regimes to improve grazing system for the purpose of developing and maintaining natural pasture lands such as: create control public grazing areas; applying *Hemma* system; protect some pasture areas to be rented to pastoralists; authorize groups and communities who recently occupied lands at the *Badia* and had livestock to continue using these lands by themselves only and give them priority right by rent agreements and charge them. Finally, It has to be mentioned that converting open-access situation to other property systems is not an easy issue, but it is a complex process that cannot be achieved by administrative decree only. The suggestion is to develop a clear strategy with objective to change the natural pasture grazing system that dominate in the Syrian *Badia* and based on open-access regimes, it should consider the participation of pastoralists, land users, and the local community members in the planning and implementing this strategy. This suggestion has to be done before introducing and transferring Mihassa Project experience to similar areas of the Syrian *Badia*.

1. Introduction

The government of Syria established the Mihassa Research Center in 1989 as part of the Integrated Watershed Development Project. The Project has the purpose of developing sustainable practices of water harvesting and water spreading techniques, under arid conditions, to produce sustainable increase in the amount of forages, and to improve grazing and range lands available for sheep and goats.

Mihassa is located about 130 km to the north-east of Damascus, and 25 km south of Al-Qariatain, in Homs province. It is a wide barren valley named “Wadi Mihassa”. There are several shallow watercourses among a number of low-lying ridges. Mihassa is within the fifth agricultural stability zone and receives less than 200 mm average annual rainfall. These areas can not sustain rainfed agriculture, but could be used as rangelands by semi-nomadic.

The areas surrounding Mihassa, which cover about 35,000 ha, represents stability zone 5 in the country and collectively called the Syrian steppe (*Badia*). This *Badia* covers over half the land of the Syrian Arab Republic, and is widely used by semi-nomadic pastoralists as herding and grazing areas for sheep and goats. The number of animal utilizing the semi-arid and arid rangelands has risen sharply over the past twenty years. but this increase has had an adverse effect on the environmental resources of the *Badia*, and the overgrazing has already depleted the natural vegetation and led to a serious loss of biodiversity among palatable grass and legume varieties.

The Integrated Watershed Development Project being undertaken by the Directorate of Irrigation and Water Use (DIWU) of the Syrian Ministry of Agriculture and Agrarian Reform is an important part of the applied research program. The Project, through water harvesting and plant production research within pilot watersheds, seeks to express concisely a generalizable model for development and sustainable operation. The technical dimension of the project includes the construction, use and monitoring of small water harvesting structures and the production of forage crops and shrubs, but there is also awareness of the substantial socioeconomic dimension to watershed development. The most suitable strategies are not simply those that can produce more forages on an environmentally sustainable basis, but also techniques and management systems that are socially acceptable, practical, and economically profitable to local people of land users.

The Project includes a socioeconomic research component that has the objective of integrating the knowledge, perspectives, and aspirations of land users into the formulation of resource management strategies in the target area. Natural Resource Management Program (NRMP) at ICARDA in collaboration with DIWU, and with financial support provided by IDRC, carried out a socioeconomic research in Mihassa area. This research had two major parts: (1) an ex ante economic assessment of the proposed technical innovations, and (2) a socioeconomic analysis of the transhumant pastoral production system practiced by the land users, including their own perspectives and understanding of the feasibility of the proposed development strategies.

The objective of the first part was the ex ante assessment of economic feasibility of the water harvesting and water spread interventions in relations with the sustainable agricultural and livestock production potential in Mihassa area. While the objectives of the socioeconomic study of land users in Mihassa watershed, carried out in 1995/96 were: (1) to determine the number of families and livestock that utilized the watershed in good, average, and dry years and develop estimates of grazing periods, (2) to document gender roles and responsibilities in resource management, (3) to develop an economic assessment of present land user livestock operations, (4) to provide estimates of supplement feeding in forms and quantities during the year, (5) to collect local explanations of the cases of range degradation and suggestions for solutions, and (6) to identify preferred shrub species for animal grazing.

The fieldwork for these studies was completed during 1995/96, where the survey data was collected and entered into a computerized data base system, and analyzed statistically. Two draft reports were prepared: (1) Economic of water harvesting and storage in the Mihassa watershed, and (2) Socioeconomic study of land users in Mihassa watershed: report of results of field work in 1995/96.

2. Objectives of socioeconomic research in the follow-up stage

Although the two mentioned reports answered many questions and achieved the objectives identified in the proposal, there will be a continuing need for socioeconomic research to complement the technical work as the project develops. The preliminary research has brought up a number of significant issues warranting further investigation and examination. The first: it was not possible at the early stage of the research process to make detailed recommendations concerning the mechanisms and institutional arrangements for pastures and rangeland management by local land users. The second: in the first stage of this research, the social and economic relationships among the land users treated each household more or less individually, the work should look at the relationships among land users where as terms of possible relevance these may have for the emergence of a group that can collectively manage the watershed. It is likely that collective management arrangements will be more successful if they are build upon existing forms of cooperation that if they seek to develop these without regard to the presence or absence of prior social and economic relationships among the land users. Finally, there is a need to understand the perceptions and suggestions of the land users, particularly in regard to arrangement that could facilitate more efficient and sustainable use of the Mihassa watershed and environs.

The above points, which need further investigation and follow up, were discussed in a meeting between the Directorate of Irrigation and Water Use and representatives from the Natural Resource Management Program at ICARDA. They agreed to collaborate in the follow up stage related to socioeconomic aspect of Integrated Watershed Development Project in Mihassa. They also agreed on the objectives of this research as follows:

1. Understand the opinions and perceptions of the land users regarding technologies of rangeland management and optimal methods of land utilizing for Mihassa project.

