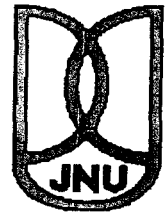
AGRICULTURAL POLICIES IN SAUDI ARABIA: 1975 – 1985

Dissertation submitted to Jawaharlal Nehru University
in partial fulfillment of the requirement
for the award of the degree of

MASTER OF PHILOSOPHY

S.V.RAVEENDRAN



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DECLARATION

I declare that the dissertation entitled **"AGRICULTURAL POLICIES IN SAUDI ARABIA: 1975–1985"** submitted by me in partial fulfilment of the requirements for the award of the degree of **Master of Philosophy** of Jawaharlal Nehru University is my own work. The dissertation has not been submitted for any other degree of this university or any other university.

S.V.RAVEENDRAN

CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

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S.V.RAVEENDRAN

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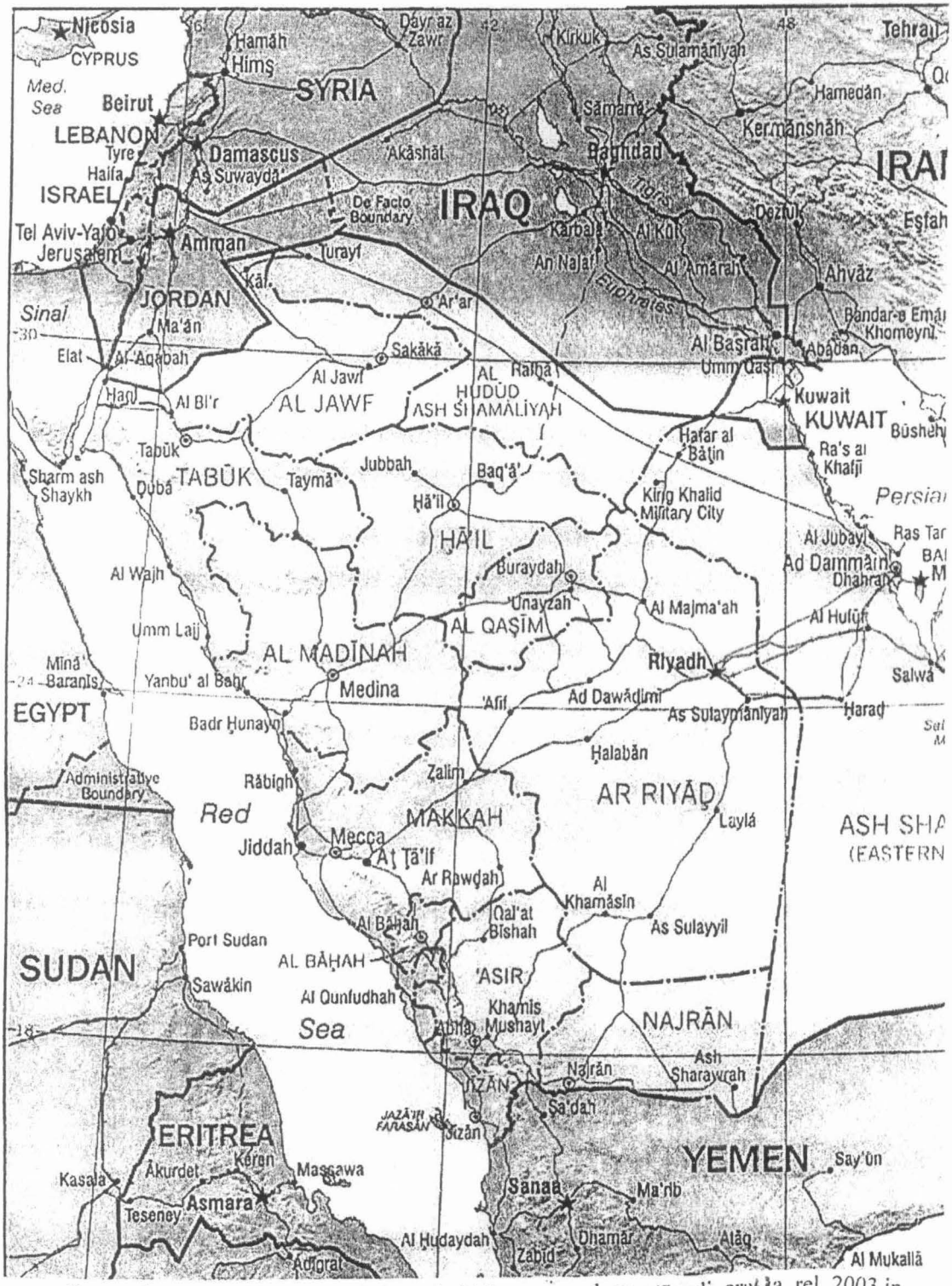

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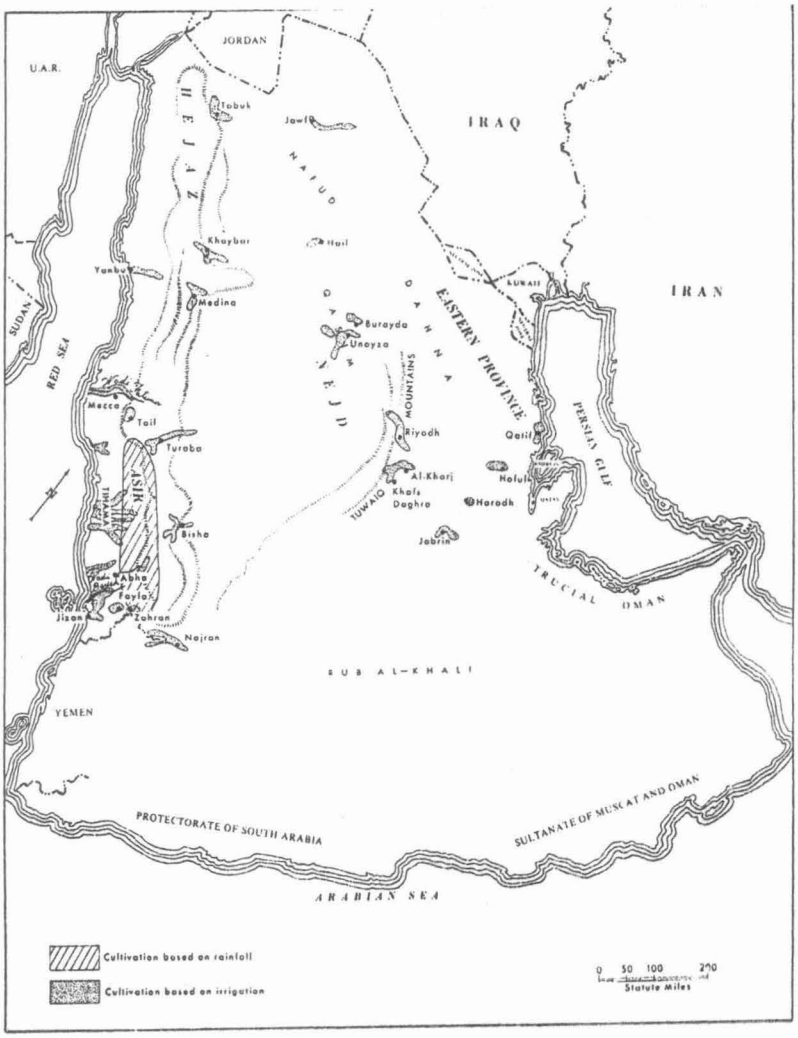

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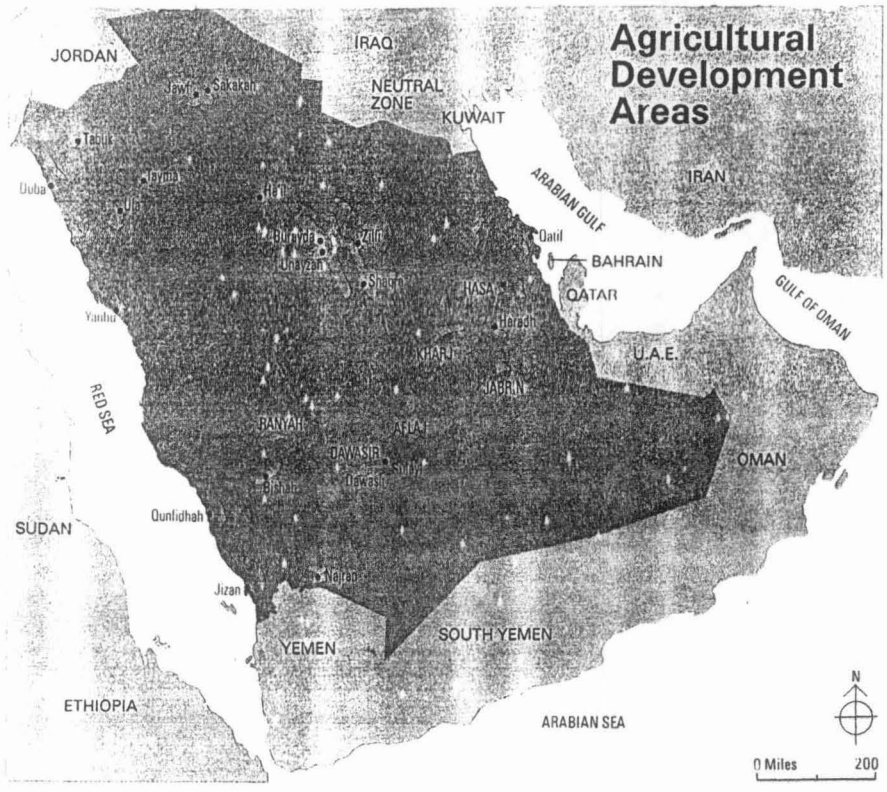

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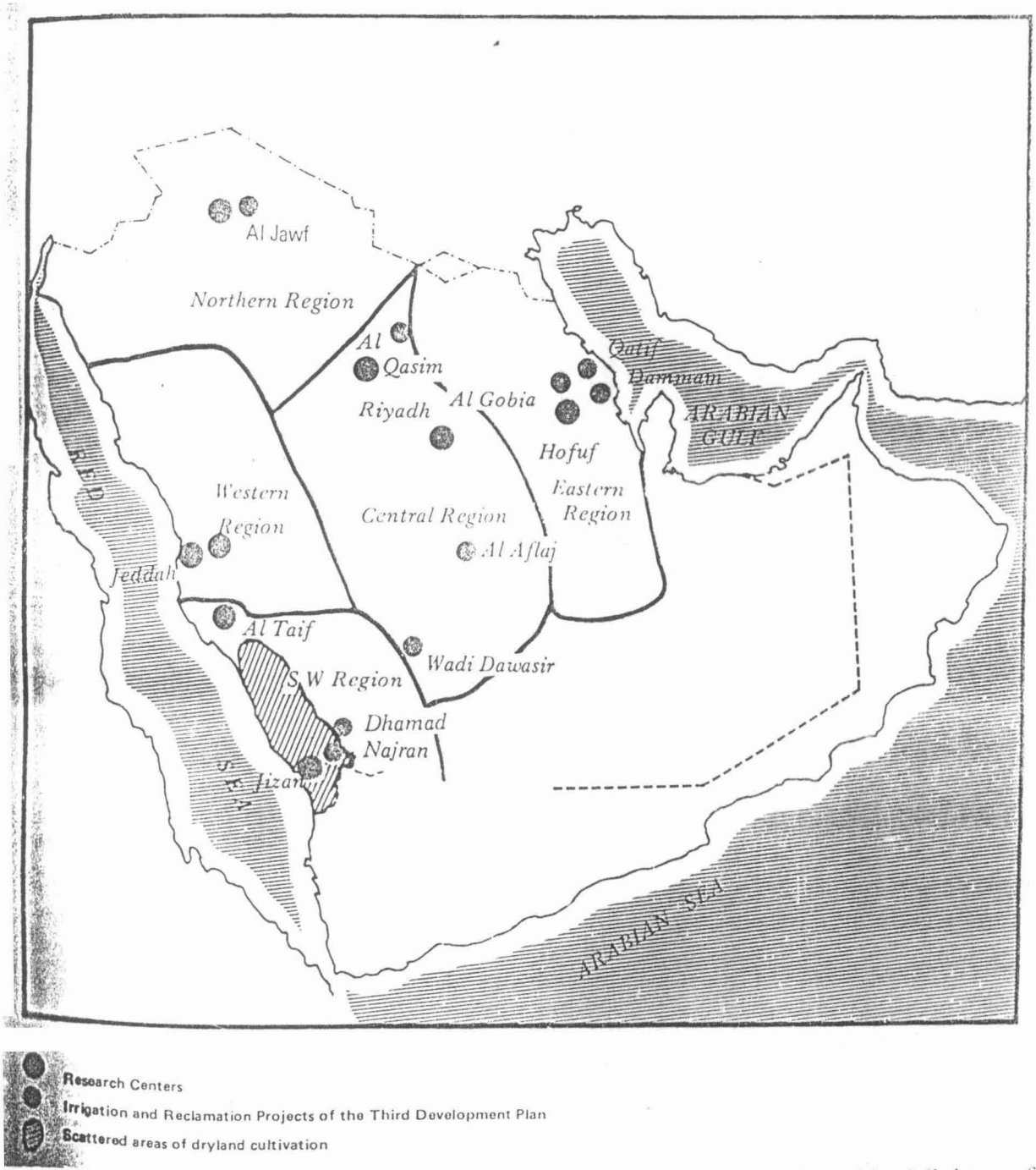

