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The impact of human activities on Asir National Park, Saudi Arabia

Al-Maharwi, Saad Ali Gana, M.A.

The University of Arizona, 1992
THE IMPACT OF HUMAN ACTIVITIES
ON ASIR NATIONAL PARK
SAUDI ARABIA

by
Saad Ali Gana Al-Maharwi

A Thesis Submitted to the Faculty of the
DEPARTMENT OF GEOGRAPHY AND REGIONAL DEVELOPMENT
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF ARTS
WITH A MAJOR IN GEOGRAPHY
In the Graduate College
THE UNIVERSITY OF ARIZONA

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STATEMENT BY AUTHOR

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This thesis has been approved on the date shown below:

Andrew Kirby
Professor of Geography

Date
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Abstract

Saudi Arabia has witnessed rapid development in economic, cultural and social aspects since the discovery of oil a few decades ago. This development involves all the governmental sectors including national parks. The need for national parks has become inevitable. Asir National Park was established to provide recreational sites and to preserve the unique natural and cultural features of the park.

Research evaluated the impact of human activities of logging, grazing, hunting, land development and elimination and negligence of traditional architecture on Asir National Park features. A questionnaire, interviews and field observations were conducted to investigate the impact of these activities on Asir National Park.

Asir National Park suffers a great deal of pressures from human activities. The local population depends on the park as their source of livelihood and as a traditional habit. The study illustrates the most affected zones where action should be taken to preserve park features.
CHAPTER 1

Introduction

The Purpose of the Thesis

The purpose of this thesis is to evaluate the impact of local human activities on Asir National Park's features. It will outline the environmental risks resulting from activities, such as logging, overgrazing, hunting, land development, and neglect and elimination of traditional architecture. The evaluation will make recommendations for developing a plan to preserve the park's features with regards to the indigenous people's rights which includes maintaining natural resources such as vegetation, wildlife, water and land, and cultural resources such as architectural features and the use of hema as the traditional conservation system.

Saudi Arabia

Saudi Arabia is located in the southwestern portion of the Asian continent between 16° 32' north latitude and 34° 56' east longitude (Ministry of Agriculture and Water, 1984). It extends from the Red Sea (west) to the Arabian Gulf (east). It borders Kuwait, Iraq and Jordan from the north, Yemen, South Yemen and Oman from the south, Qatar and the United Arab Emirates and the Arabian Gulf from the east (Figure 1).
Location Map of Saudi Arabia

Figure 1

Source: Hammond, 1991
Saudi Arabia is the largest country in the Arabian Peninsula, occupying approximately four-fifths of the total area or about 2,240,000 km$^2$ which is the largest jurisdictional area in the Middle East. Saudi Arabia ranks twelfth in the world in terms of size (Held, 1989). Large portions of Saudi Arabia are occupied by desert; therefore, arable lands, about 45,000 km$^2$, which are located in valleys and oases, are estimated at ten percent of the total land area (Abd El Rahman, 1986).

The country's relief can be divided into four major parts. The first part is the coastal plains on the Red Sea and the Arabian Gulf. The western coast extending from the Aqabah Gulf on the Red Sea north to the Yemen-Saudi borders is about 1800 km in length. The width of the western coast becomes narrower as it proceeds northward. Southward, its width is estimated at 25-45 km. The eastern coast extends about 500 km from Al-Khafji (north) to Salwa (south). Both of the coastal plains consist of mobile sand dunes as well as marshes and swamps. Scattered vegetation is common (Al-Shareef, 1984). The second part of the country's relief is the mountain chain known as the Sarat Mountains. It extends southward from the north with increasing elevation. It slopes gently eastward with a sharp escarpment rim in the west. The third part is the hilly area. It is located in the eastern sector of the Sarat Mountains and features lower elevations
with a fair amount of vegetation. The fourth part is the vast deserts which are a characteristic feature of Saudi Arabia. Three distinct deserts are located in the country. First is the Empty Quarter (Al-Rub Al-Khali), the largest sand desert in the world. Its area is estimated to be 650,000 km$^2$. The second desert is the great Nafud, which occupies about 55,000 km$^2$. Dahana is the third desert which extends about 1000 km and is nearly 400 km wide (Abd el Rahman, 1986). Such diverse relief has an absolute influence on the weather patterns.

Saudi Arabia experiences extreme weather patterns. It is considered one of the hottest areas in the world (Siraj, 1984) due to the domination of vast deserts which occupy the largest portion of the country. Temperatures vary due to the diversity of the topography. The temperature of the coastal plain is hot and humid, especially during the summer season. Moderate to cold summer temperatures occur on the Sarat Mountains. In the interior parts of the country where deserts exist, the temperature is very high, possibly reaching 46-49°C during the day and frosting in the early morning during the winter season (Fisher, 1978). Cloudless skies and sparse vegetation increase the summer heat which affects the precipitation rate. Rainfall in Saudi Arabia, in general, is scarce. It is estimated to be less than 15 mm annually (Siraj, 1984), except for the southwest region which receives
relatively high amounts of rainfall. Most of the country experiences droughts and the absence of rain for several years whereas rain is extremely rare over the deserts (Siraj, 1984; Fisher, 1978). As a result of rainfall shortage, vegetation is sparse and ranges from treeless areas like the Empty Quarter desert to some scattered plants in oases and valleys. Forests cover about 16,000 km\(^2\) of the total area of Saudi Arabia (Abd El Rahman, 1986). Settlements are concentrated in the fertile areas of the oases and valleys which are rich in water resources such as natural springs and shallow wells.

A precise figure of the Saudi Arabian population is not available but is estimated at 12,483,000 (Held, 1989) and an ongoing census is taking place now. The population is distributed over fourteen administrative regions throughout the country; among them is Asir region.

Asir region has a prominent location in the Sarat Mountains on the southwest corner of Saudi Arabia between latitude 17° 30'-21° 00' north and longitude 41° 30'-44° 30' east (Al-Khalili & Nader, 1984) (See Figure 2). Asir became part of the Saudi empire when it was conquered by Saudi Arabia in 1921. Abha is the administrative capital of Asir region. It is believed that the region's name (Asir) was used for the first time in the 19th century during Turkish rule of the region. Later the name became more common and has been
Figure 2

Asir Location Map

- Asir Region
- Major Road Network
- Asir Region Boundary

used extensively by western explorers and writers who have visited the region (Abdulfattah, 1981). Because the region is rich in natural resources, it is considered “the garden” of Saudi Arabia (Ryan, 1979).

Asir region receives the greatest amount of rainfall (about 500 mm to 800 mm in some seasons during the year) of any region in Saudi Arabia. Heavy rains usually occur during summer with extensive flooding that sometimes causes damage to farms and loss of human life. The region is featured by moderate summers and cold winters which make Asir the most beautiful local resort for vacationers in the entire country (Al-Khalili & Nader, 1984).

Asir region possesses the richest vegetation in Saudi Arabia. Ecologically, Asir's plants have some affinity to eastern African plants growing at the same level of elevation and latitude (Al-Khalili & Nader, 1984; Fisher, 1978; Brooks & Manditt, 1983). The dominant plant species are juniper, cedar, wild olive and acacia. The region also is inhabited by a variety of wildlife species, which nowadays is less abundant than in the past. Many species are endangered or extinct due to hunting and land development (Al-Shareef, 1984).
As a region rich in natural resources, Asir has attracted human settlement for many centuries. In the past, the population, composed of a large number of tribes, settled in small villages and the people practiced agriculture. Today the area is divided into agricultural and pastoral lands. Since Asir is the richest pastoral region in Saudi Arabia (Al-Shareef, 1984), herding is a principle source of livelihood, supporting 30% of the region's total population (Abd El Rahman, 1986). The region's economy depends on these activities as well as commerce which became prosperous after the discovery of oil.

Economic Development

After the unification of Saudi Arabia, the country's economic status remained weak for several decades. The economy was dependent solely on agricultural products from various oases, herding and a small income from pilgrims who annually visit the two holy shrines in Mecca and Madinah.

With the discovery of oil in 1930 (Rusher, 1986), the country's economy entered an era of prosperity. In the start-up stages of operations, production was not sufficient to generate enough income for government development of the economic sectors. But oil production continued to increase since 1965 (Table 1) and by 1970, oil income had reached a point where the Saudi government implemented advanced projects throughout the country (Brawer, 1988), and local
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Source: Direct communications to the Secretariat. • United Nations, Energy Statistics Yearbook. • National sources • OECD, Quarterly Oil and Gas Statistics • BP, Statistical Review. (Table 29, p. 30)

Source: International Monetary Fund: International Financial Statistics, Direction of Trade Statistics. • National Sources • Secretariat’s Estimates. (Table 4, p. 5)
investment of oil revenues has induced rapid economic change. Through successive oil operations, many other oil fields have been discovered in the eastern province of the country. Saudi Arabia possesses about 25% of the world's oil reserves, the largest in the world (Held, 1989; Fisher, 1979). The successive growth of oil exportation rose from 4,481 million barrels in 1971 to 9,502.8 million barrels in 1981. The annual revenue of oil exportation in 1971 was $3,809 million and had risen to $119,876 million in 1981. At the beginning of 1982 the annual revenue from oil exportation shrank to $79,077 million and the decline resulted in a $40,790 million deficit in the annual national income. This reduction in oil exportation was due to the lowering of oil prices in the international oil market (Held, 1989). In fact, oil exportation reduction can be traced to 1980. During this time, oil exportation was 9,636.4 million barrels and was reduced to 9,502.8 million barrels in 1981. In fact, during these two years, oil reduction was not very remarkable compared to 1982 to 1988. During this period, oil exportation and revenue loss was sharp. In late 1988, oil exportation was stabilized at 4,254.8 million barrels.

Other sources of income in Saudi Arabia are natural gas and mineral deposits. Many large fields of natural gas are located in Saudi Arabia and are exploited with oil. About 7.1 billion cubic meters of natural gas were exploited during
1985 (Brawer, 1988). Mineral resources are also important. The most important types found in commercial amounts are gold, silver, iron ore, copper, phosphates, zinc, manganese, coal, lead and uranium. Although available, most of these minerals are not commercially exploited due to the domination of oil production. Petrochemicals produced from oil are another source of income and the second largest product providing the government with annual revenues (Brawer, 1988).

Since most economic resources do not generate as high an income as oil, oil production and exportation dominates the Saudi economy. The massive decline of oil revenues since the beginning of the last decade (see Table 1) has jeopardized the country's gross national economy. This difficulty has induced the government to seek other sources of national income and not to rely completely on oil since it is a fluctuating source of income.

An important step, noteworthy here, which organizes and supports economic growth, is the chain of five-year national development plans which began in 1970. The goals of these plans are to:

1. Establish a strong basic economy and support for economic growth through new resources, while preserving non-renewable resources.
2. Preserve the value of morality and religion.
3. Expand and propagating national security and defense of the country.

4. Enhance and improving education and the health status of its population.

5. Increase the country's population.

The aims of the first plan (1970-1975) were stabilization of the agricultural infrastructure and foundation of schools and airports. During the second plan (1975-1980), many projects were initiated such as installation of communications, and building of roads, ports and industrial centers (Costa & Noble, 1986).

The achievements of the third plan (1980-1985) were housing, health and educational facilities and enhancement of local highways. The fourth plan (1985-1990) achieved completion of the building of industrial centers, but the plan was hampered by the sharp decline in oil revenues which has slowed down and caused delays on some projects.

In spite of the fluctuation of oil revenues, certain goals of the multi-year plans have been achieved, for example, the agricultural sector has benefitted through the agricultural bank. Though most of the Saudi Arabian land is barren desert, the country has enormous oases in many regions, which are rich in aquifers, natural springs and seasonal streams.
Before the discovery of oil, cultivated lands were restricted by desert areas and by the absence of modern technology. Until 1985, cultivated land in Saudi Arabia was about 1.5 million acres or 3% of the country's total area, with most of this acreage located in Asir region (Brawer, 1988). Saudi Arabia does not have permanent rivers and therefore 80% of the agricultural lands are watered (Beaumont, 1977). Due to the rainfall shortage in the country, agricultural products were not sufficient for local consumption.

Special attention has been given to the agricultural sector by the government to improve and develop it to reach a satisfactory level of production. Technological and monetary subsidies have been given to farmers. Such supports have resulted in the emergence of large commercial farms in some regions such as Al-Qaseem, Hassa and Haradh near Riyadh which are rich in water resources (Stevens, 1972). Underground water has been tapped, especially in eastern and central Saudi Arabia. Large areas of desert have been reclaimed and have become productive. Many large aquifers have been developed. The improvement and development of the agricultural sector has resulted in self-sufficiency in some products such as wheat. Other sectors such as education, health care, transportation, communications and tourism have been improved via the multi-year development plans.
Cultural Development

Through the execution of the multi-year national development plans beginning in 1970, rapid economic transformation has occurred, resulting in fundamental changes in the culture. One essential goal of such development has been to increase the country's population. Shortage of people with labor skills was considered a profound problem in developing the country (Fisher, 1979; Al-Soliman, 1991). The harshness of the climate appears to be the main reason for the lagging population. In barren deserts with limited resources, the impact of the environment is very clear. Carter (1983) reports "The ways that man himself had forged down the centuries to succeed in the hard environment of the desert no longer seems appropriate..." (p. 88). At the same time, a high percentage of the population was nomadic. This represented another obstacle in the path of development because these people were not skilled and needed to be trained. As a result, reduction of nomadic movement in the country was viewed as a pressing need which required direct intervention from the government.

The developmental projects of the Saudi government aimed at settling nomads have been successful through the establishment of schools, medical clinics and farms that attracted nomads to settle on the land. In the past the nature of the country and the societal viewpoint toward
nomadic life kept the rate of movement high. As Abd El Rahman (1986) state, "The life of a nomad is celebrated in Arabic prose and poetry as one of dignity and nobility, and Arabs proudly trace their genealogies back to nomadic ancestors" (p. 51). The pre-oil nomadic rate was estimated at one-quarter of the total population. By mid 1980, this figure had shrunk to 10 percent (Held, 1989; The Kingdom of Saudi Arabia, 1983).

In Saudi Arabia there are two types of nomads. The first type is the "Badia" who live in the desert and in aggregated tribal numbers. They own tremendous numbers of animals. The second type is the semi-nomads who settle the towns and desert borders with their animals. The semi-nomads emigrate during the winter season and settle in during summer. This type of behavior is a result of the extreme summer heat, which seems to hamper their movement. Additionally, during the summer season, water resources decline, and heat affects the quality of plants and grasses. During the past decades, pastoral nomadism in Saudi Arabia has been suffering. Grazing lands have shrunk because the land has been reclaimed and used for agricultural purposes. Vegetation is being degraded due to the overgrazing which causes desertification. In addition, shortages of water resources and rainfall fluctuation resulting in long term drought have affected nomadic life (Abd El Rahman, 1986).
However, the government's development plans have reduced the nomadic rate to a remarkable degree. Nomadic life may never completely disappear from the society because the population is still highly connected by strong kinship ties which keep the nomadic soul alive. Many agricultural projects, which have been established to settle the nomads, have reduced their movements and attracted them to settle in one place. Such projects are Haradh, Artaway, Yabreen, Sarhan Valley and Ganfadah (Al-Shareef, 1984) which provide the nomads with job opportunities as well as homes. Most Bedouins prefer to escape their old lifestyle by settling in the cities because of the benefits they enjoy through economic development which enhance their economic status. Nomads immigrated to cities where job opportunities have been created by oil operations and other governmental jobs were available. In addition, some of them started their own businesses. Still others have become skilled farmers and have benefitted from governmental loans.

Nomadic society has become more connected with the rest of the Saudi society. It is no longer a segregated society living in the desert with its own way of life. Nomads have given up their camels and have purchased automobiles. Autos help them travel great distances, especially to the cities where they can now obtain food-stuffs. The automobiles also facilitate movement when they decide to transfer to
another grazing area. Autos also solved the water shortages they used to suffer as they now use their cars to transport water from nearby cities or towns. These services were impossible to obtain before the advent of the automobile. Some nomads own T.V.'s and refrigerators and they own mobile electrical generators. Radio and T.V., which broadcasts nationwide, have had a noticeable influence on nomadic society. These amenities have helped educate the nomadic family and helped them become aware of national events. Such developments have induced changes in nomadic customs. These changes have been positive and have enhanced their lifestyle.

Nomadic migration to the city has increased the urban center populations by 67 percent (Al-Soliman, 1991). As a response to this phenomenon, educational opportunities have spread throughout the country.

**Education.** Elementary, secondary and high schools have been established. Education teachers have been brought from Islamic nations for the purpose of improving the educational sector. Seven new universities have been founded in the country since 1960. Vocational education has been established.

Education is desired by the people because it is an essential requirement of Islamic law. People also realized the importance and advantages of education when they saw that the best governmental jobs were given to the most qualified
persons. Education has played a fundamental role in attracting and reducing the Bedouin presence in the desert. While some nomads have refused the educational opportunities available because they prefer to keep their children out of school to look after their animals, mobile schools have been established among them in the desert (Halaissi, 1959). In this way Bedouin youth have been recruited to move to the city to pursue their education. The job advancements of those who are educated shows these youth that it is the best way to improve their economic status.

Education has not been restricted to men. Special attention has been given to educating women. Considering the educational level of the population in the past, Saudi Arabia has now reached a more satisfactory level of literacy throughout the country. This has created rapid changes in the Saudi society. Education introduced sports as a basic subject in the public school and as a result, soccer has become a very popular sport. Sport clubs have spread nationwide. Reading and studying have been introduced and exposed Saudis to world cultures and civilizations.

Health Care Services. Establishing health care services was a prime goal of development. Public health centers such as modern hospitals, medical clinics and mobile clinics have been founded in each city and village. Such facilities have the newest equipment in the world as well as
professional employees. The treatment is free to all. The private sector has established many health centers also, which provide advanced health treatment. Compared with the past, health care service has also reached an unprecedented level. Rusher (1986) reports "Public-health facilities are excellent, certainly by regional standards" (p. 57). The linkage of communication networks in the country has enhanced and facilitated health performance.

The foundation of the new medical services has eradicated some chronic diseases which were very common and the main reason for the high mortality rate in the country. Such diseases are smallpox, measles, cholera, glaucoma, bilharzia, malaria, tuberculosis caused by malnutrition and other contagious epidemics. Eradication of such diseases has increased the population rate. In addition, the expansion of new medical treatment has reduced quackery and superstitions which were practiced under the name of folk medicine. The new medical services have reduced the use of herbal medicine which people resorted to for medical purposes. At present, the population has become more aware of its health. Vaccination among children is required. Collection of garbage in cities and towns has become very important as a health measure and the health status of people has rapidly improved.

Communications. The entire country has been linked by a variety of communication systems. Roads have been paved
throughout the country. Costa and Noble (1986) report "The highway system is one of the best in the world" (p. 161). Besides the highways, a railway system was established between the eastern province and the capital, Riyadh. This was done because the eastern province is the closest seaport to the capital. Through this railway, the capital is provided with all essentials. There are in addition three international airports located in Riyadh, Jeddah and Dhahram. Domestic airports have been established in each region's capital. Saudi Airlines is the official carrier in the country.

Seaports also received special attention. On the eastern coast of Saudi Arabia, there are three famous seaports: Dammam, Jubail and Ras Tanorah. Dammam is used for commercial functions, whereas the other two ports are restricted for oil exportation. Jeddah, Yanbo and Jizan Ports are located on the Red Sea. Jeddah Port is known as the "Islamic Port" because it receives a tremendous number of pilgrims during the Hajj and it serves as a commercial port. Recently Yanbo has been designated for oil exportation purposes on the western coast. Jizan Port is the main commercial port for the southwestern region of Saudi Arabia.

Other means of communications such as telephone, telegraph, telex, T.V., radio are common and meet international standards. Media have spread education and
knowledge among the people. The communication sector has relied on itself for increasing and hiring employees. Technical institutes have been founded which train individuals needed for such essentials as mail, telegraph, telex, custom guards* and the Saudi airlines. Such developments have created job opportunities and increased the individual income. Communication has opened a window on the world's civilization. World technology has been brought to the country, again creating cultural changes.

**Housing.** Because of the economic prosperity oil has brought and the efforts of the government to settle the nomads, the traditional Saudi towns are no longer maintained. People have abandoned traditional architecture in favor of imported styles. Living in a traditional house, for instance, has become unacceptable. Akbar (1980) reports "Today, living in a traditional house...is always associated with lower-socio-economic classes" (p. 13). A real estate bank has been established and has contributed to the increasing number of housing units in the country. It provides citizens in cities and villages with free interest loans for modern home construction. As a result, rapid changes in architectural style has appeared. Costa and Noble (1986) report "Qualitative improvement in living standards of Saudi citizens were significant. Approximately 500,000 new dwelling units were completed between 1975 and 1985" (p. 161). This
rapid housing development emerged as a result of the availability of foreign labor and importation of raw materials for construction. Some materials manufactured in the country are iron, cement and sanitary equipment.

The new housing style has caused changes within the family. Extended families have shrunk. The desire for individual privacy has become common. In the past when a son married, he and his bride stayed with his parents. Today, this is no longer common. Neighborhood relationships have been reduced. More attention has been given to the privacy of the family by surrounding the home with high walls in order to protect the family from the street. When selecting a new house, people have become more concerned about the beauty of the design, decoration, gardens and furniture. Swimming pools, which were not known in the past two decades, are common in large cities.

Industry. Traditional industries such as wool rugs, black hair tents, earthenware products, ropes from palm tree leaves, wooden products, jewels and agricultural tools have been common for centuries. Recently, Saudi Arabia has entered a new era of sophisticated industry, especially the oil industry. Fisher (1979) reports "The most striking features in present-day Saudi Arabia is the very rapid process of industrial development..." (p. 768). The oil industry is concentrated in two industrial centers: Jubail and Yanbo.
Other light industries such as food stuffs, cloth, raw material for construction, cement, textiles, aluminum, paper products and leather products are concentrated in big cities like Jeddah, Riyadh and Dhahran.

Some traditional industries, such as the dagger industry, have completely disappeared due to the decline for their products. Through time, people have ceased the custom of wearing a dagger as part of their traditional formal dress. Other industries, such as soap and detergents, are now in high demand for their products which were not available in the past. The silver industry has declined. It was the substance of women's jewelry due to its availability and inexpensive prices. Today, silver has been replaced by gold as jewelry for women. Traditional market places have declined, being replaced by supermarkets and commercial malls which approach the American level. These developments have also modified the culture of the country.