2. Make recommendations for an integrated strategy for rangeland and water management based on the land users participation and acceptance.
3. Analyze the technical, economic, and social feasibility of rangeland development technologies in Mihassa project in order to introduce and diffuse these technologies in similar areas.

3. Research methodology

The follow up of socioeconomic study started in November 1998. It was based on extensive fieldwork in the target area with participation of the pasture users themselves. The fieldwork included a field day conducted on December 26, 1998, where about 30 pasture users in the study area were invited. They visited Mihassa Research Station and observed the experiments and activities currently take place, followed by a discussion between pasture users and representatives from DIWU and ICARDA on how the pastoralists perceive this project, and how they think the best method could be for managing the rangelands in Mihassa. The fieldwork included also a survey and had two phases: the first one was an informal survey, which focused on collecting qualitative data and information on perceptions and attitudes of the land users towards the conditions of rangeland management, productivity, and their changes over time. Information on optimal methods of land utilizing was collected based on the pastureland users acceptance and taking into account the rationalization of the grazing process and the regeneration of the natural vegetation in the rangelands. The results of the informal survey was used to design the second phase, which consists of a formal survey of a representative sample of households who annually use the Mihassa area for grazing. The formal survey based on a questionnaire designed to collect quantitative data and information on the land users opinions, their acceptance of the new technologies introduced by the project, and economic assessments. Forty-six households were selected randomly, from which 33 were the same households in the 1996 sample survey. Because there were many difficulties to interview all the households included in the 1996 survey, such as unknown residencies or having sold their flocks and left the livestock activity, therefore, 13 new households included in the sample survey of 1999, and were selected randomly from the same villages. The final sample include 10 households from El-Ma'ara village, 7 from El-Misherfeh, 7 from El-Sehel, 9 from Issal El-Ward, 8 from Jebbah, and 5 households from El-jarajir village, all these villages are located in Qalamun area, and total sample size reached 46 households, which represent about one half of pastureland users of surround Integrated Watershed Development Project in Mihassa. About 15% of households had a flock size of less than 175 heads, 35% had a flock size of (176-350) heads, 35% had (351-710) heads, and 15% had more than 710 heads. These categories based on the same classification used in the analysis of the 1996 survey.

A questionnaire was prepared for this survey (Appendix 1), and tested before its adoption. The households in the sample were visited in their residencies near Mihassa during February and March 1999 for data collection. The survey data then was coded, entered into a computerized data base system using SPSS. The data obtained from this survey was merged with the data collected in 1996 for the purpose of conducting comparison if needed.

4. Climate situation during 1998/99 in Mihassa

Before presenting the survey results, the climate circumstances that dominated in Syria during the time of the follow-up study should be stated. Generally, the 1998/99 season was very dry in Syria, rainfall precipitation rate was, in all agricultural stability zones, significantly less than the average rainfall rates. Rainfall precipitation in the Badia was very low and did not reach to 100 mm. In Mihassa location, the drought was very high, where the accumulative rainfed rate did not reach 20 mm till December 1998, the total rainfall precipitation in Mihassa Research Station during all the season was only 40 mm, where the average annual rainfall rate at that station is about 115 mm. The effect of this drought on pasture users was very negative in terms of forage and pasture availability, or in diseases diffusion among flocks which increased the rate of death among the livestock. The Ministry of Agriculture and Agrarian Reform decided to open all the protected rangelands, which are considered as state rangeland reserves, and permitted livestock owners to use these lands for their sheep. This decision was applied for Mihassa project, because the rangeland of Integrated Watershed Development Project is part of the state rangelands reserves.

5. Social characteristics of the sample

The average family size in the sample was 14 persons included 5 males, 4 females, and 5 children of less than 10 years old. The families in the sample were complex, which include in addition to the parents, the married sons and their families, and unmarried children. The experience of the head household in livestock husbandry ranged from 10 to 60 years with an average of 43 years. For the educational situation, 36% of them were illiterate, 26% can read and write, 35% completed the primary school, and 13% had education more than the primary certificate. All the households in the sample except one reported that their income source is from livestock and the small-size land in their villages in Qalamun.

The study showed that when the households moved from their villages to Mihassa area for livestock grazing, not all the family members moved for this purpose. Only about one half of the family members move and the other half stay behind to look after the house and take care of the land and the garden. In many cases, it was found family members alternate in coming to Mihassa. The average family members who came to Mihassa were 8 persons included 4 males, 3 females, and two children. It was noticed that there was a positive relationship between the number of family members who came to Mihassa and flock size belong the family, the correlation coefficient between this variables was calculated and reached 0.343 and was significant at 5%.

When pasture users come to Mihassa, they usually bring with them their machines and equipment such as tractor, trailer, and water tank. All the households in the sample, except one, had a tractor, about one third of the sample had a truck or a pick-up. The availability of mentioned machines are very important to serve the flock especially in terms of bringing water and feeds.

The pastoralists are affected by some kinds of sickness while in Mihassa such as cold. 70% of the sample reported that they got rheumatism due to the cold climate in Mihassa and Qalamun. 10% indicated to a fly problem, which had an effect to their eyes. The households usually visit medical doctors, or buy medicines directly from pharmacies. About 40% of the sample indicated that they use natural plants to treat themselves if they get sick.

6. Role of women in the study area

Woman, whether wife, daughter or sister, shares the man in livestock husbandry in the study area. She moves from her house located in the original village at Qalamun area to live in a tent at the grazing area, and transfer from one location to another looking for pasture. Women, generally, have an important role to play in the livestock production process. All heads of household in the sample indicated that woman look after the family and children in terms of food preparation and other needs of life, and she also is responsible for sheep milking. About 87% of the sample reported that women carry out the process of cheese making from the milk produced from their flock, and 78% of the sample mentioned that their women provide the feeds to livestock when flock comes back from pasture grazing.