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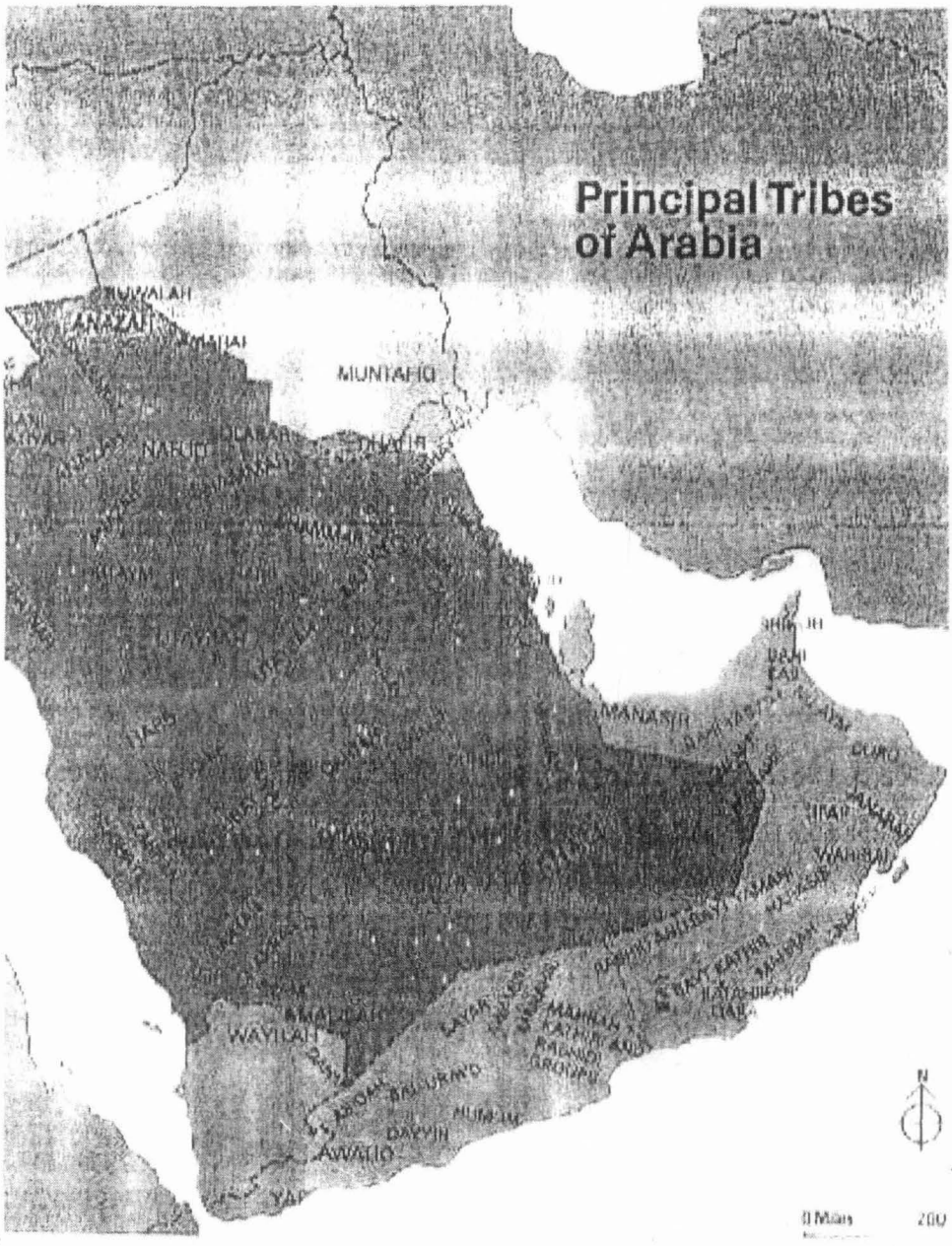

Source: The Kingdom of Saudi Arabia, (1977), London: Stacey International, p.41.

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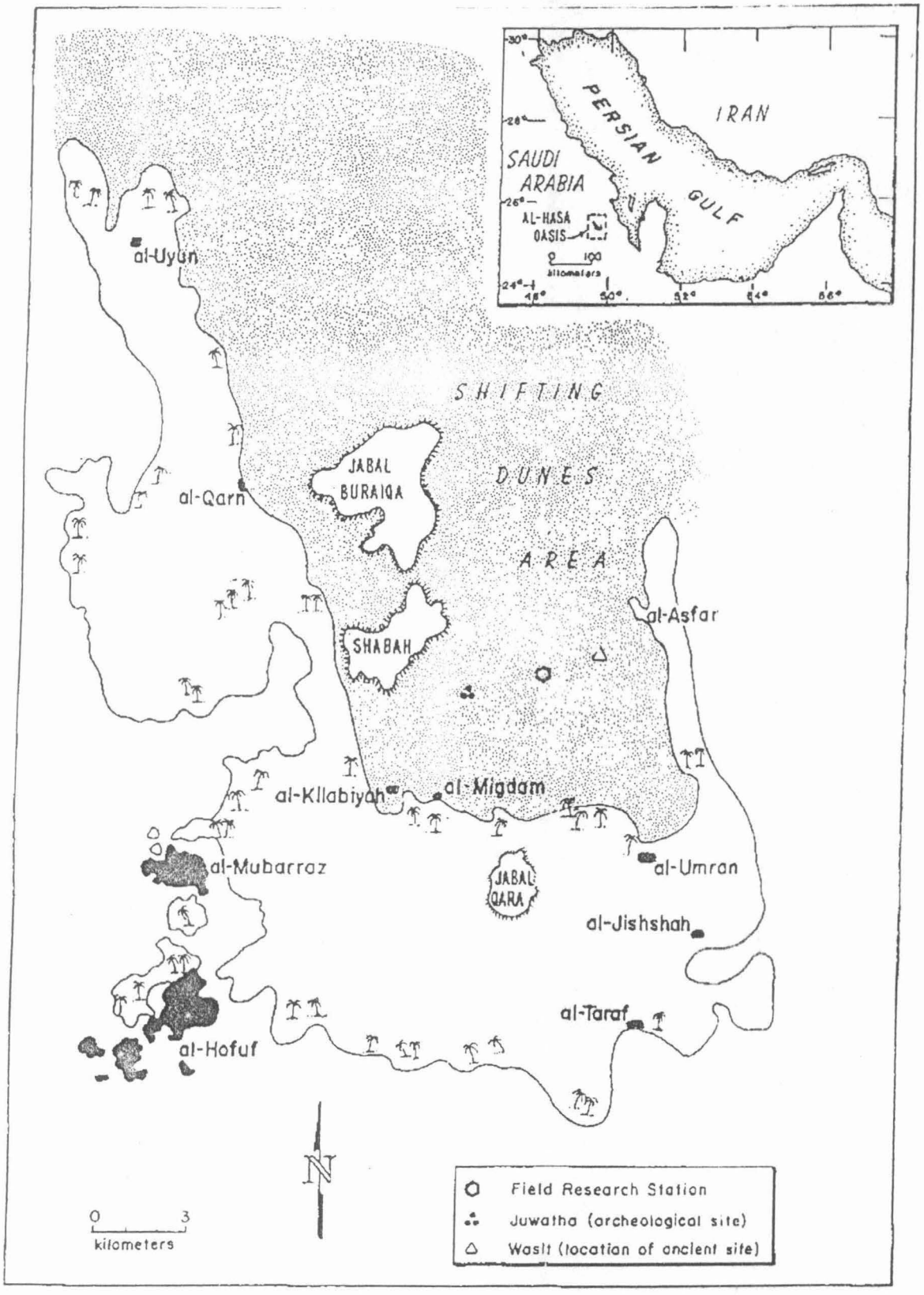

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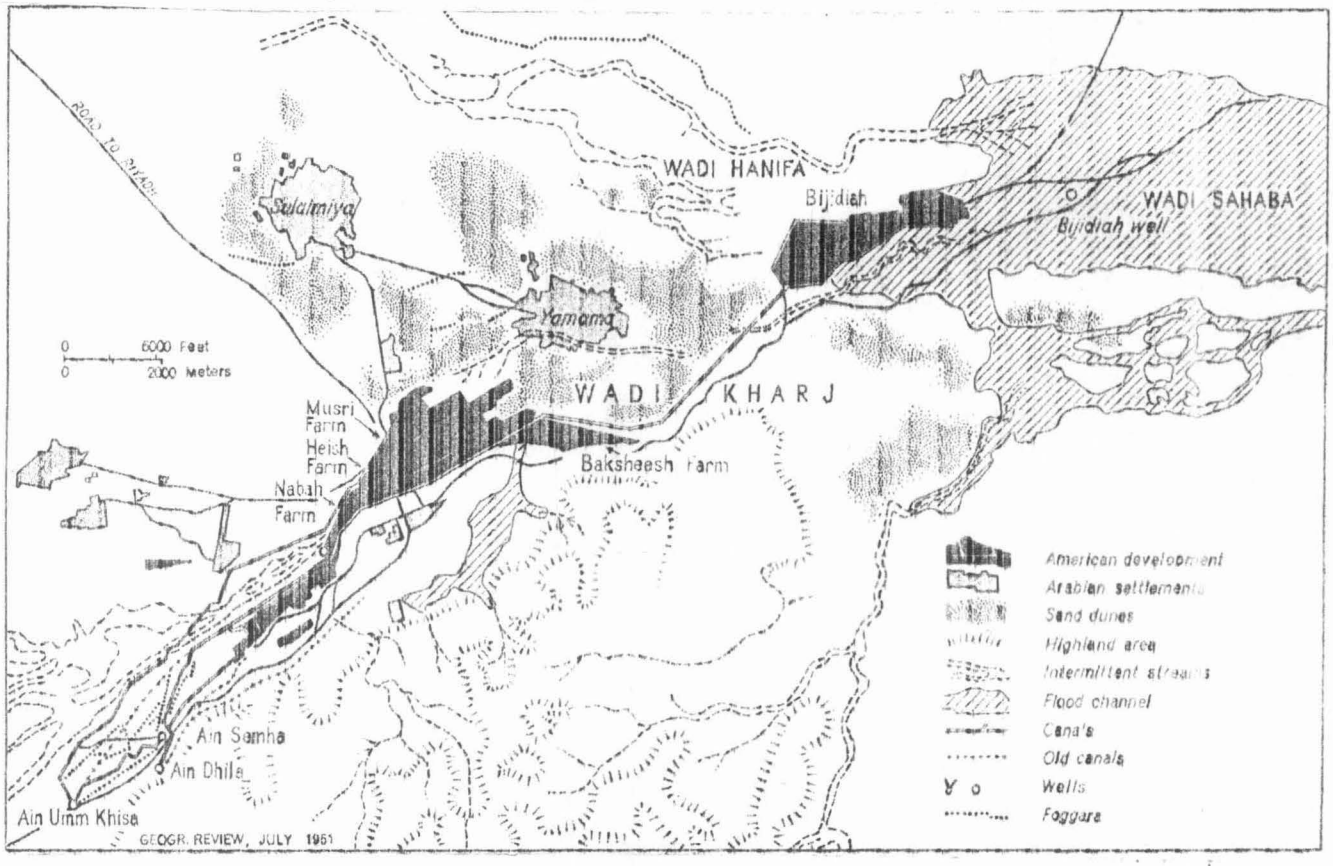

Source: Douglas D. Crary, (1951), "Recent Agricultural Developments in Saudi Arabia", *Geographic Review*, July, 41(3): 368.

ABBREVIATIONS

AD	Anno Domini (dates in the Gregorian solar year)
AH	Anno Hijra (dates in the Hijra lunar year)
CPO	Central Planning Organization
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
GNP	Gross National Project; The total value of all final goods and services produced by a nation's economy. GNP is equivalent to GDP minus the net factor payments abroad.
GSFMO	Grain Silos and Flour Mills Organization
HIDA	Al-Hassa Irrigation and Drainage Authority
IMF	International Monetary Fund
MOAW	Ministry of Agriculture and Water
MOLSA	Ministry of Labour and Social Affairs
MOMRA	Ministry of Municipal and Rural Affairs
SAAB	Saudi Arabian Agricultural Bank
SAMA	Saudi Arabian Monetary Agency
SIDF	Saudi Arabian Industrial Development Fund
SR	Saudi Riyals
SWCC	Saline Water Conservation Corporation

CHAPTER – I

INTRODUCTION

CHAPTER-I

INTRODUCTION

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CHAPTER-I

INTRODUCTION

West Asia is the cradle of civilisation, because settled or arable agriculture began there. The region displays all stages of agricultural development from the immemorial nomadic pastoral to the most advanced irrigation farming, and in irrigation itself there exist all shades of engineering and agricultural efficiency and inefficiency. The rural population density varies from intense to sparse. The systems of land ownership and tenure and the problems like economic, agricultural and sociological to which they give rise are of great complexity. But in spite of these wide diversities the territories have many common characteristics and hence many common problems. The weather distribution has led to the use of a system of agriculture in which mixed farming (the combination of arable and animal husbandry) has had little or no place. There exist wide local modifications of farming methods due to topography, soil type, use of irrigation and the opportunity of supplying internal or external markets with specialised crops.

Agriculture in West Asia is mostly a peasant and extensive system. The majority of the peasants work under some form of tenancy, usually on a share basis. With some obvious exceptions, the department of agriculture and the help they can supply to the peasants are rudimentary; education, especially rural education is very backward and village welfare and amenities scarcely exist. Apart from small and large scale developments of irrigation, West Asian agriculture is essentially a subsistence system, based on grain or bread crops, with long periods and large areas of fallow land. In West Asia the improvement of agriculture is beset by even greater problems like social side arising from the system of land tenure and social organisation, technical side with overriding influence of the climate with its long, hot, dry season and economic side from the ecological and expanding markets for the products of an intensified agriculture. The thrust of agricultural policies in the developed market economies has essentially been improving farm incomes and raising self-sufficiency or expanding exports. The basic objectives have been sought by facilitating productivity growth and by supporting producer incentives in various ways.

