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Reconnaissance Land Use Survey of Syria
1:500,000 scale and

Land Use Survey of the First Settlement Zone
1:100,000 scale

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Reconnaissance Land Use Survey of Syria 1:500,000 scale and Land Use Survey of the First Settlement Zone 1:100,000 scale

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FOREWORD

The objective of the land use mapping was to establish baseline data. Following digitizing, data were generated showing the hectares in each land use category and this information can be found summarized in tabular form in this volume.

A major function for the land use data will be to compare it to the soil classification data for both the 1:500,000 and 1:100,000 scales. This comparison, however, is done on the computer using the AREAS geographic information system. Using AREAS the user will be able to analyze the relationships that now exist between land use and soils. Following this analysis, plans can be made to plan land use changes so that the soils are used in a manner compatible with their capabilities.

Both the 1:500,000 and 1:100,000 soil survey include tabular material which show the interpretations of the soils for selected uses in addition to capability class and subclass. These interpretations also can be compared to present land use using the AREAS geographic information system described in Volume 9.

1 INTRODUCTION *

The Syrian Arab Republic-Government (SARG) is deeply involved in a program designed to expand and accelerate land classification and soil survey activities in an effort to increase both agricultural output and income through appropriate use of limited land resources. Although many sectors of the Syrian economy are growing in importance, agriculture still contributes and will most likely continue to contribute a large share of the national income and affords employment to a considerable portion of the rapidly growing labor force.

The expansion of the various sectors of the economy, including agriculture, could create a host of new and intensified nationwide development problems of unprecedented scale and complexity in the Syrian Arab Republic (SAR). These potential problems are closely linked to the very basic considerations of land and water use. The formulation of sound preventive and ameliorative measures requires an initial comprehensive nationwide approach to development planning. Such an approach must recognize the existence of a limited natural resource base and further, that the land and water resources are subject to degradation through improper land development and subsequent use.

Effective and efficient development must proceed based on a careful assessment of the intersections of the various segments of the resources available. Emphasis on the natural resource base is essential if effective settlement patterns are to be evolved and implemented in a manner to avoid irreparable damage to the environment. Such emphasis requires the collection and analysis of large amounts of data concerning the natural resource base components and their ability and potential to sustain development beyond current levels of management, exploitation and subsequent output.

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An awareness and knowledge of current land use patterns is essential to formulation of development plans. Current land use reflects the traditional knowledge of the indigenous population and hence, their adaptation to local environmental conditions. This evolved pattern is not coordinated into a comprehensive national approach, but does provide guidance on adaptable management options. Present land use patterns also provide the baseline data which can be used to evaluate the impact of future development activities. This implies frequent updating of land use data to establish patterns of shift and alteration in response to climate, socioeconomic or governmental inputs and influences. Areas may be identified where changes in technology may now permit introduction of more appropriate agricultural pursuits to the benefit of the individual land operator. Comparisons of present land use patterns with new data about the natural resources involved may reveal interrelationships which were heretofore unknown but are important to development planning.

For these reasons, as well as others, the project undertakes to map present land use in the SAR. The mapping was done on Landsat imagery base maps. The entire SAR was mapped at a 1:500,000 scale and the First Settlement Zone was completed at a 1:100,000 scale. This was done to provide the broad regional coverage and patterns of use for the entire country. Relations on a regional basis can be seen at these reconnaissance scales such as with precipitation zones as established by the SARG. The First Settlement Zone was mapped because data was needed for this most intensive agricultural production zone in the SAR.

2 METHODOLOGY

In general, the approach used in the land use mapping is the same as the approach developed for other natural resource inventory activities in other parts of the world by RSI personnel. Initially, all available, relevant, historical data are acquired and reviewed. Pertinent information is extracted and assembled into a format which is compatible with project activities. In addition, persons associated with the activity are consulted concerning the historical data, proposed procedures, and project objectives.

Secondly, a program of field work procedures is formulated and implemented. This generally involves establishment of a preliminary field legend, field checking of appropriateness of mapping units, preparation of final field legend and actual ground truth and mapping. The third and final phase is map compilation and drafting in accordance with the final mapping units of the descriptive legend and report preparation.

2.1 SUPPORT DOCUMENTATION

The base maps used for the 1:500,000 scale survey of the entire SAR and the 1:100,000 scale survey of the First Settlement Zone were Landsat satellite imagery. The 1:1,000,000 and 1:500,000 scale topographic maps provided complete coverage of the SAR, but these maps were found to be of marginal accuracy. Rainfall distribution maps were available and were used to establish the spatial extent of the First Settlement Zone. The First Settlement Zone is defined as that portion of the SAR which receives in excess of 350 mm annual precipitation. Within the First Settlement Zone, 1:200,000 scale topographic maps provided

coverage of all except the areas around Aleppo and Souweyda. This was the scale which proved most useful for field work since it was relatively simple to correlate ground observations with locations on the topographic maps and to keep brief notes directly on the maps. These are difficult to accomplish directly on satellite imagery. The 1:1,000,000 scale geology and geomorphology maps were also available. These maps were useful for photo interpretation of the imagery.

Very little published information was found available concerning recent land use patterns in the SAR. A compilation of agricultural production statistics was provided by the Directorate of Soils (DOS) of the Ministry of Agriculture and Agrarian Reform (MAAR). However, this was not accompanied by any maps so the geographical distribution of the various production units was not available except as it was reported by mohafazat and montika. The only recent land use maps available were those provided by USAID/Damascus as prepublication maps and reports. These were the result of an earlier USAID supported agricultural project. The legends were different between the two projects but enough similarity existed that some useful information could be extracted with reference to general land use patterns.