Although the role of women is productive, and men did not ignore it, still the financial return to the women due to their contribution in the production process is very limited. The heads of household in the sample were questioned “if the family income increased, is there any influence on women”, 80% of the sample answered “No”. The sample households who answered “Yes”, were asked on the type of benefits affected women when family income expanding. All of them indicated that women could purchase new clothes, others added that they could buy gold.

It has to be mentioned that most of the households who use pasturelands in Mihassa are not rich families and obtain surplus income. It was noticed during the fieldwork that most of these households were poor, the purpose of their livestock activity was to get more or additional income to cover the costs of the necessary needs for their families. Accordingly, it was required from them to cancel many needs, which believe it is not necessary for the livelihood.

7. Livestock system in Mihassa

Rain-fed farming is not practiced any more in Mihassa due to regulating the use of steppe lands that do not allow crops cultivation in Badia. Land use in the study area presently dominated by transhumant sheep and goat husbandry. Most flocks passing through Mihassa and its surroundings now have home bases in villages in the Qalamun area, which administratively pertain to El-Nabek district, Damascus province. The average distance of the Qalamun villages from Mihassa is around 100 kilometers.

The annual migration from the Qalamun villages usually begins in October as flocks move east and southeast through Mihassa towards the South Tadmor Mountains and beyond, ranging around the area of Saba Abyar. Migration routes are largely determined by the location of water points.

Mihassa, as other locations in the *Badia*, faces the problem of increasing numbers of households that use the land and animals that graze pasture during the year. It was noticed that there was imbalance between numbers of animals and the amount of vegetation available for grazing. The unequal increase in number of households and animals combined with the territorial restriction of the range, has resulted in the failure of natural regeneration.

Historically, the majority of pasture users of Mihassa area now have residences and home bases in villages in the Qalamun. Although these pastoralists own a small land in their villages where the average annual rainfall rate is around 200 mm, many of them still have activity related to transhumant sheep husbandry by a permanent base with seasonal migrations to Mihassa region. Because most of the households in villages of Qalamun trend to plant fruit trees in their lands, which are essentially small holding. However, the area of rangelands in Qalamun became limited, and there is a need to depend more on flock movements to Badia.

All pasture users, who were interviewed, reported that they move from their villages with their flocks to Mihassa every year, where they stay in the area from 3 to 9 months. It was found, during the survey, that 3 households (7% of the sample) came to Mihassa area 2 years ago and did not return back to their villages. The correlation between flock size and the staying period in Mihassa was calculated, but the result did not show any significant differences.

The study showed that, although the purpose of flock movement to Mihassa was for grazing of natural pastures, the range around Mihassa is heavily degraded, and natural vegetation presently can not provide a visible part of sheep diets except for a few weeks during March and April. In this circumstance, about 100 households with 10 thousands sheep come from Qalamun to Mihassa in good years when rainfall is relatively high; and in poor and dry years about 50 households with six thousands heads of sheep come to that area. It is expected that the migration and movement of sheep will continue during the next years towards outside Qalamun either to Mihassa or to other places in the Badia. Since this movement is very important for pastoralists due to fact that temperature is generally higher in Badia than in Qalamun area, especially during winter season where the temperature in Qalamun reaches to below zero. Sheep and goats movement towards outside Qalamun is also necessary to protect the fruit trees at that area.

After spring season, more than one half (54%) of pasture users in Mihassa return back to their original villages to graze the crop residues by sheep in their villages, while one fourth of the sample reported that they go to agricultural areas for livestock grazing cereal residues, particularly wheat and barley. About 15% of the sample mentioned that

they return back to their villages and continue the movement toward Lebanon where their animal graze the natural pasture in the Lebanese mountains. As mentioned earlier, 7% of the sample stay around Mihassa and do not return back to their original villages.

8. Socioeconomic relationship among pastureland users

Most pasture users (93%) come to Mihassa as groups, and each group stays in specific area. The staying area is identified according to pasture and water availability around it, as indicated by around 56% of the sample. Other 30% reported that pasture availability is most important factor in identifying the staying area because it is possible to bring water by tractors, the remaining (14%) mentioned other factors such as near water source, not far from main road, and near village or town.

Creating a farming group of pasture users is based on many factors, the most important factors were the family relationship (indicated by 86%), and/or coming from the same village (73%). Other 11% of the sample reported another factor which is sharing the tractor, which usually accompany flock movement. Although land users graze the rangeland in Mihassa as groups, but there is complete separation between flocks related to livestock ownership where each member in the group own his flock and no relationship of other members in the group in this flock. The main purpose in creating farming groups for grazing as mentioned by land users were: collaboration among group members; talking, and socializing during their staying at the grazing area.

Pasture area in Mihassa, as other locations in the Syrian *Badia*, is based on an open-access regime. The households in the sample were asked if they had a specific area used for their animal grazing, and the responses were negative for 75% of them. They were asked also if their livestock graze in the same location every year, the answers for 96% were “No” and the grazing area changes from year to year.

During the field work, it was noticed that there were, in many sites of the study area, four walls built with stones and clay. The questionnaire included some questions related to these walls to understand their purpose and usage. About 93% of the sample said they were built near their residence, but they are not owned by any person, or belonged to any group of people, and any pastoralist can use this place if was not occupied by another at the same time. All the households in the sample said that the main purpose of building these walls is to save the sheep during the night from dangerous animals such as foxes and hyenas. Other 80% of the sample indicated another factor, in addition to the production of livestock from dangerous animals, which is flock saving from climate conditions such as cold, freezing, and flood tide. About 13% of the households said that these walls could be used as a place for sheep birth, and it is much better to keep sheep to deliver in the open grazing fields. This idea is accepted with a research result which mentioned that declining temperature increase the rate of death among lambs in the steppe where most birth occurs in the open grazing area, It is much better to prepare a special place for birth to decrease death rate (Mira, 1996).