Among West Asian countries, Saudi Arabia is the largest and driest country on the Peninsula and one of the most arid regions of the world. It is characterised by the vastness of its land covering an area of 2,253,000 square km, which is more than 800,000 square miles with over 1.5 per cent of the world land mass. It is a desert country lying within the continental zone where temperatures are high in summer and low in winter. It has a continental climate with low humidity and minimum rain subject to Indian Ocean monsoons. It is also characterised by low annual rainfall, dry weather and difficult terrain. The principal resources of the country are agricultural produce and petroleum but greater proportion of the population follow a traditional way of life based on nomadic pastoralism or oasis agriculture. The agricultural sector is the largest non-petroleum sector in the country. Huge oil revenues give the country a high-income per capita rate, but the traditional agricultural sector is still dominant in terms of the numbers employed within it.

The objectives of the study is to examine Saudi policies on development of agricultural sector, to examine the technological and institutional reforms in Saudi Arabia, to study the implications of five-year development plans on Saudi Arabian agricultural sector and to analyse the feasibility of agricultural development in Saudi Arabia. The hypotheses framed for the study are that the major motivating factors for Saudi agricultural policies during 1975-1985 were the oil-generated affluence that motivated the Saudi government to allocate huge resource and implement ambitious policies for agricultural development; the agricultural policies were not cost-effective and were unsustainable; attaining food self-sufficiency, diversifying one-resource economy and settling down its nomadic Bedouin population The dissertation deals with overview of Saudi Arabian economy in terms of agricultural sector and its contribution to the national economy; examines Saudi Arabian agricultural policies during the decade of the peak of its oil-generated affluence and traces the developmental phases of Saudi agriculture from ancient to modern period. Thus the present study will be a unique one in the sense that as per the available literature survey, there is no detailed study on "***Agricultural policy and its impact of development on national economy in Saudi Arabia***". Therefore, this will pave way for further exploration of research on the topic.

SAUDI ARABIAN ECONOMY: OVERVIEW

Saudi economy is a one-resource economy; it produces and sells oil and imports all its requirements from abroad. The Kingdom's economic growth is based entirely on exploitation of its oil resources. The Saudi Arabian economy was deeply involved in the production and exploration of crude oil. The major source of the Kingdom's revenue is oil (royalties, income tax and participation earnings) which accounts for 96 per cent of total revenues.[1] The country's immense oil revenues are historically unique for the government to plan development, including a total transformation of the economic and industrial base without financial constraint. Production of oil on a commercial scale began in 1938, but the real development of the oil sector began after 1945. Saudi Arabia was the fifth largest producer of oil in the world and possesses the world's second largest proved reserves. Saudi Arabia's effective economic development began at 1948. The main economic development of the country began in the 1960's under the government of King Faisal. Since 1961, the Saudi economy has grown rapidly. In mid-1970's Saudi Arabia had more direct and immediate control over its income flow and major decisions affecting its economic life.

The escalation of oil prices in the mid 1970s has played a major role in lifting Saudi Arabia from the ranks of oil wealthy to the super rich country. No serious attempt was made to diversify the economy until the first five-year development plan of the period from 1969/1970 to 1974/1975 was formulated. From 1969 to 1973, the average annual growth rate of Saudi oil revenues was about 55 per cent. The largest increase of income occurred in the country between 1973 and 1974, when the price of crude oil nearly quadrupled.[2] The overall effect of higher oil prices and exports generated large revenues for the Saudi government. The revenue generated by oil exports in 1974 accounted for 84 per cent of the nation's gross domestic product. From 1969 to 1976 over 90 per cent of the government's total revenue receipts were derived from the exploration of crude oil and its derivatives, while the remaining 10 per cent was generated by non-oil sources.

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[1] Argus of Arab Economy (1975), *Economic Review of the Arab World,* 8:5. p. 38.
[2] Donald, Moliver and Abbandante, Paul J. (1980), *The Economy of Saudi Arabia,* New York: Praeger publishers. p.33.

AGRICULTURAL SECTOR IN SAUDI ARABIA

Agricultural sector in Saudi Arabia was the most productive fast expanding economic sector and considered as the fundamental pillar of national economy. The country's arid-zone agriculture was based primarily on nomadic pastoralism, since cultivation was possible only in oases and in the area in the South-west corner of the Kingdom, which receives adequate rainfall for farming.[3] Climate in Saudi Arabia ranges from the tropical desert climate of the Tehama to the warm temperate climate of the higher elevated terraces in the Asir Mountains. The highlands of Asir have rich potentialities for agriculture because of fertile soil and rainfall that support irrigation.[4] In the Asir region, 404,000 hectare (ha) is rainfed and 121,000 hectare irrigated at oases.[5] Oasis is an area having a small waterhole with few palm trees and surrounded by sand dunes.[6] Principal oases occurring in Saudi Arabia are Khyabar, Medina, Mecca, Al-Taif and Wadi Fatima in Hejaz; Hail, Burayda, Unayza, Riyadh, Al-Kharj and Khafs Daghra in Nejd and Jabrin, Al-Hassa and Qatif in Eastern Province.[7]

Medina was the largest oases found in places where fertile soils are deposited by *wadis* and having adequate springs.[8] Hauta was the oasis in Central Nejd on the line of the Jabal Tuwaiq south of Riyadh.[9] On the coastal plains of Baysh, Yiba and Jizan region the agricultural concentrations are in wadis (beds of seasonal rivers).[10] At higher elevations the agricultural areas are found at Jebel Fayfa, near the towns of Abha and Zahran at Najran valley and at the wadis of Bisha and Turaba. Agriculture was based on irrigation in the area stretching southward along the Red Sea coast from below Taif to the Jizan-Zaharan region. Sedentary agricultural system involves establishment of permanent settlements for the entire family unit to cultivate the land and raise some livestock near

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[3] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 208.
[4] Riley, Carroll L. (1972), *Historical and Cultural Dictionary of Saudi Arabia*, Metuchen: The Scarecrow Press. p. 12.
[5] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 558.
[6] Vidal, Frederico S. (1980), "Development of the Eastern Province: A case study of Al-Hasa oasis" in Willard Adolph, Beling (eds.) *King Faisal and the Modernisation of Saudi Arabia*, London: Croom Helm Ltd. p. 90.
[7] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 215.
[8] Vidal, Frederico S. (1980), "Development of the Eastern Province: A case study of Al-Hasa oasis" in Willard Adolph, Beling (eds.) *King Faisal and the Modernisation of Saudi Arabia*, London: Croom Helm Ltd. p. 558.
[9] Riley, Carroll L. (1972), *Historical and Cultural Dictionary of Saudi Arabia*, Metuchen: The Scarecrow Press. p. 51.
[10] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 215.

the farmhouse.[11] Sedentary farming, occupying 25 per cent of the population, takes place on less than one per cent of the total land area.[12] Sedentary farmers and nomadic herders produce mainly for themselves.

1.2 (a) Land Use Pattern

The land use pattern in Saudi Arabia involves utilisation of land for cultivation of crops. The total area of the country is 870,000 square miles (556.8 million acres).[13] The cultivable area in Saudi Arabia was 52.7 million ha, which was 25 per cent of the total area. The proportion of land under cultivation was 0.13 per cent in Saudi Arabia.[14] The proportion of land under irrigation was 80 per cent.[15] The average area of irrigated land per holding was less than one hectare. The total area utilised for agriculture and forests was less than three per cent.[16] Only 30 per cent of the arable land was owned inheritable in Asir, Hejaz mountains and in some oases of Nejd and Eastern Province and the remaining 70 per cent arable land and all other agricultural land are inherited only to usufruct.[17]

Most of the land area was in *miri* land, control was vested in the state or the King and most of which was actually held by tenants or in *fief.* Land not owned by the state was owned by individuals, extended families, village communities, tribes or was permanently endowed to religious or charitable institutions (*waqf*). *Miri* land includes the pasture districts (*dira*) of the nomadic tribes, which constitute about 80 per cent of the national territory. The government owns all subsoil rights as since *dira* are *miri* land, it holds the right to move the tribes, if necessary for the exploitation of subsoil mineral resources, such as oil. Each tribe has a certain district within which they can wander in search of pastures. Erratic weather conditions force tribes to wander over into another's territory, which may have received more rain during a particular season. The owner

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[11] Wickens .G.E. (1995), "Agriculture and Grazing on Arid Lands" in William A. Nierenberg (eds) *Encyclopedia of Environmental Biology* (Vol. I, A-E), London: Academic Press. p. 19.
[12] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 208.
[13] Ibid. p. 214.
[14] The Kingdom of Saudi Arabia, (1977), London: Stacey International. p. 136.
[15] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 135.
[16] The Kingdom of Saudi Arabia, (1977), London: Stacey International. p. 136.
[17] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 219.

carries out agriculture in Saudi Arabia almost completely in all area but only 9 per cent of agricultural area was rented. The government has distributed fallow land to farmers. Any Saudi citizen may own, buy and sell land, subject to few government regulations and the restrictions of *Sharia Law*. Upon the death of a landowner his land was distributed among all heirs; sons receive an equal number of shares and daughters receive half of the shares. Most lands are jointly owned by an extended family (*Musha land*) to avoid distribution of land among the heirs.

Cultivation rights to various sections of the land was rotated among family members which was entrusted to a son or other individuals and the harvest was divided each year in accordance with the inheritance laws which reduced the size of the individual shares in the harvest from generation to generation. Ownership of large tracts of agricultural land was the result of government's granting of miri land in *fief* (Ikta).[18] *Ikta* grants increase the cultivation of semi desert land. *Ikta* grants were subsequently confined to previously uncultivated desert land. *Mulk* land was the only form of full private ownership as individual owns the land himself and has full rights of disposal to arable land found in Asir region. *Mulk* was nonexistent in the extremely arid parts of the interior.

Musha land was collectively owned property of extended families who have decided to keep their lands intact rather than partition them to heirs according to Islamic law. The head of the family reports the creation of a *Musha* land to the Sheikh of the village or to the Emir of the district. In some cases, parcels of land are periodically rotated among the members of the family for cultivation. More often, a son was designed to manage the entire estate. Sometimes the estate was leased out to sharecroppers and was supervised by the head of the family of another designated person. The proceeds are divided according to the law of inheritance and the individual shares thus get smaller and smaller with each generation. The proportion of *Musha* land to the total cultivated area was small in Saudi Arabia. One-sixth of the *Musha* land was found in Nejd and in Eastern Province. Communal pastures, village and oasis communities belonging to the

[18] Walpole. Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 219.

settled farmers represent a nonfamily type of collective ownership of land, which are found in Asir are jointly owned, worked, cultivated and harvested by a group of villagers. The shares of the crop are equally divided among the working adult men and women of the community under the leadership of the sheikh. Bedouin tribes own the Jabrin and the Khaybar oasis communities. Some pastures near towns and villages are owned in common by the settled farmers throughout the country. A herdsman was designated and paid by the villagers to supervise the grading land and to take the sheep and goats to pasture after the winter rains.

Tenant farming was more widespread than owner farming. In 1956, 60 per cent of all agricultural production units were leased and 40 per cent were owner-managed.[19] The percentage of leased farms was highest at 70-80 per cent in Asir and Hejaz region. Land under all forms of tenure: *miri, ikta, mulk, musha, waqf* and tribal are leased through sharecropping agreements, term leases or heritable leases. Lease agreements, arrived at through the mechanism of public auction are written or oral and are strictly observed, whether in written or oral form. Sharecropping is the prevailing form of tenancy, covering at least 50 per cent of the total agricultural area. There is no uniform sharecropping system governing the relationship between the landlord and the tenant. Religious law holds that the sharecropping system is permissible only if the landlord provides at least the seeds; it is preferable that he provide the livestock and equipment as well. The introduction of machinery in farming units has affected sharecropping arrangements in Nejd and in Eastern Province on reclaiming *ikta* land.

Water rights are rights to the floodwaters derived from the wadis, which are dammed to divert the water to the cultivated fields by means of (*uqum*) canals. Each *uqum* irrigates a plot of land, which carries the water rights. Upper lands are irrigated before the water is let through the lower lands. Most land in Saudi Arabia is arid or semi-arid, suitable only for periodic grazing. Vast rangelands have been badly overgrazed, which support three-fourths of the country's livestock population (8.5 million in sheep-

[19] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 221.

equivalents).[20] With the exception of the salt flats and the areas of shifting sand dunes, most of the country supports some form of edible vegetation during certain seasons of the year. The major areas used for grazing are found along the wadi channels, which provide the most favourable habitats for range forage production throughout the country. Grazing areas are also found on the limestone plateaus located in the North-central region, where soil has accumulated in pockets and in areas where the limestone was covered with a layer of sand and in the Western mountains where edible grasses are found under the juniper forests at the higher elevations. After the spring rains, carpets of short-lived annual grasses grow in the areas of deep sand along the Persian Gulf and in the Great Nafud, Dahna and Rub Al-Khali deserts and in smaller deserts throughout the country. The areas near the villages and the permanent watering places are the most heavily grazed, but all pasture areas are constantly threatened with over grazing. About 39 per cent of land was used for low- grade grazing.

1.2 (b) Organisation of Farmlands

In Saudi Arabia most farms are small and size was limited by the scarcity of water. In Asir and Eastern Province, farm units are smaller in size. Most of the farms are between 5 and 12.5 acres.[21] In Nejd, most farm units are between 12.5 and 50 acres. In Hejaz, larger units of between 25 and 75 acres are more common. In the relatively densely populated areas of Asir, Hejaz and the Al-Hassa oasis, family members usually work the farms without hired help. Family members are used in great numbers in Nejd. For larger units in Qassim and Jebel Shammar, labourers are hired on long or short-term bases.