2.2 MAP PRODUCTION

The contract required mapping current land use patterns in six general categories at the 1:500,000 scale and eight general categories at the 1:100,000 scale. The first mapping was scheduled for the entire SAR at the 1:500,000 scale and the six categories were preliminary selected on the basis of previous work and on field observations of the resident staff. The categories established were:

1. Irrigated agriculture: areas where annual agricultural crops received supplemental water without distinction made between different irrigation methods or crops.

2. Rainfed agriculture: all annual cropland which is cultivated and receives water only from natural rainfall. No distinction is made between types of crops.

3. Rangeland: all land used for grazing and occupied by naturally occurring vegetation.

4. Orchards: includes olive trees, fruit trees and vineyards, sometimes irrigated.

5. Forest: areas with relatively dense cover of coniferous and deciduous trees which have no food or grazing value.

6. Barren land: areas devoid of vegetation, steep and rocky mountainous areas and salty areas.

These categories met the basic requirements of the contract and were presented to and accepted by the DOS. They also met the realities of land use in the SAR. No attempt was made to arrive at precise unit definition at that time. Definition was arrived at more precisely during field investigation so the established land

use categories actually fit the observed patterns rather than the patterns being forced to fit arbitrary mapping units.

Three locations were selected in relatively close proximity to Damascus which demonstrated each of the above six categories. These areas were:

1. Tartous

2. Deraa

3. Homs

Tartous is in the First Settlement Zone, Deraa is outside and Homs is on the border. Therefore, aside from representing the qualitatively described map units, the areas also represented a spectrum of precipitation zones wherein similar land use zones may appear differently because of climatic impacts. Thus, the three selected test sites served to establish mapping procedures and map unit definitions as well as to establish correlations between photo interpretation of satellite imagery at both scale and actual ground observations.

The field trip to the Tartous area was made with no prior photo interpretation of the area, the purpose being to evaluate the applicability of the preliminary legend. Tartous was chosen for this because of the diversity of land use encountered in the coast to mountain transect. After this trip, correlations evolved between field conditions and satellite imagery which permitted photo interpretation prior to field work. This was done in Deraa and Homs areas and accuracy of interpretation map production was evaluated. Based on these efforts, the field work for the entire SAR was scheduled using a more carefully defined mapping legend (see Section 2.2.1).

Several problems evolved during the field testing. It was found to be very difficult to locate observation sites in the field precisely on the satellite imagery particularly at the 1:500,000 scale. It was also difficult to establish and maintain field trip results on the imagery. This was resolved by plotting routes and making field notes on topographic maps, when available, and later transferring to imagery.

Mapping unit homogeneity was also a problem which was recognized early. This was a result of having such general land use categories and from the limited cartographic resolution of the imagery; 1000 ha at 1:500,000 scale and 40.5 ha at 1:100,000 scale. Naturally, many farm fields are smaller than either of these limits and therefore, became part of mapping unit complexes and lost their individual identity. It was finally determined that a unit would be mapped as a single land use category based on dominant use within an area having identifiable boundaries. This dominant theme was determined to be any land use category exceeding 60 percent of the area. A special category was established for coastal zone mapping wherein no land use exceeded 60 percent (see Section 2.2.1).

2.2.1 FINAL LEGEND

The final legends adapted for use at the scales of 1:500,000 and 1:100,000 were the product of contract specifications which were interpreted as being the

minimum acceptable level, consultation with the SARG and AID and a large amount of field work and observation.

2.2.1.1 1:500,000 SCALE DESCRIPTIVE LEGEND

Irrigated Agriculture: Included in this land use category are all agricultural crop lands which receive supplemental water during the crop season (Figure 5-1). Irrigated lands may produce more than one crop during the year and are therefore very intensively used. No distinction was made between various irrigation methods, although most fields were surface irrigated, or between the various crops produced, although most are high value row crops. Very few areas are 100 percent irrigated; however, if 60 percent of an area was irrigated, it was mapped as such. Additionally, many irrigated fields were too small to map individually and become grouped with other dominant themes. Therefore, the tabulated area of irrigated agriculture may be at variance with SARG measurements which are much more precise. It should be remembered that 1:500,000 scale land use mapping is intended to demonstrate regional and national patterns of land use for planning and development purposes, not as an inventory of land uses.

Rainfed Agriculture: Rainfed cropland receives no water other than natural precipitation (Figure 5-2). This land may produce in a prescribed rotation, a single crop per year or be multiple cropped. A considerable amount of fallow land is included in this category because it was considered as part of a rotation. No attempt has been made to separate the rainfed agriculture into its component crops because of small field sizes, mapping scale and contractual requirements.

Rangeland: Areas of natural vegetation, primarily grasses and shrubs, are utilized for livestock grazing (Figure 5-3). The rangeland category does not consider vegetation types or rangeland conditions or potential. The areas mapped as rangeland were investigated closely as part of the study and reported in Volume 6, "An Evaluation of Syrian Rangeland Problems".

Orchards: This category includes areas that are cultivated for the production of fruit, nut and olive trees and grape vineyards (Figure 5-4). Not all orchards were visible on the 1979 Landsat satellite imagery because large areas were planted more recently, for example, east of Souweyda are many new apple orchards.