Tourism

Tourism has been a part of the Saudi culture since early times. Pilgrimage to Mecca is the greatest example of tourism in Saudi Arabia. The present form of international tourism has not been known except in the pre-Islamic era when people of Mecca used to travel in trade caravans to Yemen and the Mediterranean countries.
With the existence of famous historical sites and the attractive nature of Saudi Arabia, if opened for international tourism, it would gain an international reputation. Rusher (1986) reports "There is no such thing as a tourist visa permitting one to enter the country just to look around" (p. 57). Saudi Arabia's government does not issue tourist visas (Smith, 1977). It seems that the concept of international tourism would create conflict with the country's basic Islamic beliefs because Islamic law prohibits the mixing of the sexes in all activities as well as other tourist commodities that are internationally well known such as the drinking of alcohol.

Local tourism in Saudi Arabia usually occurs during the summer months when people escape the heat by vacationing at local resorts such as Tief and Asir. Local tourism in Saudi Arabia has developed because of the massive changes in the socio-economic status of the country. Demand for recreational activities has increased as a result of the increased income of individuals. The wealth of the country has enlarged the middle class and changed the country's social structure.

As a result, the number of Saudi tourists who travel abroad has increased due to the absence of large national parks in Saudi Arabia. Another small percentage of Saudi tourists spend their summer vacation locally in areas that
have climatic amenities such as Tief and Asir. Tief city was the only summer resort in Saudi Arabia before the establishment of Asir National Park.

To meet the increasing demand for recreation and tourism, many gardens have been erected in cities and towns throughout the country. Such gardens are provided with the required facilities. People take short excursions to spend their holidays in these gardens during the day, but public gardens have not solved the problem of the need for national parks because these gardens are too small and have a limited capacity which cannot absorb a high number of visitors. Another flaw of such gardens is they can only be used during the winter season since most Saudi Arabian cities experience extreme summer heat.

In fact, the need for recreational activities in Saudi Arabia has become more important, with many people engaging in sport activities such as soccer, volleyball and basketball. These types of recreation are practiced in sport clubs established by the government in most cities. Other people participate in these activities in open spaces or in empty areas inside their neighborhood. Other activities, such as swimming, are not usual in public swimming pools, and if this does occur, it is restricted to men. This activity is seen in fancy hotels, clubs and in some governmental
properties. Men also swim off the beaches, but they do so without provided safety precautions.

During holidays and weekends people escape the city environment by camping outside the city. Camping activities are very common among youth, but is less common among families. This is attributed to the lack of suitable camping areas with proper facilities. Walking is not a popular activity but is done by a small percentage of the population. T.V. and video are the main entertainment in the home, especially by women and children. However, recreational activities in Saudi Arabia are still limited. Other types of recreational activities may take place as they gain in popularity and suitable facilities and equipment are installed. In spite of all this, the demand for tourist sites and recreation is increasing.

In order to respond to this demand Asir National Park has been established. This park has the tourist attractions that are fundamental for the tourism industry. Some sites of Asir National Park have been designated as recreational areas. Such sites have received a tremendous number of tourists from Saudi Arabia and the Gulf States since they officially opened to the public in 1981. Undoubtedly, local tourism in Asir National Park has activated the local economy and has had a positive impact on the region's economy. Templeman (1975) reports that tourism encourages and
influences other economic sectors such as agriculture. Tourism also helps to revive cultural resources. The handicrafts industry, for instance, was once a profitable source of income in Asir region, but through time, it has almost disappeared. As an example, Deitch (1977) notes that the Indian craft industry in the southwestern United States attracts tourists and was revived due to tourist demand.

The study area (Asir National Park) is located in Asir region, southwest of Saudi Arabia. The park has many attractive features such as vegetation, diversity of landscape forms, wildlife, pleasant climate and traditional architecture which have made Asir National Park a unique place. The park area as well as the rest of the region is rich in many features which have attracted settlements for many centuries. The activities of the park's local population, however, have induced severe damage, threatening the park's uniqueness. Overgrazing, logging of trees for fuelwood charcoal, construction and local manufacturing consumption have abused the park's ecosystem. Occupation of natural springs, fertile lands, forests, and green and wet valleys used for land development have caused the disappearance of many plants. Elimination and negligence of traditional architecture have reduced the country's cultural heritage.
CHAPTER 2

Literature Review of National Parks, Recreation and Tourism

Unfortunately, there is no consensus established regarding the definition of a national park. The extent of the different types of park functions has caused disagreement among scholars, leaving the definition a controversial matter (Gold, 1973). A very broad definition of a national park that has gained general acceptance is offered by Gold (1973) as "any area of public or private land set aside for aesthetic, educational or cultural use" (p. 13). Wilkinson (1978) defines a national park as an "area of national territory for which the general government authority has ordered the following requirements to be fulfilled: 1) status of general protection; 2) size in excess of a certain minimum; and 3) the protected status be adequately maintained" (p. 606).

The concept of a national park is very old. It can be traced to 2340 B.C. when Sumerian civilization first introduced a park, represented by the hanging Gardens of Babylonia. Such parks were usually located on the periphery of cities and towns. Most founders of parks in the ancient world were nobles and affluent people. In India, parks were founded for the king's personal use whereas in other locations its prime use was for recreation. During the Roman
and Ancient Greek era, large national parks were established for hunting only. Later the concept of the national park was transmitted to France and Germany by the ancient Romans during the first century of the Christian era. National parks were known in Persia where parks and gardens were designated for kings who gave them the name "Paradise" (Doell & Twardzik, 1973).

The contemporary concept of the national park that is known worldwide today was first introduced in the United States in the late 19th century. Its aim was to reserve lands with outstanding features from human intervention and exploitation. The preservation of such lands was first adopted by the military in the United States in the eighteen century (Failor, 1978).

In general, people view and evaluate national parks from different perspectives according to their needs and use. Johnson (1965) says:

To devotees of the national parks, it is often things subtler than geysers, fumaroles, and the reviv earth that brings them back vacation after vacation. To the camper, it is the camaraderie of the campfire of the trail; to the fisherman the park is a place where time stands still while he trolls a lake or casts into a rushing stream. To parents it is a place where the flash of wonder and delight glows on the faces of their children when they first feel a running stream against their shins, or see a fawn, a theiving jay or chipmunk, or Smokey in all his natural majesty. To some, it is a garden of trees and wildflowers, stones and lichens; an aviary; and a place to watch animals going about their
daily chores. To all the parks offer the soul-stretching experience of being alone in a world of wide-open space, of grand vistas of forest and mountain and great storms rumbling across the land... The parks offer a return to nature, and the renewal that comes from recontact with the wild and primitive environment. (pp. 12-13)

Large prosperous countries tend to establish many large parks (Burnett & Butler, 1987). Such countries are rich, highly populated, have good educational facilities, attractive landscape for tourism and well developed health service (Wilkinson, 1978). In the United States, for instance, there are more than 300 preserves covering about 300,000 km$^2$ which are watched over and cared for by the National Park Service (Backsell, 1982).

In 1830, the need for national parks was recognized. The area in the Great Plains was visualized as a park to protect the wilderness and the environment (Nelson, 1978). A short time later, the concept of the national park was developed and established in California. Yosemite Valley was reserved to save the unique Sequoia trees from commercial logging (Johnson, 1965). In 1872, Yellowstone National Park, the first park in the world in modern times, was established. Since its establishment, the concept of the national park has spread worldwide in an attempt to save the uniqueness of the earth for future generations (Nelson, 1978).

During the late nineteenth century, several other national parks were established: Royal National Park in 1879
in Australia and Banff National Park in 1885 in Canada. They have been followed by twenty other national parks established worldwide (IUCN, 1980b).

In some developed countries, the concept of the national park took time to develop. In the United Kingdom, for example, national parks were established 50 years after the establishment of Yellowstone Park (Blacksell, 1982).

The establishment of large national parks is common in countries having large wide open areas, i.e., the largest national parks in the world are located in the U.S.A., Canada, Australia, The U.S.S.R., Zambia, Chad, Zaire, South Africa, Botswana and Kenya (Wilkinson, 1978).

At the present time, park establishment stresses the importance of the area's characteristics which play a crucial role in park designation. Establishing a national park in any given area should meet certain requirements and criteria which are continually being modified by the International Union for Conservation of Nature and Natural Resources (IUCN). The proposed area of a national park should contain unique geological, geomorphological, biological, ecological and historical importance. It should have unique natural qualities, landforms, climate patterns, wildlife, forest and beach diversity. It should have one or more ecosystems. The area should have a good deal of scientific, educational and

Presently, great concern is being given to the health and quality of the environment. Its condition is considered the most important factor for establishing a national park. Conservation of the environment is a worldwide goal of the present park system. To achieve this goal, careful consideration must be given to the social and economic conditions of the area which can enhance or restrict the development of the park system (Wilkinson, 1978; Butler & Burnett, 1982).

The value of the designated preserved land is an important consideration. Classification of reserved areas in the world by the United Nations have taken place for the purpose of defining each reserved area's function. They are: 1) world heritage area; 2) national parks and equivalent reserves; 3) nature reserves; and 4) biosphere reserves.

The concept of world heritage areas emerged in 1972 as a result of the need for protection of world resources as stated at the World Cultural and Natural Heritage Convention. The preserved areas should have outstanding features which include cultural and natural areas such as parks. Nature reserves are assumed to be excluded from human activities such as recreation or any type of land use. They are restricted for scientific use which emphasizes their
protected status. Biosphere reserves have been designated by the UNESCO and Biosphere (MAB) Program. These areas are designated for education, monitoring, research and conservation of the ecosystems. Some national parks are considered biosphere reserves as well as nature reserves (UN, 1980).

As the concerns to preserve nature grows greater, so too does the concern for historical and cultural sites. There are parks of prehistoric value, national historic parks, national monuments, natural military parks, national memorial parks and national battlefield parks (Failor, 1978).

During the past few decades, park functions have become more important, for example, the National Monument Park in the U.S. has been exempted from road systems and recreational facilities. It consists of battlefields, forests, cliffs, canyons, sand dunes, caves, islands, homesteads, birthplaces of famous people, deserts, cacti, scenic views and geological features. Other national parks have been established to serve as protection for wildlife, especially endangered species. Mount McKinley National Park in the United States is an example of this (Johnson, 1965). Still other parks have been established for the protection of native crafts and folk art (Failor, 1978).

Policies of the national park system have been highlighted because of their importance in fulfilling the
goals of the national park. Usually, the park's policies are enforced by the highest authority in the country. In national parks, all activities except recreation are prohibited. Visitors are allowed to use the park under the control of the park authority for recreation, education and cultural purposes. The park provides people with recreational land and facilities to be enjoyed without creating impairment to the lifecycle of the park. Human activities such as hunting, grazing, logging, forestry, agriculture, mineral extraction, dam erection, hydroelectric power, fishing, public construction, residential and industry are not permitted. Plant control and plant protection from diseases, fire control and installation of facilities which are limited to small zones are allowed. Areas of historical importance are withdrawn from the public's control. Capturing wild animals for commercial purposes is prohibited. National parks are excluded from human activities whereas human activities are allowed in some preserved lands such as national forests (Johnson, 1965; Failor, 1978; IUCN, 1985; UN, 1980).

Park management has been greatly emphasized. It is the legitimate authority which administrates and applies park policy to protect the park's features from undesirable human activities. This obligation has been declared by the IUCN meeting held in New Delhi in 1969 (Moore, 1981).
Management's responsibility is to manage and control plant, animal and visitor movement in the recreational sites. Management must also instruct visitors about use and conservation of natural and cultural features of the park (Isakov & Nelson, 1978). Management needs to maintain the correct visitor capacity to eliminate pressure on recreational zones within the park. Introducing visitors to other sites that are less known can help keep the numbers down at well-known recreational sites. In such sites, recreational facilities should be installed to be enjoyed without creating a negative impact on the environment (Failor, 1978). Communication between management and visitors through such media as publications and audio-visual devices help maintain the park's integrity. Trained guides also help in this goal (Moore, 1981).

Surrounding border areas of the national park should be managed by the park management division which means that management tasks do not end at the park's periphery (Eidsvik, 1980). Management must use strict control in regard to land use within the park and its neighboring areas. It must set policy on activities taking place in areas bordering the park because these activities affect the life cycle of the park's ecosystem (Nelson, 1978; Isakov and Nelson, 1978). Thus, creating park policy awareness among people living in neighboring areas to the park is crucial. They need to be
taught how to protect the park's features. Such concepts have been applied in Senegal National Park. The Senegal Park management sent a team to neighboring villages to explain (through films) the importance of their park. This operation took one year and feedback seems to indicate that this method has met its goal (Sow, 1980).

Another area of importance is the professionalism of park employees who must be well qualified in the field. Park operations also require specialists, scientists, technicians, skilled and unskilled employees. The task of the manager is especially important as he or she must know how to administer the area's ecosystems and its impact on the park (Thorsell, 1990). Management members should include many ecologists because their role is crucial in giving scientific opinions regarding the changes occurring in the park's ecosystem (Grimsdell, 1977).

Participation of many agencies in park management results in better management and performance because of the competition between these agencies (Nelson, 1978).

Drawing up fixed policies for short and long-term use for the park is necessary. The policies need to cover such items as facilities, research, regulations, visitors, education, fencing, fire protection, water, reintroduction and control of wildlife and plants (Jungius, 1988). Park administration is concerned about resource management,
visitor service, interpretation, maintenance, planning and development, and administration. Resource management employees are concerned with water, land and wildlife management in the park. They are charged with research and management of the park's ecology and the surrounding zones. They need to be knowledgeable about the park's natural, historical and recreational areas. Visitor service employees provide visitors with information, rights, safety, food, housing, fuel and recreational services. Interpretation services are the most important tasks in the park administration. This type of service provides talks, visitor monitoring, exhibits, film shows, publications and museums. In some parks, a sociological aspect has been introduced to the interpretation division. Interpretation provides visitors with a great deal of information regarding conservation.

Maintenance and development are extremely important to the national park system. In most cases, 60% of the park's total budget goes to this division. It maintains the park's roads and facilities. It repairs all damages done by vandalism which consumes a large percentage of the budget (Failor, 1978; Bannon, 1972).

Inventory for the park's elements is very important. Management needs to investigate and inventory soil, plant, geological features, lake and stream characteristics, water supply, sewage disposal, and wildlife. Archaeological and
historical features need to be documented (Doell & Twardzik, 1973). Inventory of the park provides information about the plants, animals and their habitats, distribution and density, and shelter, food and water. Condition of water resources can be determined. Threats to the park's stability need to be assessed. Areas being disturbed because of plant competition, invasion of other plants, water quality and human activities will subsequently need to be restored (Thorsell, 1990).

A park's value and provisions are recognized worldwide through its role as a social amenity. It has a positive impact on the value of nearby lands as it raises the land's price. It increases environmental awareness among people and it motivates business investment and attracts tourists (Doell & Twardzik, 1973). The park's establishment can be especially beneficial to the local population because they can get a permanent supply of potable water. The park will attract wildlife as a suitable habitat and local people can hunt outside the park land. They can benefit monetarily from tourism and recreation, new roads, health services, commerce and employment opportunities (Allen, 1980).

A national park should not be seen so much as a place for recreational activities, but as a natural laboratory where research and scientific studies take place (Failor, 1987). Conducting such research is highly significant. It helps people who are concerned about the park to know more
about its ecosystem. Such research analyzes plant and animal changes. Researchers study visitor behavior and volume to understand the impact on the environment. Research also includes human activities taking place in neighboring zones. This research aims to improve the quality of the environment inside and outside the park (Isakov & Nelson, 1978). The national park protects the natural environment possessing outstanding features. It preserves diversity, waste catchment, minimizes environmental risks such as erosion, revitalizes tourism, and provides recreational activities (Thorsell, 1990; Burnett & Butler, 1987).

Developing Countries. While developed nations have well established national parks, the concept of national parks in developing countries has been frustrating to government officials. The living standard and the general economic status in these countries hamper national park growth and development. Even if a national park has been established, the above factors stand as barriers to the park's objectives (Burnett & Butler, 1987). Nonetheless, there are unique national parks located in developing countries such as the tropics. It is thought that some of these national parks should be preserved for scientific research only instead of tourism and recreation (Myers, 1980, 1983).
National Parks in Arab Countries. There is very little written about national parks and it is a neglected subject in Arab countries. What is available was written two decades ago. While this is outdated literature, it is still considered current by most researchers.

There are few parks in Arab countries in spite of the availability of park components and the preserved land ratio to the size of the country is very small (Jungius, 1988). Due to the weak economy in most of these nations, the concept of the national park has not been accepted although the concept of conservation is part of the Arabic culture (Kassas, 1974; Ghabbour, 1975).

National parks can be found in the following countries: Saudi Arabia established Asir National Park with 1,000,000 ha; Tunisia has two parks with a total area of 11176 ha and Sudan has two parks with a total area of 163,370 ha with the first Middle East national park being established in Sudan in 1936. One park was established in Morocco and another two parks were established in Syria and Lebanon for the purpose of preserving historical heritage sites (U.N., 1980; Ghabbour, 1975; Ritter, 1975; Baker, 1986).

In 1976, Bahrain's first conservation step was establishing a land reserve for wildlife located in Al-Areem with an area of about 4 km² (Abbas, Saleh & Mohammed, 1991). Oman has established one reserve for the reintroduction of
the Arabian orxy and to protect migratory birds and desert wildlife. The area of this reserve is estimated to be about 16% of the total area of the country (Jungius, 1985, 1988).

The concept of national parks has been introduced to Saudi Arabia just recently. National parks and reserved lands in Saudi Arabia occupy a very small percentage of the total area of the country (Jungius, 1988). There are four national parks with variations in area and purpose: Al-Hassa National Park, Thammah National Park, Saad National Park and Asir National Park (Ministry of Agriculture and Water, 1984).

Al-Hassa National Park is located in the southeastern section of the eastern province in Al-Hassa region. The location was originally a sand dune stabilization project to stabilize the encroachment of sand, which through time, had engulfed large portions of agricultural lands. It occupies 4500 ha and is planted with trees that thrive in high temperatures and resist soil salinity. The park was opened for public use in 1985 and has been provided with recreational facilities to serve the regional population (Ministry of Agriculture & Water, 1984).

The Saudi government requested that the U.S. National Park Service to evaluate the value of the proposed park. The U.S. National Park Service recommended the establishment of Al-Hassa National park because the area possesses rich natural and cultural resources. The region is also rich in
natural springs, plants, animals, and historical sites. The second, Old Friday Mosque, is located in this region as well as Ottoman Empire forts, ancient ruins from the Umayyad civilization of Mesopotamia and the ruins of the Garmathian state which once inhabited the region centuries ago. At the same time, the region is rich in oil fields which have caused a negative impact on the environment (U.S. National Park Service, 1984).

The second national park in Saudi Arabia is Thammah Park. It was a private farm that was converted to a national park. It is located 80 kms north of Riyadh and occupies about 130 km². A small part of it serves as a captivity farm for the preservation and reintroduction of the Arabian oryx and the remaining portion of the area is designated as a recreational area. The park is provided with all required facilities (Ministry of Agriculture and Water, 1984).

The third national park in Saudi Arabia is Saad National Park. It is located on the western edge of the Dahna desert about 115 km east of Riyadh. It occupies 300 ha of the sand desert. It has 40,000 hand-grown trees. The park is provided with facilities for recreation (Ministry of Agriculture and Water, 1984).

Asir National Park, located in Asir region and occupying 1,125,000 acres, is the fourth and largest national park consisting of outstanding features that do not exist in
the other parks in Saudi Arabia. It is considered one of the world's largest parks in terms of size and natural features and it is the first of its kind in the Arabian Peninsula. The park area consists of different zones, each of which have their own features and are rich in vegetation and wildlife (Al-Khalili & Nader, 1984). It is the only national park in Arabia that is listed in the United Nation's list of world national parks. (U.N., 1980; Habibi, 1986).

A serious drawback to park management is that in general, parks and reserved areas in Saudi Arabia lack professional employees and training programs (UN, 1980; Habibi, 1986).

Objectives of National Parks. The literature on national parks reveals that there are two main objectives for the establishment of national parks and they are highly emphasized. One is the preservation of natural and cultural heritage and the second is to provide recreational areas for the public (Failor, 1978). Conservation of national parks provides protection and increases the wildlife population inside and outside the park and enhances their habitats. The park provides a means to control wildlife. While preserved areas create a healthy environment which is free from deterioration, recreational activities satisfy the people's needs and attract tourists which improves the local economy (Lusigi, 1978).
Conservation and recreation as the ultimate goals of a national park have been examined. Halle (1985) defines conservation as the "management of human use of the biosphere so that it may yield the maximum benefits to present generations while maintaining its capacity to meet the needs and aspirations of future generations" (p. 265). Conservation was first introduced in India about 4000 years ago. Thereafter, it was practiced by the Incas in Latin America and by Europeans to prevent landslides and provide preserved lands for hunting activities (Jungius, 1988). Protection of natural resources was known in China since 1122 B.C. In 1535 Switzerland moved to protect the song-birds (Eidsvik, 1980; Szafer, 1973) while during this same century, Poland instituted measures to protect the European beaver.

In more recent times, conservation became an international quest because of the Industrial Revolution and rapid population growth. At this time, environmental pressure had experienced an increase directly attributable to these two factors, producing a dramatic drain on natural resources and conservation became a pressing need to counteract this problem (Polunin, 1978).

At the present time, national parks suffer threats such as soil erosion, air and water pollution, plant invasion and visitor misuse. Other threats come from outside the park in such ways as land development on the adjacent land, oil,
gas and mineral extraction, timber harvesting, leaching of toxic chemicals and acid rain. Coastal parks suffer the same problems plus they must contend with beach alteration, salinity variation, sand destruction by automobiles and oil spills (Becker, Dottaviò & Menning, 1986).

Education is recommended as a means of spreading the idea of conservation among the human population. (Curry-Lindahl, 1978). Creating and developing environmental protection plans, employment training and conservation awareness among decision-makers are required to protect resources (IUCN, 1983).

Conservation in developing countries is hampered by poverty and rapid population growth. Plants, animals and the environment are all in a critical condition. Although developing countries possess rich natural resources, they lack finances and skilled people to develop protective measures for resources. It has been suggested that unique places in developing countries be preserved through the World Heritage Fund by giving these countries long-term loans to be used for supporting conservation (Allen, 1980).

Environmental protection in the Arabic countries is also an overlooked subject due to the lack of conservation awareness causing severe impacts to the environment. The successive occupation of many civilizations in the regions has changed the face of the environment. At the present time,
the protected and unprotected lands are in critical condition. The trace of severe damage done to the environment is very clear. These damages are attributed to the rapid population growth and the living standards of the people (Gabbour, 1975).