In Nejd, women work more than men on the farms. Many labourers work on a contractual basis, free slaves who formerly served families involved in agricultural production generally remained with the families and still work on the farms without formal arrangements. Some farm workers work faithfully for a farmer on non-contractual basis; and often own a small date orchard or vegetable plot of their own. In Nejd members of Bedouin tribes work as nomadic migrant farm workers on a short-term basis

[20] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 119.
[21] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 225.

to earn money. Foreign migrant workers like Yemenites, Palestinians, Sudanese, Somalis, Egyptians, Jordanians, Lebanese, Syrians and Ethiopians are concentrated primarily for agricultural activities in Saudi Arabia.[22] The total area of medium farms of 5 to 200 ha was 730,000 ha with 7,300 farms and small farms are less than five ha covering 450,000 ha with 180,000 farms. The average size of the total area per holding is 64,000 square metres or 64 dunums (one dunum = 1,000 square metres), while the average area under cultivation per holding was only 22.2 dunums/2,200 square metres. An area of 10 dunums/10,000 square metres is sufficient to sustain an average family. Agriculture in the kingdom was carried out on small farms, at or slightly above subsistence size. Out of 70,352 holdings (excluding livestock holdings), 33,242 or 47.3 per cent, are between 0 and 5 dunums/5,000 square metres and 13,661 or 19.4 per cent are between 5 and 10 dunums or 5,000 and 10,000 square metres in size.[23]

1.2 (c) Farming Practices

In Saudi Arabia, most of the farms are small and privately owned, with land tenure based on a traditional system governed by Islamic law. Farming takes place on approximately 0.5 million to 0.7 million acres-less than one per cent of the total land area.[24] The ground is prepared for cultivation with a mesha, a cross between a shovel and a pickaxe or with hoes and crowbars or spades. In *wadis* and terraces in Asir and Hejaz, a wooden drag was used to form the basins and the wadi barrages and to level the fields. Soil erosion by surface water and wind presents a serious problem on cultivated land.

Farmers on cultivated terraces practice contour ploughing to prevent the erosion. Farmers built hedges of dead plants or drought-resistant trees to prevent wind erosion. Weeding was done with the aid of a short handled cutlass. Harvesting was done mostly by the women with the use of hand sickles. Threshing was done mostly by animal drawn threshing boards. Irrigated highlands of Asir region have a triennial rotation of wheat, sorghum and lentils or wheat, barley and lentils. A second season is applied when the

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[22]Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. pp. 226-227.

[23]CDS, Statistical Yearbook, 1386 A.H., vol.2 (Riyadh, 1966), in Knauerhase Ramon (1975). *The Saudi Arabian Economy,* New York: Praeger Publishers, p. 121.

[24] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 214.

monsoon rains are utilised; the planting is in late May, the harvesting in October. The land remains fallow in the case of insufficient rain. On the irrigated land, the crops are planted in late May and are harvested in October. Under dry farming conditions, crops are planted in November and are harvested in July. Perennially irrigated land was cultivated every year. In Nejd and Northern Hejaz, a biannual rotation of wheat or barley and occasionally, legumes was practiced. Planting was done in late February or early March and harvesting was done in July. The land was left fallow the rest of the year.

In truck farming areas like in Wadi Fatima, two crops are grown each year and in Al-Kharj, three crops are grown each year. In the low-lying oasis of Al-Hasa and Qatif in Eastern Province, where the availability of water from artesian wells and springs favours agriculture, crops are grown the year round. Cultivation before planting was increasingly more often done by machine, but most of the cropland was still prepared by hand. Planting, weed control and harvesting was done completely by manual operations. Dry farming was practiced largely on the higher elevation in the Asir Mountains, where terrace farming was highly developed.

In general, there is only one cropping season. The major irrigated crop is wheat. The main crops grown in Saudi Arabia are dates; grains such as wheat, barley, sorghum, millet, maize, rice, alfalfa; tomatoes, citrus, onions, grapes, melons and vegetables.[25] Coffee was grown in Asir highlands. The summer crops are millet, sorghum, rice and corn and the winter crops are wheat and barley. Crop rotation was practiced in all agricultural areas in March and crop was harvested in July. Plum, apple, figs and several other fruit bearing varieties are also under cultivation. Palm trees predominate among the permanent crops with about 8 million trees. Despite the arid climate, there are some areas where weather conditions and water supply are such that it is possible to raise two or more crops annually. Multiple cropping has raised the average number of crops to 1.08 per annum.[26] The total area planted with field crops was 980,004 acres, vegetable crops

[25] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 660.
[26] Knauerhase Ramon, The Saudi Arabian Economy (Praeger Publishers, New York, 1975). p. 111.

of 77,253 acres and tree crops (including palms) of 55,884 acres.[27] The area under agricultural ownership was about 1.9 million acres of which 900,000 acres are productive. The area planted with winter and summer crops are 239,059 acres and 701,797 acres respectively. The largest part of the area under vegetable cultivation was planted with watermelon, squash, pumpkin, tomato and onion of which 300 square metres (sq.ms) was under vegetable cultivation, of which 235.3 sq.ms or 76.3 per cent were planted in the Central and Quaseem regions. In terms of field crop, Central region accounted for 329.2 or 32 per cent of the total area, followed by the Southern region with 261.3 or 25.4 per cent, the Quaseem with 186.3 or 18.1 per cent and the Al-Taif region, with 154.9 or 15.1 per cent. In Saudi Arabia, 3,749,600 acres of forest and woodlands are used for grazing and 4,940,000 acres are potentially suitable for forestry.[28]

WATER RESOURCES OF SAUDI ARABIA

The Kingdom of Saudi Arabia is known for the scarcity of its water resources. The country's severe arid conditions cause surface and renewable groundwater to be very limited.[29] As there are no free flowing, permanent rivers in Saudi Arabia, the usable water supply depends on rainfall and on exploitable under-ground water.[30] Rainfall is scanty, irregular, sporadic, variable and unreliable, occurring mostly during the months from October to April.[31] Rainfall comes usually in the form of sudden storms. Saudi Arabia receives no more than 75 mm to 85 mm of rain each year with areas without rainfall for several years.[32] Roughly, 80 per cent of surface area receives less than 4 inches of rain annually. Asir receives a yearly average of 300 mm to 320 mm of rain, all of it in the summer from the southwest monsoon. South-western parts of the country are affected by monsoons and the annual rainfall average in these areas is 500 mm.[33] Water is found near the surface in dry riverbeds or natural springs. Saudi Arabia contains

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[27] *The Kingdom of Saudi Arabia*, (1977), London: Stacey International. p. 136.
[28] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 235.
[29] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London, p.24. URL:http://www.soas.ac.uk/wa.occ48
[30] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 215.
[31] The Kingdom of Saudi Arabia, (1977), London: Stacey International. p.17.
[32] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 546.
[33] *The Kingdom of Saudi Arabia*, (1977), London: Stacey International. p.139.

several long systems of wadis or intermittent streams, especially in the Nejd region.[34] A dependable flow of water nourishes the deep wadis of the south-west in winter months and much of it runs off into the desert sands or quickly evaporates.[35] Total surface water resources estimated was 2.2 km^3 per year, most of it infiltrating to recharge the aquifers about 1 km^3 recharges the usable aquifers. The total (including fossil) groundwater reserves estimated is 500 km^3, of which 340 km^3 are probably abstractable at an acceptable cost in view of the economic conditions of the country.

Groundwater represents the major water source in Saudi Arabia. The two types of groundwater sources are renewable and non-renewable. Renewable water aquifers are encountered in about one third of the surface of Saudi Arabia according to Ministry of Agriculture and Water known as the "Arab Shield". Much of Saudi renewable groundwater is in the Southeastern region, which was accessed through wells ranging in depths between a few meters and 100 meters. Non-renewable aquifers represent the major source of water in Saudi Arabia, which was formed 600 million years ago.[36]

Water was found at depths ranging from 100 meters to 500 meters, sometimes up to 2,500 meters and due to unavailability of mechanical means and money; they remained largely undisturbed until the early 1980's when exploitation started in earnest. The other source of water supply in Saudi Arabia is treated wastewater used mainly for irrigation purposes.[37] Shallow alluvial are unconfined, narrow and long, small in area and their water tables fluctuate rapidly in response to local precipitation and discharge. The types of aquifer seen in the country are shallow alluvial aquifers along wadi systems underlying by weather bedrock and deep rock aquifers usually sandstone and limestone. The nine deep aquifers in Saudi Arabia are Wajid, Saq, Tabuk, Minjur, Biyadh, Wasia, Umm Er Radhuma, Neogene and Dammam.[38] The most binding constraint on Saudi agriculture

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[34] Riley, Carroll L. (1972), *Historical and Cultural Dictionary of Saudi Arabia*, Metuchen: The Scarecrow Press. p. 12.
[35] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 546.
[36] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London. p.24. URL:http://www.soas.ac.uk/wa.occ48
[37] Ibid, p. 27.
[38] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215.

was imposed by water.[39] The general availability of water in areas of cultivable soil was insufficient everywhere in the Kingdom. Agriculture accounts for 85-90 per cent of water demand which was met mostly by non-renewable groundwater reserves. Eighty per cent of the cultivated area was irrigated with water from wells, pits and springs. The remaining twenty per cent of the cultivated area, which was rainfed, includes areas in the highlands of Asir and Southern Hejaz and the Tehama coastal plain on the Red Sea. The lack of water has made 2 per cent of the total land area useful for farming. Irrigated lands near oasis have been virtually the only sites of cultivation. More than 75 per cent of the Kingdom's arable land is rainfed, but rainfall exceeds 400 to 500 mm (millimetre), which occurs for a short period. Except for the Western and Central regions, ground water resources are sufficient to encourage further agricultural development.

1.3 (a) Irrigation Pattern

Irrigation was primarily carried out by flooding. The distribution devices for flood irrigation consist of pieces of sod or small earth walls used to control the flow of water leading from irrigation ditches onto the cultivated fields.[40] Of the total irrigated area, 16.6 per cent was irrigated by rainfall, 2.5 per cent by springs and 80.9 per cent by wells. Nearly 1.2 million dunums/1,200 million sq.ms of land are irrigated by wells, of which 60,088 were artesian wells and 811,734 were ordinary shallow dug wells. The government has constructed more than 200 dams with varying storage capabilities adjusted to rainfall and volumes of floodwater. Floods of a few hours or at most a few days reach the ocean, which are coming from the Asir Mountains and short coastal streams. Water flows in the wadis for a short time and soon disappears into the sands, which is stored in the wadi fill.

There are two irrigations in a year in July and December/January when water flows through the natural wadi.[41] On the Tehama coastal plain, cultivation depends entirely on monsoon floods that occur from June to September and winter rains from December to February permit dry farming to a limited extent.[42] Wadi is a dry or

[39] *The Kingdom of Saudi Arabia*, (1977), London: Stacey International. p. 138.
[40] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 215.
[41] Argus of Arab Economy (1979), *Economic Review of the Arab World*, 13:1. p. 51.
[42] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 216.

intermittent streambed running through a canyon or gulley, usually a steep sided one.[43] Wadis are dammed partially or completely to divert the floodwaters to the cultivated basins. The basins that are surrounded by dikes are soaked one by one, starting with the upper lands.

Irrigation water in Saudi Arabia was extracted with mechanical energy produced by pumps driven by electricity from diesel generators.[44] All agricultural land was irrigated and all equipped with full or partial control irrigation. Surface irrigation was practiced on old agricultural lands that are cultivated since 1975, which represent about 34 per cent of the irrigated area. Sprinkler irrigation was practiced on about 64 per cent of the irrigated areas. The central pivot sprinkler system covers practically all the lands cropped with cereals. Normally pumped groundwater from one deep well supplies one or two central pivot systems with the irrigation application efficiency between 70 and 85 per cent. Vegetables and fruit trees are irrigated by drip and bubbler methods respectively. Water is supplied free of charge to the farms.

In Al-Hassa irrigation project in the East, agricultural drainage water was reused for irrigation after blending with fresh groundwater. The rain falling on uncultivated slopes was collected and diverted to the walled terraces by channels that are cemented to prevent seepage and to supplement meagre rainfall. Between 5 and 10 acres of uncultivated land was used as a catch basin for every acre of land under cultivation.[45] In Eastern Province, irrigation of the larger fields, for dates and rice was done by diversion of water from artesian springs by gravity through canals to the fields. The farmer allows the surplus water to drain into a secondary canal that leads the water to a lower field. To irrigate the smaller fields of alfalfa and vegetables in Eastern Province, water was lifted from springs and wells by animal power and less frequently, by mechanised pumps into irrigation ditches running along the sides of the fields or into reservoir from which it was diverted. Water from the irrigation ditches was lifted by a simple hand-operated lift if

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[43] Riley, Carroll L. (1972), *Historical and Cultural Dictionary of Saudi Arabia*, Metuchen: The Scarecrow Press. p.117.
[44] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London. p. 13. URL:http://www.soas.ac.uk/wa.occ48
[45] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 217.

small amount was needed. Wells and pits provide the water for the oasis agriculture throughout the country, particularly in the interior and in Hejaz. Lifting was done by animal power and centrifugal pumps to an increasing extent. In Wadi Yenbo, the areas around Mecca, Medina and Wadi Fatima in Hejaz, in the Central highlands of Nejd and a few places in Eastern Province horizontal wells *(dabbles)* were dug into water-bearing strata above the level of the land to be irrigated. From the well a slightly inclined tunnel, sometimes several miles in length, allows the water to flow by gravity underground to the irrigation area. *Dabble* was to minimise evaporation of the precious water that would occur from long, surface irrigation ditches.

Water problems faced by irrigated farming are high salt content, which rapidly creates salinity; inadequate drainage and leaching; inefficient irrigation systems causing wastage of water and periodic droughts which cause drying up of shallow wells temporarily eliminating sources of irrigation water. The largest quantity of runoff occurs in the Western region, which represents 60 per cent of the total runoff although it covers only 10 per cent of the total area of the country. The remaining 40 per cent of the total runoff occurs in the far south of the Western coast of Tehama region, which covers only 2 per cent of the total area of the country. Water logging and drainage problems occur in Central and Southern parts of the country due to the existence of shallow and impervious layers in the soil.