Forests: This includes all areas where the growth of non-fruit trees is of sufficient density to preclude any other land use (Figure 5-5). These areas, primarily in the northwestern part of the SAR, are readily seen on the imagery and include both coniferous and deciduous types of trees. It also includes urban areas and water bodies.

Non-Agricultural: In the preliminary legend, this was referred to as barren land and is defined as areas with little or no plant cover, normally steep, rocky areas, steep mountains or high salt affected areas (Figure 5-6). It also includes urban areas and water bodies.

Undifferentiated: This is an additional mapping unit category included to accommodate mapping complexity in the coastal zone (Figure 5-7). This map

complex includes areas of orchards, forests, irrigated and cultivate categories which occur in a complex pattern but with no simple land use category occupying more than 60 percent of the area. Therefore, no simple category can be assigned and this map unit applies.

2.2.1.2 1:100,000 SCALE DESCRIPTIVE LEGEND

The essential difference between the two scales of mapping is basically one of cartographic resolution, the smallest mappable unit at 1:500,000 scale being 1000 ha and at 1:100,000 scale being 40.5 ha. This obviously leads to much more detail in the smaller scale mapping and this in turn requires a modified legend. The contract requires eight general categories of land use at this scale. However, nine categories were utilized to resolve differences and produce the smaller scale and more accurate maps.

This scale of mapping was done only in the First Settlement Zone as defined by the 350 mm rainfall minimum.

Irrigated: This category includes all agricultural crop land which receives supplemental irrigation water regardless of the method of application, time of year, type of crop or number of crops grown per year.

Rainfed This includes all agricultural crop land which relies solely on natural precipitation for water to support the annual crop regardless of the type of crop grown. It also includes all fallow land which is in a crop-fallow type of rotation.

Potential Grazing: These are areas in the First Settlement Zone which support natural grass vegetation and are not cultivated (Figure 5-8). These are referred to as potential because no grazing is practiced in the First Settelement Zone. These areas are normally on steep topography and inaccessible to mechanical equipment. They usually occur at lower elevations.

Bush Range Land: These are areas, primarily in the coastal mountain regions which appear to be transitional between potential grazing, grass areas at lower elevations and forests at higher elevations. These areas are steep and rocky but support a group of bushes and underlying grass and could, with careful management, be grazed by goats or similar livestock.

Orchards: This includes areas which are used primarily for production of olive, fruit and nut trees and grape vineyards.

Forests: This includes areas of coniferous and deciduous tree growth and without cultivation, generally located in the northwestern part of the SAR.

Urban: At this scale of observation and mapping, cities and larger towns may be identified on the imagery and mapped as a separate land use category.

Surface Water: This includes all lakes and rivers large enough to be delineated on the imagery.

Barren Land: This is all steep, rocky land with little or no vegetation cover and highly salty areas where no vegetation grows.

2.2.2 PHOTO INTERPRETATION

The availability of two seasons imagery, as discussed in Volume 1, Introduction, was particularly important in land use mapping since seasonally variable climatic inputs have their most immediate impact on present land use patterns on Landsat imagery. For example, the imagery recorded at the end of the rainy season, May, was particularly useful in establishing the border between cultivated zones and desert zones. The end of the dry season imagery, September, was very useful in recognition of irrigated areas. The photo intepretation guidelines were applicable to both scales of mapping so only one discussion will be presented.

The purpose of the preliminary field trips (Section 2.2) was to establish correlations between Landsat imagery and actual field conditions. Establishment of these correlations permitted reliable photo interpretation and made field work much more efficient. Variations in reflectance were then useful to produce maps prior to field work which was maintained as ground truth of questionable areas and continued observation and checking of other interpretation.

The irrigated fields appeared bright red on the Landsat false color composite (FCC) imagery. In addition, the regular shape and sharp boundaries were used to identify this category. Geographic location assisted in knowing where to look for irrigated fields.

When an obvious field pattern appeared, but not in bright red and a comparison of the two data sets failed to indicate irrigation, the areas was mapped as cultivated. Cultivated areas were difficult to map at the border with the desert zone and required much ground truth. The same was true in areas of basalt bedrock because of the dark color on the imagery.

Rangeland showed little or no reflectance in the infrared because of the sparse vegetation. The reflectance was the result of soil and bedrock reflectance. In the First Settlement Zone, it was found that the potential grazing areas showed a light red reflectance on FCC and the bush rangeland was at higher elevations with a darker red color. The darkest red colors associated with more level topography were orchards. At higher elevations, and associated with steep, rocky terrain, were mapped bright red, irregular shaped forest areas.

Barren lands had reflectance associated with basic bedrock or salt. Cities and towns were light blue in color and could be identified and located with the help of topographic maps. Water bodies were irregularly shaped but with abrupt edges and dark blue to black in color.

3 REGIONAL DESCRIPTIONS

For the purpose of discussing the land use patterns of the SAR, it is convenient to divide the country into several geographic regions based on land use, climate and geomorphology. As will be seen, these factors are all closely

interrelated. The regions are:

1. Coastal Region
2. Aleppo Region
3. Hama - Homs Region
4. Damascus Region
5. Southwest Region
6. Southeast Region
7. Euphrates Region
8. Bend of Euphrates Region
9. Northeast Region

3.1 COASTAL REGION

This region can be divided into three morphological elements; in the west; the coastal plain, the mountainous area to the east and north, and the central portion which is a series of interfluves and wadis tending east and west. The region is bounded by Lebanon on the south, Turkey on the north, the Ghab Depression on the east and the Mediterranean Sea on the west.