9. Flock structure

The average flock size in the sample was 444 heads with standard deviation of 394 heads; ewes represented the highest percentage in the flock and reached to 68%, yearling was 22%, rams represented 5%, lambs was 3, and goats was only 2%. Because flock size was not the same among the pastoralists, there were variations among the households related to flock size as was classified earlier and as it is shown in table 1.

Table 1 Average Number of Livestock by Types and according to Flock Size Categories

| Flock Size (Heads) | Ewes | Yearlings | Lambs | Rams | Goats | Total |
|---------------------------|-------------|------------------|--------------|-------------|--------------|--------------|
| <= 175 | 89 | 27 | 2 | 9 | 6 | 133 |
| 176-350 | 175 | 56 | 9 | 15 | 9 | 264 |
| 351-710 | 350 | 122 | 9 | 29 | 11 | 521 |
| > 710 | 678 | 203 | 40 | 45 | 22 | 988 |
| Average for entire sample | 300 | 97 | 13 | 23 | 11 | 444 |

Because the number of ewes and yearlings affect the renewal of flock and its increase, a comparison between its numbers during 1996 and 1999 was estimated based on the data collected from the same households that interviewed in 1996 and 1999 seasons, which were 33 only. As shown in Table 2, the number of ewes have risen from 243 heads in 1996 to 395 in 1999 or by 21%, number of yearlings also have risen by 6% in the same period. T-test was carried out for the mean values; and analysis did not show significant differences at 5%.

Table 2 Average Number of Ewes and Yearling in 1996 and 1999 seasons

| Types | 1995/96 | 1998/99 | Increase |
|--------------------|----------------|----------------|-----------------|
| Ewes (S.D) | 243 (211) | 295 (232) | 21% |
| Yearlings (S.D) | 82 (75) | 88 (67) | 6% |

10. Supplemental feeding

Providing supplemental feeding to sheep while in the Badia became a common practice due to range degradation as a result of overgrazing which led to the depletion of the natural vegetation. The Badia, at present, can not provide enough pasture and forage to feed the increasing number of sheep, which is now more than the capacity of the steppe. However, the households tend to camp at fewer sites for longer periods of time, further exacerbating of the overgrazing and degradation at that locations. Currently, pastoralists provide supplemental feeding for their flocks even during the high grazing period in the spring to complete the shortage of feeds provided by Badia.

Barley, straw (especially of legumes), bran, cotton seed cake, cotton seed hull, and dry bread are the most important feeds purchased by pastoralists to feed their animals. It was noticed that the quantities of feeds that provided to the flocks are changed according to the season, in the dry years more purchased feeds are provided compared to the normal years where the rainfall rate is appropriate.

During the survey, the householders were questioned on the quantities and qualities of purchased feeds provided to their flocks in 1997/98 and 1998/99 seasons. Table 3 presents the average quantities of purchased feeds by the household in the sample from different feed items. It seems that barley and legume straw are the most important feeds provided to the flocks as supplemental feeds.

Because 1997/98 was a normal year in term of rainfall rate, and 1998/99 was a dry year, thus, it was possible to compare the additional amount of feeds that provide by the households to their flocks in the dry years. The comparison indicated that in dry years they provide about the twice as much as in normal years for many feed items such as barley, seed cotton cake, and dry bread (Table 4).

As a result of the drought that dominated in the 1998/99 season which led to an increase in the demand on feedstuff, which resulted in increasing the feed prices compared with the 1997/98 prices. The increase in feed prices were calculated based on the survey data, it reached up to 6% for barley, 33% for cereal straw, 22% for legume straw, 20% for bran, and 7% for dry bread. For the prices of cotton seed cake and cotton seed hull, it was relatively fixed because the pastoralist can get a quota of these feed items for his animal by purchasing it from government agencies.

Table 3 Estimated Average Quantities of Purchased Feeds by the household in Mihassa

| Items | 1997/98 | 1998/99 | Increase |
|--------------|---------|---------|----------|
| Barley | 9210 | 18740 | 103% |
| Cereal Straw | 2110 | 1695 | - 20% |
| Legume Straw | 7860 | 15410 | 96% |

| | | | |
|------------------|------|-------|------|
| | | | |
| Cotton Seed Cake | 990 | 3450 | 248% |
| Cotton Seed Hull | 3670 | 3410 | - 7% |
| Bran | 7500 | 11190 | 49% |
| Dry Bread | 1370 | 3240 | 136% |
| Wheat | - | 460 | - |

This report did not carry out an economic analysis and/or calculation of the return from livestock production that depended on steppe husbandry since these points were discussed in the socioeconomic study of land users in Mihassa watershed: report of results of field work in 1995/96. The analysis in this report include calculation the average of supplemental feed values that provided to livestock by the household for 1997/98 and 1998/99 season; the purpose of this calculation is to estimate measure value of the economic contribution of range lands in providing feeds from pasture and forage to livestock.

The collected data, from the current survey, maintained to estimate the values of supplemental feeds provided to flocks as presented in Table 4. In normal years, pastoralist provides feeds to his flock with an average estimated cost is 204 thousands Syrian Lira (1997/98 season). This cost increases to reach of 417 thousands Syrian Lira in the dry years (1998/99 season). The average feed cost increasing by flock in dry years represents about 104% higher than in normal years. When the difference between the dry and normal seasons was calculated per head cost value of supplemental feeds, it reached to 526 SL/head. In other words, the natural ranges, in the normal season, provide the above amount of money for pastoralists for each head of sheep owned by them, and that is an indication of the economic meaningfulness of range lands and its effect on the household income.