TRADITIONAL AGRICULTURE AND PASTORAL NOMADISM IN SAUDI ARABIA

Pastoralism is a way of life dictated by the arid climate, scarcity of water and meagre supply of forage in the deserts.[46] The poor and uncultivated lands used for grazing cover approximately 80 per cent of the Kingdom's total area and are divided into districts for use by the various nomadic and semi nomadic tribes.[47] Majority of the population consisted of nomadic tribesmen who drove their herds of camels, goats and sheep from one grazing area to another throughout the year across the desert in search of fodder for

[46] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 232.
[47] Ibid. p. 208.

their animals. The Bedouin groups have oasis spots to spend long periods of the year. The Bedouin nomads comprise 10 per cent of the Kingdom's population and are virtually the only users of about 90 per cent of the country's land area. In 1965, Bedouins occupied 50 per cent of the country's population. Bedouin are the nomadic peoples of the deserts of Saudi Arabia and surrounding areas. Bedouin have low per capita income in comparison to the national average.

Bedouin depend largely on raising livestock for domestic meat supplies as the basic source of income. Bedouin have a complex and highly developed social, economic and legal system, which has adapted to change over many hundred of years. In Saudi Arabia between 80 and 90 per cent of the land is pastureland. Traditionally, the various tribes jointly owned pasturelands. In the past *Miri* lands were collectively owned by the force and disputes over the right to the pastureland was one of the main sources of friction among the Bedouin.

In 1925 king, Abdul Al-Aziz abolished the tribal rights to pasture land to maintain peace among the tribes.[48] Since 1925, the government has exercised the right of eminent domain over the uncultivated lands and legally denies or modifies it. The various tribes continue to graze their herds, but the government has the final word in the disposition of the rangeland. The government owns all subsoil rights and it has the right to move the tribes from the land in order to exploit subsurface minerals or oil. Since then the Bedouin and semi nomads, who own 80 per cent of the livestock in the country, remain at permanent watering places near the villages in the dry season and feed their animals with hay, which grow only in the rainy season. The settled farmers, who own 20 per cent of the livestock, feed them alfalfa, dried or green grass and sending them out to pasture in the grazing lands located near the villages. Camels, indispensable to every Bedouin family, provide livelihood for approximately 200,000 to 300,000 Bedouin. Barley and clover are occasionally fed to special work or milk animals.

[48] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 232.

DEVELOPMENTAL PHASES OF SAUDI AGRICULTURE FROM TRADITION TO MODERN PERIOD

Until the discovery of oil, pastoral economy played a key role in the history of the Bedouin population. Pastoralism has been traditionally the most important source of agricultural income. With the initial search for oil and the introduction of modern drilling technology, changes in traditional agriculture and in patterns of consumption occurred in the Eastern Province. Droughts in the 1950's revived the idea of settling Bedouin tribesmen in selected parts of the country.[49] In 1965 pastoralism provided livelihood for approximately 50 per cent of the population.[50] The remainders are semi nomads who raise mostly sheep and goats and remain at permanent watering places near villages in the dry seasons, and move out into remote areas of their tribal districts only after the annual rains. Some live in huts and cultivate crops like millet, sorghum and watermelons during their sedentary phase.

Until the 1970's, sedentary agriculture saw few changes and declined in the face of foreign imports, urban drift and lack of investment. Bedouin following heavy showers cultivated a very small amount of semidesertland. One member of a lineage usually remains to care for it while the rest wander with the herds. The great transformation from a traditional to a modern agricultural system was accomplished, both by large experienced and able individual farmers and by large agricultural companies, either limited or corporate. Development of the traditional agricultural sector was designed to help the farmers and herders to achieve a higher standard of living and to decrease the country's dependence on imported agricultural products. A great deal of money has been invested in a number of agricultural schemes to nomadic tribesmen. The spontaneous settlement of Bedouin tribesmen throughout much of Saudi Arabia results from a combination of environmental, political, economic and social factors to put pressure on the Bedouin to leave their traditional way of life for a new one.[51] Some of the Bedouin tribal groups are totally sedentarised and many of them live in tent and hut encampments

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[49] Brian D. Clark, "Tribes of the Persian Gulf" (eds) in Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 494.
[50] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 213.
[51] Brian D. Clark, "Tribes of the Persian Gulf" (eds) in Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 494.

that have sprung up around urban centres, while others are permanently established as cultivators in oases. The settled farmers, constituting approximately 25 per cent of the population, live in villages and small hamlets in the agricultural regions; they supply most of their own needs and exchange agricultural produce for animal products of the nomads in local markets.[52] The *hilal* settlement was a transition stage between nomadism and integration into an urban society. The newly settled Bedouin keep many of their ties with their nomadic Kingsmen, often acting as middlemen in the livestock trade and being hosts to their relatives during visits.

The spontaneous settlements (*hilal*) of Bedouin nomads were found on the outskirts of the urban areas in Saudi Arabia. The largest number of *hilal* were found in Riyadh and the oil towns of the Eastern province with most cities having sedentarised-nomadic settlements.[53] In 1972, eighteen separate *hilal* were located around cities of Northern-Central Qassim region, eight at Unayza, two at the regional capital of Buraida and the remainder in smaller towns.[54] Many of the *hilal* were founded during drought years when the nomadic Bedouin lost most of their livestock, settling for economic opportunities in the urban areas. Two *hilal* had been established in 1943, nine in the 1950's, five in the 1960's and two in 1970.[55] The hilal comprised of families from specific tribes. In Qassim region of Harb, Mutair, Utayba, Suluba, Anaza and Shammar tribe constitute the *hilal*, the inhabitants being either entirely from one tribe or sometimes from two or three.[56] *Hilal* are located on the periphery of cities because of the availability of cheap or free land and settled Bedouin do not want to live in the crowded urban areas.[57]

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[52] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 214.
[53] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 256.
[54] Ahmed A.Shamekh, "Spatial Patterns of Bedouin Settlement in Al-Qassim Region, Saudi Arabia," in Cottrell. Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 256.
[55] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 256.
[56] Ahmed A.Shamekh, "Spatial Patterns of Bedouin Settlement in Al-Qassim Region, Saudi Arabia," in Cottrell. Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. pp. 256-257.
[57] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 257.

CHAPTER-V

CONCLUSION

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Although oil is the basis of Saudi Arabia's current wealth, agriculture is a key area of development. The country's economic growth was based entirely on exploitation of its oil resources. As the main economic development of the country began in 1960's Saudi Arabia had more direct and immediate control of its income flow and major decisions affect its economic life. The escalation of oil prices in the mid 1970s has played a major role in making Saudi Arabia diversify the economy. From the first five-year development plan, Saudi Arabia was allocating huge investment in all non-oil sectors to produce the produce and compete in the world market. Among non-oil sectors, agricultural development was also given priority with many projects and programmes to meet the demand of the population and making great progress in realising the long-held objective of achieving self-sufficiency in food production. The major motivating factors for the agricultural development in Saudi Arabia are a conscious decision to diversify the economy, attain self-sufficiency in agriculture and settle the nomadic Bedouin populations.

The agricultural sector in Saudi Arabia is the most productive fast expanding economic sector and is considered as the fundamental pillars of national economy. The principal resources of the country were agricultural produce and petroleum but greater proportion of the population followed a traditional way of life based on nomadic pastoralism or oasis agriculture. The country's arid-zone agriculture was based primarily on nomadic pastoralism that drove their herds of camels, goats and sheep from one grazing area to another throughout the year across the desert in search of fodder for their animals.

Until the discovery of oil, pastoral economy played a key role in the history of the Bedouin population. Pastoralism has been traditionally the most important source of agricultural income. With the initial search for oil and the introduction of modern drilling technology, changes in traditional agriculture and in patterns of consumption occurred in Saudi Arabia. The great transformation from a traditional to a modern agricultural system makes the farmers and herders achieve a higher standard of living and decrease the

country's dependence on imported agricultural products. The nomadic population was declining in net annual decrease of 2 per cent per year due to rapidly deteriorating rangelands in most areas by overgrazing. The factors that led to declining importance of nomadic pastoralism in Saudi Arabia are decreased importance of the camel as a means of transportation and the government's policies of settling the Bedouin and of increasing crop production. Lack of immediate access to social, educational and other services and significant migration to urban areas due to employment opportunities in the cities especially in the industrialising regions of Eastern Province also result in declining nomadic pastoralism.

King Abdul-Aziz first thought of settling the Bedouins on a larger scale, founded many "settlements" in the heart of the desert and persuaded them to abandon their nomadic life as much as possible and lead a settled life. He also set up 122 settlements each accommodating between 400 and 100,000 people. Bedouin participation in the desert development programmes create spontaneous incentive in them to achieve progress and preserve their dignity and enable them to exercise the right of participation in the project. The country's leaders have always encouraged the growth of the agricultural sector, for its role in food security and contribution to diversifying the economy away from oil. Government is dedicated to improve agricultural output and change the way of life on every farm in the kingdom with petroleum revenues. The state draws policies and sets aims, supports and guides the private and private sector and implements all stages of productive operation.

Saudi Arabia is also applying complete revolution on up-to-date scientific technology to farming methods, irrigation, and animal and fishing resources. The agricultural sector is encouraging private investment in projects that use modern irrigation for minimal water use, protecting the environment pollution and preserving natural resources. The government has contributed to diversification of the economic base, raising income levels and improving rural living standards for both settled and nomadic communities. The policy of the Saudi government was encouraging local farmers to diversify their production by means of modern methods of irrigation away

from water-intensive crops to cultivation of alfalfa, dates, corn, rice, millet, fruits and vegetables. The state has also given more financial assistance to the farmers to improve the agricultural production so that they can have more involvement in the production and make the products with self-sufficiency.

Therefore, the above study would examine Saudi Arabian policies and their implications for five-year development plans analysing the feasibility of agricultural development in Saudi Arabia. The proposed study would also seek to examine Saudi Arabian agricultural policies during the decade of the peak of its oil-generated affluence and trace the developmental phases of Saudi agriculture from tradition to modern period especially from 1976 to 1985.

CHAPTER-II

ROLE OF AGRICULTURE IN SAUDI ARABIAN DEVELOPMENT PLANS: REASONS AND RESOURCES

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ROLE OF AGRICULTURE IN SAUDI ARABIAN DEVELOPMENT PLANS: REASONS AND RESOURCES

AGRICULTURAL DEVELOPMENTS OF SAUDI ARABIA

DEVELOPMENT PLANS OF SAUDI ARABIA

FIVE-YEAR AGRICULTURAL DEVELOPMENT PLANS IN SAUDI ARABIA

REASONS FOR THE DEVELOPMENT OF AGRICULTURAL SECTOR

RESOURCES ALLOCATED FOR AGRICULTURAL SECTOR BY GOVERNMENT IN SAUDI ARABIA

Infrastructure Facilities

Agricultural Subsidies

Saudi Arabian Agricultural Bank

Land Distribution System

GOVERNMENT ROLE IN AGRICULTURE

Ministry of Agriculture and Water (MOAW)

Objectives of MOAW

Policies of MOAW

Functions of MOAW

AGRICULTURAL PROJECTS IN SAUDI ARABIA

Al-Kharj Project

Wadi Jizan project

Al-Hassa Project

Al-Qatif Project

Haradh Project

Wadi Jabrin Project

Wadi Sirhan Project

SUPPORTING PROGRAMMES FOLLOWED DURING SECOND FIVE-YEAR DEVELOPMENT PLAN PERIOD

CONSTRAINTS OF SECOND FIVE-YEAR DEVELOPMENT PLAN FOR AGRICULTURAL DEVELOPMENT IN SAUDI ARABIA

CONCLUSION

CHAPTER-II

ROLE OF AGRICULTURE IN SAUDI ARABIAN DEVELOPMENT PLANS: REASONS AND RESOURCES

In Saudi Arabia, agriculture embraces settled agriculture and nomadic livestock production together with fishery, forestry and range resources. Broadly, the Kingdom's agricultural production was divided into settled and nomadic sectors. Settled agriculture which includes crop and livestock production, concentrates development at oases in the Northern, Eastern, Central and in the Southern regions, where rainfall was sufficient to support scattered dry land agriculture. Large areas of sparsely vegetated rangeland provide the grazing needs of nomadic herds of sheep, goats, camels and some cattle. Despite the discovery and development of oil and subsequently, rapid development of other sectors, agriculture has remained the primary occupation of the Kingdom's population.

Until the discovery of oil, Saudi Arabia's traditional economy was based on subsistence arid-zone agriculture and desert pastoralism that has provided livelihood for 50 per cent of the population. As the exploitation of oil increased, traditional agriculture declined and lost its importance. Saudi government chose the course of expensive agricultural development for an arid country despite its persistent and large budget deficits due to combination of three factors like food independence, settlement of nomadic Bedouin populations and enriching the ruling elite.[1] The main objectives for agricultural development in Saudi Arabia are to have food security through self-sufficiency, minimise the Kingdom's dependence on imported food and release surplus labour for employment in other sectors.[2] This chapter scrutinises the Saudi five-year agricultural development plans and examines the reasons for the development of agriculture sector and the resources allocated by the government in Saudi Arabia.

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[1] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London. p.32. URL:http://www.soas.ac.uk/wa.occ48

[2] *The Kingdom of Saudi Arabia*, (1977), London: Stacey International. p. 141.

AGRICULTURAL DEVELOPMENTS OF SAUDI ARABIA

Agricultural development is a process aimed at improving the socio-economic well-being of the people in rural areas and an equitable distribution of the fruits of agricultural planning. It also involvers the process of organising natural land resources management in order to increase agricultural productivity in depressed areas inhabited by distressed people. Agricultural production in Saudi Arabia includes nomadic and settled agriculture along with fishery, forestry and range resources. Growth in crop production is ascribed in three factors: arable land, cropping intensity and yields. Historically, expansion of arable area has been the main source of growth. As with crops, three primary sources of production growth can be distinguished: expansion in livestock numbers; increased intensity of range and pasture utilisation and better use of feed concentrates and agricultural by products and higher output of meat, milk or eggs per animal through improved management, breeds and technologies. In crop production, wheat covers about 106,000 acres, yielding approximately 37,000 metric tons a year.[3] Wheat crop was the major food crop grown on the terraced mountain slopes in Asir. Barley covers 58,000 acres with production of 23,000 metric tons a year.