The land use patterns in this region are extremely complex and mapping is further complicated by small field sizes and diverse agriculture. Being a high rainfall area, much more active growing vegetation produced reflectance in the infrared which was dissimilar from other regions. For example, dark red on the FCC imagery normally indicated olive orchards, but it was found to be dependent on age of trees and crown density. In the Banias area, patterns photo interpreted as orchards were in fact mixed orchards and small fields of annual crops. Geomorphology, geology and topographic maps were consulted frequently to establish map units and a great deal of ground truth was required.

The coastal plain component occurs along the Mediterranean Sea at an elevation from 0 to 100 m above sea level (ASL). The width of the plain is variable from the wide plain at Jableh, very narrow from Banias to Tartous and wide south of Tartous on the Akar plain. Rainfall varies from 750 to 1000 mm per year depending on elevation. North of Lattakia, land use is mostly irrigated vegetables and grain crops interspersed with olive orchards and citrus orchards. In the area near Jableh, a good water supply permits production of irrigated vegetables over a large area. South of this plain, between Banias and Tartous where the coastal plain is very narrow, most of the land is used for olive production with some small fields of irrigated vegetables. South of Tartous, in the Akar plain area, larger areas of grain and vegetables are irrigated. Along the coastal plain where topography is level to gently undulating and soils are predominantly Vertic Xerochrepts and Typic Chromoxererts irrigated crops of vegetables are the dominant land use. In other areas of narrow plain and more rolling topography the soils are Lithic Xerochrepts and the predominant land use is olive production with interspersed citrus groves.

Moving inland from the coastal plain, the central portion occurs at elevations from 160 to 800 m ASL. Rainfall is from 850 to 1200 mm per year. The predominant soils are Lithic Xerochrept. The land use patterns in the portion of the coastal region are extremely complex. In the north of this component and east of Lattakia, the land use is mostly rainfed crops. The area near Tartous is

mostly orchard, predominantly olive trees. The area between these two is transitional from crops in the north to orchards in the south. This is the area for which the special undifferentiated map unit was established (see Section 2.2.1.1). The predominant cropping is tobacco plantations and grain fields intermixed with orchards of olive and nut trees. Much of this zone is on steep topography and therefore a considerable amount of terracing has been done. Many of these cultivated terraces are one meter or less in width and characterize the agriculture at the high elevations.

The mountainous element of this region occurs at elevations from 800 to 1600 m ASL and receives from 1000 mm to greater than 1400 mm precipitation per year. The soils are mostly Lithic Xerorthents and bare rock exposures on steep slopes. The area is bounded on the east by the Ghab Depression. Coniferous and deciduous forests dominate the northern part of the area with the conifers occurring where rainfall amounts are highest. In a southern direction, deciduous trees become dominant and are gradually replaced by the shrub rangeland. Small, cultivated areas occur but are unmappable at the scales of this project.

3.2 ALEPPO REGION

This region has been divided into two areas, the western and eastern areas. The mountainous area of the Coastal Region forms the western limit and the 350 mm precipitation isohyet forms the eastern edge. Rainfall varies through the region from 500 to 350 mm per year. Elevations are from 275 m to 500 m ASL. The soils are predominantly Petrocalcic Xerochrepts.

A large part of the western area is underlain by basalt and as a result the imagery appears very dark. Field investigation revealed many areas which were irrigated. North of the basalt, is the narrow valley of the town of Afrin. It is cultivated, irrigated and used for orchards. The surrounding mountains are covered by coniferous forests and rangeland. Rainfed agriculture consists of wheat and vegetables in annual rotation. Irrigated areas have a great diversity of vegetables. In the area around Aleppo there are predominantly orchards of fruit trees. In the Afrin Valley and north to the Turkish border the orchards are dominantly olive trees.

The eastern limit of the region is physically indistinct since it is an arbitrary rainfall limit within a natural rainfall continuum. As rainfall diminishes from west to east, agriculture becomes less intensive. Land use patterns become less definite on the Landsat imagery. Temporal imagery is of less value because of sparse annual vegetation. Some small valleys, for example al Manbj and al Bab, are irrigated, but by and large, the proportion of fallow land increases eastward and diversification decreases. Normal agriculture consists of small grain, wheat or barley, in rotation with fallow. In many places, the reflectance of the fallow and the surrounding range land are virtually indistinguishable and require considerable ground verification.

3.3 HAMA - HOMS REGION

This entire region receives greater than 350 mm per year of precipitation, ranging as high as 500 mm per year. Elevations range from 150 m to 400 m ASL.

The soils are predominantly Typic Xerochrepts and Typic Haploxerolls. The land use pattern is dominated by two large, intensively irrigated areas. These are particularly evident on the late season imagery. Al Ghab Depression is oriented north-south in a rift valley. Irrigation water is provided by a system of canals, which are visible on the imagery, from the Orontes River. The major crops are cotton, maize, sugar beets and various vegetables. Between the cities of Hama and Homs is a large area of irrigated land which is very similar to al Ghab in crop production.

The western part of this region is shrubby rangeland as described in Section 3.1. East of al Ghab, near the city of Idlib, is a larger cultivated area which spreads eastwards towards the desert zone. As rainfall decreases eastward, cropping slowly changes from intensive land use to non-agricultural rocky areas and desert land. These are punctuated by small valleys which may be irrigated to produce vegetables, orchards or vineyards. The extensively cultivated areas are mostly cereal grain, wheat and barley, in rotation with fallow.