Table 4 Average feed costs by flock size (SL)

| Flock size (Heads) | 1997/98 Season | 1998/99 season | Differences | Per head difference |
|-------------------------------|-----------------------|-----------------------|--------------------|--------------------------------|
| > 176 | 57,134 | 140,410 | 83,279 | 575 |
| 179-350 | 121,117 | 273,449 | 151,331 | 589 |
| 350-710 | 278,309 | 536,625 | 258,316 | 495 |
| < 710 | 371,875 | 752,096 | 380,221 | 403 |
| Average | 204,215 | 417,333 | 213,018 | 526 |

Based on the collected data, the supplemental feed costs were estimated per head in 1997/98 and 1998/99 seasons by flock sizes (Table 5). It seems that per head supplemental feed cost was higher in the small flock holders compared with medium and large flock holders.

Table 5 Estimated average supplemental feed costs per head (SL).

| Flock size (Heads) | 1997/98 | 1998/99 |
|-------------------------------|----------------|----------------|
| > 176 | 466 | 1041 |
| 179-350 | 481 | 1070 |
| 350-710 | 532 | 1026 |
| < 710 | 366 | 769 |
| Average | 479 | 1005 |

11. Milk process by pastoralists

Milk produced by sheep represents an important part of the household's income in Mihassa area. It was noticed, during the survey, that milk processing by pastoralists to produce cheese or ghee, which is often sold, increases their income. Value added due to this process was estimated, using survey data, to be around 13%.

Although this process is profitable for these people, the results indicated that about 56% of the households sell part of their milk production to cheese makers as fresh milk. The households in the sample were asked in which form do they usually sell their milk; fresh or processed. Table 6 presents average percentage of sold milk by type of product. The estimations indicated that about one third of milk production usually sold as fresh milk to cheese makers and the other two thirds sold as cheese, the importance of yogurt and ghee are not significant. It was noticed that there was a positive relationship between the percentage of sold fresh milk and flock size. The analysis indicated that the pastoralists who had flock size greater than 710 heads sold in average about 57% of the milk production as fresh, compared with one quarter for the pastoralists who had flock size less than 175 heads (Table 6).

Table 6 Average percentage of sold livestock products by type of products.

| Flock size (Heads) | Fresh Milk* | Cheese | Ghee | Yogurt | Total |
|-------------------------------|--------------------|---------------|-------------|---------------|--------------|
| > 176 | 26% | 68% | 1% | 4% | 100% |
| 179-350 | 25% | 75% | - | - | 100% |
| 350-710 | 35% | 65% | - | - | 100% |
| < 710 | 57% | 43% | - | - | 100% |
| Average | 33% | 66% | 0% | 1% | 100% |

* Sold to cheese makers to process, and not to consume as fresh milk

The pastoralists who sell fresh milk were questioned about the logic behind selling the milk and not processing it which means losing potential income from value added. Many reasons were mentioned such as: not having enough time for milk processing due to looking after sheep for grazing, bringing water, or purchasing feed, availability of labors, and marketing difficulties.

During group discussions with pastureland users, it was noticed that some cheese makers have good experience in this aspect, and they have transport equipments such as trucks and pick-ups, in addition to cash money. These cheese makers, who are originally from large cities such as Hama and Aleppo, come to Mihassa in the beginning of milking season and arrange contracts with pastoralists to buy fresh milk; the milk price is inconsistent and change by the market mechanism, which is influenced by supply and demand. Cheese makers manufacture the milk in the grazing area, and send the cheese daily to the cities that they come from, using their trucks. They can sell their cheese production through wholesale shops, where they may have sharing arrangement with their owners.

12. Opinions and comments of pastoralists in Mihassa

It should be indicated first, that the 1998/99 season was very dry season, which affected negatively the households' attitude in Mihassa related to the project. There were no staff members working in agricultural extension scope, although there was an agricultural extension section in the project, which influenced the unawareness of pastoralist with the objective of the project and its purpose. In addition, the participation of the pastoralists in the planning and implementation of this project was ignored.

During the field day and the survey, pastoralists raised several important issues; the first issue was their belief that they have priority right in the range and land of Mihassa since this area was used by their grandfathers who were the only pastoralists in that area more than 100 years ago. Accordingly, they see the integrated water development project as a foreign issue brought to them. They request to identify the borderlines of this project to know the areas not allowed for public grazing. They request also to permit them to move

and use the roads within the project because they are shorter and easier for bringing water and feedsuff for their flocks.

During group discussions, it was found that many pastureland users perceive this project as if its objectives were to grow olive trees and irrigate some crops. Therefore, the survey questionnaire included some questions related to their understanding on the project. About 80% of the households in the sample reported that they had an idea on the project; but when asked about the objectives of the integrated watershed development project as they understood, 24% only from the sample knew all the actual objectives of this project, 8% did not know the objectives, while two thirds of the sample knew some objectives but not all of them.

Although more than half (54%) of the pastureland users in Mihassa area indicated that the Integrated Watershed Development Project is useful in general, still 28% of the sample mentioned that this project had limited values, others (17%) reported that this project is useful for limited groups of people.

Households in the sample were asked about their perspectives on how they improve the benefit from this project. About 65% of them indicated that this could be done by allocating limited numbers of sheep to graze for a limited duration, while 37% said that it could be done by allocating land plots for animal grazing for each pastoralists' group, other 9% indicating by protecting the project and open it when needed, especially in dry years. Only one person mentioned that pastoralists must pay money when they enter their livestock for grazing into the project area.