**Hema.** While the concept of conservation (*hema*) was once known in the Arabic countries and practiced for many centuries, this traditional concept has disappeared because the tribal system has broken down, resulting in severe damage to the environment. The *hema* system was created by the nomadic tribes to protect grazing land that was reserved and excluded from the tribe's total lands. It was designated as grazing land that is subject to specific regulations. Each tribe had its own *hema* and grazing in any other tribe's *hema* was prohibited. At the present time, the system is no longer practiced in Saudi Arabia. It is generally believed that the introduction of the automobile is the main reason for the system's disappearance (Draz, 1969; Ghabbour, 1975).

In Arabic countries, environmental protection might succeed if the *hema* is renewed through education and by enhancing and improving the living standard as well as enforcing environmental laws (Ghabbour, 1975).

Recently, advances have been made to renew environmental conditions in the Arabian Peninsula, which
right now, are in the worst condition ever experienced. Rapid population growth has increased the demand for greater exploitation of natural resources, inducing changes in the environment. Some plant species have already disappeared; forest areas have shrunk; and the underground water table has been lowered. Many animal species, such as the cheetah and Arabian ostrich, have become extinct during the past few decades. Even beaches, which are being used as landfill or are occupied for private use, suffer from severe damage (Jungius, 1988).

In response to the need to restore the land to its former condition, preserved lands have been established in the Arabian Peninsula as well as Saudi Arabia. The aim of such preserved areas is to protect plant, grass and the region's wildlife (Abbas, Salah & Mohammed, 1991).

Some of these areas have preserves for endangered animal species such as the Arabian orxy which is being bred in captivity to reintroduce it to the wilderness. Some orxy were saved by IUCN and WWF and were sent to Europe and the U.S.A. to be raised and then returned to their original environment in the Arabian Peninsula (Jungius, 1985).

In response to the need to preserve the environment, the Ministry of Agriculture and Water has established Asir National Park and the creation of the Commission of Wildlife Conservation and Development which has two sites for wildlife
conservation at Harat Al-Harrah and Al-Hawiah (Jungius, 1988).

The wildlife conservation movement was formed recently in Saudi Arabia in response to a pressing need for wildlife restoration which is seen by environmentalists as critical. Wildlife has been tremendously exploited. Hunting activities have driven some species of wildlife to the verge of extinction, while other species are extinct already. Animal habitats have been degraded and destroyed. Other reasons for this decline are overgrazing that has destroyed the sparse vegetation that wildlife feed on, new hunting weapons, the advent of the automobile which has facilitated nomad movement, the loss of the hema system and large volumes of livestock owned by the nomads (Habibi, 1986).

A prime problem obstructing environmental protection is nomadism. Protected areas in Saudi Arabia do not survive nomadic intervention, especially areas that have been fenced for improving grass and plant life. Such areas generally receive less rain, producing less grass and scattering plants. The nomads cut the fences and permit their herds to graze on the grasses and plants in the protected areas (personal observation, 1992).

Asir National Park. This park is the first step in establishing environmental protection in the Asir region. Asir region as well as Asir National Park is rich in natural
and cultural resources. The region has forests, wildlife, vegetation and receives a large amount of rainfall (Ghabbour, 1975). But like other Arabian parks, Asir has suffered massive destruction and exploitation that is difficult to control because of the lack of conservation awareness and the untrained staff of the park's management (Habibi, 1986).

Recreation

One of the goals of the establishment of national parks is to provide recreational areas for the general population. While no agreement has been reached on a satisfactory definition for recreation, Doell and Twardzik (1973) define recreation as "The refreshment of mind or body or both through some means which is in itself pleasureful" (p. 4). Gold (1980) defines recreation as "any leisure time activity which is pursued for its own sake or what happens to a person as a result of a recreational experience" (p. 29).

The availability of land with certain features to accommodate outdoor recreation is important and some land needs to be provided with recreational facilities. Since the beginning of this century, demand for recreational areas has increased so dramatically that national parks have been established in response to this demand. Some parks are devoted to summer activities and others to winter activities (Failor, 1978).
At the present time, a variety of recreational activities have been created in response to such influences as urbanization, industrial explosion, high rate of migration, transportation development, new technology and the increase of individual income (Dunn, 1978). The social changes important for creating recreational growth are population growth, economic status, availability of leisure time, moral attitudes and ethnic changes, relationship between people and their environment and people movement in space (Doell & Twardzik, 1973).

The government's role in supporting recreation is inevitable. Recreational demand for unique areas has fallen upon the government for budgetary allowances and designating certain areas such as national parks to meet the demand for recreation (Kirby, 1985; Gunn, 1979; Chubb & Chubb, 1981).

Recreation can improve the quality of life. The general objective of its creation is to increase people's welfare by providing them with healthful, pleasurable and attractive environments (Gold, 1980).

**Recreation in Arabic Countries.** Recreation is a neglected matter in these countries and is not promoted because of their weak economy. The condition of beaches in some of these countries is overlooked. Egypt, Lebanon and Palestine were the first to introduce recreational activities adapted from western culture. Hot springs are the most
popular places for recreation and medical purposes. People enjoy such places because they believe hot springs help in healing rheumatism. Historical places, such as Pettra and Palmyra in Jordan and Pharaonic sites in Egypt attract people as well as the scenic views provided by rivers and mountains (Ritter, 1975).

**Recreation in Saudi Arabia.** This phenomenon has appeared recently as the population's income has increased from the oil boom. Islamic recreation or "pilgrimage" has been known since the pre-Islamic period (Ritter, 1975; Al-Shareef & Mohammed, 1980).

In the past, the courtyard of the home was the main recreational area for children and women. It provided the family with privacy. Modern house design has now been changed. The front yard is provided with recreational facilities for the children. Other types of housing, such as multifloor buildings, lack recreational places. Therefore, while gardens have been built in cities to meet the recreational demand, they are not able to absorb the high demand for more recreational lands. Automobile ownership is now popular and is a factor in the increased demand for additional recreational areas. Although the government has set aside area for a national park, it has failed to meet the demand because of: 1) rapid city population growth accompanied by rapid expansion of cities, 2) tremendous
shortage in recreational lands, 3) the extent of extreme weather patterns, 4) and the inability to deal effectively with the decline in the quality of the city environment which causes pollution, dust and polluted water (Al-Shareef & Mohammed, 1980).

At the present time recreational activities have become important because of changing lifestyles due to an increase in individual income, a decline of working hours and increase of leisure time, an increase in educational level of the population, introduction of new recreational activities and the improvement of transportation (Al-Shareef & Mohammed, 1980).

People in cities resort to empty lands inside and outside the city for recreation causing deterioration to the areas. In the entire country, there is a lack of playgrounds, clubs and sufficient gardens. Recreational activities are taking place in undeveloped areas because of the shortage of officially designated recreational areas. Sand dunes are used for motorcycle riding. People also camp in the desert, especially during the spring season, when rainfall, vegetation and temperature are ideal. They camp in tents or caravans for a few days during the holidays, enjoying nature and playing games, such as soccer (Al-Shareef & Mohammed, 1980).

Farms are another place for recreation. Inhabitants of cities take trips to nearby farms. Low-lying valleys having
a fair amount of vegetation, usually enough to attract people. High elevation zones are another place that people enjoy for the scenery. Small lakes located in the country are used for swimming. These lakes lack the recreational facilities found in central Saudi Arabia. Roads are considered recreational areas. In places like Al-Hassa, people enjoy swimming in the abundant natural springs and beaches and visiting historical sites (U.S. National Park Service, 1984; Al-Amiri, 1986).

Interestingly enough, the most attractive places in the country have not been developed for recreational activities (Al-Amiri, 1986). This can be attributed to the fact that the recreational sector is still in its developing stages.

Tourism

Conservation is a way to preserve the environment which promotes recreation. In turn, conservation and recreation support tourism (Gunn, 1979). Smith (1977) defines tourism as "a form of leisure activity that structures the personal life cycle to provide alternate periods of work and relaxation" (p. 2). Tourism as an activity requires travel and time and usually occurs during holidays or summer vacation (Mitchell & Smith, 1989).

The availability of tourist places such as parks as tourist attractions is important (Gunn, 1979). Pearce (1982)
defines a tourist place as "any place that fosters the feeling of being a tourist" (p. 98). The environment of the tourist location must be protected because it is the tangible thing which attracts people to travel to it (Britton, 1980). Attraction is considered a major factor for tourism because it motivates tourists to travel to such places as developed beaches, mountains, scenic areas, historical sites, outdoor recreational areas, amusement parks, and shopping centers (Gunn, 1979).

Since World War II, the advent and development of new means of transportation such as the automobile, ships and jet planes have changed and developed the concept of tourism. As a result, from the 1950s to 1970s tourism has grown annually by 10% (Haron, 1982). In 1963, the number of tourists was estimated at 93 million and had risen to 284 million by 1981. This increment is attributed to the world population growth as well as the improved living standard in most nations (Pearce, 1987).

Presently, tourism has become a significant source of income for many countries. It is viewed as an independent sector that provides people with meaningful services. Because of its importance, it has become an important subject that is taught in schools and universities and it has its own organizations and unions (Haron, 1982).
Tourism has an impact on the social factors in the host country because it is a type of communication and interaction between people and their culture (Peppelenbosch & Tempelman, 1975). Tourism plays a remarkable role in the nation's relationships. It develops international friendships, supports the world peace movement and improves education (Haron, 1982). If tourism produces problems, they are not mentioned in the literature.

On the international level during the past few decades, tourism has witnessed rapid growth. This is attributed to world economic growth, an increase in individual annual income, the availability of holidays and the improvement of transportation (Lusigi, 1978).

Tourism has a positive impact on the host country because it generates foreign currency for the country, creates new infrastructures, enhances individual income, increases job opportunities, revitalizes other economical sectors and the country gains an international reputation as a tourist attraction (Gearing, Swart & Var, 1976).

Drawbacks. The growth of the tourism industry in developing countries is hampered by the absence of short and long-term planning, shortages of money, political events, deficits in capital investment, lack of professional staff and communication problems with tourists. In spite of all this, developing countries receive a tremendous number of
tourists whose stay is longer in developing countries than in
developed countries (Peppelenbosch & Tempelman, 1975).

**Domestic Tourist Growth in Arabian Countries.** Tourism in
the Arabian region has increased. The annual rate had
risen 26% during the period of 1979 to 1984. For some
countries in the region, the tourism industry is considered
an important source of income, i.e., in Jordan, tourism
generates 10% of the total national income (Samawi, 1990).

Tourist sites in the Arab Gulf States are limited and
the number of foreign tourists is very few. At the present
time, the region is not a well known tourist site for several
reasons. No country in the region (except the United Arab
Emirates), permits international tourism. The region is
dominated by a conservative culture in spite of the major
changes occurring. There are huge differences in cultural
issues between local people and tourists, i.e., segregation
between the sexes and the absence of integration between
tourists and local people (Ritter, 1982).

The tourism industry in the Gulf States is hampered by
such drawbacks as prohibition of international tourism,
skilled employment, lack of developed beaches, lack of access
to tourist places, lack of tourist services, and lack of
tourism facilities (Ritter, 1986).

**Human Activity.** The human population has induced
changes in the environment on a global level. The most
remarkable problems are erosion, degradation of the land and other changes in the ecosystem (Nelson, 1978). Studies on protected areas have shown that factors such as population growth, industrialization, tourism and resources extraction have changed the environment of the preserved lands (Tichnell, Machlis & Fazio, 1983).

The present destruction of wildlife is caused by the development of new technology, hunting, and extensive destruction of wildlife habitat (Goudie, 1982). This has resulted in a great loss of wildlife species and will continue into the future. Activities such as agriculture, grazing and forestry have a negative impact on the wildlife environment. Humans are unaware of the benefits they can obtain from wildlife. The whole problem needs urgent attention to enhance the man-environment relationship (Kellert, 1985).

Activities such as clearing forests for the purpose of agriculture or charcoal or to obtain fuelwood and construction materials is an activity that causes severe damage to the environment. Trees protect soil from water and wind erosion and they stabilize the topsoil. Clearing trees causes soil loss, erosion, and acceleration of desertification (Goudie, 1982).

Presently, the world's forests are facing massive destruction. The most exploited forests in the world are
found in the tropics; here loss is estimated at 11.3 million ha per year (Gregory & Walling, 1987). In Latin America alone about 5 to 10 million ha of forest is logged for agricultural purposes, construction materials and fuelwood (Wetterberg & Meganck, 1978).

**Land.** Land conversion has expanded since the 1700's. The expansion of economical agriculture has resulted in sophisticated problems. It has caused shrinking in grazing land and massive changes in the environment (Richards, 1984; Walling, 1987). In developing countries, half of the forest area had been cleared from 1900 to 1965 for the purpose of fuelwood and agricultural lands (Meganck & Goebel, 1979). More than 300 million ha of the world's agricultural land is used for temporary cultivation (Wetterberg & Meganck, 1978).

**Grazing Activity.** The raising of livestock has increased dramatically because of the high demand for meat and other animal products (Richards, 1984). This has increased the need for grazing areas which has serious results on the environment. It reduces the palatable grass and increases unpalatable grass that reduces the quality of hay. When plant cover is destroyed, soil becomes more exposed to wind erosion which carries away fertile soil components such as clay and silt. Later, soil accumulates and results in dust storms. Through time underground rock layers are exposed
and desertification is in its final process (Gregory & Walling, 1987).

**Asir Region in Saudi Arabia.** In Asir the environment has suffered from overuse for many centuries (Landers, 1981). The nature of the region has experienced remarkable changes which have come as a result of human activities and the advent of the automobile, inducing dramatic changes in the region. The outcome has been land degradation, wildlife decline, shrinking grazing land and soil erosion (Barwood, 1980).

During the past 30 years the regional environment has been under extensive pressure (Al-Sayed, 1984). Grazing is an activity that causes severe damage to the environment. Along with a reduction of palatable grass, livestock, especially goats, have reduced the plant seedlings in the forest areas. Asir region is considered the number one place to raise goats and sheep in Saudi Arabia. In 1989, the region possessed 1,708,126 sheep and 1,203,937 goats (Ministry of Monetary, 1990). As a result, erosion has occurred and is a serious phenomena, especially in the plateaus (Brooks & Mandilt, 1983).

Vegetation cover in Asir has been abused. For example, logging is extensively practiced in the region by the local people to satisfy their need for firewood, grazing and land development (Al-Shareef, 1984). Old trees have been cut down,
especially in agricultural zones and nearby areas (Brooks & Mandilt, 1983). As a result, the region experiences landslides, erosion and desertification. During the Turkish reign of the region, a tremendous number of the region's old growth trees were cut down to be used for Hijaz railroad erection (Elsard, 1984).

The use of plants for medicinal purposes is a common practice among the population. While Asir region once was rich in medicinal plants, it has now been greatly reduced (Abulfatih, 1984).

In some zones of Asir National Park, people still produce charcoal for commercial purposes from junipers, cedar and thorn trees. When the park authority prohibited logging, they resorted to drying trees and then after some time, they collected them as dead trees (Landers, 1981). Land development has expanded rapidly with agricultural lands expanding at the expense of the wilderness and forests and reducing grazing areas in the region (Al-Shareef, 1984). In Asir National Park, agriculture is practiced extensively with new machinery and expansion is still taking place (Al-Sayed, 1984; Ryan, 1979). Wildlife has been experiencing rapid decline since the beginning of this century. Population growth, extensive hunting and occupation of water sources have reduced the number of species and driven the remaining species to the verge of extinction (Abd El Rahman, 1986).
Because hunting, with the use of automobiles and firearms, supports a large portion of the population as a source of livelihood, the region's wildlife faces an unknown future. Rare animals are being pursued further into the inner hills (Al-Shareef, 1984). Predator animals in the region face extensive killing; Bedouins claim that such animals attack their herds. Some Bedouins capture the wolf's pups and sell them in local markets or to the zoo (Nader & Buttiker, 1980; Landers, 1981). Hunting for certain species of birds, such as the turtle dove, is practiced by the indigenous population along the seacoast of the Red Sea during autumn and spring. The type of hunting has increased on a commercial level since the advent of the automobile (Buttiker, 1988).

Reducing or prohibiting human activities in preserved areas such as national parks creates conflict between the authorities and the public. Establishment of any national park area creates hardships for the people such as the nomad hunter, farmer and fisherman. IUCN regulations allow temporary use of the park by indigenous people if the park is newly established. human activity is restricted to a small area and their residency in the park is not permanent (Jungius, 1988; IUCN, 1985).

The establishment of a national park that has natural resources such as minerals, timber, grazing zones or dams is usually resisted by the local population. The results of
these controversies over natural resources may result in a reduction of the designated park area (Johnson, 1965).

Conflict emerges as a result of the public's increasing demand for natural resources and the concept of ecology. Such conflict usually leads to public debate between developers and ecologists (Jackson, 1987). Conflict emerges over land intended for preservation for public use. Conflict appears in developing countries due to the high demand for natural resources and land use. Conflict also increases among people who live in a preserved area characterized by many valuable features such as timber (Dalland, 1978). For instance, when people have relied on timber production for their livelihood and such areas are converted to national reserves, disputes and conflict are the result (Johnson, 1965). Protection of certain zones provokes land developers, construction builders and farmers because reserving the land reduces their activities. This results in competition and ownership for land (Gunn, 1979).

Some developing nations' preservation of land for public use creates conflict because of the poor economic status of the country (Eidsvik, 1980). When fuelwood, food, grazing and harvesting of other products are prohibited in reserved lands, local people will invade the protected land in order to satisfy their need (Allen, 1980).
Arid countries with few wet zone resources experience conflict when national parks are established in such zones. The people suffer from water shortages and preservation of wetlands causes water competition. Government officials met with conflict when they established Tunisia National Park, a watershed zone (Warren, Hollis, Wood, Hooper & Fisher, 1979). Some national parks that had been established close to marginal agricultural areas face expansion at the expense of the park area (Burnett & Butler, 1987).

Searching for new land that can be cultivated is a continuous problem in developing countries. Arable land shortages, rapid population growth and high demand for food are the reasons. National parks in developing countries are the target for human activities because the land is productive (Meganck & Goebel, 1979; Burnett & Butler, 1987).

In Arabia, activities such as grazing, hunting, charcoal production and traditional agriculture cause the same conflict and difficulties as elsewhere (Jungius, 1988). Reserved lands suffer threats and invasion. Nomads bring their herds, cut the fences and use the protected land for grazing. Intervention by authorities causes disputes with the nomads (Ghabbour, 1975).

It is generally believed that conservation projects in Saudi Arabia will not succeed because the country's nomad population is large and the preservation of land is seen as
a major violation of their traditional right to land ownership. (Habibi, 1986).

The literature demonstrates that national parks are an important issue in developed countries but that very little information is available about parks and national reserves in the Arabic countries, indicating that this situation needs immediate attention.
Chapter 3

Features of Asir National Park

Geology

During the Tertiary and Quaternary period, southwest Arabia was geologically formed (Fig. 3). It was uplifted from the south and the west and gradually lowered north and east. The mountainous portion was structured during the Pre-Cambrian and Cambrian period. It consists of metamorphosed sedimentary rocks, volcanic rocks and greenstone. The basement, formed about 600 to 650 million years ago, consists of gneiss and granite (Abdulfattah, 1981; Abulfatih, 1984).

Asir region is located on the Arabian shield which was once a part of the Afro-Arabian shield dating to Pre-Cambrian time. The region consists of granite, gneiss and schist. During the Quaternary period, it was subjected to massive geological tectonic movement that formed the Arabian shield in the east and the African shield in the west, separated by the huge rift which is now occupied by the Red Sea (Fisher, 1978; Al-Shareef, 1984).

The mountain chain known as the Sarat Mountains runs parallel with Tihama and the Coastal Plain. The chain is 40 km to 140 km wide and rises up sharply to the west. It is characterized by sharp edges on the westward side and deep
THE GEOLOGY OF THE SOUTHWESTERN PART OF SAUDI ARABIA

Figure 3

Quaternary
Tertiary
Permian or older
Jurassic
Pre-Cambrian to Paleozoic
Tertiary & Quarternary
Cretaceous

Source: The Arabian Desert, 1983
canyons extending from the foothills up to the high peaks. Valleys were formed deeply among the mountains, draining westwardly and eastwardly (Brown, 1960).

The geology of Asir National Park as well as Asir region is characterized by mobilization and clear change in rock structure that was affected by heat, pressure and water. The formation of the park geology belongs to the Pre-Cambrian period. The mountainous section is considered the deepest eroded section in the Arabian shield. It consists of sedimentary and volcanic rocks with intruded granite rocks (Al-Khalili & Nader, 1984). Tihama and the Coastal Plain consist mostly of volcanic hills, sand dunes, and coral reef, 3m above sea level. This portion consists of crystalline rocks, some scattered basaltic lava and cinder cones (Brown, 1960). The Coastal Plain is characterized by extensive sand dunes, occupied by scattered marshes which might reach 3 km in width. The entire area, located west of Sarat Mountains, is permeated by valleys draining from the mountains (Abdulfattah, 1981).

In addition to the unique geological formation of Asir National Park, the topographical variation marks it as an exclusive site in the country. Park elevation ranges from sea level to 3207m on the highest peaks. Its topography can be divided into three physical formations:
1. **The Mountain Zone (Zone 1).** The mountain zone or highland ranges from 2000m to 3207m. This area consists of mountains and hills that slope gradually toward the east with a sharp escarpment in the west. This part of the park contains the most scenic areas in Saudi Arabia and experiences the most pleasurable climate in the country.

2. **The Tihama Area (Zone 2).** This area is located between the Sarat Mountains and the Coastal Plain. Its elevation increases from the west to the east ranging from 1000m to 2000m. The area's landscape consists of well-vegetated hills and mountains. The mountains located in Rijal Alamma are Madaragah, Khamarah, Marrar, Bani Jona, Al Gariyah. They provide unique scenery and are inhabited by many species of wildlife.

3. **The Coastal Plain (Zone 3).** This area runs parallel to the Red Sea. Its elevation ranges from sea level to 1000m, increasing from the west eastward. Landscape consists of sand dunes and scattered plants. The Coastal Plain has virgin beaches which can be developed as recreational sites. In general, landscape variation in Asir National Park provides a suitable home for wildlife, plant species, a favorable area for settlements, attractive site for tourism and an invaluable environmental treasury.
Climate

The climatic pattern of Asir National Park as well as the entire region is influenced by its altitude and proximity to the Red Sea. In spite of the region's small area which represents 4% of the country's total area (Abdulfattah, 1981), its topography gives Asir a unique climate that differs from the rest of the country.