Sorghum and millet are also staple food of many Bedouins and farmers in the Hejaz area. Durra, a variety of grain-yielding sorghum was grown primarily in highland areas of Asir, Nejd, Tehama flood plain and in Southern Hejaz. Sorghum production covers 91,000 acres, producing 37,000 metric tons a year. Millet *(dukhan)* produced approximately 27,000 acres yielding 11,000 metric tons a year. Corn was grown in parts of Asir and on some of the larger oasis in Eastern Province of 37,000 acres, yielding 21,000 metric tons. Rice was grown as an important crop in Hofuf and in Al-Hasa oasis producing 4,000 metric tons a year. Alfalfa was grown in all oases especially in the areas under the date palms, which was used for donkeys, camels, poultry and milk animals. Qat, a cash crop of green succulent plant was grown in Asir at altitudes over 4,000 feet. The net annual return on qat production is SR2,400 and SR4,000 per acre. Sesame was produced at approximately 1,350 metric tons on 4,500 acres in the Tehama plain.

[3] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 228.

The marketed crops in Saudi Arabia are bananas in the wadis of Hejaz and in Asir, alfalfa in oasis in Nejd and dates grown by the nomads in Jabrin and Khaybar oases. The date palm was the important subsistence crop for the nomads and oasis dwellers. Date palm was also one of the major sources of wealth in most of the agricultural regions, excepting the mountains of Asir and the Tehama coastal plain. The best of the more than 70 varieties come from the oasis in Medina and Bisha in the west, Al-Kharj in Nejd and the Qatif and Al-Hasa oasis in Eastern Province. An average of 200,000 tons of dates is harvested from 8.5 million date palms which cover approximately 88,920 acres, making Saudi Arabia the fourth largest date grower in the world. The average annual return on date production is between SR360 and SR600 for an acre.

Coffee was an important product in Asir, cultivated on the terraced slopes at altitudes between 4,000 and 5,000 feet above sea level.[4] The average annual return of coffee was approximately from SR2,000 to SR4,000 per acre. Vegetables are produced on extremely small plots averaging between 0.6 and 2.5 acres. Fruits and vegetables are abundant in Hejaz, Taif, Medina, Wadi Fatima and Asir, Al-Kharj experimental farms in Nejd and at other irrigated farms throughout the country. Production of tropical fruits like bananas, papayas was concentrated on the coastal plains of the Red Sea and the Gulf.

In Saudi Arabia, livestock production was heavily dependent on range or pasture grazing in a harsh natural environment. The total grazing land in Saudi Arabia was 210 million hectares, of which only 5 per cent are excellent and 31 per cent are good.[5] Good grazing areas have deteriorated because of irregular rainfall, overgrazing and cutting of shrubs. The extremes of climate, deficiencies of soil and fodder, problems of diseases and parasites reduce the productivity of livestock on the open range. Saudi Arabia's reputedly richest businessmen, the Alrajhi brothers of Bukairia and Qassim are involved in poultry farming.[6]

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[4] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 230.
[5] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning, p. 138.
[6] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London. p.13. URL:http://www.soas.ac.uk/wa.occ48

DEVELOPMENT PLANS OF SAUDI ARABIA

Oil revenues have made Saudi Arabia the driving force behind the economy and provides essential infrastructure for development of the country. The development plans identify the infrastructural, agricultural, industrial and commercial needs and formulate the strategies to achieve defined national goals. Indeed, as the country's agricultural and industrial base expands, the part played by the private sector in the economy will grow in importance, reducing the role played by government. Planning is the primary instrument of development in the Kingdom. The five-year development plan represents structural designs for society's development and provides guidelines for implementation of development programmes. The five-year development plan was prepared according to the guidelines of the national development strategy, as approved by the council of ministries. Five-year plan includes plan document, which outlines the medium term economic policies and development strategy and the detailed operation plans for each Ministry and public agency, which set all government expenditure and development programmes.

Five-year development plans integrate the main elements of development: the structural priorities and directions of the economy and the development and expenditure programmes of government. It also provides orientation for the private sector on the likely course of the economy on related government policies and potential business opportunities. The kingdom of Saudi Arabia first established a planning agency in 1958 in response to suggestions of *International Monetary Fund* (IMF) advisers. In 1965, planning was formalised in the *Central Planning Organisation* and in 1975, government reorganised *Ministry of Planning.* The *Ministry of Finance and National Economy* controls on providing funds exert considerable influence over plan implementation.

3.1 FIVE-YEAR AGRICULTURAL DEVELOPMENT PLANS IN SAUDI ARABIA

In Saudi Arabia the first five-year agricultural development plan was started in 1970-75, (1390-95 A.H.) which was drafted in the late 1960's and became effective on September 2, 1970. During the drafting period of fiscal constraint, gross domestic product (GDP) increased by 9.8 percent per year (in constant prices) and showed the greatest increase in

the non-oil sectors.[7] The policy to intensify production on developed land was pursued through the programmes of the *Agricultural Research Centres* and the *Agricultural Credit Bank*, expand arable land through large irrigation projects at Al-Hassa and Wadi Jizan, the settlement project at Haradh and the *Fallow Land Distribution Programme.*[8]

2.4 REASONS FOR THE DEVELOPMENT OF AGRICULTURAL SECTOR

In Saudi Arabia, priority was given to the agricultural sector, which makes a major contribution to the diversification of income resources and encourages farmers to continue working on the land by means of development projects. Reasons contributed to the increased demand for agricultural credit were to increase the development activity, demand for food, which led to higher prices and better returns for producers. The major stimulant to agricultural investment was the government's decision in 1974 to subsidise a wide range of agricultural machinery and agricultural supplies including seeds and fertilisers. Because of direct action during the Faisal decade, Saudi Arabian government achieved the revolutionary change in the irrigation patterns in the oasis of Al-Hassa in Eastern Arabia.[9]

Some of the other factors that led to development of agricultural sector in Saudi Arabia are

1. Encouraging growth of the agricultural sector by country's leaders for its role in food security and for its contribution to diversifying the economy away from oil.
2. Recognising the commitment of leaders to the process of agricultural development with maintenance of political stability.[10]
3. Developing agricultural sector as one of the major accomplishments of modern agriculture in the West Asia.
4. Boosting the demand for particular agricultural products by means of agricultural diversification.

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[7] Al-Farsy Fouad (1990), *Modernity and Tradition: The Saudi Equation,* London: Kegan Paul International. p. 147.
[8] Report of the Central Planning Organization, (1974) Jeddah, in Al-Farsy Fouad (1990), *Modernity and Tradition: The Saudi Equation,* London: Kegan Paul International. p. 150.
[9] Vidal, Frederico S. (1980), "Development of the Eastern Province: A case study of Al-Hasa oasis" in Willard Adolph. Beling (eds.) *King Faisal and the Modernisation of Saudi Arabia,* London: Croom Helm Ltd. p.90.
[10] *The Kingdom of Saudi Arabia,* (1977), London: Stacey International. p. 141.

5. Achieving self-sufficiency in food production as the major motivating factor for the development of agricultural sector.
6. Increasing agricultural research and surveys, training programmes and information services in the Kingdom.
7. Receiving foreign assistance for many schemes from experimental dairy farming to land reclamation.
8. Diversifying the economy for future economic prosperity to the agricultural sector.
9. Achieving food security in wheat and other crops aiming development of agricultural sector through the Kingdom's national plan.
10. Attaining complete revolution on agricultural sector based on up-to-date scientific technology to farming methods, irrigation, animal and fishing resources.
11. Implementing governmental incentives and productive operation by creating policies, setting aims, supporting and guiding the private sector participation in all stages.
12. Generating employment opportunities both within sector and in closely related agro-industries by means of planned development.
13. Contributing agricultural sector to diversification of the economic base, import substitution, raising income levels and improving rural living standards for both settled and nomadic communities.
14. Encouraging of large-scale mechanised agriculture to induce structural change in the economy.
15. Promising high financial returns and subsidies from government to the farmers for wheat growing.[11]

[11] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College, London: University of London. p.34. URL:http://www.soas.ac.uk/wa.occ48

2.5 RESOURCES ALLOCATED FOR AGRICULTURAL SECTOR BY GOVERNMENT IN SAUDI ARABIA

Saudi Arabia, has allocated various resources for the agricultural sector to meet the demand of their people and to attain self-sufficiency in some of the crop production. Some of the resources allocated for agricultural sector by government in Saudi Arabia are

2.5 (a) Infrastructure Facilities

During the late 1970's and early 1980's, the government undertook a comprehensive programme to modernise and commercialise agriculture. Indirect support involved for agricultural development are substantial expenditures on infrastructure, electricity supply, irrigation, drainage, secondary road systems and other transportation facilities for distributing and marketing produce. The ploughing tractors constitute 22.1 per cent of the number of agricultural machines with drillers and threshers of 1.1 per cent, which was owned by Ministry of Agriculture.[12] There are 48,343 wells in use, of which 44 per cent (21,251) were equipped with irrigation machinery. 277 tractors are in use, with 5.638 sq.ms of cultivated land per tractor and 254 holdings per tractor. The largest number of tractors 68 and 119 were found in the Quaseem and Central regions.

2.5 (b) Agricultural Subsidies

Government pays subsidies on selected imports and products to encourage adoption of modern technology and to increase farm production.[13] The agricultural sector benefited from three subsidies; un-quantified were subsidised electricity and fuel prices, concessionary borrowing terms from the Saudi Agricultural Bank, government land given under the 1968 *regulation for fallow land distribution scheme.*[14] The amount of subsidy was determined based on price levels prevalent at the end of Sha'ban 1973, taking into consideration the price of shipping and a 10 per cent profit. The cash subsidy for each commodity was determined at the beginning of every month according to the Hejra

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[12] CDS. Statistical Yearbook, 1386 A.H., vol.2 (Riyadh, 1966), in Knauerhase Ramon (1975), The Saudi Arabian Economy, New York: Praeger Publishers. p. 130.

[13] *The Kingdom of Saudi Arabia*, (1977), London: Stacey International. p. 141.

[14] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College, London: University of London. p. 13. URL:http://www.soas.ac.uk/wa.occ48

calendar.[15] Subsidies on foodstuffs are based on the difference between the cost price (plus 10 per cent profit margin for the importer) and the posted government price. The government for drought relief at a nominal cost also provided supplemental feed. Subsidies on marketing facilities, fruit and vegetable processing, data production are also done. The rapid development in Saudi irrigation prompted and promoted by government subsidies to farming in general and to growing wheat and later barley in particular.[16] Input subsidies are paid on farm machinery and equipment; irrigation pumps and engines; certain poultry and dairy equipment. Saudi Arabia pays full money for transportation costs of dairy cows shipped to the country and encouraging establishment of dairy operations in the country. Output subsidies are paid on land and labour inputs by attracting more resources into production of subsidised products. Output subsidies are also paid on wheat, sorghum, rice, camels and sheep.[17]

The government has adopted an intensive programme of farming subsidies including interest free loan offers and generous aid to agricultural investment and production projects. The government offers aid to the value of 50 per cent of the cost of agricultural machinery and equipment imports, as well as for seeds, fertilisers and fodder. It also contributes to the cost of insecticides and air transport of milking cows from abroad. The government also offers few arable lands to farmers and agricultural companies. The government has drawn policy for the subsidy of wheat, date prices and has imposed customs tax to protect the production of eggs for consumption.

The subsidy programme granted 45 per cent of the price of farm machinery; 50 per cent of the prices of fertilisers; 50 per cent of the prices on animal feed concentrate; 30 per cent of poultry and dairy farms (20 per cent if financed by the Agricultural Bank) and 100 per cent of transportation cost of 200 or more daily cattle (SAMA, 1976, Annual

[15] Argus of Arab Economy (1974), *Economic Review of the Arab World*, 8:3. p. 51.
[16] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College, London: University of London. p.10. URL:http://www.soas.ac.uk/wa.occ48
[17] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 121.

Report, 58).[18] GSFMO implemented official procurement programme, purchasing locally produced wheat and barley at guaranteed prices for domestic sales and exports. In Qassim, state encourage farmers by paying SR50 (SR=Saudi Riyal) as subsidy for the planting of every palm shoot of good quality.[19] The financial cost of growing agricultural products at home over and above the cost of importing a similar volume of foodstuffs from abroad represents the sum of four components.[20] The first is the cost of the direct subsidies that the Saudi government pays to farmers. The second is the cost of the indirect government subsidies that benefit the farmers. The third is the annual economic cost of operating government infrastructure projects that benefit the agricultural sector. The fourth is the cost of production incurred by private sector farmers. The indirect subsidies paid in the form of electricity, fuel to operate farm machinery, transportation equipment and pumps. The subsidies and investments were made over a period of persistent and large budget deficits. To encourage increased productivity through greater use of modern inputs, a part of their price was paid by the government to increase the output, productivity and net farm income by lowering costs.

2.5 (c) Saudi Arabian Agricultural Bank

Saudi Arabian agricultural bank was established by the government to provide credit to the agricultural sector. It is directly responsible to the ministry of finance and national economy. The banks lending comprises short, medium and long term cash loans for seasonal agricultural requirements, development projects and the land development.[21] In coordination with the ministry of agriculture and water, the bank disburses subsidies and agricultural supplies and machinery. As one of the basic pillars of agricultural development in the kingdom, the bank contributes an effective role in promoting the production capabilities of the agrarian sector by encouraging farmers to use the farming techniques and equipment offered by modern technology. The bank was founded in 1964

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[18] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College, London: University of London. p.13. URL:http://www.soas.ac.uk/wa.occ48

[19] Argus of Arab Economy (1981), *Economic Review of the Arab World,* 15:4. p. 195.