3.4 DAMASCUS REGION

Damascus is located in an area which receives from 200 mm to 500 mm of precipitation per year, the higher amounts occurring in the mountains to the west at an elevation of 750 m ASL and the lesser amounts occurring near the city of Damascus. The soils are primarily Xerollic Camborthids. Surrounding Damascus is the Gouta, a large irrigated basin, receiving water from the Barada river. The irrigation is for fruit trees such as apricots and olives which have grain and vegetables produced in association. This is one of the most intensively utilized areas in the SAR with multiple cropping each year. West of the city are steep, rocky, barren mountains and valleys such as at Zabadani and Bloudan which are irrigated and produce vegetables and cherry and apple orchards. The eastern portion of the region is nearly all rangeland because of low rainfall and high temperatures.

3.5 SOUTHWEST REGION

This is the region south of Damascus to the Jordan border. It is a densely populated agricultural area. The land use is strongly dictated by the geology of the region. Rainfall varies from 200 mm to 400 mm per year. Elevations range from 500 m to 1200 m ASL. The western part is in the First Settlement Zone by virtue of receiving in excess of 350 mm of rain per year as does the Jebal Arab east of Souweyda and Deraa and north of Bousra. Much of the southern portion, including Jebal Arab, is basalt. In many places the surface is completely covered by Quaternary age basalt flows associated with volcanic activity and cinder cones. Many other areas are covered with a rubble of older, broken-basalt. In these areas, fields are prepared for cultivation by hand removal of rock. Therefore, the fields are very small.

The remainder of the region is in culivated land for small grain production or, where precipitation is limited fo rangeland In the western areas, irrigation is done. The major crops are wheat, barley, chickpeas, lentils, and broad beans. The major summer crops are tomatoes, sesame, maize, melons, onions, garlic and cucumbers. Orchards are olive, apple and fig trees along with grape vineyards.

3.6 SOUTHEAST REGION

This is the region of very low rainfall, ranging from 300 mm to less than 100 mm per year. Elevations vary from 600 m to 750 m ASL. In this very arid part of the SAR, soils are not well developed and are predominantly Typic Calciorthids. The major land use is for grazing of rangeland. In a full report, please refer to Volume 6.

Small, isolated areas of irrigation occur along the road from Homs to Palmyra. These are usually well watered wadis with the major crops being wheat, barley, cotton and olive trees. Some nonirrigated wheat and barley fields are in evidence. A considerable amount of barren land is mapped in this region consisting mostly of steep mountains and basalt areas.

3.7 EUPHRATES REGION

The irrigated area associated with the Euphrates River extends through the SAR from its border with Turkey to the north to Iraq on the east, approximately from Jarablous to Abu Kamal. The rainfall varies from less than 100 mm to 300 mm per year. The soils of the valley are typically heterogeneous but dominated by Typic Xerofluvents.

Two major irrigation projects are mapped on the imagery. One, located north of Raqqa, was finished in 1978 but did not appear to be operating at full potential in 1981 during field investigation. The other project is located on the Aleppo-Raqqa road near the Euphrates. It was easily identifiable on imagery but was not visited during field work.

The majority of the irrigation is along the flood plain of the river below the dam. This area is multiple cropped with winter crops of Mexican and local wheat, lentils and barley. Summer crops are cotton, sesame, maize and millet. Irrigated orchards of apricots, apples, pomegranites and grapes occur interspersed with many trees which supply wood. The major tributaries of the Euphrates River exhibit similar land use patterns.

3.8 BEND OF EUPHRATES REGION

This region is defined as the area inside the bend of the Euphrates River from Jarablous to Raqqa. Rainfall in this region is less than 300 mm per year. The northern part of the region is dominated by cultivated areas of wheat and barley. The southern part is more densely populated and more intensively used. Accessibility is limited by poor roads. Major crops are wheat, lentils, tomatoes, melons and sesame in irrigated areas. All other portions are rangeland.

3.9 NORTHEAST REGION

This region extends from the Bend Region north and east to the borders with Turkey and Iraq respectively. The rainfall varies from 250 mm to 600 mm per year. The elevation varies from 400 mm to 700 m ASL. The major soils are Typic Chromoxererts and Vertic Xerochrepts.

Land use is mostly cultivated with wheat and barley being the major crops. The most northeastern part is in the First Settlement Zone. Some narrow valleys are irrigated but are insignificant in extent. Areas of rangeland do exist but are minimal.

3.10 SUMMARY

Throughout the SAR, certain consistant relationships can be seen to exist between present land use patterns and the physical resources of the SAR. The resources of most obvious influence are the climate, soils and geology and associated geomorphology. Not only do land use patterns appear to be dictated by environmental factors, but also the distribution of the population is controlled by the same physical environment.

In the coastal area, between the Mediterranean Sea and the mountains, the landscape is gently undulating to rolling and rainfall is in excess of 600 mm per year. Surface water is available for irrigation. The population density is high and land use is very intensive with a great diversity of crops being produced.

Moving eastward and going up into the mountains, rainfall increases to as much as 1400 mm per year in places. However, topography limits land use because it is very steep. Soils are thin to nonexistent and the population is accordingly sparse. This is an area of forest with some orchards in the narrow mountain valleys.

Continuing eastward, beyond the mountains, an area of high population density occurs, but less than in the coastal region. Topography is gently rolling to nearly level, soils are moderately deep and rainfall is from 500 to 350 mm per year. This is the eastern edge of the First Settlement Zone and most agriculture is supported only by natural rainfall events. Land use is quite intense. Limited areas of irrigation occur in association with availability of water and suitable land and soil resources. For example, al Ghab Depression, an artificially drained rift valley watered by the Orontes River and the area near Homs and Hama also watered by the Orontes River.