Weather patterns of Asir National Park vary from zone to zone because of the diverse elevation (Fig. 4). The Coastal Plain is one of the hottest zones in the world (Abdulfattah, 1981) being extremely hot and humid during summer and warm during winter. The slopes located west, facing the escarpment, feature moderate weather due to their intermediate location. The Tihama zone experiences hot summers and mild, warm winters.

The mountain zone is characterized by a moderate climate during the summer season and cold weather during the winter which might reach the frosting point in early morning hours. This zone extends from Al-Sawdah north to Jirrah south and experiences the same climate patterns with little variance between sites because of the similarity in elevation. As the highest summit in the park, Al-Sawdah is the coldest site.

An extreme hot and dry desert climate dominates the sand dune desert located between Tihama and the Red Sea. In
Figure 4

Desert Climate, Hot and Dry
Peaks Climate, Cold
Mountainous Climate, Moderate to Cool
Slope Climate, Moderate and Warm
Coastal Climate, Hot and Humid

general, while climatic information about Asir National Park is lacking, the mountain zone weather components, such as rainfall and surface temperatures, are recorded by Abha Meteorology and Environmental Protection Station located at Abha Airport about 25m east of Abha.

Records indicate that the mountain zone experiences low temperatures during September to December with the temperature increasing from January to April. During June the average temperature reaches a pleasurable 23.1°C. During late June and early July, temperatures reach an average maximum of 30.1°C. During the winter season low temperatures drop from an average of 21.7°C in September to the average of 18.1°C, averaging a minimum temperature of 10.7°C to 6.8°C (Table 2).

**Rainfall**

Precipitation in Asir region as well as Asir National Park is influenced by the intertropical convergence zone: the Mediterranean, Sudan and Indian Ocean atmospheric depressions (Girbah, 1983; Held, 1989; Siraj, 1984).

The region experiences two annual rainy peaks. The first starts in late winter and lasts to mid-spring, falling in separate time periods. The greatest amount of rain falls in a short period of one week and forms the potential annual rainfall. The second rainy peak is the summer rains occurring in the mountain zone.
<table>
<thead>
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<th>Average Maximum °C</th>
</tr>
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<td>19.3</td>
</tr>
<tr>
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<td>25.3</td>
</tr>
<tr>
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<td>15.5</td>
<td>8.3</td>
<td>22.5</td>
</tr>
<tr>
<td>Dec</td>
<td>13.4</td>
<td>6.8</td>
<td>20.0</td>
</tr>
</tbody>
</table>

Table 2. The average annual surface temperatures recorded at Abha Airport during the period 1978-1990.

Source: Meteorology and Environmental Protection Administration, Abha Station.
The impact of the two atmospheric depressions on Asir region result in formation of a westerly jet stream on the southern zone of the Red Sea. This causes heavy rainfall in the mountains during the summer season (Girbah, 1983).

The Mountain Zone. Except for the mountain zone, which collects data at Abha station, both Asir region and Asir National Park lack rainfall information. The mountainous zone, which is so high, receives the greatest amount of rainfall in Asir and acts as a barrier that intercepts moisture clouds. Rainfall in the mountainous zone is estimated at 500mm to 1780mm (Held, 1989), and varies because of the elevation factor. The rainy seasons produces heavy clouds over the mountains, increasing the area's humidity.

Rain distribution is a result of altitude. The mountain strip extending from Al-Sawdah north to Jirrah south receives the greatest amount of rainfall in Asir National Park. The annual average is 223.7mm, falling approximately 51 days per year. Calculation of rainfall shows that the spring season receives the heaviest amount of rainfall in the mountainous zone at 696.8mm. It rains 423.7mm during the summer monsoon and 214.7mm falls during fall. The average amount of rain falling daily on the mountainous zone during spring, summer and fall is 27.9mm, 22.2mm, and 5.9mm, respectively. The wettest period is usually from March to
<table>
<thead>
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<td>51</td>
<td>223.7</td>
</tr>
</tbody>
</table>

**Table 3:** The annual average and highest of rainfall and the average number of days in which rainfall occurred during the period of 1981 to 1990.

**Source:** Meteorology and Environmental Protection Administration, Abha Station.
August with a cumulative number from 42 to 51 days. The semi-dry period begins in September and lasts till December with the rainfall average fluctuating at 53.8mm (Table 3).

Timaha. Rainfall in Tihama area (zone two) is 310mm (Abdulfattah, 1981). Since this zone is located west, below the mountainous zone, its rainy season occurs during spring and summer. As a lowland, it experiences floods that descend from the high mountains, resulting in massive damage to farms, homes and plants located on the valley banks from the steep topography of the valley's run-off courses.

Coastal Plain. Rainfall in this area (Zone 3) is scarce and cloud formation is rare. This zone is penetrated by many valleys which drain from the high mountains. Such valleys recharge the underground water table during flooding from zones one and two. The area receives little rainfall from May till November (Abdulfattah, 1981). Al-Gahama village receives about 100mm of irregular rainfall annually due to its hilly location (Al-Shareef, 1984). In Shugayq village as well as the rest of this zone rainfall might be absent for several years.

Water Resources

Rainfall is the main source of water in Asir region. The diverse topography forms the region's drainage system and this has created variations in water resources that differ from zone to zone. There are four main water supply resources
in Asir region: rainfall, traditional wells, artificial lakes and distillation.

Rainfall. The region lacks permanent rivers so the amount of rainfall is the life blood on which the region relies. In the past, rain water was restrained by terrace farming on the mountainsides and the slopes. This water source supported agriculture, plant and animal life and supplied people with their drinkable water. Drainage from rainfall is contained in catchment areas in valleys and used to water farms crops. This method reduces the flow of water down the valley and helps to prevent the destruction that has been experienced in the past. It also permits the water to penetrate slowly down to the lower layers. Rain water is also contained in the watershed and valley areas creating small lakes and providing people and wildlife with drinkable water.

The Traditional Well. The second source of water is traditional wells. In the past these wells were dug by hand to a depth of 20-25m. At the present time, wells are being dug by new machinery such as excavators to the depth necessary to locate water. The water level in such wells is dependent on the monsoon season. Shallow wells containing a great amount of water are located in areas rich in rainfall. Asir National Park has many of these types of wells which are the main source of water. These wells are located on farms
and on the valley banks and rainfall constantly recharges them.

**Artificial Lakes.** The third source of water in Asir National Park is artificial lakes. The rugged topography of the region as well as Asir National Park results in the wasting of water. The greatest amount of rain falls in the highlands and results in fast run-off which cannot be utilized. As a result, dams have been erected to reserve and control the water.

In Asir National Park twelve dams have been constructed for the purpose of reserving water for agriculture, to control run-off and provide for drinking purposes (Ministry of Agriculture & Water, 1991). Three of these dams are located in the mountain zone and nine others are located in the Tihama zone. These dams replenish traditional wells and increase their water level. This permits agricultural activities and provides the people and their herds with drinking water.

**Distillation.** The fourth water resources in the region is the distillation of saline water. The rapid urbanization in Asir region has resulted in a high demand for drinking water. The available water resources could not meet this demand. Therefore, a saline water distillation project has been established during the past few years. The plant, established by the Saudi Water Conversion Corporation, is
located in Shugayq village on the shoreline of the Red Sea, 215 km from Abha (Saudi Water Conversion Corporation, 1990). The project provides Abha, the capital of the region, with a sufficient water supply. It pumps 24 million gallons a day and generates 128m watts of electricity (Saudi Water Conversion Corporation, 1990). Although the recreational sites are not linked by the water pipeline, the use of tankers has solved the water shortage problem experienced by the recreational sites at Asir National Park.

Soil

Asir National Park's soil types vary from one zone to another. The fertile soil of the mountain zone has made it one of the most productive in Saudi Arabia (Al-Khalili & Nader, 1984). Through erosion, soil is accumulated and transported by run-off that distributes it along the valley banks during the monsoon season. Soil can be found in depth and in large volume in depressions, valley banks, low lands and watershed areas.

The Mountain Zone. Rocky, sandy and loam soils are found in the mountain zone. Sandy to loam soil mixed with small sized rocks is abundant in plateaus (Abulfatih, 1984). Loam soil can be found between boulders and in the depressions between mountains. Fine clay to silt texture with fine sand is carried down by the run-off and deposited in low elevation zones (Al-Khalili & Nader, 1983).
Tihama. Soil of the Tihama area (zone two) is of an alluvial type that is rich in humus and minerals. The area is among the most important cultivated lands in Saudi Arabia (Al-Shareef, 1984). Fertile soils are carried from the highlands by run-off and deposited in the area. As a flat and vast area, its soil quantity and quality increases annually. Run-off washes down tree leaves, fine soil and organic materials from forests of the mountain zone and deposits them in the Tihama zone.

Coastal Plain. This zone's soil is mostly loam found in nearby areas of valley courses (Al-Shareef, 1984). The area is dominated by mobile sand which covers the largest portion of this area. In addition, the area paralleling the sea coast is covered with large saline swamps containing high salinity soils.

Vegetation

The diverse abundance of vegetation cover of Asir region is due to the topography variation of the region, such as mountains, wet valleys, oases and barren deserts. Climate differentiation influences plant diversity providing Asir region with the richest vegetation in the country.

Plant study classification shows that 40% of Asir plant species are similar to plant species growing at the same elevation in Somalia, Ethiopia and Kenya (Brooks &

Asir plant life has economic, scientific and medicinal values. Studies of plant classification reported 33 medicinal plants in Asir region that are used mainly for folk medicine. In addition, in another 272 plant species reported from Asir National Park, 67 were listed as new species (Abulfatih, 1987; Al-Khalili & Nader, 1984).

Plant distribution is dominated by topography variation, elevation, moisture, type of climate and soil. The mountain zone is the richest zone of the park in vegetation type and many plant species grow and prosper under the influence of rain, fog and low temperatures.

The Mountain Zone. The dominant plant covering large areas of the mountain zone is the juniper: *Juniperus procera*; *Juniperus macropoda*; and *Juniperus phoenicia* (Kerfoot, 1961) which thrive in this zone because of the suitable weather and moisture that stimulates plant growth. While they thrive in isolated areas on mountain, peaks and along the western slopes, they cannot in low elevations. Rich juniper forests are found in Al-Sawdah, Jurrah and Gara.

Other plant species found frequently in the mountain zone are *A. asak*, *A. ethbaica*, *Commiphora sp.*, *Blepharis persice* and *Publicaria adenesis*. Several grass species that are abundant are *hypanzenia*, *Themed a triandra*, *Chrisopogon*
aucheria and Sporobolus marginatas (Brooks & Mandilt, 1983). Another plant found in abundance growing in dense wet areas such as valley banks is the acacia. Wild olive grows in isolated high elevations in isolated areas. Tamarisk thrive on valley banks, where people plant it to act as a defensive shield to protect their farms from devastating floods. *Acacia tortilis* grows in the mountain zone.

**Tihama.** In Tihama (zone two) the most distinguished plants are *Lavandula dentata, Solanum* spp. *senecio, Acacia asak, A. ethaica* and other deciduous plants like *Commiphora shimperi, C. myrrha* and *Grewia velutina* (Vesey-Fitzgerald, 1955).

The Tihama zone is the second most important zone in type of plant species. Plants of this zone grow in scattered areas except in the wet valleys and lower down on the slopes. Plant density decreases as the elevation decreases. The area is an arid zone that receives small amounts of rainfall, but it receives huge amounts of water flowing down from the mountains. This water is absorbed in flat areas such as watersheds and dams. Acacia is the plant most frequently found in the Tihama zone while a thick cover of grass grows on the slopes that are fed by rain and moisture during the dry season.

As the area is located below the sharp escarpment, natural plants suffer from devastating floods during the
monsoon season. In addition, the high summer temperature causes evaporation and dries out the plants.

**Coastal Zone.** The Red Sea Coastal Plain (zone three) is poor in vegetation cover. Common plants are the palm tree, tamarisk, bamboo and acacia (Rafai, 1987). The most common plant growing in this area is the *Acacia tortilis*. It is found in deep valleys and plateaus which are fed by large volumes of water coming down from the mountains during the monsoon season. Acacia grows in scattered stands or shrub forests. Several factors influence plant growth. High temperatures increase the evaporation rate especially during summer. It dries up the moisture which causes the death of the plant. Rainfall scarcity limits the number of plant species and the high rate of salinity hampers plant growth on the Coastal Plain.

**Wildlife**

Environment differentiation in Asir National Park and neighboring areas has made the park a suitable home for a variety of endemic wildlife species. The historical record illustrates that the area was abundant in wildlife when the vegetation cover was richer and thicker than now. In spite of the area's richness in several natural aspects, its wildlife is limited. Many species are now extinct; others are considered endangered. Wildlife habitat has been shrinking
since the beginning of this century for the following reasons:

1. Human population growth has created a high demand for land development. Humans have settled in water resource areas, at fertile soil sites and wet valleys and destroyed the original habitat of wildlife.

2. Overgrazing and extensive logging of trees and shrubs that shelter wildlife has caused reduction in wildlife species.


Al-Shareef (1984) notes "Hunting is still the main source of food for a large portion of the people" (p. 79). Others shoot wild animals because they attack their herds, or because they compete with the herds for grass and water. In spite of the above factors, Asir National Park is still rich in wildlife species which, if protected, will proliferate. Wildlife studies show 327 species residing in Asir National Park (Al-Khalili & Nader, 1984). This number gives great hope that the establishment of Asir National Park will provide protection, reintroduction and enhancement of wildlife habitats where food and shelter is available.

The advent of the automobile as well as the introduction of new weapons has encouraged hunting. In the past, most sections of Asir National Park were so isolated
they were not reachable. With the establishment of roads linking most of the park zones, people can now reach wildlife habitats easily. In addition, the newly passed hunting legislation was enacted too late to save many now extinct or on the verge of extinction species.

Some extinct animals are the lion, scavengers and zebra. Endangered species are the gazelles, leopard and Arabian ibex. Wildlife living in Asir National Park and surrounding areas are the red fox, white-tailed mongoose, striped hyena, tristrams wild cat, caracul lynx, Arabian leopard, Arabian rock hyrax, mountain gazelles, Arabian hare, porcupine, dormouse and sacred baboon (Nader & Buttiker, 1980; Abd El Rahman, 1986; Al-Shareef, 1984).

In spite of the strict prohibition of wildlife hunting in the park and in the rest of the region, animals are trapped and sold for economic purposes. The wolf and its pups are caught by the local park people and sold in markets or to zoos. They are caught alive in their habitat in places such as Al-Sawdah and Rijal Almna in Tihama. Nader and Buttiker (1980) report "2 wolves were seen at Abha market" (p. 409) and "One of four pups was caught after the killing of its mother about 1 1/2 months earlier" (Kept Alive at the Zoo of Coll. Ed. Abha) (p. 408), and "Pups bought from a bedouin who caught them two months earlier (Kept Alive at the Zoo of Coll. Ed. Abha) (p. 409).
Asir National Park is inhabited by a variety of birds. Surveys indicate there are more than 300 species of birds in the park, 32 of which are birds of prey. The most frequently sighted birds are the gray hornbill, abyssinian, masked weaver, the pygmy sunbirds, the bee-eater, Arabian songbirds, rock pigeon, doves, sand grouse, quail, sparrows, weaver birds, crows, kites, falcons, hawks, vultures, wagtails, flamingoes, seagulls and kingfishers (Saudi Arabia, 1985; Abd El Rahman, 1986; Barwood, 1980). Some bird species, such as turtle doves, doves and pigeons, have suffered from traditional trapping which is one of the most effective hunting methods practiced along the Red Sea coast. Buttiker (1988) reports "The large-scale trapping of turtle doves at three locations along the Red Sea shore, where over 100,000 birds are captured and brought alive to the markets of Jeddah and Gizan, or are eaten locally by an increasing population, is a real threat to this migrating bird species" (p. 17).

Asir National Park is also inhabited by other species such as insects, rodents and reptiles.

Agriculture

Agricultural activity is practiced in the villages located in Asir National Park. Agricultural lands are distributed over mountains, slopes, valleys and plateaus. Since the three zones of Asir National Park are rich in water resources and fertile soil, they are among the most
productive lands in Asir region. Agricultural activity in Asir National Park is characterized by small farms and overwhelmingly influenced by topography and tribal traditional rights.

The Mountain Zone. In this zone, the amount of water available for agriculture comes from rainfall. Terrace farming is the dominant irrigation method. Other farms, irrigated by traditional wells, support agriculture during the dry seasons. Terrace farms are distributed over the slopes and on the inner valleys in the mountain zone. Such farms are usually fed by rainfall maintained through a traditional system called khalij. The khalij extends from the highest summits and collects and transports water down to the farm. It is an excavated path with built up sides of stones and soil that keeps the water running smoothly from upper to lower elevations. This system is usually built and owned by the tribe and is subject to specific regulations and rights.

The dominant method of agriculture is the traditional one that requires a lot of physical effort and a serious defect is the wasting of a great deal of water. Common products in this zone are sorghum, barley and wheat. Alfalfa is extensively planted and used as forage for animals. This zone is famous for its limes, oranges, grapes, applies, pears, figs, peaches, and apricots. The highest demand products, which are extensively planted, are vegetables which
generate high incomes for the farmer. The largest markets in the region, Abha and Khamis Mushit, are located close to the mountain zone. Tomato, cucumber, eggplant, pepper, potato, garlic, pumpkin, acorn squash, radish, onion and carrot are the most frequently grown vegetable. Other products are planted for family consumption.

**Tihama.** Agriculture in the Tihama area (zone two) is concentrated on valley banks and low slopes. It is traditional agriculture dominated by the traditional irrigation system in which farmers do not use modern machinery, thus maintaining the ecosystem. Usually such wells are rich in water because the area is located in a watershed zone fed by floods coming from the high mountains. Since the soil is rich, it is an important agricultural area. Even with this great advantage, agricultural activity in this zone suffers from the traditional cultivation method that depletes soil fertility and produces low product yields.

Cultivated products are millet, wheat and barley. Coffee is planted in the mountains and banana farms are located in deeper valleys such as the famous Al-Mafjar villages. Vegetables and fruits are less common in this area because farmers lack the knowledge of how to plant these products.

Recently, investors have been buying large farms in this zone. They have had artisan wells dug and they have
introduced new machinery for the cultivation process. Such farms are rich in underground water and the soil is favorable for vegetable and fruit production during the warm winter season.

Coastal Plain. Agricultural activity in the Coastal Plain (zone three) is less productive because of the use of traditional farming methods and soil salinity. The most productive lands are those located on valley banks which are fed by flood and alluvial soil brought down from upper zones. Farms in this zone are large in size, and their wells are rich in water. Common products are millet and corn used for family consumption. Fruit and vegetables, except for tomatoes and watermelons, are rarely cultivated. Nowadays, this zone attracts investors to the productive lands reclaimed by fertilizers and water. Sand encroachment has been stabilized by planting trees and spraying water.

In general, agricultural activity is extensively practiced in Asir National Park, but is highly governed by water and fertile soil availability. Agricultural activity is overwhelmingly stimulated by factors such as the foundation of the Agricultural Bank, the availability of imported labor, and the high demand for agricultural products, especially fruits and vegetables.

The Agricultural Bank has expanded agricultural lands, providing farmers with long-term multi-purpose
interest-free loans. It also provides the farmer with the opportunity to purchase cultivation machinery on the installment plan.

Farmers themselves have given up cultivation operations for government jobs and have resorted to importing agricultural laborers from nearby countries. This labor force is well trained and works cheaply. At the same time, youth leave their villages to go to the city either to study or to look for jobs. The point here is that the farmers have encouraged importation of labor for the purpose of improving their economic status through agriculture. These imported workers are not environmentally aware and they act like the indigenous people of Asir National Park, adding to the current problems of the Park. They have been hired by farmers who own the land and they do what they are told to maintain their jobs.

Architecture

In general, Asir region is characterized by its architectural style that differs from the rest of the country. In spite of the domination of the imported style, many traditional houses still exit and people continue to dwell in them.

The topography and climate variations in the region has resulted in three types of traditional houses, each of
which are found in Asir National Park and differ from zone to zone.

1. The traditional mud house (Figure 5.A). Such houses are common in the mountain zone. It is the housing unit that was built completely from local raw materials. People stopped building this type of house two decades ago when the new imported raw materials became available in the local market. Construction of the traditional house requires a professional builder and a certain type of soil. The soil is mixed with straw and water, and preparation takes one day. The next day the contractor builds the first line. Building a traditional house often took more than two months and was commonly constructed during the dry season for the sun to dry the mud.

In the mountain zone the traditional house can be one story, but the most common type is two or three. The first floor is designed for the animals, the second consists of guest setting and sleeping rooms and the third floor consists of many bedrooms for the family, a kitchen, a grain storage room and a small washroom. Traditional houses were built in clusters on deadend streets and the multi-floor houses do not have courtyards. Most traditional houses have rain protection slates made of rock that protect the mud house from the heavy rain of the mountain zone. The first floor has one entrance and there are no windows, whereas small narrow windows open
Figure 5

A. Mud House

B. Stone House

C. Hut House

Source: Asir Heritage and Civilization, 1987
on the other floors. Such windows were intentionally designed to keep the cold air outside and the warm air inside the house. Other small holes were made in the body of the house to create cross ventilation.

2. **The stone house** (Figure 5.B). This type of house is built in a rectangular shape with rocks. Usually the stone house consists of one or two stories such as those found in the Sawdah site. In the Tihama zone, multistory stone houses, such as those located in Rijal Almma village, are very common. Some houses in Asir National Park were built of black stone (volcanic rock) and decorated with white quartz. Such houses still exist in the Tihama zone.

3. **Hut house** (Figure 5.C). This was the dominant dwelling along the Coastal Plain because of the extreme heat. The hut is made of local tree branches such as acacia and bamboo, covered with straw. It is plastered with mud from the inside. Since it has a wooden structure, it helps to reduce the temperature. Coastal Plain soils are not sufficient for building a mud house since the soil is highly saline, and the area consists of mobile sand. In addition, the construction of a hut dwelling is inexpensive and does not take time and effort as does the mud or stone house.

4. **Towers.** Towers are very common architectural features in Asir National Park. There are two types; one is the circle or the squared mud tower and the other is the
Rectangular Mud Tower

Circular Mud Tower

Stone Tower

Source: Asir Heritage and Civilization, 1987
squared or the circled stone house (Figure 6.A-B-C). The mud tower is very common in the mountain area. Its popularity can be attributed to the availability of fertile soil that is used to build such towers. Stone towers can also be found in the same zone due to the availability of rocks used for tower construction.