[20] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College, London: University of London. p. 10. URL:http://www.soas.ac.uk/wa.occ48

[21] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning, p. 155.

in Riyadh, with branches in Jeddah Burayda, Hofuf and Abha with the original capitalisation of SR10 million by the end of the first plan. Saudi Arabian agricultural bank offers interest-free loans to finance investments and operations in various agricultural projects; for well drilling and casing; irrigation equipment, farm-machinery and pumps; short-term working capital loans to help farmers purchase fuel, fertilisers, seeds, insecticides and pay labour's wages.[22]

The primary objectives of the bank were to expand the number of agricultural loans to the farmers and credit in support of agricultural development. The bank makes available loan for seed, fertiliser, labour and other production inputs, transporting, marketing; processing of agricultural products, agricultural machinery and irrigation equipment; purchasing and developing of agricultural land. The bank issues short-term credit for up to 12 months, medium credit for up to 5 years and long-term credit for between 15 and 20 years, to assist farmers in improvement of soil, irrigation schemes; experiments with livestock and poultry breeding; purchase of agricultural machinery and equipment and to facilitate land reclamation activities.[23] The time limit to complete loan applications was reduced to 7 days for short-term loans to 15 days for loans dealt with at branch level and to 30 days for those dealt with at the head office. Regulations for loan guarantees were also amended; personal guaranteed were sufficient for loans up to SR3 million.

Increased delegation of lending authority was accomplished with branches entitled to grant loans up to SR200,000 million; 72 per cent of all loans were authorised at branch level.[24] The bank has 70 branches having SR28.5 billion, providing price subsidies to farmers to a total of SR10 billion and SR488 million paid to farmers to encourage them to grow certain crops. The total support provided by the bank for food security in the kingdom is SR39 billion. The bank offers a total of SR528 million in credit for agricultural production and SR140 million for the marketing and processing of

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[22] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College, London: University of London. p.13. URL:http://www.soas.ac.uk/wa.occ48

[23] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 236.

[24] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning, p. 155.

agricultural products. Saudi Arabian agricultural bank also provides subsidies for buying other capital inputs. In Nammas of the Southern province, agricultural bank provides loan and aid at SR 20 million in the form of short-term loans to meet current production expenses or medium-term to purchase agricultural machinery and equipment of long-term including reclamation of large land plots.[25]

2.5 (d) Land Distribution System

Land distribution was an integral part of the agricultural development programme in Saudi Arabia. The 1968 *Public Lands Distribution Ordinance* allocated 5 to 100 hectares of fallow land to individuals free of cost and up to 400 hectares to companies and organisations and a limit of 4,000 hectares for special projects. The average fallow land area given to individuals was 5.9 hectares, 118 hectares to projects and 15,375 hectares to companies. The beneficiaries were required to develop a minimum of 25 per cent of the land within a set period (usually two to five years); thereafter, full ownership was transferred. In 1989, the total areas distributed were more than 1.5 million hectares. Of this total area, 7,273 special agricultural projects done under 860,000 hectares or 56.5 per cent; 67,686 individuals received just less than 400,000 hectares or 26.3 per cent; 17 agricultural companies received over 260,000 hectares or 17.2 per cent.

GOVERNMENT ROLE IN AGRICULTURE

The agencies responsible for implementing agricultural policies in Saudi Arabia are *Ministry of Agriculture and Water, Ministry of Commerce, Ministry of Municipal and Rural Affairs, Ministry of Labour and Social Affairs, Saudi Arabian Agricultural Bank, Saudi Arabian Industrial Development Fund, Grain Silos and Flour Mills Corporation, Saline Water Conservation Corporation, Al-Hassa Irrigation and Drainage Authority and Masstock Company.*[26] *The Saudi Arabian Agricultural Bank* (SAAB) involves wide range of financial services for agricultural sector operating under the Ministry of Finance. *The Grain Silos and Flour Mills Organisation* (GSFMO) involve purchase and storage of local wheat, production of animal feed concentrates, monitoring of animal feed

[25] Argus of Arab Economy (1981), *Economic Review of the Arab World*, 15:4. p. 196.
[26] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 132.

production subsidy, oversee the supply of major agricultural products for domestic consumption which works under the Ministry of Commerce and Industry. Ministry of Commerce coordinates agricultural trade policy and administration of price support and subsidy payments. *Saudi Arabian Industrial Development Fund* (SIDF) gives loan for agro-industries. *Ministry of Labour and Social Affairs* (MOLSA) supervise rural cooperatives.

Ministry of Education Universities and Colleges gives training in agricultural skills to the farmers. *Haradh Agriculture and Animal Production Company* was converted into a major joint stock company under the name of "*National Agriculture Development Company*", within the scope of a programme of development by the Ministry of Agriculture that undertake agriculture and livestock investment projects all over the country.[27] Four principal government organisational entities are involved in the production, treatment and distribution of the Kingdom's water supplies: *The Ministry of Agriculture and Water* (MOAW); *The Saline Water Conservation Corporation* (SWCC); *The Al- Hassa Irrigation and Drainage Authority* (HIDA) and *The Ministry of Municipal and Rural Affairs* (MOMRA).[28] Animal breeding stations were established in Medina and Riyadh in the spring of 1957 to demonstrate better livestock-raising techniques and to aid in improving the local breeds.

2.6 (a) Ministry of Agriculture and Water (MOAW)

The *Ministry of Agriculture and Water* plays an important role in the development of the agricultural sector.[29] It was established as separate Ministry in December 1953 to increase the agricultural production with many sided programme like control of a number of hazards, introduction of new agricultural methods and machinery; use of fertilisers, range management and agricultural credit. It also provides farmers technical advice, mechanical implements, seed and fruit-tree seedlings; fertlisers and education on the prevention and treatment of plant diseases. The Ministry is headed by the Minister of agriculture assisted by two deputy ministers, one for agriculture and other for water. The

[27] Argus of Arab Economy (1981), *Economic Review of the Arab World,* 15:1. p. 36.
[28] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning, p. 116.
[29] Ramon, Knauerhase (1975), *The Saudi Arabian Economy,* New York: Praeger Publishers. p. 128.

deputy minister for agricultural affairs supervises four major departments like department for public land management; research and development department and agricultural extension and services department and agricultural trading department, which provides in-service training for ministry employees.

2.6 (b) Objectives of MOAW

1. Develop methods, transfer agriculture from the traditional stage to the modern stage.
2. Expand the area of agricultural land to diversify its products.
3. Co-ordinate animal farming with the other phases of agriculture to achieve self-sufficiency in meat and dairy products.
4. Conserve the country's livestock to arrive at a level of production that would fill the people's needs for food through the utilisation of the entire water resources including underground resources.[30]

2.6 (c) Policies of MOAW

A statement of national policy for agricultural development has been prepared by the *Ministry of Agriculture and Water*. They are

1. A comprehensive statement with respect to land use and development for crop production, grazing and other purposes.
2. A water code based on hydrologic surveys and existing laws relating to water rights.
3. A range management code.
4. A statement with respect to the distribution of virgin land and its more effective development and use.
5. A set rules to protect wildlife and forests in the Kingdom.[31]

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[30] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 234.
[31] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 123.

2.6 (d) Functions of MOAW

1. The Ministry is in charge of a number of projects designed to improve the efficiency of the agricultural sector.
2. It reorganises water and drainage system of Al-Hassa oasis in the Eastern region and constructs dams and irrigation systems in the Wadi Jizan and Abha in the Southern region.
3. It builds drainage system at Qatif region to reclaim saline land and for sand stabilisation.
4. It does area studies in various regions to assess future development possibilities.[32]
5. It launches projects on farming, irrigation, reclamation and distribution of land.
6. It implements government economic plans, policy and programmes concerned with agriculture, water development, desalination, irrigation and conservation of scarce water.
7. It is also responsible for animal resources, fisheries and locust control.
8. It takes direct responsibility for irrigation and drainage projects if they beyond the means of local farming communities through the *arable land distribution scheme.*
9. It identifies land suitable for reclamation and allocates to Saudi citizens for agricultural development.
10. It provides seeds, saplings, herbicides and fertilisers; training and supervision by means of modern farming methods.
11. It provides direct financial encouragement to farmers, supports substantial agricultural research, education and pest control programmes.
12. It maintains over 100 offices throughout the kingdom sending teams to spray crops free of charge.
13. The Ministry runs a string of experimental farms studying local crop problems, livestock production, fish farming, methods of sand stabilisation and seed research.
14. It develops improved strains in the quality of vegetables.

[32] Al-Farsy Fouad (1990) *Modernity and Tradition: The Saudi Equation,* London: Kegan Paul International. p. 191.

15. It establishes an intermediate agricultural school providing free education and free lodging for its students.
16. As a temporary measure, it undertook the training of a number of Saudis in certain limited agricultural functions such as water control, combating locusts and other pests, weather observation and flood control.
17. It has taken steps to teach farmers how to protect their crops with the control of plant diseases and set up a quarantine taking effective steps to combat pests.
18. It has taken steps to fight against desert locusts in collaboration with the neighbouring Arab countries and international organisations.
19. It has established a veterinary service to propagate the use of serums, vaccines and inoculations and to treat animal disease.
20. It has taken care to develop methods for breeding animals and fishes and to conserve and develop pastures.
21. Model farms are established in furnishing practical advice to farmers, providing seeds and plants for their modern nurseries at encouraging prices, importing good quality seeds and plants for distribution to farmers to obtain better crops.[33]
22. It involves the discovery and prudent utilisation of irrigation waters, construction and reconstruction of dams and drainage of underground water.

AGRICULTURAL PROJECTS IN SAUDI ARABIA

The government of Saudi Arabia aims with making self-sufficient in agricultural products by accomplishing a number of agricultural projects in the region. Some of them are

2.7 (a) Al-Hassa Project

Al-Hassa Project is one of the most important date-producing areas in Saudi Arabia.[34] It was also known as Eastern Province which lies between the Dahna and the waters of the Gulf.[35] Al-Hassa oasis has over 30, 000 acres under cultivation, including some 3 million-palm trees. Al-Hassa is one of the largest "true" oases in the world.[36] It

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[33] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 235.
[34] Ibid. p. 237.
[35] Riley, Carroll L. (1972), *Historical and Cultural Dictionary of Saudi Arabia*, Metuchen: The Scarecrow Press. p. 51.
[36] Vidal, Frederico S. (1980), "Development of the Eastern Province: A case study of Al-Hassa oasis" in Willard Adolph, Beling (eds.) *King Faisal and the Modernisation of Saudi Arabia*, London: Croom Helm Ltd. p. 91.

has extraordinary size of farming area with large amount of water produced from artesian springs. It has 500 springs of which two thirds are privately owned, producing enough water to irrigate individual gardens. The bulk of the remaining ones are linked to a communal irrigation system. The palm trees are irrigated by water, which is flowing freely, but much of the water was wasted during the winter months.

The water used to irrigate palm trees was used once more for the irrigation of orchards situated at a lower level. The repeated use of water in the field without purification results in increasing the proportion of salt in the low orchards. Over-irrigation from uncontrolled springs harms fruit trees and vegetables planted among palm trees, especially since water level is very high in the areas. The water resources of Al-Hassa are made sufficient by improving the drainage system, constructing aqueducts and canals for proper water distribution, setting up proper irrigation and drainage systems and install necessary pumping stations for cultivation of the area of 30,000 hectares.[37] The stabilisation of sand dunes was the first major project of environmental improvement undertaken in Al-Hassa in 1963.[38] The methods and techniques employed to prevent sand stabilisation were employing erecting sand fences, planting a wide band of vegetation, altering dune shapes and coating them with oil. In Al-Hassa, gardens were irrigated by water coming from a spring with 'new' water (*hurr*) and 'second' water (*tawayih*) which was an oversupply of water channelled to irrigate other gardens.

2.7 (b) Wadi Jizan Project of Tehama Region

The costal plain in the South-western part of Saudi Arabia possesses great potentialities for the increase of agricultural products and production of new crops. In Wadi Jizan most plantations are utilised by dry farming and crops are exposed to some risk because rainfall was not sufficient for irrigation at approximate intervals.[39] In the valleys, irrigated crops have the problem with flow of water, which is not regular because farmers divert the course of rainwater in the wadis to irrigate the lands, which they

[37] Assah, Ahmed (1969). *Miracle of the Desert Kingdom*, London. p. 237.
[38] Vidal, Frederico S. (1980), "Development of the Eastern Province: A case study of Al-Hassa oasis" in Willard Adolph, Beling (eds.) *King Faisal and the Modernisation of Saudi Arabia*, London: Croom Helm Ltd. p. 93.
[39] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 236.

prepare for cultivation by building dams of fine sand and loam so that no regular irrigation work is possible in the area. Water flowing in the wadis was diverted to the lands nearest to the water dividing line and once these lands have been irrigated, the water was diverted to the lower lands. Farmers are accustomed to planting their crops in July and August of each year after the agricultural lands have been fully submerged under water to produce their main traditional crop, summer sorghum and other crops such as millet, sesame and vegetables. First irrigation project for agricultural development was undertaken in Wadi Jizan where rainwater accumulates for suitable agricultural purpose. Soil is suitable and conditions in the area permit full control of floods. The local inhabitants are well known as diligent settled farmers who are accustomed to irrigate work. Wadi Jizan has 23 villages whose inhabitants are of 42,000 farming an area of about 10,000 hectares or 100,000 dunums or 100,000,000 sq.ms. FAO reports that the implementation of the Wadi Jizan project would result in increasing the crops and help in production of new crops such as beans, tomatoes, bananas and various kinds of fodder and cotton.