Further east, precipitation continues to decrease and soils become less desirable for agricultural development and production. Populations diminish rapidly in density. Agricultural land use diminishes rapidly from the First Settlement Zone and rangeland is the dominant and finally the only land use. Climatic limitations cause this trend.

If direction is toward the northeast, precipitation amounts increase to greater than 600 mm per year near the Tigris River. Soils are deep and well developed and agricultural land use is quite extensive.

The exception to this general pattern is the flood plain of the Euphrates River which receives limited rainfall but is intensively irrigated because of

available water and level topography. The same is true in the Damascus area with irrigation from the Barada River.

The controlling factor of land use patterns in the SAR is climate. For annual rainfall amounts which are greatly exceeded by potential evapotranspiration amounts is the single most important characteristic, but it is modified by topographic and pedologic considerations.

Table 5-1
Hectares and Percent of Area of Land Use
Categories

	PERCENT AREA	AREA CONVERTED FROM SQKM TO HECT
Rangeland	59.912	11,070,370
Cultivated Dryland	27.140	5,014,900
Barren Land	7.452	1,377,020
Irrigated Agriculture	3.723	687,850
Orchards	0.960	177,300
Forests	0.510	94,320
Lake	0.302	55,875
Other	0.000	0
TOTALS	100.000	18,477,750 HA

Table 5-2
Hectares of Land in Land Use Categories
First Settlement Zone

Map Number	Irrigated Agriculture	Cultivated Dryland Agriculture	Orchards	Forests	Potential Grazing	Bush Rangeland	Barren Land	Urban	Surface Water	L.U.
A1	258	5,649	3,143	1,449	54,198		22,570	2,520	63	89,848
A2	745	10,813	2,628		52,512	1,084		138	76	67,996
A3	8,437	12,420		6,299	39,950			2,860		69,966
A4		25,305	1,672		85,969	1,491		160	64	114,661
A5		37,250			1,032	3,088		675		42,045
A6	9,025	24,800	758		54,786	130		177	96	89,772
A7	2,435	6,319			3,529	1,520		73		13,876
A8		38,866	2,985		34,459	2,310		446	20	79,086
A9		46,438	5,229		25,808	435		611		78,521
Totals-A Area	20,900	207,660	16,415	7,748	352,243	10,058	22,570	7,660	319	645,771
B1	263	11,531	3,472	26,372	40,517					82,155
B2	2,106	29,457	6,511	10	8,664			315		47,063
B3	6,814	16,647	18,593	1,105	31,097		34,632	92		108,980
B4	6,510	90,510	8,021		24,668		2,850	1,115	402	134,076
B5	469	15,270		165	39,223	4,982	18,493	308		78,910
B6	4,162	58,780	935		48,587		18,290	3,325		134,080
B7	1,603	10,983	4,400	56,001	12,036	635	51	77		85,785
B8	21,502	15,503			70,577	5,892	18,514	450		132,438
B9	21,402	99,200	51		10,136		1,380	567	927	133,663
B10	7,596	55,032	10,618	17,234	2,269	10,051	2,816	2,402	100	108,118
B11	36,230	26,354		2,280	47,788	18,938	2,354	36		133,980
B12		101,420			29,663		2,550	351		133,984
B13	8,670	57,534	1,066	2,992	5,678	38,858	5,216			120,013
B14	41,602	69,509			20,586	46		1,792	545	134,080
B15	1,107	30,122	50,603	2,477	5,387	36,782	2,772	163		129,413
B16	21,055	34,769	843	298	74,003	30		832	1,831	133,661
B17	721	42,259	19,067	197	16,379	1,495	470	937		81,525
B18	11,141	48,124	4,585		59,517			1,974	3,741	129,082
B19	21,974	69,230			19,183		876	357	2,207	113,827
Totals-B Area	214,927	882,234	128,766	109,131	565,958	117,709	111,264	15,093	9,753	2,154,833
C1		28,514								28,514
C2		12,583						92		12,675
C3	3,525	81,248			3,179			803		88,755
C4	7,387	80,182			735			2,364		90,668
C5	4,656	105,330			952			1,134	579	112,651
C6		81,239			18,395	273		555		100,462
C7	834	8,008						39		8,881
C8	4,548	24,670						197		29,415
C9	3,063	31,702						674		35,439
Totals-C Area	24,013	453,476			23,261	273		5,858	579	507,460
Total-A,B,C Areas										3,308,064 HA

Figure 5-1

Irrigated land in Northeast Syria near Hasakeh.