Stone towers are common in Tihama area because of the existing rocks. Mud towers are rare in this zone. Neither type of tower exists in the Coastal Plain, except for a few forts that were erected by the Turks; most of these have collapsed. The towers were used mainly as a military base by tribes whenever their villages were attacked by the enemy. The tower door is made of thick wood and has very tiny windows. In the middle of some towers there is a lookout area from which people could shoot anyone trying to enter the door. Some towers have stairs; others do not. In Asir National Park most of the towers still standing are bound to collapse because they lack maintenance and other service requirements. In this area, there are several forts that can be traced back more than two hundred years. Some have value as historic architecture such as the Turkish forts, but most of them have already collapsed.
CHAPTER 4

The Study Area and Its Analysis

Location

Asir National Park is located in Asir region, in southwestern Saudi Arabia between latitude 17° 30'-18° 30"N and longitude 41° 30'-43° 30'E. The Park area is 4500 km² (Al-Khalili & Nader, 1984) and comprises three different zones, each having its own features.

The Mountain Zone. Zone 1 is the mountain zone that is characterized by high elevation, prominent peaks and sharp escarpment in the west. This zone receives the greatest amount of rainfall in the country. This is accompanied by low summer temperatures, rich vegetation and a diversity of wildlife. It is the most scenic zone in Asir National Park as well as the location of a summer resort developed recreational sites.

Tihama. Zone 2 is located west of the mountain zone and occupies the canyon land of Tihama. It has hot summer temperatures, fair cover of vegetation and land rich in soil fertility and water resources.

Coastal Plain. Zone 3 is the Coastal Plain, extending from zone two down to the Red Sea. This area does have coral reef, but most of it is occupied by mobile sands and swamps.
It experiences extremely hot summers, scarcity of rain fall and poor vegetation cover.

Zone 1, the mountain zone, is the smallest zone occupying the escarpment rim of the mountain strip. Zones 2 and 3 represent the largest portion of Asir National Park and they share similar features, such as weather patterns and plant species.

Establishment

Studies on the park location began in 1976. The Ministry of Agriculture and Water engaged the United States National Park Service to study the area to determine the usefulness of establishing a national park. Studies showed that the park area consists of a variety of landforms, wildlife, plant diversity, climate variation and beaches. The U.S. National Park Service recommended integration of the outstanding features as well as preservation of a rich cultural heritage (United States-Saudi Arabian Joint Commission on Economic Cooperation, 1982).

On April 12, 1979 Retser Taiwan Company began building park facilities such as the headquarters, visitor center, outlook areas, exhibition room and rest rooms (Ryan, 1979). In 1981, the recreation sites were officially opened for public use.
The park establishment aims to achieve two goals: 1) maintenance of the park's natural, and 2) provide designated public recreational areas for visitors.

Management

Asir National Park is managed by the Ministry of Agriculture and Water. This agency is responsible for providing the park with employees, budgets, transportation, tools, etc. Park headquarters is located in the mountain zone, a few kilometers from Abha.

Until now, management's role has been limited. They control the recreation sites and a small area in zone 2, but the largest portion of the park is unmanaged. Park management's performance is hampered by such factors as the park's large size, rugged topography, shortage of qualified staff and the absence of environmental awareness among the people.

Park regulations are established by the Ministry of Agriculture and Water. The regulations are restrictive about exploitation of natural resources, including land use. The park management division has achieved some of its plans, such as planting, reintroduction of wildlife species, maintenance, fencing, communication and roads. Replanting has begun for some of the plants destroyed by human activities, particularly in the mountain zone where the recreational sites exist. The park's nursery is managed by the Ministry of Agriculture and Water, Asir branch. This agency has adequate
employees and equipment to plant and protect trees from disease. Other plant species have been introduced to the park and thrive under regulated water and protective regulations. The park's security team patrols the park to prevent damage to the natural resources. If a violation occurs, park management reports it to Asir Principality that enforces the law.

During the past few months, park management has reintroduced the gazelle in Wadi Bayed in Tihama. The area is guarded to protect gazelles from being hunted. According to park officials, the gazelle numbers have increased remarkably in a few months and now can be seen in the area.

Park management has a maintenance team that takes care of the facilities located in the recreational sites. This team's responsibility is to repair damages that occur as a result of vandalism. The recreation sites are divided into the family section and the bachelor section. These areas are fenced and gated for each site, protecting areas from grazing, and it also segregates the family section from the bachelor section.

Signs have been installed to instruct visitors on park use. Other signs warn visitors about fire prevention and destruction of park property.

Roads have been opened within the recreation sites and parking lots constructed to restrict cars in certain areas to
reduce damage to trees and soil that causes degradation. Additionally, recreational sites are linked to each other by paved roads.

The Recreation Sites (Developed Sites)

Four recreation sites have been developed in the mountain zone of Asir National Park: Al-Sawdah, Dalaghan, Garah and Habalah. They are provided with tourist facilities and are open for public use. These four sites receive a tremendous number of visitors, especially during the summer season, as these sites feature climatic amenities. Most visitors are Saudis, but a small percentage come from the Arabian Gulf States as well.

A. Al-Sawdah Site. Al-Sawdah (the Black Mountain) is located on the highest peak of Saudi Arabia in the Sarat Mountains about 3200m above sea level (Buttiker & Ferguson, 1983). It is about 26 km northwest of Abha between 18° 16'N-42° 22'E (Nader, 1981).

In addition to electricity and tap water, the site is provided with recreational facilities such as playgrounds, hiking paths, natural trails, lookouts, parking lots, rest rooms and picnic and camping areas.

Because of the area's high elevation, it is the coldest site in Asir National Park along with the richest vegetation and greatest rainfall. About three-fourths of the
area is covered with vegetation; the most dominant plant is the juniper.

One large hotel was constructed in Al-Sawdah, but in the summer season, it is filled to capacity and usually has no vacancies. Visitors camp in tents at sites that provide electricity, water and other services. Other visitors rent apartments or live in hotels in Abha City and they visit Al-Sawdah site during daylight hours. At the present time, many rental apartments are being built by the private sector for investment of capital in tourist projects.

Al-Sawdah is the most scenic site in Asir National Park. Visitors can enjoy the forest view, terrace farming, landforms, pleasant weather and the traditional architecture such as the stone house and Turkish forts.

B. Dalaghan Site. This site, outside the boundaries of Asir National Park, is located in the mountain zone on the eastern side of Al-Sawdah-Jirrah road, about 35 km southeast of Abha (Abulfatih, Emara & Hashish, 1989).

It is rich in vegetation, being dominated by acacia. The site is thickly covered by palatable grass (Abulfatih, et al., 1989). It is rich in wild flowers and other bushes that grow in the hills and on the valley banks and are well watered by a large reservoir built for the site.

The site attracts a large number of visitors because it has more open space and it is provided with recreational
facilities such as playgrounds, hiking paths, camping areas, a shopping center and rest rooms. The site lacks hotels and motels, but some rental apartments are available. Most visitors rent apartments or live in hotels in Abha City and spend the daylight hours at Dalaghan site. The weather here is very pleasant during the summer season as its elevation is lower than Al-Sawdah site. During winter, cold weather is minimized by warm air and fog that emerges from the lower Tihama zone.

C. Garah Site. This site, located approximately 31 km south of Abha on the escarpment rim of Sarat Mountains, is estimated to be 420 hectares (Ministry of Agriculture and Water, 1984). It is an open forest consisting of a variety of trees, but dominated by junipers that cover most of the area. The density of the plants provide visitors with shade as well as privacy for their families. The site has recreational facilities such as camping areas, playgrounds, trails, rest rooms, electricity and water.

Garah lacks hotels and motels except for a few rental apartments in neighboring areas. Visitors camp overnight in the site because of the availability of services; others live in Abha City but visit the site during daylight hours.

The climatic pattern is very pleasant during summer and cold in winter. It receives a fair amount of rain and is therefore rich in plant and wildlife species.
D. **Habalah Site.** This site is located 600 feet deep on the base of the cliff of Sarat Mountains about 42 km south of Abha. The village is surrounded by a cliff about 300 meters high. It was named Habalah because its population got its supplies delivered by rope from the upper escarpment. The only means of transportation in or out of the village is a rock stairway cut into the cliff.

This isolated village had been inhabited for 350 years because the people who had chosen to live here wanted to protect their lives from tribal warfare and later from the Turkish army.

The village population had practiced herding and lived on its own agricultural products such as coffee, bananas, pomegranates and fruits. The village had a few stone houses which are still standing. At the present time, the village has been abandoned, the population having left it to live in the highlands (Eigeland, 1980; United States-Saudi Arabian Joint Commission on Economic Cooperation, 1982).

**Overview of the Research**

The population of Asir National Park consists of fourteen scattered villages that are located in oases and valleys. These villages are: Al-Sawdah, Al-Sharaf, Garah, Dalaghan, Habalah, Jirrah, Al-Mafjar, Rijal Almamma, Al-Shuqayq, Al-Gahma, Wadi Al-Awra, Bani Hadi, Wadi Reem and Mahduwah (Fig. 7). Each of these villages consists of a group
1. Wadi Al-Awra 8. Rijal Alma
3. Gerah 10. Al-Sawdah
4. Dalaghan 11. Mahduwah
5. Halaqah 12. Bani Hadi

Source: Ministry of Agriculture and Water
of neighborhoods. These villages act as centers for nomads and farmers who roam the park with their herds. There is no accurate population number of the park because of the lack of a census. The population is estimated at 1500 to 2000 persons according to the park officials. The study area (Asir National Park) is divided into three zones with each zone having its own unique features. These zones are:

1) The Mountain zone which extends from Al-Sawdah (west) to Jirrah (south). This portion of Asir National Park occupies the area located between these two villages, is bordered by the road which links these villages and restricts this zone between the Sawdah and Jirrah highway from the east and the mountain rim from the west.

2) Tihama zone is the area which extends from the Mountain rim down to the sand dune desert. It extends from Rijal Almama north to Wadi Al-Awra in the far south.

3) The Red Sea Coastal Plain extends from the hilly area in the east to the Red Sea in the west and is bordered by Khamis Al Bahr in the north and Al-Shuqayq in the south.

The methodology used in this study was to interview the park population, interview governmental officials and through personal field observations.

Park Population

A questionnaire consisting of 22 questions (see Appendix A) was structured for the interview of the park
inhabitants. The questionnaire was divided into seven major issues: land development, overgrazing, hunting, logging, elimination and negligence of traditional architecture, local population economic status and the population's point of view regarding the establishment of the park and their relocation.

The interview was conducted informally with the park population for two weeks. It was held in the village mosques, firewood market, at wedding ceremonies, real estate offices and with individuals on roads, at water sources, grazing lands and with Bedouins in their residence. The people were very cooperative and a majority wondered why a written questionnaire was not available. They were willing to discuss anything except the hunting issue. The questionnaire was then translated into Arabic at King Saud University. After two weeks, the interview process began again. The hunting questions were asked informally due to the sensitivity of the issue. The formal questions are summarized as follows:

**Land Development.** The interview was conducted with people in the three zones by visiting each village in the park. People were asked about the length of time they have lived in the park, farm ownership, cultivation tools, farm expansion during the past ten years and the desire to enlarge or create new farms in the future.

The land development questions were aimed at achieving three goals: (i) to discover how long the individual has
lived in the area for the purpose of ascertaining if he was a new inhabitant or an original resident of the park village; (ii) to discover the types of machinery used in agriculture for determining the impact of modern machinery as opposed to traditional farm tools; and (iii) to discover if expansion was part of future plans and if so, why.

**Overgrazing.** The inhabitants were asked about livestock ownership: type, number and feeding patterns of livestock. This section aims (i) to discover the livestock distribution among the people to ascertain the percentage of people who raise animals; (ii) to determine the category and number of domesticated animals owned; (iii) to discover if the animals are fed by grazing, grain or both.

**Hunting.** The local population was asked about their point of view regarding wildlife, killing predators and hunting animals for food. The questionnaire aimed (i) to discover the predators that most people prefer to kill and the reasons; (ii) to determine that if people still practice hunting for food, what animal and bird species do they hunt. This will determine the status of endangered species in the park.

**Logging.** These questions stress the type, demand and location of trees for firewood. They aim: (i) to evaluate the type of tree that is used for firewood or producing charcoal; (ii) to determine the percentage of people who collect
firewood and (iii) the environmental area from which the trees are gathered.

Elimination and negligence of traditional architecture. These questions asked about the feelings toward traditional architecture, especially the traditional house. The goal was: (i) to discover the people's perceptions of traditional architecture in regards to eliminating it or replacing it with new housing through government loans. (ii) to determine if people will do maintenance and restoration work or abandon the structure when it is ready to collapse; (iii) to determine the people's point of view regarding local raw materials for building.

Economic status of those living in the park. Local inhabitants were asked about income, job and the role of the park in increasing or decreasing their income. These questions aim to (i) evaluate income to determine if poverty causes them to practice the above activities for their livelihood or do they practice them as a traditional lifestyle; (ii) to determine the local inhabitants' income; (iii) to determine if the park is playing a role in changing the people's income through tourism. The last question was asked to determine the local population's point of view about relocating in case the government wants to place the entire park area in a protected status. The aim of this question is to discover how willing they are to leave the park.
Interviewing of Officials. A formal interview was conducted with the officials of the governmental agencies who are concerned about Asir National Park. These include officials from the park, from the Ministry of Agriculture and Water and from the Tourism Development Department in Asir Principality. The interview consisted of twenty one questions (see Appendix B) that were typed in the Arabic language. An appointment was made with the head of each agency. The author was introduced to them through an official letter from King Saud University and the interviews were conducted individually.

The purpose of the interview was to determine the impact of human activities on the park's features based on the observations made by officials. The questions asked stressed the following issues (i) The impact of human activity on park features through changes noted such as erosion, land degradation, plant quantity and quality; (ii) classification of the activities to determine which activity has caused the most damage to park features and in what part of the park; (iii) regulations for park protection and conservation.

Personal Observation

During the field trip of summer 1991 and 1992, personal observation was carried out at the park. Farms, traditional architecture, forests, charcoal production
fields, wildlife habitats, firewood markets, livestock and grazing lands, beaches and selected locations of bedouins were visited. Slides were taken that show traces of logging, elimination of traditional architecture, domestic and wildlife animals, agricultural machinery, and the mass destruction as a result of land development. These slides present an image of the people's activities as practiced in Asir National Park.
CHAPTER 5

Analysis

Methodologies

The data obtained from interviews of park inhabitants, governmental officials and field observation are used to evaluate the impact of human activities that are taking place in Asir National Park, such as logging, overgrazing, hunting, land development and elimination and negligence of traditional architecture. The analysis aims to evaluate the impact and its distribution in each zone of the park and in the entire park. Analysis of data is employed to discover the following:

1) Events occurring at Asir National Park.
2) Impacts of human activities on park features.
3) Results and distribution over the study area.
4) Comparison of data for the three zones of the study area to discover which zone is impacted the most and which activities are most dangerous to the park's features.

This will ascertain where action needs to be undertaken to preserve the park.
Developing the Questionnaire

The questionnaire for the park population consists of 22 questions and addresses seven major issues (See Appendix A and Chapter 4 for details). Part one of the questionnaire, question one to question six, deals with land development. Part two, questions seven to nine, addresses perception of traditional architecture and use of raw materials. Part three, questions ten and eleven, stresses grazing activity. Part four, questions twelve to fourteen stress hunting activity. Part five, questions fifteen and sixteen, addresses logging activity. Part six, questions seventeen to twenty, addresses the economic status of the park population. Part seven, questions twenty-one and twenty-two, addresses the population's point of view regarding the establishment of the park and possible population relocation.

The interview with governmental officials consists of twenty-one questions (see appendix B and Chapter 4 for details). The interview inquired about the quality of the park's features and how human activities have induced changes in the park features. The questions also inquired about park regulations that are applied for protection and conservation of the park's features.

The questionnaires were of a simple structure designed to be as free of details as possible, as noted by Dixon and Leach (1978).
Undertaking the fieldwork: When, How, What

Fieldwork was undertaken during the summer of 1992 for two months from May 17 to July 8th. Upon arrival at Asir region, the author went to the College of Education, Geography Department and explained to the head of the department the purpose of the trip. The head of the department supported him with an official letter that was used to introduce him to government officials and to the interviewees.

The local population was interviewed informally over two weeks. After each interview, the data were recorded. After two weeks, the interviewees seemed to be willing to answer questions in a formal interview. They asked "We wonder why you don't have written questions." At this point, formal interviews were conducted with the exception of the hunting issue. On this issue, information was gathered informally because of the sensitivity of the topic.

Because of the park's large size, rugged topography and the extreme weather which could have hampered data collection, two field assistants were hired to help with data collection. The two assistants were familiar with the village locations, roads and the local population. They had automobiles that were needed because of the complete absence of public transportation, and their automobiles had the ability to go through sand and unpaved mountain roads.
The selection of the field assistants was made carefully by the author and some professors from the Geography Department who knew one of them as a student. Both field assistants are official employees of the telegraphy and public phone service sectors. They know the villages because of their jobs. Both are well educated. They were trained on data collection, the reading and explanation of questions and communication with interviewees. The questionnaire was translated from the English language to the Arabic language without any change in the meaning of the questions. The field assistants and I distributed the questionnaire to the local population and gathered data from interviewees.

Each evening, the assistants met with the author to turn in the collected data. During meetings, if necessary, problems were discussed and suggestions provided.

The first ten interviews conducted by each assistant were carried out in the author's presence to be sure that they understood the appropriate way of collecting data.

The author visited each village in the study area and took slides. Interviews of the local population were conducted in the park's fourteen villages (see Figure 7), and their neighborhoods. The sample size for this study was (N=230).

The sample size was based on park density. No accurate figures of the park population are available because of the
complete absence of an official census. The population of Asir National Park was estimated by officials and the author's field observations to be about 2000 people. The population of each zone of the park was estimated as the following:

The mountain zone (zone one) has about 800 people; Tihama zone (zone two) has about 700 people and the Red Sea Coastal Plain (zone three) has about 500 people. This sample is thus based on about 11% of each zone population.

Interviews were conducted with governmental officials who are responsible for the park. 1) Headquarters of Asir National Park; 2) the Ministry of Agriculture and Water, Asir branch; 3) the Department of Tourist Development in Asir Principality. Questions were translated and typed in the Arabic language on an official letterhead from King Saud University.

Each official was asked a series of questions and then his answers were written down. At the same time, the interview was recorded on tape for a verbatim record.

**Questionnaire Analysis**

For the collected data, percentages were computed for the following six issues: Logging, ownership of livestock, hunting, land development and economic status of the local population. The results of each issue are illustrated by
tables and figures. Each item on the questionnaire for the local population was analyzed separately as follows:

Question One: "How long have you been living here?" Analysis of percentage was used to determine the residency period of the respondent in each category (<10-yr, 11-20 yr and > 20 yr). Percentages of respondents in each zone of the park and over the entire park were computed: See Table 4.

Question Two: "Do you own a farm?" Analysis of percentages of respondents in each zone and over the entire park were computed to determine the percentage of farm ownership: See Table 5.

Question Three: "If the answer to the above question is yes, have you used new agricultural machinery in your farm operations?" "If yes, what type of machinery?" Percentages of respondents in each zone of the park and percentages of respondents over the entire park were used to determine the percentage of respondents who use agricultural machinery in their farm operations: See Table 6.

Question Four: "If you do own a farm, would you like to enlarge your farm area? Why?" Analysis of percentage of respondents in each zone of the park and percentages of respondents over the entire park were used to determine the percentage of respondents who would like to enlarge their
farm area: See Table 7. The chi-square test of significance was used to analyze the spatial distribution of responses (See chapter 6).

Question Five: "Has your farm area increased in size during the past ten years? If yes, how much?" Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were used to determine the percentage of respondents who increased their farm area during the past ten years: See Table 8.

Question Six: "Do you own private land that you intend to develop?" Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were computed to determine the percentage of respondents who will develop private land in the future: See Table 9.

Question Seven: "If you wished to build a new house which of the following would you use - modern methods or hand labor?" Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were calculated to determine the percentage of respondents who consider building a new house either by modern methods or hand labor: See Table 10.

Question Eight: "What is your opinion regarding traditional housing? Should it be eliminated or should it be preserved. Why?" Analysis of percentage of respondents in
each zone of the park and percentages of respondents over the entire park were computed to determine the percentage of respondents who tend to eliminate or preserve the traditional house: See Table 11. The chi-square test of significance was also employed.

Question Nine: "If you consider building a new house, would you use the available local materials?" Analysis of percentage of respondents and percentages or respondents over the entire park were computed to determine the percentage of respondents who would use local materials when building a new house: See Table 12.

Question Ten: "Do you own livestock? If yes, how many? Which kind of the following: Cows - Goats - Sheep - Camels?" Analysis of percentage of respondents in each zone in the park and percentages of respondents over the entire park were calculated to determine the ownership of livestock: See Table 13.

Analysis of the number of respondents who own livestock according to the four categories: cows, goats, sheep and camels was given. The percentage of each category was computed respectively because respondents gave more than one answer. (Most respondents raise three kinds of livestock.): See Table 13A.
Question Eleven: "If you have livestock, how do you feed them? Grazing - Grain - Both?" Analysis of percentages of respondents in each zone of the park and the percentages of respondents over the entire park were computed to determine how people feed their livestock: See Table 14.

Question Twelve: "Do you prefer to get rid of predator animals (i.e., wolves)? Why?" Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were calculated to determine the percentage of people who tend to kill predator animals: See Table 15.

Question Thirteen: "Do you practice hunting for food?" Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were computed to determine the percentage of people who practice hunting: See Table 16.

Question Fourteen: "If the answer to the above question is yes, what are the animals you prefer to hunt?" Analysis of number of respondents in each zone was calculated. The respective percentage of animals that are hunted was computed respectively because most respondents gave more than one answer: See Table 17.

Question Fifteen: "Which one of the following do you use to warm your house during the cold season? Firewood - Charcoal - Electricity?" Summation of number of respondents
in each zone of the park was used and the respective percentage of respondents who use firewood, charcoal or electricity respectively was computed because most respondents gave more than one answer: See Table 18.

Question Sixteen: "Which one do you prefer: To buy or to collect firewood? Where do you collect it? What type of wood do you prefer?" Analysis of percentage of respondents in each zone and the percentages of respondents over the entire park were calculated to determine the percentage of people who buy, collect or who do not rely on firewood: See Table 19.

Question Seventeen: "Has your income increased since the establishment of Asir National Park? How?" Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were computed to determine the percentage of people whose income increased since the establishment of the park: See Table 20.

Question Eighteen: "Do you have a job?" Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were calculated to determine the percentage of people who have a job: See Table 21. The chi-square test of significance was also employed.
Question Nineteen: "Do you have a constant monthly income?" Analysis of percentage of respondents in each zone of the park and the percentage of respondents over the entire park were computed to determine the percentage of people who have a constant monthly income: See Table 22. The chi-square test of significance was applied.