Pastureland users were questioned about usefulness of the components introduced and/or tested by the project such as water harvesting, shrubs plantation, establishing protected area, and providing water for animals. Table 7 presents the households options, which were obtained. It appears that there was acceptance among all pastureland users on the benefit of providing water for animals. The majority (more than 90%) accepted the appropriateness of water harvesting and shrubs plantations. For installing protected area to maintain the steppe and pasture lands, potential pastureland users reported that this idea is not helpful; in other words, they prefer to continue applying the current grazing system which is based on open-access regimes. This finding was supported when they answered a direct question on their reaction about the idea to identify specific areas for animal grazing and protect other areas for the purposes of grazing management and vegetation renewable. 78% of the households did not agree with this idea. They believe that it will be unbalanced among the pasloralists when pastureland will be distributed for livestock grazing,

Table 7 Pastrolists' Opinion on the benefit of technology components tested by Mihassa project.

| | % positive answers |
|-----------------------------|--------------------|
| Providing water for animals | 100% |
| Water harvesting | 98% |

| | |
|-----------------------------|-----|
| Shrubs plantation | 91% |
| establishing protected area | 28% |

13. Problems and difficulties faced pastoralists in Mihassa

The households in the sample were requested to inform about the general problems and difficulties they faced during their pastoral activities. The study showed that most pastoralists in Mihassa area face several problems every year such as degradation of range vegetation. Others (74%) indicated the shortage of supplement feeds and increasing their prices, 72% mentioned problem of the animal health and shortage of animal medicine. The pastoralists also indicated other difficulties that they usually face, as shown in Table 8.

In addition to the common problems that mentioned earlier. The parstorlists faced other general problem, which is the diffusion of plastic bags in the steppe area that sheep occasionally eat one which stays in the stomach. The pastureland users do not know how to deal with this problem. However, 74% of the sample requested to make the people aware of the bad effect of these plastic bags on the sheep, About one half of the sample requested to stop the plastic manufactures to produce bags.

Table 8 Difficulties faced by pastureland users in Mihassa

| | % of households that indicated |
|---|--------------------------------|
| degradation of vegetation | 89 |
| Feed shortage | 74 |
| animal health and shortage of animal medicine | 72 |
| Do not apply the regulations | 46 |
| Water availability | 30 |
| Close the road through Mihassa Project | 22 |
| Government support is not enough | 22 |

The problems and difficulties faced by the land users in 1998/99 season, were in general the same as those faced in other very dry seasons. They were various, such as: animal diseases, especially the effect of FMD; degradation of vegetation; feed shortage; increased feed prices; shortage of animal medicine; decreased market price of sheep; and increased rate of sheep mortality. Table 9 summarizes the difficulties faced by pastoralists in Mihassa as mentioned by them during the survey.

Table 9 Difficulties faced pastoralists in Mihassa in 1998/99 season

| | % of households that indicated |
|--------------------------------------|---------------------------------------|
| Sheep diseases | 93 |
| Degradation of vegetation | 84 |
| Feed shortage | 78 |
| Increase feed prices | 63 |
| Shortage of animal medicine | 61 |
| Decrease market price of sheep | 61 |
| Increase death rate of sheep | 59 |
| Expired date of veterinary medicines | 23 |
| Shortage of veterinary doctors | 15 |

14. Economic and social feasibility of rangeland development

It was mentioned earlier that one of the objectives of this study is to analyze the technical, economic, and social feasibility of rangeland development technologies in Mihassa project in order to introduce and diffuse these technologies in similar areas. However, since the 1998/99 season was very dry, it was not possible to collect the data required for this analysis, especially that related to estimation of forage production expected to be obtained by using the technologies tested in the project. Therefore, previous studies will be used to cover this point, in addition to some information collected in this study.

Economics of water harvesting and storage in the Mihassa watershed report (ICARDA, 1997), which analyzed the ex ante economic assessment of the proposed technical innovations, showed the economic feasibility of the water harvesting and water spreading interventions in relation to the sustainable agricultural and livestock production potential in Mihassa area. It is possible to obtain substantial yield increase per unit area through water harvesting and water spreading techniques. The conclusion of this study indicated that the project may break even and still add environmental and socioeconomic benefits to rural communities.

A study conducted by the Arab Center for the Studies of Arid Zones and Dry Land (ACSAD, 1987), on nutrition and grazing evaluation of *Atriplex* on sheep, which continued for 4 years in 3 research stations of the Syrian Ministry of Agriculture and Agrarian Reform at Wadi El-Azib, Al-Edami, and Marj El-Karim, showed that the calculated financial evaluation for internal rate of return reached to 45% for *Atriplex*. This rate reached to greater than 50% when supplemental feeding was used in addition to *Atriplex*, the above rate is equal to five times the interest rate. The project owner can accelerate their additional costs in the two cases in the end of the fifth year of project's age if they plant related *Atriplex*.

This report has showed also the importance of natural pasture and rangeland from an economic point of view, and the role of steppe in providing forage for livestock. It was found that natural pastureland, in normal years, provide forages, with an annual estimation value is of 526 SL/head (Table 4).

The results of scientific agricultural research were positive regarding the techniques for protecting areas in rangelands. Studies carried out in cooperation between ICARDA and the Syrian Ministry of Agriculture and Agrarian Reform compared land that was open for grazing with other land which had been protected for two to several years after it had been planted with shrubs (*Atriplex spp.*). It was found that protected areas had 3 to 9 times more plants than unprotected areas (ICARDA, 1986). Another study, carried out in the northern part of the Kingdom of Saudi Arabia, indicated that protection against grazing is an efficient procedure for improving and renewing vegetation of range and pasture lands that had been degraded. The degree of vegetation renewable is based on climatic factors and the steppe situation at the beginning of protection. In places, where density of main plants is less than 100 plants per hectare, it is necessary to combine protection with plantations.

From the above results, it seems that all the primary indicators mentioned the economical feasibility of the technologies used and tested in Mihassa project to improve steppe and pasture areas.

Regarding the social dimension, it is known that the technologies examined in the project, include more than one component, such as: providing drinking water for livestock, water harvesting and storage, shrub plantations, and protecting shrub areas.