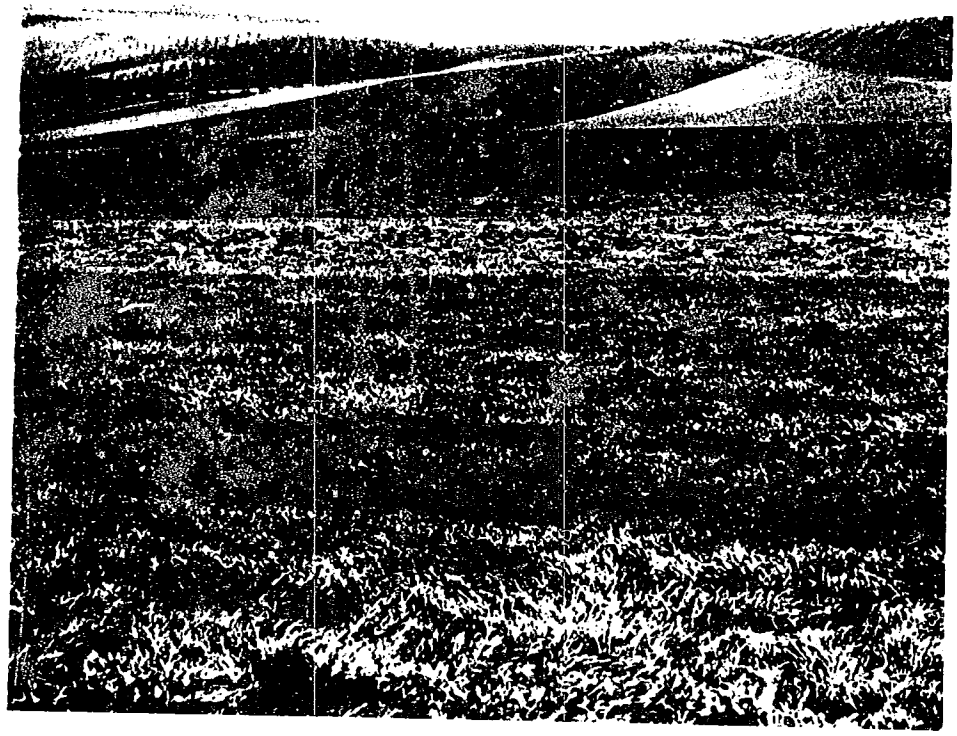

Figure 5-2

Cultivated land in Ghab Valley (non-irrigated).

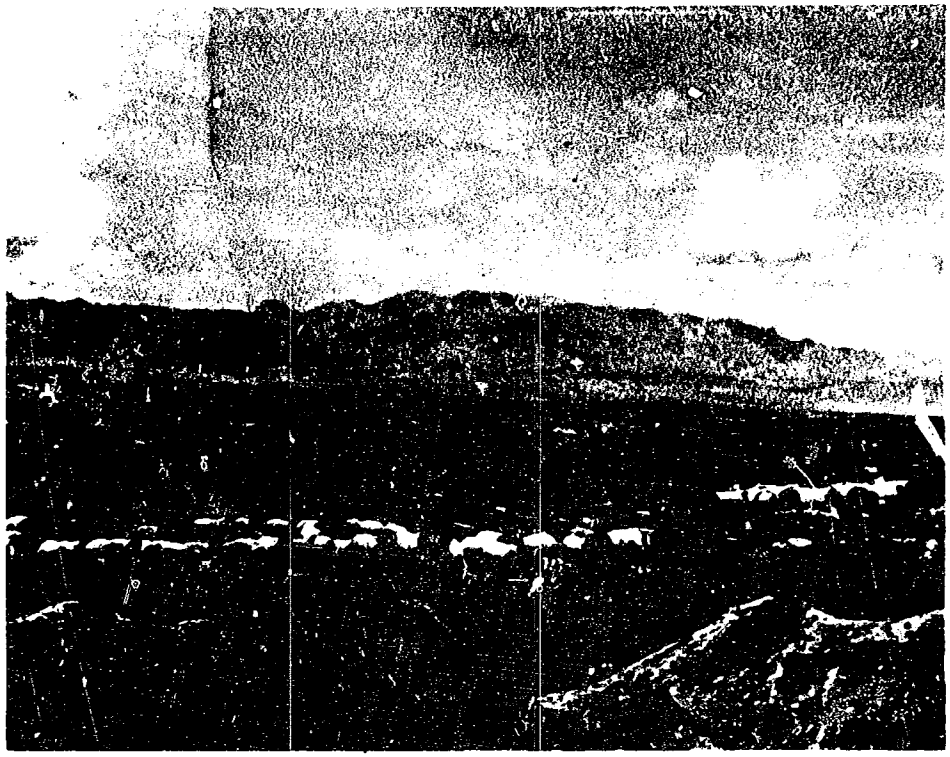

Figure 5-3

Area of natural vegetation used for grazing purposes. Northeast Syria overlooking the Tigris River Valley.