Question Twenty: If the answer to question 19 is yes, then could you tell in which of the categories your income falls? 1000 - <2000 S.R.; 2000 - <3000 S.R.; 3000 - <4000 S.R.; 4000 - <5000; >5000 S.R.
Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were computed to determine the percentage of people in each category (Fig. 18).

Question Twenty-one: "Are you happy with the establishment of Asir National Park? Why?" Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were computed to determine the people's point of view regarding the park establishment: See Table 24.

Question Twenty-two: "Do you prefer to be relocated somewhere else out of the park? Why?" Analysis of percentage of respondents in each zone of the park and the percentages of respondents over the entire park were calculated to
determine the percentage of people who are willing to be relocated: See Table 25.

Finally, for the purpose of making a comparison between the three zones of the park to determine which zone suffers the most impact, tables and figures are presented. The percentage of respondents in each zone as well as that of the entire park were computed for each issue.

Tables 5, 7, 8, 9 and Figures 13-16 illustrate the percentage of respondents who were involved in land development in each zone of the park as well as that of the entire park.

Table 11 and Figure 17 reflect the percentage of respondents who tend to eliminate traditional architecture in each zone of the park, as well as that of the entire park.

Tables 13 and 14 and Figures 9 and 10 show the percentage of respondents who own livestock and who rely on grazing or grain or both in feeding their livestock in each zone of the park as well as that of the entire park.

Table 15 and Figure 12 illustrate the percentage of respondents who tend to kill predators in each zone of the park, as well as that of the entire park.

Table 16 and Figure 11 reflect the percentage of respondents who practice hunting in each zone of the park as well as that of the entire park.
Table 19 and Figure 8 illustrate the percentage of respondents who were involved in logging activity in each zone of the park as well as that of the entire park.

Figure 19 illustrate the percentage of respondents who were involved in logging, grazing, hunting, land development and elimination of traditional architecture on the park level.
Table 4. Percentage of respondents in each zone of the park and percentage of respondents of the entire park reflecting the length of residence of respondents in each category

<table>
<thead>
<tr>
<th>N. of Obs.</th>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Total % of Respondents in the Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10 yr</td>
<td>21</td>
<td>2.1</td>
<td>18.8</td>
<td>7.3</td>
</tr>
<tr>
<td>11-20 yr</td>
<td>12</td>
<td>1.1</td>
<td>2.5</td>
<td>16.4</td>
</tr>
<tr>
<td>&gt; 20 yr</td>
<td>197</td>
<td>96.8</td>
<td>78.7</td>
<td>76.3</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5. Percentage of respondents in each zone of the park and in the entire park reflecting farm ownership

<table>
<thead>
<tr>
<th>% of Respondents</th>
<th>Over the Entire Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Has a farm</td>
<td>189</td>
</tr>
<tr>
<td>Has no farm</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
</tr>
</tbody>
</table>
Table 6. Percentage of respondents in each zone of the park and percentage of respondents in the entire park reflecting the usage of agricultural machinery

<table>
<thead>
<tr>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. of Obs.</td>
</tr>
<tr>
<td>Using Machinery</td>
<td>179</td>
</tr>
<tr>
<td>Not using</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>189*</td>
</tr>
</tbody>
</table>

*Number of farmers among total respondents.

Table 7. Percentage of respondents in each zone of the park and percentage of respondents in the entire park reflecting the tendency for farm enlargement

<table>
<thead>
<tr>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. of Obs.</td>
</tr>
<tr>
<td>Would like to</td>
<td>108</td>
</tr>
<tr>
<td>enlarge farm</td>
<td></td>
</tr>
<tr>
<td>Would not like</td>
<td>81</td>
</tr>
<tr>
<td>to enlarge farm</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>189*</td>
</tr>
</tbody>
</table>

*Number of farmers among total respondents.
Table 8. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting increments of farm area during the past ten years

<table>
<thead>
<tr>
<th></th>
<th>N. of Obs.</th>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm area increased</td>
<td>76</td>
<td>37.2</td>
<td>45.5</td>
<td>40.0</td>
<td>40.2</td>
</tr>
<tr>
<td>Farm area did not increase</td>
<td>113</td>
<td>62.8</td>
<td>54.5</td>
<td>60.0</td>
<td>59.8</td>
</tr>
<tr>
<td>Total</td>
<td>189*</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

*Number of farmers among total respondents.

Table 9. Percentage of respondents in each zone of the park and percentage of respondents in the entire park reflecting private land development in the future

<table>
<thead>
<tr>
<th></th>
<th>N. of Obs.</th>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will develop private land</td>
<td>137</td>
<td>59.6</td>
<td>90.9</td>
<td>77.5</td>
<td>72.5</td>
</tr>
<tr>
<td>Will not develop private land</td>
<td>52</td>
<td>40.4</td>
<td>9.1</td>
<td>22.5</td>
<td>27.5</td>
</tr>
<tr>
<td>Total</td>
<td>189*</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

*Number of farmers among total respondents.
Table 10. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting the usage of modern methods and hand labor when building a new house

<table>
<thead>
<tr>
<th></th>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Use modern methods</td>
<td>225</td>
<td>96.8</td>
</tr>
<tr>
<td>Use hand labor</td>
<td>5</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Total 230* 100 100 100 100

*Number of respondents

Table 11. Percentage of respondents in each zone of the park and percentage of respondents in the entire park reflecting the respondent’s perception regarding the traditional house

<table>
<thead>
<tr>
<th></th>
<th>% of Respondents</th>
<th>Over the Entire Park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Elimination</td>
<td>110</td>
<td>29.5</td>
</tr>
<tr>
<td>Preservation</td>
<td>120</td>
<td>70.5</td>
</tr>
</tbody>
</table>

Total 230* 100 100 100 100

*Number of respondents
Table 12. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting the usage of local materials when building a new house

<table>
<thead>
<tr>
<th>% of Respondents</th>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. of Obs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use local materials</td>
<td>12</td>
<td>4.2</td>
<td>3.8</td>
<td>9.1</td>
</tr>
<tr>
<td>Do not use local materials</td>
<td>218</td>
<td>95.8</td>
<td>96.2</td>
<td>90.9</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 13. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting the ownership of livestock

<table>
<thead>
<tr>
<th>% of Respondents</th>
<th>Over the Entire Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Own livestock</td>
<td>189</td>
</tr>
<tr>
<td>Does not own livestock</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
</tr>
</tbody>
</table>
Table 13A. Number of respondents in each zone of the park and the relative percentage of respondents who own each type of livestock

<table>
<thead>
<tr>
<th></th>
<th>Number of Respondents</th>
<th>% of Respondents in the park respectively</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone 1</td>
<td>Zone 2</td>
</tr>
<tr>
<td>Cows</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Goats</td>
<td>61</td>
<td>67</td>
</tr>
<tr>
<td>Sheep</td>
<td>50</td>
<td>21</td>
</tr>
<tr>
<td>Camels</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 14. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting how respondents feed their livestock

<table>
<thead>
<tr>
<th></th>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. of Obs.</td>
<td>Zone 1</td>
<td>Zone 2</td>
</tr>
<tr>
<td>Rely on grazing</td>
<td>67</td>
<td>23.0</td>
</tr>
<tr>
<td>Rely on grains</td>
<td>8</td>
<td>5.4</td>
</tr>
<tr>
<td>Rely on both</td>
<td>114</td>
<td>71.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>189*</td>
<td>100</td>
</tr>
</tbody>
</table>

*Number of respondents who own livestock.
Table 15. Percentage of respondents in each zone of the park and percentage of respondents in the entire park reflecting the percentage of respondents who prefer to get rid of predators

<table>
<thead>
<tr>
<th></th>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Kill predators</td>
<td>185</td>
<td>78.9</td>
</tr>
<tr>
<td>Do not kill predators</td>
<td>45</td>
<td>21.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>230</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 16. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting the percentage of respondents who practice hunting and others who do not

<table>
<thead>
<tr>
<th></th>
<th>% of Respondents</th>
<th>Over the Entire Park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Practice hunting</td>
<td>188</td>
<td>78.9</td>
</tr>
<tr>
<td>Do not practice hunting</td>
<td>42</td>
<td>21.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>230</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 17. Number of respondents in each zone of the park and the relative percentage of respondents who prefer to hunt wildlife

<table>
<thead>
<tr>
<th></th>
<th>Number of Respondents</th>
<th>% of Respondents in the park respectively</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone 1</td>
<td>Zone 2</td>
</tr>
<tr>
<td>Rabbit</td>
<td>70</td>
<td>65</td>
</tr>
<tr>
<td>Dormouse</td>
<td>33</td>
<td>47</td>
</tr>
<tr>
<td>Gazelle</td>
<td>9</td>
<td>36</td>
</tr>
<tr>
<td>Birds</td>
<td>74</td>
<td>46</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 18. Number of respondents in each zone of the park and the relative percentage of respondents who prefer to use firewood, charcoal and electricity

<table>
<thead>
<tr>
<th></th>
<th>Number of Respondents</th>
<th>% of Respondents in the park respectively</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone 1</td>
<td>Zone 2</td>
</tr>
<tr>
<td>Firewood</td>
<td>85</td>
<td>80</td>
</tr>
<tr>
<td>Charcoal</td>
<td>66</td>
<td>21</td>
</tr>
<tr>
<td>Electricity</td>
<td>70</td>
<td>4*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Respondents who generate electricity through their own generators.
Table 19. Percentage of respondents in each zone of the park and the percentage of respondents in the park reflecting the respondents preferences regarding buying or collecting firewood and charcoal, or relying only on electricity

<table>
<thead>
<tr>
<th></th>
<th>% of Respondents</th>
<th>Over the Entire Park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Buy</td>
<td>46</td>
<td>27.4</td>
</tr>
<tr>
<td>Collect</td>
<td>182</td>
<td>70.5</td>
</tr>
<tr>
<td>Only electricity</td>
<td>2</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 20. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting the increment of respondent's income as a result of the park establishment

<table>
<thead>
<tr>
<th></th>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Income increased</td>
<td>66</td>
<td>27.4</td>
</tr>
<tr>
<td>Income did not increase</td>
<td>164</td>
<td>72.6</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 21. Percentage of respondents in each zone in the park and the percentage of respondents in the entire park reflecting the percentage of respondents who have a job

<table>
<thead>
<tr>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Has a job</td>
<td>129</td>
</tr>
<tr>
<td>Has no job</td>
<td>101</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
</tr>
</tbody>
</table>

Table 22. Percentage of respondents in each zone of the park and the percentage of respondents in the park reflecting the percentage of respondents who have a constant monthly income

<table>
<thead>
<tr>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Has constant monthly income</td>
<td>143</td>
</tr>
<tr>
<td>Has no constant monthly income</td>
<td>87</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
</tr>
</tbody>
</table>
Table 23. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting the percentage of respondents in each category

<table>
<thead>
<tr>
<th>Income in Saudi Riyal</th>
<th>N. of Obs.</th>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Over the Entire Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000–&lt;2000</td>
<td>93</td>
<td>21.1</td>
<td>53.8</td>
<td>54.5</td>
<td>40.4</td>
</tr>
<tr>
<td>2000–&lt;3000</td>
<td>41</td>
<td>12.6</td>
<td>23.7</td>
<td>18.2</td>
<td>17.8</td>
</tr>
<tr>
<td>3000–&lt;4000</td>
<td>35</td>
<td>13.7</td>
<td>12.5</td>
<td>21.8</td>
<td>15.2</td>
</tr>
<tr>
<td>4000–&lt;5000</td>
<td>21</td>
<td>18.9</td>
<td>2.5</td>
<td>1.8</td>
<td>9.2</td>
</tr>
<tr>
<td>&gt;5000</td>
<td>40</td>
<td>33.7</td>
<td>7.5</td>
<td>3.7</td>
<td>17.4</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 24. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting the percentage of respondents who either like or dislike the park establishment

<table>
<thead>
<tr>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Happy with park establishment</td>
<td>197</td>
</tr>
<tr>
<td>Not happy with park establishment</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
</tr>
</tbody>
</table>
Table 25. Percentage of respondents in each zone of the park and the percentage of respondents in the entire park reflecting the percentage of respondents who are willing to be relocated.

<table>
<thead>
<tr>
<th></th>
<th>% of Respondents</th>
<th>Total % of Respondents in the park</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N. of Obs.</td>
<td>Zone 1</td>
</tr>
<tr>
<td>Prefer relocation</td>
<td>19</td>
<td>7.4</td>
</tr>
<tr>
<td>Do not prefer relocation</td>
<td>211</td>
<td>92.6</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
<td>100</td>
</tr>
</tbody>
</table>
CHAPTER 6
Results and Discussion of the Impact of Human Activities

Asir National Park is an area rich in natural and cultural resources and has attracted human settlement for many centuries. Since the beginning of this century, its resources have been seriously exploited by its human inhabitants. However, it is only recently that the importance of these resources in an arid country, such as Saudi Arabia, has been realized. As a result, the need to preserve these resources became apparent and Asir National Park was established. The park's achievement of its goals requires complete protection of its resources to preserve the area for future generations. Therefore, according to the National Park's Policy, human activities such as logging, overgrazing, hunting, land development, and elimination and negligence of traditional architecture, which are contrary to the park's objectives, must be reduced.

Logging

Whereas logging is identified in other parts of the world with lumber and construction purposes, in Asir National Park cutting trees for firewood is considered logging.

The survey indicated that for warming their homes during winter and for cooking purposes, 58.7 percent of the
park respondents rely on firewood; 21.6 percent depend on charcoal and 19.7 percent rely on electricity (Table 18). Although electricity has been made available to most respondents of the park, they still depend on firewood and charcoal for cooking and heating purposes because it is the most inexpensive means available.

Because of the design, respondents' houses lack electrical heating systems and this is a major reason for the high consumption of firewood and charcoal. Secondly, the respondents have a traditional habit of using firewood and charcoal, inherited from past generations. In addition, the availability of trees attracts people to violate the logging law in order to satisfy their needs. As a result, the use of electricity is being ignored. This non-usage of electricity for basic domestic purposes keeps the demand of firewood and charcoal high.

The survey also illustrated that respondents of the park satisfy their demand for firewood and charcoal either by buying or collecting it themselves.

The mountain zone (zone one) leads the other two zones with 27.4 percent of respondents buying and using firewood and charcoal (Fig. 8). Cold winters bring a rise in demand for firewood and charcoal. Sellers of firewood and charcoal in local markets buy firewood and charcoal from professional firewood harvesters and charcoal producers who bring their
Fig. 8. Percentage of respondents in each zone, and that of the entire park respondents, reflecting the percentage of respondents who buy or collect firewood and charcoal or rely only on electricity.
In the mountain zone, respondents rely on firewood and charcoal because they are available, cheap, easy to use and produce satisfactory heat. As the zone is the richest zone in vegetation in the entire park, firewood is collected from forests, valleys and the slopes. Of the respondents in the mountain zone, 70.5 percent collect firewood (Fig. 8). They rely on collecting because it saves them money, whereas buyers believe that firewood prices are very cheap. Respondents state they rely on firewood because it is easy to use.

In the mountain zone also, reliance on electricity is low. Of the respondents of this zone, 2.1 percent rely solely on electricity (Fig. 8). Some respondents replied they rely on electricity because it is more secure, sanitary and keeps the house clean.

Other respondents who prefer using firewood and charcoal stated that using firewood and charcoal is a cultural custom. They use firewood and charcoal for heating houses during winter, and for cooking and preparing hot beverages such as tea and coffee.

The most preferable types of firewood gathered in the mountain zone are juniper, wild olive, acacia and some tamarix. The type purchased most frequently either as firewood or charcoal is *Acacia tortilis*. Most respondents
prefer *Acacia tortilis* because it produces less smoke and the fire lasts longer than any other type. It is the most dominant type of firewood, purchased either as firewood or as charcoal, and commands the highest prices on the markets.

In the **Tihama** zone (zone two) 10 percent of respondents buy firewood and charcoal; 90 percent collect firewood themselves. Electricity is not available in this zone except for some respondents who own generators (Fig. 8). Firewood is considered the most reliable source of fuel. This can be attributed to the type of respondents, who are nomads and semi-nomads who rely on firewood. The high consumption of firewood is not for heating their houses in the pleasant winter which is warm, but for cooking purposes and some respondents collect firewood as a source of income. They produce charcoal that they sell in local markets. They rely on firewood because it is available. A variety of plant species grow on the slopes and in plateaus and the respondents gather firewood from valleys, forests and farms. After floods, they collect the wood that washes down from the mountains. The most collected type of wood in Tihama zone is *Acacia tortilis*, ziziphus, tamarix and acacia.

In the **Red Sea Coastal Plain** (zone three) 21.8 percent of the respondents buy firewood and charcoal and 78.2 percent of respondents collect and use firewood and charcoal (Fig. 8). Most respondents in this zone rely on firewood and
charcoal for cooking purposes as this zone experiences a pleasurable winter climate. Field observations and interviews illustrated that most dealers of firewood and charcoal are from Tihama and the Red Sea Coastal Plain zones. Gathering firewood and producing charcoal in these two zones are considered important sources of income. The most frequently collected type of firewood in the Red Sea Coastal Plain is *Acacia tortilis*, *ziziphus* and *tamarix*.

In general 20.0 percent of the respondents of the entire park resort to buying firewood and charcoal, whereas 79.1 percent of the entire park respondents supply their demand for firewood by collecting their own. Only 0.9 percent of the entire park respondents use only electricity (Fig. 8).

The survey showed that certain plant species of Asir National Park are badly affected by logging activity. According to governmental officials, cutting trees for firewood and charcoal is the most serious and destructive activity being practiced. It constitutes a serious threat to vegetation cover. It is the main reason for the disappearance of many plant species of the park. Governmental agencies have observers watching the logging activity practiced in the park. They report that the number of *Acacia tortilis* and junipers have been shrinking and forests in isolated, remote, and inaccessible areas are highly impacted. A severe penalty has been imposed to enforce the logging prohibition. The
 penalty is a jail sentence and a fine of $266 for each tree and $80 for each shrub logged. The penalty is seldom enforced and, therefore, ineffective.

**Overgrazing**

In the entire park, 82.2 percent of respondents own livestock (Fig. 9). In the entire park, goats are the number one type of livestock raised by 53.8 percent of the respondents. Sheep are second by 30.3 percent of respondents. Camels are the third type of livestock raised by respondents at 9.8 percent. Raising cows is the least likely type of livestock raised by 6.1 percent of respondents (Table 13A). On the park level, the survey indicated that 35.4 percent of respondents rely solely on grazing as feed for their livestock; 4.2 percent rely on grains and 60.4 percent depend on both grazing and grains for feeding their livestock (Fig. 10).

In the **mountain zone** (zone one) 77.9 percent of respondents own livestock (Fig. 9). Despite the availability of grazing lands, ownership of livestock is the least in this zone compared with the other two zones due to the low nomadic rate. In this zone raising goats is the highest (Table 13A). It seems goats are the best animal to raise because of their ability to live in the rugged mountainous area. Sheep are the second type of livestock raised and cows and camels are the
Fig. 9. Percentage of respondents in each zone, and that of the entire park respondents, illustrates the percentage of respondents who own livestock.
Fig. 10. Percentage of respondents in each zone, and that of the entire park respondents, indicating the percentage of respondents who rely on grazing or grains, or on both in feeding their livestock.
ruggedness of the mountains and that heavy animals cannot tolerate living in this type of landscape.

In the mountain zone, 71.6 percent of respondents rely on both grazing and grains for feeding their livestock; 23.0 percent rely on grazing only and 5.4 percent depend on grains only (Fig. 10).

For several years, the government has subsidized grains, especially barley, which is either a local or imported product. This step was taken to mitigate overgrazing pressure on lands. In spite of this, most respondents consider grain prices expensive and unaffordable.

Raising livestock in the mountain zone is a traditional activity that is considered an important source of livelihood. People raise livestock because they utilize the meat and milk and its derivatives. For many respondents, livestock is their main source of income as they sell them in local markets. Livestock prices increase greatly during the Islamic occasions in which people slaughter livestock as a religious ritual. They also increase during the Ramadan month, at pilgrimage time, for festive occasions, such as weddings.

The Tihama zone (zone two) ranks second in raising livestock with 83.8 percent of respondents in this zone owning livestock (Fig. 9). Tihama leads the other two zones in raising goats, followed by sheep, camels and cows (Table
This zone also surpasses the other two zones in relying on grazing with 44.8 percent of respondents depending solely on grazing for feeding their livestock; 4.5 percent rely solely on grains and 50.7 percent depend on both grazing and grains for feeding livestock (Fig. 10).

The Red Sea Coastal Plain (zone three) ranks first in the entire park in raising livestock with 87.3 percent of respondents owning livestock (Fig. 9) Goats are the number one livestock raised in this zone followed by sheep, camels and cows (Table 13A). The Red Sea Coastal Plain leads the other two zones in raising camels. This can be attributed to the topography of this zone as it is sand desert. Camels are the best type of animal to accommodate and tolerate a desert climate. In addition, the camel is used as transportation in remote areas that do not yet have paved roads.

In the Red Sea Coastal Plain, 41.7 percent of respondents rely on grazing for feeding their livestock; 2.1 percent rely on grains and 56.2 percent rely on both grazing and grains (Fig. 10).

Reliance on grazing in Asir National Park causes overgrazing and shrinking of grazing lands over the entire park. Although not officially measured, desertification is observed by park officials who state that it is clearly noticeable as a result of overgrazing. According to governmental officials, the park is highly impacted by
overgrazing. Governmental agencies discovered these results through their team's field observations. They affirmed that shrubs, palatable grass, and recently replanted species of plants are highly affected. At the present time, animal grazing is practiced in developed sites of Asir National Park except for Dalaghan sites which are completely fenced. Shepherds violate the law and graze their herds in protected areas. Linking the park villages with paved roads has enabled nomads to transport their herds by truck to areas that are rich in grass and vegetation. Such areas were not reachable in the past because they were in isolated and inaccessible areas. According to officials, areas affected the most by grazing are lands near villages and water resources as well as vegetated areas.

**Hunting**

The practice of hunting for food by respondents in Asir National Park is common. In the entire park, the survey showed that 81.7 percent of respondents hunt for food (Fig. 11).

On the park level, 32.7 percent of respondents prefer to hunt rabbit which is the favorite target of hunters. The second target is birds. Birds are consumed by 30.8 percent of respondents. The dormouse is the third favorite hunted animal preferred by 22.9 percent of respondents. The gazelle at 13.6 percent is the fourth most hunted animal (Table 17).
Fig. 11. Percentage of respondents in each zone, and that of the entire park respondents, illustrates the percentage of respondents who practice hunting.
Park respondents do not discriminate between wildlife species. They hunt what can be hunted for food and kill other wildlife, such as predators, because they claim they attack their herds.