Providing drinking water for livestock is an important component for pastoralists in the study area and socially accepted. All pastureland users in Mihassa agreed on this component because they benefited from it. Results of the survey indicated that all the households in the sample depend on state wells, either those inside the project or outside, in providing water for their livestock.

Water harvesting and water spreading technology component is also socially acceptable as mentioned by pastoralists. Since this process is helping in increasing the available water and forages in the natural range without additional cost, no pastoralist is against this component. It was noticed that shrub plantations by the Ministry of agriculture and agrarian reform is socially adequate in the study area because it is increasing the amount of forages in the range and does not cost the pastureland users. If shrub plantations were carried out by the pastoralists themselves, it would not be easy to know the social acceptance of this idea at this time. The reason behind that is because the current grazing system is based on an open-access regimes, and there is no specific protected areas specified for a group of pastoralists or local communities in the study area.

As was mentioned earlier, establishing protected areas is an issue, which is rejected by the majority of pastoralists in Mihassa. Although the results of this technology is positive and well known by pastureland users, the main reason for rejection was the circumstances

of grazing system dominant in the Syrian *Badia*. This system is based on open-access and unorganized, where everybody has the authority to bring his animals for grazing without any control, as there are no property rights in an open-access situation. Pastoralists believe that it will be unbalanced among land users if pasturelands are distributed for grazing. Therefore, they prefer to continue applying the current grazing system. Thus, this situation led to analyze and understand the institutional structure and management of natural steppe and range lands in Syria.

15. Institutional structure of natural steppe and range lands

It is useful, before discussing institutional structure of natural steppe and range lands, to consider four possible resource regimes, which are based on property of natural resources. These resources, as mentioned by Bromley and Cernea (1989), are (1) state property regime, (2) private property regime, (3) common property regime, and (4) non-property regime (open-access).

There is a general agreement among researchers that the dominant grazing system in Syria, especially in *Badia*, is based on open-access, as the steppe lands legally belong the state (*Amiri* real estate); but practically, each person can bring his animals for grazing without any control or permission. Pastoralists usually pay an annual tax to the state for each head of livestock they own, the amount of this tax differs according to the type of livestock. It is greater for camels and cattle compared to sheep and goats. The livestock owner must pay this tax whether he uses the steppe areas or not.

There are limited natural range areas in Syria, which are protected by the state for the purpose of research and development projects. There are also some range areas which belong to some range cooperatives where each cooperative protects its area and does not allow people from outside the cooperative to use its areas for grazing, but these areas are limited. Except these limited areas, the rest of the Syrian *Badia* is open-access for livestock grazing.

In an open-access regimes, the available natural range resource in this regime is for the first person or group who stays and occupies the grazing area, and potential user has complete autonomy to use the resource since no one has the legal ability to keep any potential user out.

Many studies indicated that the problem of range degradation in the Syrian steppe was essentially due to the increasing number of small ruminants and the unorganized grazing system which is based on an open-access regime. If this open-access prevails, it is expected that the range degradation will persist even if the results obtained from agricultural research were positive.

The World Bank indicated in a discussion paper (Bromley and Cernea, 1989) that any investment in range improvement under open-access regimes must first focus on the institutional dimension. If property and management are not determined, and if the investment is in the form of a capital asset such as improved tree species or range

revegetation, the institutional vacuum of open-access insures that use rates will eventually deplete the asset. Another study carried out in the northern part of Saudi Arabia by FAO and Research Center for range improvement and livestock in El-Jouf, indicated that no improvement can occur on the natural ranges if there is no control on grazing system which is based on open-access regimes (Mira, 1996).

There are several principle laws and policies in Syria that organize the property of grazing the natural pasture and rangelands. The Syrian civil law divided the real estate in the country (Art 86) to five categories *Mulk*, *Amiri*, *Matrouka Morfaka*, *Matrouka Mahmiya*, and *Khalia Mobaha* or *Mawat*, These real estate were defined in Art 86 as follow:

- (1) *Mulk* real estate, held in absolute freehold. Two sorts of rights are involved: the right of absolute ownership, and the usufruct right to make use of the real estate. With *Mulk* tenure, both rights belong to the individual. This type of real estate is mainly in the cities and towns, and in the rural areas when lands are planted by trees.
- (2) *Amiri* real estate, of which the absolute ownership belongs to the state, but usufruct rights belongs to the individual. This is a form of heritable “ownership” through which the state leases land to the individual.
- (3) *Matrouka Morfaka* real estate, of which the absolute ownership belongs to the state, but there is a right for a community to use it.
- (4) *Matrouka Mahmiya* real estate, of which the absolute ownership belongs to the state and reserved for public purposes such as roads.
- (5) *Khalia Mobaha* or *Mawat* real estate, which is *Amiri* land which belongs to the state, but includes undefined and unspecified borders. It is possible for the first person who occupies it to get authorization from the government for priority right as mentioned in the state land systems.

However, since natural pasture and range lands have no defined borders, which means that they are *Khalia Mobaha* real estate and the first person who occupies it has priority right to continue using it after having permission from the government.

In fact, there were also several regulations, decrees, ministerial and high agricultural council decisions, in addition to the state lands regimes, which organize the *Badia* affairs. It is possible to list some of these regulations such as decree No. 140 issued in 1970, which legally named *Badia* for the first time for the steppe area that received average annual rainfall less than 200 mm, and limited ownership of steppe lands, and did not allow farmers to cultivate and grow rain-fed crops in the *Badia*. In March 1973, law no.13 was produced, and permitted farmers and families in the range lands who cultivated land in their village or boundaries before 1970 to cultivate 10 hectares; and farmers who planted trees of at least five years old were also allowed to cultivate. There were also ministerial decision No. 16/T in 1982 and ministerial decision No. 96/T in 1988. The objectives of all these regulations were to organize and manage steppe lands, limited growing field crops, and allocating steppe area for grazing only. In 1992 Prime Minister’s decision No. 17 requested governors “ to observe strictly the prohibition of the cultivation and growing non-irrigated steppe lands, which will remain dedicated for

natural and planted rangelands and shrubs. All deterring measures will be taken against transgressors as per the provisions of laws and by-law in force". The high agricultural council decision No. 27 in 1995 terminated the irrigated cultivation in steppe lands. All these with licensed wells were authorized to continue cultivation until December 1997, while the non-licensed wells were illegal.