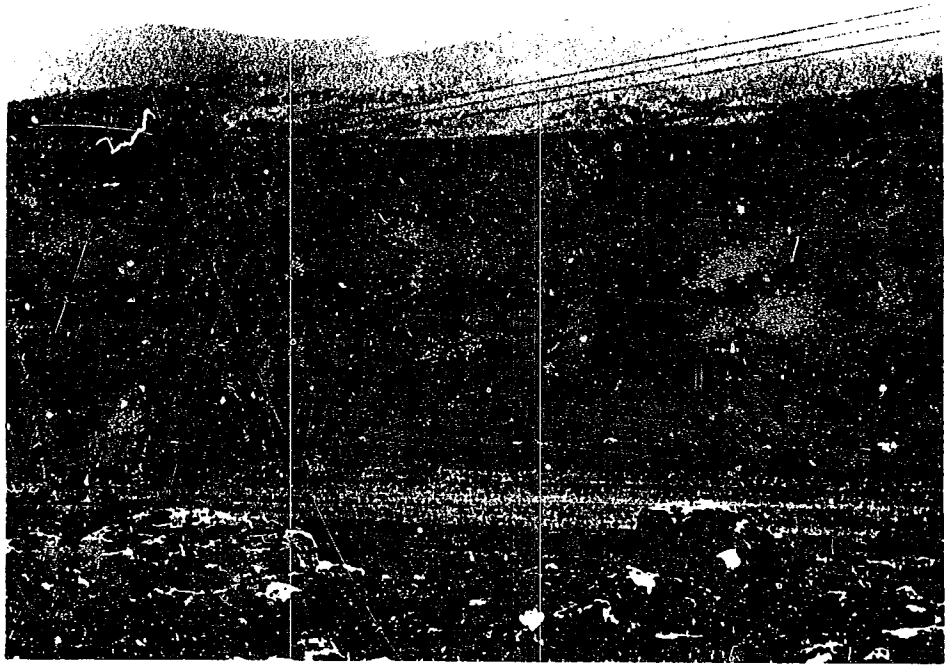

Figure 5-4

Orchard on gentle slope leading down to the Ghab Valley.

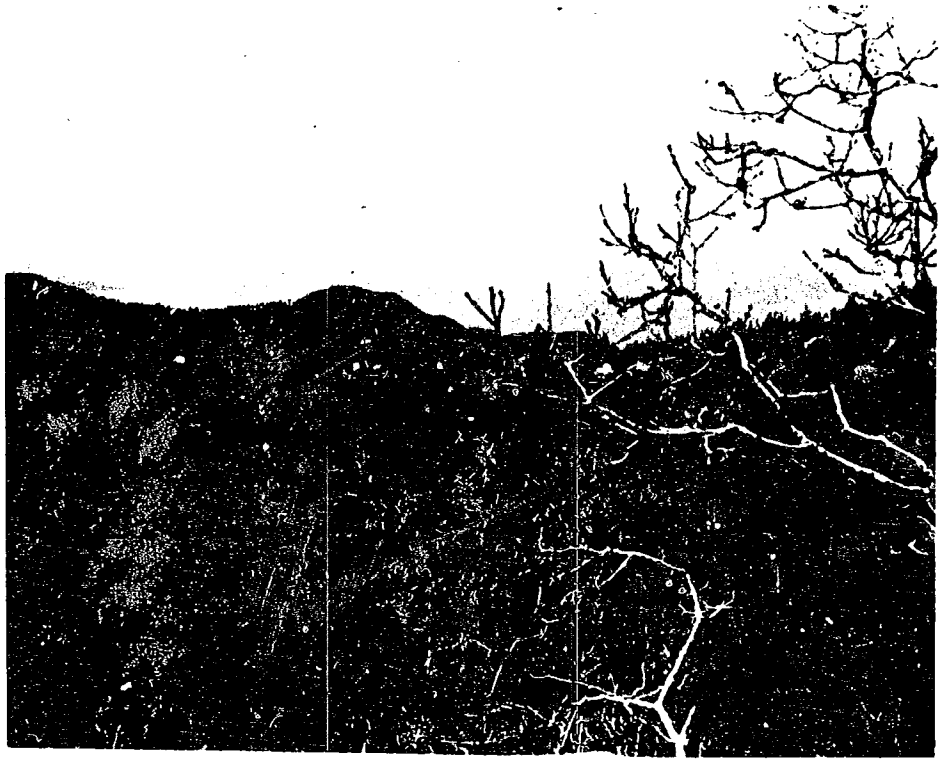

Figure 5-5

Forested area near Kassab in northwest Syria

Figure 5-6

Non-agricultural land. These rock outcrops occur south of Ariha in western Syria.

Figure 5-7

Undifferentiated land use along the Mediterranean coast. Included uses are orchards, forests, and cultivated categories.

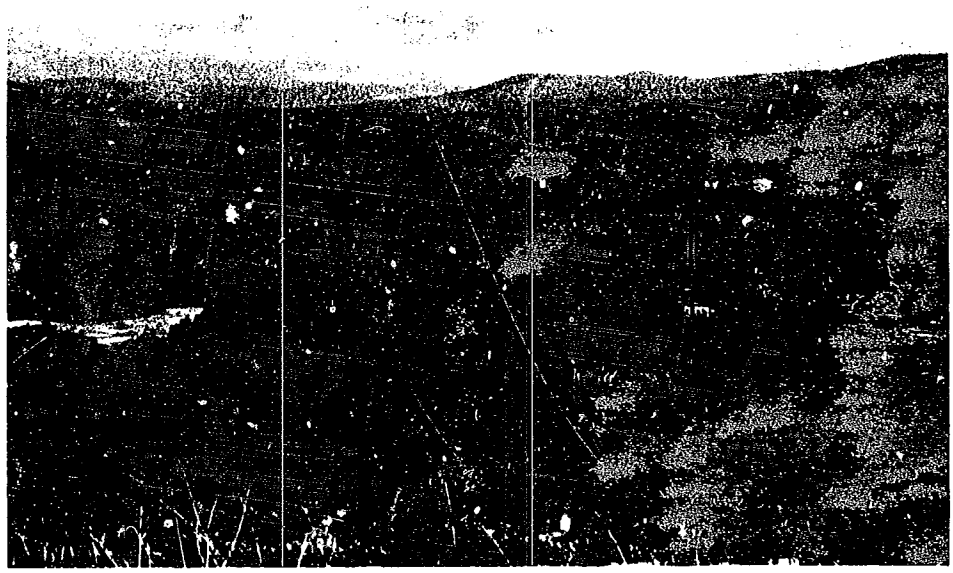

Figure 5-8

Potential grazing land in the First Settlement Zone. This area is south and west of Kasseb in northwest Syria.