The killing of wildlife, especially predators, is high. On the park level, the survey showed that 80.4 percent of respondents prefer to get rid of all predators such as the wolf, hyena, tiger and wildcat (Fig. 12). In the mountain zone (zone one), the survey showed that 78.9 percent of respondents hunt for food (Fig. 11). The mountain zone leads the other two zones in bird hunting. Rabbit is second; the dormouse is third, followed by the gazelle (Table 17). In the mountain zone, 78.9 percent prefer to get rid of predators (Fig. 12).

The Tihama zone (zone two) leads the other two zones in the practice of hunting. The survey indicated that 83.8 percent of respondents hunt (Fig. 11). In Tihama zone, rabbit is the favorite hunted animal. The dormouse is second and birds are third. The Tihama zone leads the other two zones in hunting gazelle (Table 17).

Tihama zone also leads the other two zones in killing predators. Of the respondents 88.8 percent prefer to get rid of predators (Fig. 12).
Fig. 12. Percentage of respondents in each zone, and that of the entire park respondents, reflecting the percentage of respondents who prefer to kill predators.
The Red Sea Coastal Plain zone (zone three) is second in the practice of hunting with 83.6 percent of respondents who hunt (Fig. 11). In this zone, the dormouse is the first target of hunters, followed by birds. The rabbit is the third most hunted animal, followed by the gazelle, respectively (Table 17).

The survey showed that the Red Sea Coastal Plain zone is the last zone in killing predators with 70.9 percent of the respondents preferring to get rid of predators (Fig. 12).

The high rate of hunting in Asir National Park can be attributed to several reasons. Construction of roads seems to be the number one reason that has increased the rate of hunting. The common ownership of cars among people helps them to search the park, especially remote, isolated, inaccessible areas. Another reason seems to be the common usage of firearms. Furthermore, the law banning hunting has only recently been enacted. Hunting is still practiced by most people who are not cooperative or do not know about the importance of wildlife. The last reason is the existence of many types of wildlife in Asir National Park.

Wildlife predators are killed by a high percentage of herdsmen and farmer respondents. Herdsmen revealed that they will not hesitate to kill predators because they claim that predators attack their herds and some attack humans. Such
actions have driven predators as well as other wildlife species to the verge of extinction.

According to governmental officials, hunting is totally banned in Asir National Park except for hunting with falcons during the hunting period which is established by the government. Despite the ban on hunting, officials revealed there are hunters who capture gazelle alive and sell them in local markets for about $1066. Although a severe punishment has been enacted to reduce hunting activity, it is not enforced.

According to park officials' observation teams, the gazelle has been considered an endangered species for the past few years. Since last year, it has been removed from the endangered species list because park management has reintroduced them into their original habitats in Wadi Bayed in Tihama zone. The park management hired observers to protect gazelle from hunting and in a short span of time, they have proliferated.

Land Development

The survey showed that land values and land development have increased in Asir National Park in general and, in particular, in the mountain zone where recreational sites are located. As a result some mobile respondents on the park level have established their own farms among the tribes
although Asir National Park is a governmental reserve except for farms that are owned by approved governmental documents.

On the park level, the survey showed that 9.1 percent of the respondents have lived in the park less than ten years; 5.2 percent have lived in the park 11-20 years and 85.7 percent have lived in the park for more than twenty years (Table 4).

The survey indicates that 82.2 percent of respondents own farms (Fig. 13), and that 94.7 percent of respondents on the park level use machinery for farm operations (Table 6).

The survey also indicated that 57.1 percent of farmers on the park level wish to enlarge the size of their farms (Fig. 14). During the past ten years 40.2 percent of the entire park respondents have increased the area of their farms (Fig. 15) and that 72.5 percent of the entire park respondents would like to develop private land in the future (Fig. 16).

In the mountain zone (zone one), the survey showed that 96.8 percent of the respondents have been settled in this zone for more than twenty years. Most respondents answered that because of their past family ties, they have lived in this zone for hundreds of years. The remaining results indicate that in the mountain zone 1.1 percent have
Fig. 13. Percentage of respondents in each zone, and that of the entire park respondents, indicating the percentage of farm ownership.
Fig. 14. Percentage of respondents in each zone, and that of the entire park respondents, showing the percentage of respondents who would like to enlarge their farm area.
Fig. 15. The percentage of respondents in each zone, and that of the entire park respondents, illustrates the percentage of respondents whose farm areas have increased during the past ten years.
Fig. 16. Percentage of respondents in each zone, and that of the entire park respondents, illustrates the percentage of respondents who will develop private land in the future.
lived there from 11 to 20 years and 2.1 percent have lived there less than ten years (Table 4). Most of the respondents are the original population of the mountain zone. Those who just settled said they were nomads who decided to settle on their own lands with their herds.

Of the respondents in the mountain zone, 98.9 percent own farms, leading the other two zones in terms of farm ownership (Fig. 13). This can be attributed to the fact that this zone receives the highest amount of rainfall as well as having soil with the greatest fertility. People own farms because they are productive and because it is a customary tradition. In addition, they own farms from generation to generation and they cannot sell even a part of it.

In the past using animals in farm operations was the only means of cultivation, but it was a hard task. Of the respondents 94.7 percent of the mountain zone respondents have been using agricultural machinery since it became available in local markets (Table 6). Farmers who do not use machinery say they cannot do so because their farm's location is inaccessible, being located on slopes or isolated areas that are too difficult to reach. They use animals such as cows for cultivation and donkeys for transportation in their farm operations. Others do not use agricultural machinery because their farms are surrounded by neighboring farms. In
this case, they need to get permission from their neighbors to bring the agricultural machinery across their property.

In the mountain zone, 36.2 percent indicated that they would like to enlarge their farms (Fig. 14). Those who would like to enlarge their farms feel they need more land to increase farm production. Others believe they should do so because they have virgin lands that might be considered governmental lands and it is time to cultivate them or they will lose them by law in the future. Others would like to enlarge their farms because their economic situation has improved and they can afford to do so. Overnight, farmers take additional land by cutting down trees, clearing debris and making claim to the additional land. The government does not contest the farmer's claim, thus the farm is enlarged.

On the other hand, respondents who would not like to enlarge their farms said they cannot do so because their farms are already defined by governmental documents and they cannot exceed the farm borders. Others cannot afford to enlarge their farms because of their weak economic situation. Still others have already enlarged their farms.

The survey illustrated that 37.2 percent of the mountain zone respondents have increased their farm area during the past ten years (Fig. 15). They said they increased their farm area by using agricultural machinery. In addition, they benefitted from the Asir Branch Agricultural Bank which
has been established in Asir region to provide interest-free
loans, agricultural machinery and consultation. Some
respondents bought machinery to restore their farms or dig new wells. The
agricultural bank provided water pumps and even automobiles. As
a result, the government has begun a new program to encourage
agricultural activity. It buys grains from farmers for a good price through the
Grains Storage and Milling Agency. A majority of respondents are eager to
develop new private lands. The agricultural bank provided water pumps and
even automobiles. The agricultural bank also provided land to restore their farms or dig new wells. The
majority of respondents bought machines on the installment plan. Some
bought machines to use as a winter resort. Field observation indicated that this
groundwater. Some respondents revealed they bought farms to
cheap compared to the mountain zone. Farm buyers believe that
they are more suitable for cultivation due to its richness in
some who recently settled in this zone said they
20 years and 78.7 percent for more than 20 years (Table 4).
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78.7 percent of respondents have settled in this zone for less than
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78.7 percent of respondents have settled in this zone for less than
view. One factor that has made Tihama zone attractive is that the government has established a new highway and opened the descent that links the mountain zone with Tihama zone. Other inhabitants who settled the zone for less than ten years are nomads who found their own farms.

On the other hand, the survey showed that the number of farmers in Tihama is the least in the entire study area with 68.8 percent of respondents who have farms (Fig. 13). Since the population of each zone is similar, this indicates that the rate of nomads seems to be higher in Tihama zone than the other two zones. Some respondents said they have their own farms, but they do not remain on them the whole year because they look after their herds. Others complain that their farms are costly to run.

Farms in Tihama zone are devastated annually by floods during the monsoon season. This seems to be another cause for farm diminution. As a result, the need for agriculture machinery is inevitable.

The survey illustrated that 92.7 percent of Tihama zone respondents use agricultural machinery (Table 6). The percentage of respondents not using agricultural machinery in their farm operations is the highest in this zone. Respondents revealed that they cannot use agricultural machinery because their farms are located in isolated
mountains that are not accessible. As a result, they still use traditional methods to cultivate their lands.

The percentage of respondents who would like to enlarge their farms is highest in Tihama with 85.5 percent who would like to enlarge their farms (Fig. 14). Most respondents revealed that they would like to enlarge their farm because most of their farms are located on the valley banks that are annually destroyed. In addition, some respondents said they have benefitted from the Agricultural Bank through loans that they use for digging artesian wells. Artesian wells are not allowed in the mountain zone because they affect the area's traditional well level. The abundance of underground water in Tihama attracts farmers and investors to settle in this zone.

The percentage of respondents whose farm areas increased during the past ten year is highest in Tihama with 45.4 percent of respondents who have increased their farm areas (Fig. 15). One reason for farm area increase can be attributed to the agricultural bank assistance. This assistance needs to be eliminated or greatly regulated to reduce land development in terms of farm area. Another reason is the recent linkage of a road network between Tihama zone and large markets in Abha. The establishment of this road enables farmers to reach large markets in the mountain zone. Tihama zone supplies the mountain zone markets with
agricultural products that are planted on commercial farms during winter. The survey also indicated that Tihama zone leads the other two zones in future development of private lands with 90 percent of respondents indicating they will develop private lands (Fig. 16). This indicates that the majority of this zone's respondents plan on settling down and giving up nomadic life. In addition large portions of virgin lands will be reclaimed and converted to agricultural lands.

In the Red Sea Coastal Plain (zone three), the survey showed that 7.3 percent of the respondents have lived in this zone for less than ten years; 16.4 percent of respondents have lived in this zone for less than twenty years and 76.3 percent have been settled in this zone for more than twenty years (Table 4).

In the same zone, 72.7 percent of respondents have farms (Fig. 13). Respondents said that their farms were not productive due to the high salinity of the soil. During the past ten years agricultural activity has been revived because of assistance from the agricultural bank. The respondents began to use fertilizers to reclaim the lands. Agricultural lands were limited to valley banks and were suffering from sand dune encroachment. Investors have introduced farmers to the method of fencing farms with trees that protect agricultural lands from sand engulfment. Farmers have planted tamarix on farm borders which, unfortunately, also increase
soil salinity. Tamarix protect the farms from sand encroachment while using a great deal of groundwater, which, eventually, will cause another problem. Because this zone is rich in groundwater, it is considered an agricultural incentive and agricultural lands have been revived. This has been accomplished through the use of agricultural machinery.

The survey further indicated that the Red Sea Coastal Plain zone leads the other two zones of Asir National Park in using agricultural machinery with 97.5 percent of respondents using agricultural machinery in their farm operations (Table 6). In addition, 67.5 percent of respondents said they would like to enlarge their farms (Fig. 14).

During the past ten years, 40.0 percent of respondents have already increased the area of their farms (Fig. 15). Some respondents who would like to enlarge their farms said they cannot because of their weak economic status. They added that when their economic status has improved, they will increase the area of their farms. The survey showed that 77.5 percent of respondents plan to develop private land in the future to increase their production (Fig. 16). Others who will not develop private lands have either enlarged their farms already or they cannot do so due to their weak economic status.

Field observations indicated that land development is increasing in Asir National park. The local population is
trying to gain as much land as it can. Not only that, in the mountain zone where recreational sites are located, the local population is fencing parts of the forest and trying to get governmental documents to develop them as agricultural lands. In addition, rental machinery is available in the recreational sites.

On the park level, the park is used as a dumping area for trash by the local population. Interviews with park management showed they are facing conflicts with the local population. Governmental officials have said that land development has induced remarkable change in the park features. The local population violates the law and occupies lands for agricultural purposes. They added that the over usage of agricultural machinery has led to desertification and denuded the environment. Furthermore, over usage of agricultural machinery has caused severe erosion such as landslides. Officials added that in the future land development activity will be limited. The local population will not be able to enlarge their farms beyond their farm's boundaries as defined in the government document.

Elimination and Negligence of Traditional Architecture

Asir National Park is rich in traditional architecture that is considered a tourist attraction. Of this architecture, there is the traditional stone, mud and hut dwellings and stone and mud towers and some ruins of Turkish
forts. Most of this traditional architecture is not in use and has had no maintenance. This came as a result of the imported house style, which is thought to be the main reason for negligence of traditional architecture. The local population accuses the traditional architects of failing to meet modern life requirements. This is true if we apply this criteria to the old houses whereas the new traditional houses can be adapted to meet the requirements of modern life, such as sanitary equipment. Elimination or negligence of traditional architecture means the elimination or negligence of part of the people's culture. If the present perception of the park population toward the traditional architecture remains as it is, the park's traditional architecture will disappear over time. The point is that traditional houses should not be eliminated when people move to a new house but should be preserved as a tourist attraction by the governmental agency which has been established for this purpose.

On the park level, the survey illustrated that 47.8 percent of respondents prefer elimination of the traditional house because it does not fit their modern lifestyle. In addition, the imported style (the concrete house) is provided with sanitary equipment. Furthermore, the cost of the imported house is supported by government loans through the
real estate bank. Of the respondents, 52.2 percent prefer to preserve the traditional house (Fig. 17).

On the park level the survey showed that most respondents would consider using modern methods when they want to build new houses with 97.8 percent of respondents who will use modern methods when they are going to build a new house (Table 10). On the other hand, on the entire park, 5.2 percent prefer to use local materials when they consider building a new house (Table 12).

In the mountain zone (zone one) 29.5 percent of respondents prefer to eliminate the traditional house and 70.5 percent prefer to preserve them (Fig. 17). Respondents prefer to eliminate traditional houses because they are an eye sore. They believe that the existence of traditional houses in a neighborhood distorts the picture of modernity that is represented through the imported style of house. Others regard the traditional house as a ruin or old fashioned and should be destroyed. Other respondents said traditional houses are treated as a landfill in which people dump garbage. Other respondents who do not possess private land would eliminate the traditional house in order to replace it with new concrete houses through the real estate bank. This bank gives interest free loans to citizens who possess land with a governmental document. It loans about $54,000 to each villager who wishes to build a new house. On
Fig. 17. Percentage of respondents in each zone, and that of the entire park respondents, reflecting the percentage of respondents who prefer elimination or preservation of the traditional house.
the other hand, the respondents who prefer to preserve the traditional house are either still living in it or they use it as a storage or as a stockade for their livestock. They continue to use it without doing maintenance till it collapses. Others said that they would like to preserve the traditional house as heritage of their fathers and grandfathers. In fact, the survey illustrated that the mountain zone leads the other two zones in preserving the traditional house because they realize the local tourist's admiration of the traditional house. At the same time, respondents of this zone became more aware of their heritage.

The survey showed that 96.8 percent of respondents in the mountain zone will use modern methods when they consider building a new house (Table 10). Respondents who will use hand labor when building a new house are those who are poor and prefer to use the cheapest method available. Such respondents usually violate the land law. They use labor and construct their simple houses overnight without governmental permission. Such violations are practiced in this zone and such type of houses are subjected to destruction by the municipality. In the mountain zone 4.2 percent of respondents prefer to use local materials when they erect a new house (Table 17). Local materials are rarely found in local markets because people do not buy them since the imported raw materials are available at fair prices. The main problem for
those who would like to use local materials is the absence of professional builders who used to build the traditional house. On the other hand, the new raw material for building are available in local markets. In addition, most respondents prefer to build the new concrete style that is supported by government loans.

In Tihama zone (zone two), the survey showed that 48.8 percent of respondents prefer to eliminate the traditional house (Fig. 17). The respondents revealed that the traditional house should be eliminated because it is not practical at the present time. Others in Tihama zone believe that the traditional house built of stone is very dangerous to life as it gets older. Some respondents said that some multifloor stone houses have collapsed and killed its dwellers. Such accidents happened during the past few years in Rijal Almma village. Other respondents prefer to preserve the stone house as their heritage. Respondents in Tihama zone stopped building stone houses and replaced them with houses made of cement bricks. Of the respondents, 98.8 percent prefer to use modern methods when they are going to build a new house (Table 10). Respondents who prefer using the modern method said that the modern method is the best for constructing a suitable house that can accommodate the extreme weather. Some respondents benefitted from the real estate bank by erecting a new house that is provided with an
air conditioning system. They operate the air conditioning system using their own generators. Others who prefer to use hand labor are those who usually build a very tiny home which might not exceed 25 M². These houses are built with cement bricks and roofed with tamarix or ziziphus wood. These houses lack bathrooms and other sanitary requirements. The survey showed that 3.8 percent of respondents prefer to use local materials (Table 12). Usually respondents who prefer to use local materials are those respondents who have just settled in the village. They are nomads who lived a very simple life in tents and they have already adapted themselves to the extreme climate conditions through their living in the desert.

The Red Sea Coastal Plain zone (zone three) leads the other two zones in preferring to eliminate the traditional house. The survey illustrated that 78.2 percent of respondents prefer to eliminate the traditional hut house and 21.8 percent prefer to preserve it (Fig. 17). Most respondents prefer to eliminate the traditional house because it is very simple and modest and can no longer accommodate contemporary life. Others believe that such type of huts should be eliminated because the huts reflect poverty. Others believe that the hut house should be preserved as a heritage.

Field observations indicate that hut houses are very rare where once they were the original type of housing in the
Red Sea Coastal Plain zone. It seems that the availability of bricks made of cement are now the main reason for the huts' disappearance.

The survey indicated that 98.2 percent of respondents prefer to use modern methods when considering a new house and 1.8 percent prefer hand labor (Table 10). On the other hand, the survey illustrated that 9.1 percent prefer to use local materials when they are going to build a new house (Table 12). The respondents who prefer to use local materials said they do so because they can afford them. Most people prefer to use modern raw materials frequently found in local markets.

Field observation found that most respondents are not willing to dwell in the traditional house throughout the park. At the same time, traditional houses, towers and some historical ruins, such as the Turkish forts are completely ignored by the local population. It appears that traditional architecture is going to disappear completely during the coming decades.

According to governmental officials, the traditional house has been completely abandoned by the local population for three reasons. 1) The role of the real estate bank that supports the construction of the new house style using modern materials through interest-free loans; 2) Increased individual income; and 3) The failure of the traditional
house to meet sanitary and social requirements of the people. They added that there are some Turkish forts existing in Asir National Park. Some of these forts have already collapsed and others need urgent restoration.

It seems that human activities in Asir National Park continue to flourish for of two reasons: 1) As a tradition and 2) as a way to enhance their economic status. Most respondents of Asir National Park rely on these activities as a source of livelihood, such as grazing, farming, hunting and logging. At the same time, all activities are traditional habits that have been inherited from generation to generation. The case of abandoning the traditional house is a matter of modernity. The respondents have given up dwelling in the traditional house because they have been introduced by the government to the new house style that fits modern civilization.

On the other hand, the respondents practice these activities to support themselves economically. The survey showed that some respondents have benefitted from the park visitors since the park opened officially in 1981. On the park level, the income of 28.7 percent of the respondents has increased as a result of the positive impact of tourism on the host population whereas the income of 71.3 percent of the respondents' income did not increase (Table 20). The income of 27.4 percent of the mountain zone respondents has
increased as a result of rental apartments and selling agricultural products. In the Tihama zone, the income of 28.8 percent of the respondents has increased since the establishment of Asir National Park. This increased income is a result of the sale of livestock and firewood. The income of 30.9 percent of the respondents of the Red Sea Coastal Plain increased as this zone receives visitors who enjoy the beach. The local population sell agricultural products, firewood, fishing products, rent apartments and run shops (Table 20).

On the park level, respondents have a monthly income either through governmental employment or through their own business. Despite this fact, the majority of respondents have a low income. The survey illustrated that 56.1 percent of the entire park respondents are governmental employees with 80.0 percent of them in the mountain zone, 40.0 percent in the Tihama zone and 38.2 percent of them in the Red Sea Coastal Plain (Table 21). The percentage of the population having jobs decreases in Tihama and the Red Sea Coastal Plain zones. This can be attributed to the nature of these two zones. Most people in these zones are nomads and they are not educated. In contrast, the opportunity for education in the mountain zone is greater than the other two zones because of the availability of transportation and pleasurable weather which are considered obstacles in the other two zones.
The survey also illustrated that 62.2 percent of the entire park respondents have a constant income. This constant income is received through government jobs or through selling animals, agricultural products, firewood and charcoal, fishing products or through their simple business. Of the respondents, 84.2 percent of the mountain zone, 48.8 percent of the Tihama zone and 43.6 percent of the Red Sea Coastal Plain zone have a constant monthly income (Table 22). This constant monthly income is distributed on five categories (Table 23). On the park level, the income of 40.4 percent of respondents fall in the first category 1000–<2000 S.R./month (about $266–533). Income of 17.8 percent of the respondents fall in the second category 2000–<3000 S.R./month (about $534–800). The income of 15.2 percent of respondents fall in the third category 3000–<4000 S.R./month (about $801–1066). The income of 9.2 percent of respondents fall into the fourth category 4000–<5000 S.R./month (about $1067–1333). The income of 17.4 percent of respondents fall into the fifth category of more than 5000 S.R./month (greater than $1334) (Fig. 18).

Analysis of the respondents' income indicated that most respondents receive a low income that might motivate them to continue practicing their activities to satisfy their needs. While 40.4 percent of respondents receive less than 2000 S.R. (<$533) the greater percentage of respondents (58.2 percent) receive less than 3000 S.R. (<$800) (Table 23). The
Fig. 18. Percentage of respondents in each zone and that of the entire park respondents, reflecting the income of respondents in each category
survey illustrated that the majority of respondents who receive 3000 S.R. or less live in Tihama and the Red Sea Coastal Plain zone. Of the respondents, 53.8 percent of Tihama and 54.5 percent of the Red Sea Coastal Plain zone receive less than 2000 S.R. whereas the greater percentage who receive greater than 5000 S.R. live in the mountain zone. Of the respondents 33.7 percent of the mountain zone receive more than 5000 S.R. whereas 7.5 percent of Tihama and 3.7 percent of the Red Sea Coastal Plain zone receive greater than 5000 S.R. (Table 23).