Although there were many laws, decrees, and policies related to managing, conserving, and protecting pasture and range land resources, there was no actual control in practice. The Arab Organization for Agricultural Development (AOAD) mentioned that one of the main constraints of agricultural development in Syria is the weakness of special law political system to protect and save the natural pasture lands (AOAD, 1994).

The government of Syria pays great attention regarding management and conservation of steppe and rangelands resources. The policies and agricultural development programs included the renewal of the natural vegetation for the Syrian *Badia*, availing essential services for pastoralists, establishing stations to produce shrubs and plant them in locations where vegetation is degraded, and organizing shrubs grazing. But this work, as seen by the Arab Organization for Agricultural Development, was unsatisfactory (AOAD, 1994). One principal reason for not reached the satisfying for natural range management was no participating and sharing of pastureland users in the planning and implementation process (AOAD, 1994). The main problems with the pastureland users that their understand on role of steppe are not correct, their perspective to range is focused on the short run only, and ignore their participation in management of natural resources in their areas. Thus, the government agencies should work very close to pastureland users to improve, manage, and maintain natural range resources. It is possible to reach that by improving agricultural extension programs, and participate local communities in planning and implementation of these programs.

Property rights of the natural pasture and rangelands, in most cases, are essential for the success or failure of any project related to improvement of these lands. The current grazing system, which is dominant in Mihassa and in most other Syrian *Badia* areas that is based mainly on open-access regimes, should be changed. It is possible to implement several regimes to improve grazing system for the purpose of developing and maintaining natural pasture lands such as:

1. Create control public grazing areas, where number of flocks that will be grazed in these areas, will be limited. It is possible to divide the *Badia* to many public grazing areas under government agencies supervision, where number of livestock which will graze will be identified annually, according to rainfall precipitation, for specific duration.
2. Applying *Hemma* system, there is regulation in Syria regarding this system, where steppe lands can be divided, and each part can allocate and manage by rangeland cooperative which is responsible on the maintains and improvement of the allocated part.
3. Protect some pasture areas by the government agencies to be rented to pastoralists, the maximum number of livestock and the grazing period must be identified.

4. Authorize groups and communities who recently occupied lands at the *Badia* and had livestock to continue using these lands by them only for the purpose of animal grazing and not for crop cultivation, and give them priority right by rent agreements and charge them. This idea is with the principle regulation mentioned in the civil law especially Art 86.

Finally, It has to be mentioned that converting open-access situation to other property systems is not an easy issue, but it is a complex process that cannot be achieved by administrative decree only. When such a process is attempted, the design of the change process should consider number of general variables and their local context. These variables concern both to the physical environment and to the existing socio-cultural systems. The American National Academy of Sciences suggests in 1986 that there are at least four main sets of variables that are critical for such a process. They are: (1) the nature of the resource itself; (2) the supply-demand conditions of the resource; (3) the characteristics of the users of the resource; and (4) the characteristics of the legal and political environment in which the users reside.

16. Summary and conclusion

The Integrated Watershed Development Project is an important part of the applied research program in the Directorate of Irrigation and Water Use of the Syrian Ministry of Agriculture and Agrarian Reform. This project aims to develop an integrated watershed management strategy that utilizes water harvesting technique in very dry areas, to increase the amount of pasture and forage available for sheep in the Syrian *Badia*. And also to conserve and maintain the natural range in the steppe and sustain livestock production for pastoralists, which most of them can be classified as poor people.

The technical results that obtained from the research in the project indicated that there is potential to increase the beneficial from the limited available resources of this environment, and in the same time conserve and sustain these resources. Economic analysis showed the feasibility of this project.

Although most of the pastureland users in the study area had an idea on the objectives of the Integrated Watershed Development Project and they believe that the project is useful in general, still the idea was not complete for most of them and for some of them was inadequate. The main reason of unawareness is that the potential pastureland users were relatively far away from the project, and that they did not participate in the planning and implementation of this project.

Pastoralists in Mihassa accepted some of technology components that tested or provided by the project such as water harvesting, shrubs plantations, and providing water for animals. They found these components useful and socially acceptable. For installing protected area to maintain the steppe and pasture lands, the majority of potential land users did not accept this idea and it seems to them as socially unacceptable. The main reason behind this attitude is the grazing system dominated in the Syrian *Badia*, which depend on open-access regimes. Potential pastureland users belief that any control on the

open-access regimes do not support them, especially they usually look for the short run. Other belief that it will be unbalanced among land users when pasture land will be distributed for grazing.

Many studies indicated that the problem of range degradation in the Syrian steppe was essentially due to the increasing number of small ruminants and the unorganized grazing system that based on open-access regimes. If this open-access prevails, it is expected that the range degradation will persist even if the results obtained from agricultural research were positive. Many researchers also mentioned that any investment in range improvement under open-access regimes must first focus on the institutional dimension.

Property rights of the natural pasture and rangelands are essential for the success or failure of any project related to improvement of these lands. The current grazing system, which is dominant in Mihassa and in most other Syrian *Badia* areas should be changed. The suggestion is to develop a clear strategy with objective to change the natural pasture grazing system that dominate in the Syrian *Badia*, it should consider the participation of pastoralists, land users, and the local community members in the planning and implementing this strategy. This suggestion has to be done before introducing and transferring Mihassa Project experience to similar areas of the Syrian *Badia*.