Despite the weak economic status of the park respondents, most of them are happy with the park establishment. The survey illustrated that 85.7 percent of the park respondents are proud of Asir National Park as it is the only way to introduce the Asir region to the rest of the country. Others are happy with the park establishment because they hope that local tourism in Asir National Park will reduce those who travel abroad. Other respondents believe that the park establishment provides great opportunity for recreation not only for the people of Asir but for all Saudi Arabians. Of the respondents 14.3 percent are not happy with the park establishment (Table 24). Respondents from Tihama and the Red Sea Coastal Plain zone who are not happy with the park said they had not heard about it. Those respondents are nomads and they do not understand its significance. Those respondents in
the mountain zone who are opposed to the establishment of the
park gave two reasons. The first reason is that they believe
the recreational site design does not meet the Islamic law
requirements. They said that segregation matter between sexes
is not completely applied. Their point of view is that
unsegregated recreational sites between sexes creates
conflict with Islamic morality which tends to corrupt the
Islamic culture. The second reason is that respondents
claimed that the park administration has seized some of their
private lands to be part of the park area. As a result, the
park respondents are worried about their lands and most of
them are against the notion of relocation.

The survey shows that 91.7 percent of respondents are
unwilling to be relocated. They said that they cannot abandon
their villages where their families had lived. In addition,
they said they cannot accept relocation even if they are
given lands that are better than their present lands. Of the
respondents 8.3 percent are willing to be relocated (Table
25).

Those respondents who prefer relocation are nomads and
they roam the entire park looking after their herds. Some of
these nomads do not have farms and for them, relocation means
acquiring land.
Comparison between the Three Zones of the Study Area

The survey, governmental official interviews and field observation indicated that the entire area of Asir National Park, except for the developed sites, suffers from continuous pressure as a result of human activities that have induced unfavorable changes in the park's features.

On the park level, activities such as logging, overgrazing, hunting, land development and elimination of traditional architecture are still practiced by a high percentage of park respondents (Fig. 19).

The government should take full measures to protect the park features that are threatened by human activities. This could be done by the government directing its responsible agencies to check on human activities such as logging, overgrazing, hunting, land development and elimination of traditional houses throughout the park. This is necessary because human activities have continued to increase with serious consequences on park features. The survey showed that each zone of Asir National Park suffers from human activities with zone two the most affected zone, followed by zone three and then zone one.

The survey indicated that the mountain zone (zone one) is the greatest zone affected by land development and that action should be taken to reduce the impact. The highest
Fig. 19. Percentage of respondents of the entire park, who are involved in the activities of logging, overgrazing, hunting, land development, and elimination of traditional architecture in the entire park.
percentage of farm ownership throughout the park is in zone one with 98.8 percent of zone one respondents (Fig. 13) owning farms, indicating the extent of land development.

The survey illustrated that Tihama zone (zone two) is affected mostly by logging, overgrazing, hunting and private land development. The percentage of these respondents who collect firewood is 90.0 percent, the highest in the entire park area (Fig. 8). Zone two leads the other two zones in grazing. Of the respondents who own livestock, 44.8 percent rely on grazing only for feeding their herds (Fig. 10). Furthermore, zone two is the first zone of Asir National Park in hunting with 83.8 percent of respondents practicing hunting (Fig. 11). Tihama zone is the number one zone in killing predators with 88.8 percent of respondents preferring to get rid of predators (Fig. 12). Tihama zone also exceeds the other two zones in land development. Of respondents of this zone, the survey showed that 90.9 percent will develop private land in the future to be used for farms and other purposes (Fig. 16). The survey illustrated that in Tihama zone 85.5 percent want to enlarge their farm (Fig. 14). Throughout the park, the percentage of respondents who desire to enlarge their farms shows great differences. The $X^2$ is 48.2 which exceeds the conventional level of significance.

Action should be taken in the Red Sea Coastal Plain (zone three) for the purpose of reducing the pressure
resulting from ownership of excess numbers of livestock, hunting, use of agricultural machinery and the elimination of the traditional house. The survey illustrated that the percent of livestock ownership is the highest in zone three with 87.3 percent (Fig. 9). In addition, this zone is the second zone in Asir National Park in the practice of hunting. Zone three is exceeded by zone two by 0.2 percent with 83.6 percent of zone three respondents practicing hunting (Fig. 11). Zone three is also the first in the use of agricultural machinery with 97.5 percent (Table 6). Finally, zone three leads the other two zones in eliminating the traditional house. The survey illustrated that 78.2 percent of this zone's respondents said that the traditional hut house should be eliminated (Fig. 17). The $X^2$ is 65.4 which indicated that the difference is greater than would be expected by chance.

The study illustrated that the economic status of Asir National Park is weak but mostly in Tihama (zone two) and the Red Sea Coastal Plain (Zone three). The survey showed that 38.2 percent of zone three respondents have a job; 40.0 percent of zone two respondents have a job whereas 80.0 percent of zone one have a job (Table 21). The $X^2$ is 30.1 which exceeds the conventional level of significance.

The survey further indicated that other respondents of the park who do not have a job have low constant monthly income. The survey showed that the percentage of zone three
respondents who receive a constant monthly income is 43.6 percent, followed by zone two with 48.8 percent and zone one which is the highest in the entire park with 84.2 percent (Table 22). The $X^2$ is 74.8 which indicated that the difference is greater than we would expect by chance.
CHAPTER 7

Summary, Suggestions and Conclusion

Although there are no official measurements, responses from park officials and the survey conducted on the respondent population of Asir National Park showed that the park has been adversely affected by the local population's activities, such as logging, overgrazing, hunting, land development and elimination of the traditional house.

The survey showed that logging is the most frequent activity engaged in by the local population and, according to park officials, it has caused erosion in the park's. Of the respondents, 58.7 percent use firewood; 21.6 percent depend on charcoal and 19.7 percent rely on electricity for heating their houses and cooking (Table 18). The survey showed that 20.0 percent buy firewood while 79.1 percent collect it from the nearby forest (Fig. 8). This indicated that the park's vegetation cover is threatened by logging. The respondents of the park collect a variety of plant species but the most preferable types are Acacia tortilis and junipers. In Tihama (zone two) 90.0% of the respondents rely on firewood collection, making this zone the most logged area (Fig. 8).

Overgrazing is still very common in Asir National Park. Livestock ownership by the local population is very high. Of the park respondents, 82.2 percent own livestock
On the park level, goats are raised by 53.8 percent of the local population. Sheep are second, raised by 30.3 percent of the park's respondents. Camels are third at 9.8 percent, whereas cows are the least type of livestock raised at 6.1 percent (Table 13A). These livestock are fed by grazing and grains. The survey showed that 35.4 percent of respondent who own livestock rely solely on grazing as feed for their livestock; 4.2 percent depend on grains and 60.4 percent rely on both grazing and grains (Fig. 10). The survey also illustrated that grazing activity is greatly practiced in the Red Sea Coastal Plain (zone three) and in Tihama zone (zone two). These two zones are the most affected zones of Asir National Park.

Hunting activity is common in Asir National park. The survey showed that 81.7 percent of the respondents practiced hunting (Fig. 11). The park's wildlife is the target of undiscriminated hunting. The survey showed that 32.7 percent of respondents prefer to hunt rabbit. Birds are consumed by 30.8 percent. The dormouse is the third type of animal preferred by 22.9 percent of the respondents. The gazelle is the fourth preferable animal at 13.6 percent (Table 17). The survey also illustrated that the park respondents do not discriminate between wildlife. While they hunt the eatable species, the survey showed that 80.4 percent of the park respondents prefer to get rid of predators such as the wolf,
hyena, tiger and wildcat because they believe they attack their herds (Fig. 12). The survey showed that 83.8 percent of respondents practice hunting in Tihama (zone two) and 83.6 percent in the Red Sea Coastal Plain (zone three) which is a threat to wildlife (Fig. 11). The survey also illustrated that killing of predators is the highest at 88.8 percent in Tihama zone (zone two) (Fig. 12).

Land development in Asir National Park has increased throughout the park since its establishment. The roads and the bank establishment have increased land values. Therefore, most respondents are attempting to acquire as much land as they can. Usage of agricultural machinery through the agricultural bank and other subsidies provided by the agricultural bank enabled respondents to increase the area of their farms. As a result respondents have benefitted from the agricultural bank and others have given up nomadic life and have settled down. The survey showed that 9.1 percent of the park respondents have lived in the park less than ten years; 5.2 percent have lived in the park 11-20 years and 85.7 percent have lived in the park for more than twenty years (Table 4).

In addition, the survey showed that farm ownership in Asir National Park is high with 82.2 percent of the respondents owning farms (Fig. 13). Of the respondents, 94.7 percent use agricultural machinery for farm operations (Table
6). Such usage of agricultural machinery seems responsible for the degradation of the land caused by land development and is also responsible for the disappearance of some plant species, loss of traditional architecture, and elimination of wildlife habitat which lies in the path of development. The survey further indicated that 57.1 percent of the Park's respondents would like to enlarge the size of their farms to gain more land for additional agricultural production, while during the past ten years 40.2 percent of the park's respondents have already increased the area of their farms for production reasons (Fig. 14, 15). Moreover land development has not ceased with the establishment of the park and its new regulations. In the future 72.5 percent of Asir National Park's respondents intend to develop private land (Fig. 16). This indicates that the rest of the park that is not developed at the present time is under pressure for land development at a later date. The most affected zone at the present time is the mountain zone (zone one) with 98.9 percent of zone one respondents owning farms (Fig. 13). Tihama zone (zone two) will be the most affected zone in the future with 90.9 percent of zone two respondents planning to develop private land (Fig. 16). Respondents revealed that they will settle down and give up nomadic life.

Finally, the elimination of traditional architecture, especially the traditional house, is prevalent as the survey
indicated. The survey indicated that 47.8 percent of the park's respondents have eliminated their traditional house in favor of the imported style that is supported by government loans through the real estate bank (Fig. 17). The traditional house is seen as failing to meet the requirements of their present lifestyle. Houses have been neglected till they collapsed or they have been eliminated. The greatest elimination is taking place in the Red Sea Coastal Plain (zone three). In this zone, the survey showed that 78.2 percent of respondents have eliminated the hut house (Fig. 17). They revealed that the hut house is no longer fit for the present time. In addition, they said that they will not dwell in a hut house since new houses can be erected that are supported by government loans that also provided for equipment such as air conditioners that mitigate the heat generated by the extreme weather patterns. The study illustrated that the local population of Asir National Park practices these activities as a tradition and to support themselves economically. The survey illustrated that 43.9 percent of the park respondents do not have a job and 37.8 percent do not have a constant monthly income (Table 21, 22). The study also showed that since the establishment of the park, the income of 28.7 percent of respondents who have a constant monthly income has increased as a result of the positive impact of local tourism (Table 20).
Despite the weakness of the economic status of most of the park's respondents, they welcome and appreciate the establishment of the park. The survey showed that 85.7 percent of them are happy and proud of the park, and that 91.7 percent of the respondents are not willing to be relocated (Table 24, 25).

Nonetheless, the continued practice of human activities in Asir National Park will continue to impact on the park's features unless urgent steps are taken to restrict local population activities and should be enforced by strict regulation.

Suggestions

The richness of Asir National Park in natural and cultural resources in a country that is one of the most arid zones in the world is a unique place. Based on this concept, the protection of the park's features is a social and cultural necessity to conserve the park for generations to come. The park administration can control and minimize the impact of human activity by enforcing strict regulations over the entire park. For this purpose the following suggestions are recommended.

1. Prohibit logging activity completely throughout the park by enforcing the law. At the same time, establish nursery projects by the Ministry of Agriculture and Water to be used by the local population as alternative supplies for
firewood. This project might take a decade to provide alternatives to the present method of logging. Replant local plants, especially the most affected ones, as well as other plant species. Establish nurseries in watershed areas in each zone of the park and fence them to protect them. During the monsoon season, utilize the flood waters to irrigate these nurseries. Distribute saplings free to villagers to plant on their own lands to provide firewood and charcoal. The nursery projects will contribute a great deal to solving the logging problem.

The nursery project is expected to succeed due to the availability of water. In the mountain zone, for instance, the amount of rain that occurs during the monsoon season can support the nursery's water requirements. On the park level, most plant species are desert plants that have low water requirements and the ability to resist drought, salinity and heat. In Tihama and the Red Sea Coastal Plain zones, nurseries are also expected to succeed due to the availability of underground water and huge amounts of flood water that descends from the highlands during the monsoon season. The most important factors for these nurseries to succeed are location and protection.

2. Fence the dense forests of Asir National Park to protect them from logging, grazing and land development.
3. Replant areas that are seriously affected by human activity.

4. Ban the production of charcoal in Asir National Park by imposing stringent penalties.

5. Prohibit grazing activity throughout the park and restrict it to village boundaries. Nomad movement in the park should be reduced. Herdsmen will have to depend on their farm products for feeding livestock.

6. Replant grass during the wet season in the grazing land to compensate for grass lost as a result of overgrazing.

7. Reinstitute the traditional conservation Hema system that was practiced by local people some decades ago. Park management can impose direct control by allowing herds to graze in designated lands in fixed visits.

8. Prohibit hunting in the park by enforcing severe penalties.

9. Prohibit the killing of predators throughout the park to protect them from being killed or captured by the local people.

10. Enforcement of the land-use law throughout the park by the administration. Appoint forest rangers or park wardens to roam the park to report violations.

11. Redefine the boundaries of the villages so that most of them will be beyond the park boundaries. This means relocating the villages to the periphery of the park. Park
boundaries need to include unique areas. This step would completely preserve the park. Furthermore, when completed, local population activities can be restricted to their own village.

12. Ban the buying, selling and renting of land in Asir National Park to reduce land development activities. Map the entire area of the park including the villages. This will define the land area and make violations of land development more obvious.

13. Reduce the ownership of agricultural machinery that farmers obtain from the agricultural bank. Reduce the use of rental agricultural machinery through regulations. This can be achieved by requiring farmers to apply for a permit from the park administration before using the machinery.

14. Refuse agricultural loans and assistance to farmers who do not have governmental documents for their land.

15. Encourage the local people to maintain the traditional house even if they abandon it in favor of building a new style house.

16. Mitigate the pressure created by park visitors on current recreational sites by developing new sites, especially in Tihama zone and the Red Sea Coastal Plain zone.
17. Impose fees on park visitors in order to support the park budget.

18. Educate the local population about the importance of the park, the value of wildlife species as well as the preservation of trees and vegetation. Encourage them to use propane and electricity for cooking and heating. This can be achieved through presentation of movies, slides and lectures by a team from the park administration who visit the park's villages.

19. Concentrate on the protection of the park's features as well as the recreational goals. Less developed sites need as much attention as developed sites to maintain the entire park.

20. Give job priority for park maintenance to the local population of Asir National Park as an incentive to protect the park.

21. Teach environmental protection and awareness in the public schools as well as universities.

22. Draw up a rehabilitation plan to overcome the impact of human activities based on the exchange of information with other governmental agencies.

23. Develop research programs in conjunction with King Saud University, Abha branch, utilizing the expertise of university professors.
24. Construct artificial lakes in the watershed areas of Asir National Park for three reasons: 1) to maintain the water that falls during the monsoon season; 2) To provide wildlife and nursery projects with water; and 3) to attract visitors to the recreational areas.

25. Utilize the United Nations program for national park development and protection. Attend its meetings and conferences. Research the experiences of other developed countries such as the United States and the United Kingdom regarding park policy and development.

26. Hire environmental experts who officially measure the change in the park's ecocsystem and develop plans for maintaining the park's features.

Conclusion

Saudi Arabia has entered a new era of prosperity after the discovery of oil several decades ago. The main goal has been to improve the weak economic status of the country. Therefore, oil revenues have been invested to improve the governmental sectors, which has resulted in a massive positive shift in the economic sector. This has influenced the culture on behalf of modernization. The concept of recreation has come as a result of modernization.

In general, Saudi Arabia's weather is extreme and the landscape similar throughout the country, except in Asir region which has a diverse landscape, climate and a variety
of wildlife. These features have made Asir a unique region for the establishment of a national park based on its richness in natural and cultural resources which are essential to attract tourists. The problem is that the uniqueness of Asir national park's features are being threatened by the local population's activities. People are still living in the park, which is contrary to the United Nation's recommendation that national parks should be free of human habitation.

The continued practice of human activities such as logging, grazing, hunting, land development and elimination and negligence of traditional architecture have induced changes in the park's features. For long-term, these activities will sharply reduce the uniqueness of the park's features.

The objective of this study was to evaluate the impact of human activities on the park features. The survey illustrated that the percentage of respondents who were involved in logging was the highest activity across the entire park level. Logging is the most destructive activity producing the most profound problem facing the park. Logging is practiced by most respondents for firewood, charcoal (heating and cooking) and land development.

The survey also showed that the percentage of respondents who were involved in grazing, hunting and land
development is high. Most respondents who own livestock rely on grazing. The high rate of livestock creates pressures on grazing lands which results in overgrazing. The percentage of respondents who practice hunting for food was high. The park's wildlife is threatened by the local population who violate the law against hunting, especially in remote and isolated areas where wildlife live. Construction of roads, the popular ownership of automobiles and the availability of firearms are considered the main reason for wildlife decreasing. The percentage of respondents who were involved in land development was high. Most people have owned farms for more than twenty years. A small percentage of respondents have moved to the park and established their own farm during the past decade. In addition, some respondents realized the value of the park lands so they increased their farm areas. Others who were not supposed to enlarge their farm area did so anyway. In spite of the land-use law that restricts any expansion, some land violation is still common.

The survey showed that the percentage of respondents who prefer to eliminate the traditional house was the least on the park level. Modernity and the failure of the traditional house to meet the new lifestyle requirements are the reasons behind traditional house elimination. In addition, loans that are given by the real estate bank to citizens who wish to build a new house is another reason. The
respondents who do tend to preserve the traditional house do so for their heritage or for other purposes, such as corrals for livestock. Respondents evacuate the traditional house in favor of the imported style which is supported by the real estate bank.

Most activities are considered a traditional habit and source of livelihood. The survey showed that most respondents on the park level suffer from a weak economic status. On the park level most respondents receive a poor income that is not sufficient to support their needs, particularly in Tihama and the Red Sea Coastal Plain. Some respondents of the park could benefit financially from tourism through selling farm and livestock products and through rental of apartments.

The survey illustrated that most respondents are happy with the park establishment. They are proud of the park because it introduces the region to the rest of the country. In addition, the park provides the local population with recreational activities as well as the revival of the region's economy. On the park level, the survey showed that most respondents are not willing to be relocated. They reject the concept of relocation because they cannot abandon their land even if they are given better lands.

In general, human activities in Asir National Park will result in the loss of the park's uniqueness and
attractiveness. The exploitation of the park's resources by the residents should be restricted in favor of public interest. The existence of a unique place such as Asir National Park in an arid country such as Saudi Arabia is an invaluable treasure that should be preserved. Therefore, protection of Asir National Park's features is absolutely necessary.
APPENDIX A

Questionnaire of the Park Population

1. How long have you been living here?
   ___ Less than 10 years  ___ 11 to 20 years  ___ More .

2. Do you own a farm?
   ___ Yes  ___ No

3. If the answer to the above question is yes, have you used new agricultural machinery in your farm operations?
   ___ Yes  ___ No
   If yes, what type of machinery?__________________________

4. If you do own a farm, would you like to enlarge your farm area?
   ___ Yes  Why ________________________________
   ___ No  Why ________________________________

5. Has your farm area increased in size during the past ten years?
   ___ Yes  ___ No
   If yes, how much?______________________________

6. Do you own private land that you intend to develop?
   ___ Yes  ___ No

7. If you wished to build a new house, which of the following would you use?
   ___ Modern methods  ___ Hand Labor
8. What is your opinion regarding traditional housing?
   ___ Should be eliminated   ___ Should be preserved
   Why? ________________________________

9. If you consider building a new house, would you use the available local materials?
   ___ Yes   ___ No

10. Do you own livestock?   ___ Yes   ___ No
    If yes, how many?______________________________
    Which kind of the following?
    ___ Cows   ___ Goats   ___ Sheep   ___ Camels

11. If you have livestock, how do you feed them?
    ___ Grazing   ___ Grain   ___ Both

12. Do you prefer getting rid of predator animals (i.e., wolves)?
    ___ Yes   Why?______________________________
    ___ No   Why?______________________________

13. Do you practice hunting for food?
    ___ Yes   ___ No

14. If the answer to the above question is yes, what are the animals you prefer to hunt?
    1. ____________________________
    2. ____________________________
    3. ____________________________
15. Which one of the following do you use to warm your house during the cold season?
   ___ Firewood    ___ Charcoal    ___ Electricity
   Why? ________________________________

16. Which one do you prefer: To buy or to collect firewood?
   ___ Buy         ___ Collect
   Where do you collect it?________________________
   What types of wood do you prefer?__________________

17. Has your income increased since the establishment of Asir National Park?
   ___ Yes  How?______________________________  ___ No

18. Do you have a job?
   ___ Yes    ___ No

19. Do you have a constant monthly income?
   ___ Yes    ___ No

20. If the answer for question 19 is yes, then could you tell in which of the categories your income falls?
   ___ 3000-Less than 4000 S.R.    ___ 4000-Less than 5000 S.R.
   ___ 5000 and more S.R.
21. Are you happy with the establishment of Asir National Park?
   ____Yes  Why______________________________
   ____No   Why______________________________

22. Do you prefer to be relocated somewhere else out of the park?
   ____Yes  Why______________________________
   ____No   Why______________________________
APPENDIX B

Interview Questions of Governmental Officials

1. Have you noticed land degradation?
   What is the reason?
   How do you measure it?

2. Have you noticed erosion?
   What is the reason?
   How do you measure it?

3. Does grazing affect a particular type of grass like palatable grass?

4. Has grazing had serious impact on vegetation quality located close to water and settlements?

5. What effect has been noticed from use of machinery for land development?

6. What type of agriculture is practiced in the park's area?

7. Do people deposit wastes in the park?

8. Have cultivation, grazing, land development and logging increased since the establishment of the park?

9. What is the result of road construction within the park?

10. What is the purpose of logging?

11. What activity has had the most serious impact on the park's features?

12. What is the disadvantages of cultivation in the park?

13. Which plants have been impacted the most?
14. What are the reasons for neglect of traditional architecture?

15. Are there fixed regulations for the park? What are they?

16. Do you intend to restrict the population's activities?

17. Are you planning to regenerate native wildlife and plant species that once thrived in the park?

18. Do you have programs that provide awareness of environmental conservation?

19. Have international conservation laws been applied to Asir Park?

20. What are the results?

21. Have you thought of creating incentives to establish environmental protection in Asir Park?
References


Mann (Eds.). Waterloo: University of Waterloo Press, pp. 1-27.