2.7 (c) Al-Qatif Project

Al-Qatif is one of the biggest date-producing areas in the Kingdom of Saudi Arabia.[40] Palm trees are irrigated from the numerous artesian wells under operation. Because of large tracts of evaporation in the supersaturated cultivated land areas, the surface of the land was covered with a layer of salt. Diminished flow of water from the artesian wells has left plantations almost dry, which are not provided with pumping equipment. 40,000 hectares of cultivated area with local inhabitants of 100,000 are benefited from this project by utilising 150 artesian wells, 15 springs and drainage canals of length 50 km costing SR5 million. Annual rainfall in the Abha and Khamis Mushait region are 300 mm which waters the cultivated lands of terraces starting from tops of the narrow valleys in the mountains and ending on the tableland producing wheat, barley, summer sorghum, fruit trees and various kinds of vegetables. The project cost 6.5SR millions, which provides sufficient water for cultivation of 1200 hectares of arable

[40] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 238.

land.[41] The area of cultivated lands of Tabouk-Al-Ula-Al-Jauf-Sakaka basin of 11,110 hectares, which was irrigated from wells and one-sixth from rainwater and by large reservoirs of subterranean water of low salinity which was used for agricultural purposes.

2.7 (d) Al-Kharj Project in Nejd Region

Al-Kharj is an experimental farm set up in 1937 by the Saudi government with technical assistance from Iraqi and Egyptian experts.[42] The project includes irrigation water lifted from huge natural pits with modern pumps distributed by a large network of canals and ditches in Wadi Kharj and 2,100 acres of Wadi Khafs Daghra region. Wheat covers a great part of the area along with vegetables, fruits, melons, barley, alfalfa and dates in the region.

2.7 (e) Haradh Project

Haradh Project is one of the important projects for the settlement of large portion of the desert in Saudi Arabia by teaching the Bedouins how to lead a settled agricultural life. The project exploits the potentialities of Bedouins to provide new opportunities to raise their economic and social standard and to exploit the various natural potentialities in the area of the project. It also educates them to make profitable sources of production and take further step towards achieving self-sufficiency in the field of food products. It also utilises the training of Saudi technicians in agricultural guidance work in the future period. The Haradh project consists of three stages. The first stage provides for the establishment of an experimental farm in the desert on an area of 100 acres.

The second stage consists in the setting up of a centre for the training of Saudi technicians in agriculture in the desert, while the third stage provides for the reclamation of about 10,000 acres in the region for the settlement of 1,000 desert-dwelling families. Experimental station and training centre conduct scientific studies on plants and field products and on fruit and vegetable farming to determine the best type of agricultural products that are grown in the region. Reclamation of 40,000 dunums/40,000,000 sq.ms

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[41] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 239.
[42] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 238.

in Wadi Sabha accommodates more than 2,000 families of 15,000 persons, which are distributed among the Bedouins who are willing to settle. Settled families are given a plot of land of 20 dunums/ 20,000 square meters supplied with water from a central system fed from 50 artesian wells.

2.7 (f) Wadi Jabrin Project

The project of Wadi Jabrin involves reclamation of area 100,000 dunums/100,000,000 sq.ms involving first stage with technical studies and surveys; second stage undertaking reclamation of 40,000 dunums/40,000,000 sq.ms of land for agriculture at the rate of 5,000 dunums/5,000,000 sq.ms in the first year and 7,000 dunums each year.[43] The cost of the project was 65,147,035 riyals; of which 19,340,455 riyals spend on the establishment of a training and experimental centre and 45,806,080 riyals on the reclamation of the 40,000 dunums/40,000,000 sq.ms.[44] The project formulates a suitable guidance policy ensuring a reasonable income for every Bedouin family who decide to settle down and work in agriculture.

2.7 (g) Wadi Sirhan Project

Wadi Sirhan Project is one of the earlier agricultural experiments of the Saudi government, launched in 1957-1958 with the aim of providing wells and arable land to settle Bedouin.[45] It implements temporary agricultural project that aim in helping the desert dwellers who had lost 90 per cent of their animal wealth due to six successive years of drought. The aim was to provide urgent relief to those of them who wish to take up farming as a first stage towards permanent settlement. Government assists in drilling of surface water wells and in cultivation of the lands around wells with simple crops. It has also provided new farmers with small water pumps, lent tractors free of charge, provide them with free wheat, barley and vegetable seeds and furnished necessary fuel free of charge for all agricultural machines used in the experiment. It also includes the project for the improvement of pastures in the Northern Province by organising pasturage

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[43] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London.pp.282-283.
[44] Ibid. p. 283.
[45] Riley, Carroll L. (1972), *Historical and Cultural Dictionary of Saudi Arabia*, Metuchen: The Scarecrow Press. p. 117.

and regulating its cycles, protecting fully or partially certain wadis and areas for use only in times of drought and developing water resources for watering desert flocks. The project aims at meeting the shortage by producing fodder through the use of irrigated pastures and improvement of the economic situation in the Northern desert through the expenditure by the government of liquid cash in the form of labour wages to absorb unemployment resulting from the successive years of drought.[46] In 1977 special emphasis was given to the projects like conducing detailed soil surveys in agricultural development areas; preparation of a base map depicting general soil conditions for the entire Kingdom; implementing land allocation and record keeping system for the Kingdom; activating native range and grazing improvement projects; installing computerised water data base; overseeing the collection and analysis of water supply and demand data for a national water plan.[47]

SPECIAL AGRICULTURAL PROGRAMMES IN SAUDI ARABIA

In Saudi Arabia some of the programmes are provided with special techniques and methods to increase the efficiency of agricultural production. The special agriculture related programmes are pest control programmes, programmes for the environmental protection of farming, hydrological resources, fisheries and dates processing factories. Government support services include increasing the efficiency of marketing mechanisms, product protection policies, training of Saudi labour, provision of veterinary services and the offer of guidance. The *King Faisal Settlement Scheme* at Haradh in the Eastern Province develops agriculture in Saudi Arabia.

The *Al-Hassa Irrigation and Drainage Authority* (HIDA) is part of MOAW and is in charge hydrological studies and data collection to improve the use of water for irrigation. It is also responsible for irrigation, water conservation and distribution to the farms; operation and maintenance of irrigation and drainage canal systems.[48] Fishermen's cooperative society was set up in Thuwal area to use modern fishing methods with fish preservation and marketing. In 1956 agricultural unit system was established dividing

[46] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 285.
[47] Argus of Arab Economy (1977), *Economic Review of the Arab World*, 12:3. p. 24.
[48] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 102.

country into areas, each of which was provided with an agricultural administration possessing certain technical administrative facilities and vested with sufficient powers to provide services to farmers in the best manner possible.[49]

2.8 (a) Development Programmes for Bedouin Population

Settlement of Bedouin population was an important aspect of social change in Saudi Arabia. King Abdul al Aziz attempted with the Ikhwan settlement in the second and third decade of the twentieth century for the settlement of Bedouin population in and around various cities to curtail their wanderings considerably. The Aramco Company drilled a number of wells, along tapline of Bedouin population. The availability of water induced many nomads to restrict their movement to the vicinity of these wells. Special attention was given to integrate Bedouin tribes into the national economy in Great Nafud Desert having vast steppe-land suited for grazing and ravaged by droughts containing 37 per cent nomadic population.

The *King Faisal Model Settlement Project* was designed to speed up Bedouin settlement in the Eastern province. Fields of 4,000 hectares of land under cultivation are laid out with building of complete irrigation and drainage system. The project includes a training centre and an experimental farm, cultural centres and housing for 1,000 Bedouin families. In the Northern sector of *Homestead Development Programme*, the Bedouin were offered land for settlement. The homesteads were scattered, making it difficult to develop an effective infrastructure of agricultural extension and education programmes. Wells were drilled and pumping equipment installed, but the lack of trained maintenance and repair technicians led to equipment failure that could not be repaired immediately, creating severe problems for the farmers and discouraging extensive resettlement. Ministry of Agriculture launched a number of training programmes designed to teach the farmers the new methods of cultivation required to make the new wheat a commercial success.

[49] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 234.

The development and wellbeing of the nomadic Bedouin receives major attention during the second development plan. Programmes are developed on economic rather than a welfare basis; and are adapted to the special needs and situation of the Bedouin. The programmes cover agriculture, health, education and social affairs. The below table explains the distribution of Bedouin around the Kingdom.

Table: 2.1
The Distribution of Bedouin around the Kingdom

Region	Number	Percent of Regional Population
Northern	263,000	48.2
Central	152,000	9.4
Southern	92,000	5.5
Western	71,000	4.2
Eastern	57,000	8.4
Total	635,000	75.7

Source: Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 422.

The government establishes a special unit in the Ministry of Interior for all aspects of Bedouin development with adopting policy and programmes.[50] Planned settlement of tribals refers to the official government policy of encouraging Bedouin tribesmen to settle. The environmental factors leading to sedentarisation are the major droughts of 1930's and 1950's that led to a reduction of grazing lands. The introduction of pump-wells made some tribes increase their number of animals that led to a deterioration of the ranges by overgrazing.

Political factors affecting sedentarisation is the modern bureaucratic state not compatible with tribal organisation. While tribal Bedouin institutions thrived on raids, imprecise boundaries, clan alliances and mobility, the modern state was based upon fixed international and internal boundaries and on treaties and bilateral agreements. The traditional movement of the nomadic tribesmen has been also curtailed. Tribal territories and rights were abolished in 1925 that eliminated self-government of tribes and subjected them to state control.[51] Economic factors affecting sedentarisation is the discovery and exploitation of oil that has the greatest impact on the Bedouin. Upto 35 per cent of the oil

[50] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. pp. 95-96.
[51] Brian D. Clark (1980) "Tribes of the Persian Gulf" (eds) in Cottrell, Alvin J. et al., *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 494.

work force are Bedouin tribesmen. Many of the new urban areas that sprang up because of oil development have attracted Bedouin tribesmen. Cultural changes that have affected the Bedouin are raiding, caravan trade and hunting that provide supplementary income. The herding of camels and sheep, which in the past was an important status symbol to them, was increasingly market-oriented. The camel in its traditional role as the main vehicle of transportation has largely been replaced by motorized vehicle. The size and make of car or truck is now the new status symbol of the tribesmen whereby animals are transferred to new pastures creating new patterns of tribal mobility and environmental degradation of pastures. In 1964 *Al-Faisal agricultural settlement* focus on resettling of 8000 Bedouins as farmers and distribute 40,000 acres of land with water supplied by deep (up to 670 feet) wells in Haran oasis.[52]

2.8 (b) Problems Facing Development of Agriculture in Saudi Arabia

Rapid development of agriculture in the Kingdom was greatly impeded by physical and climatic adversities like small inefficient farms dispersed over a large land area, subject to wide fluctuations in rainfall, limited supplies of low-quality irrigation water, harsh summer climate and drying winds and encroachment by sand dunes. The environmental issues that led to lack of agriculture development in Saudi Arabia are desertification, frequent sand and dust storms and depletion of underground water resources. Lack of perennial rivers or permanent water bodies prompted the development of extensive seawater desalination facilities and coastal pollution from oil spills. The accumulation of salts in the soil is one of the permanent problems facing irrigated agriculture.[53] Production of crops and livestock was limited by adverse climatic conditions and primitive agricultural practices.

Land arrangements and customary water rights hinder the adoption of modern technology. Termination of traditional communal rights (the Hema system) to use the range without introduction of an alternate system of management has contributed to serious over-grazing. The general prosperity of the Kingdom was having both positive

[52] Riley, Carroll L. (1972), *Historical and Cultural Dictionary of Saudi Arabia*, Metuchen: The Scarecrow Press. p. 50.
[53] *The Kingdom of Saudi Arabia*, (1977), London: Stacey International. p. 139.

and negative impacts on development. *Positive impacts* of agricultural development in Saudi Arabia include expanding markets, improved transportation at lower cost, greater availability of modern inputs such as water pumps, farm machinery, fertilisers, improved seeds and increased access to credit.

Some of the *negative impacts* causing permanent damage to the resource structure are

1. Over-exploitation of the range caused by increasing use of motor vehicles, uncontrolled exploitation of trees and shrubs for timber and charcoal and a general neglect of land conservation of much of formerly productive land.[54]
2. High rates of water extraction by pumping, resulting in falling water tables and increasing salinity and the abandonment and relocation of farms.
3. Mining of non-recharging aquifers to meet the demands created by agricultural expansion to develop a long-range National Water Plan.
4. Reduced consumption of some traditional crops like dates in particular, sorghum, and millet as prosperity leads to changes in consumer diets.
5. Slow emergence of commercial agriculture because of the relative attractiveness of other sectors for entrepreneurial talent. [55]
6. Isolation, perishability of marketable foodstuffs and inadequacy of transportation facilities prevent many villages from carrying on regular trade with the larger centres.[56]

CONCLUSION

In this chapter, Saudi five-year agricultural development plans and reasons for the development of agriculture sector in Saudi Arabia are scrutinised. The government efforts to expand and improve agricultural production include the settlement of desert tribes; the development of water supplies, mainly through flood control and more efficient irrigation systems; the increasing of arable land and the introduction of modern agricultural techniques. The key elements of development strategies in Saudi five-year agricultural development plans were diversification of economic base through emphasis on increasing

[54] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 213.
[55] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. pp. 122-123.
[56] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 214.

agricultural production and lay the foundation of economic self-sufficiency in the future as a precautionary measure against the gradual depletion of oil, when revenues and foreign exchange from oil may decline. Increasing numbers of farmers and nomads living in cities and towns are attracted by higher economic rewards and living conditions in relation to agriculture because of the oil-fuelled economic boom. The farmers and ranchers who remained in agriculture plus investors in large-scale poultry and dairy enterprises who were attracted by subsidy payments and investment incentives attained the agricultural sector's growth.

The agricultural production programmes are stimulated through research and extension activities, credit and input subsidies and expanding of productive land. The regional projects and existing agriculture and stock raising was supported by coordinated research programmes and extension services designed to increase domestic production of priority cereals (wheat, barley, and sorghum), livestock, vegetables, and fruit. An achievement of higher yields depends largely on painstaking research; extension and training within agriculture and facilitates the vertical and horizontal expansion of the agricultural sector as a whole. Concerning self-sufficiency, the Kingdom produced a sufficient surplus to export limited quantities of food. However, for the entire production process, the import of fertilisers, equipment and labour have made the kingdom even more dependent on foreign inputs to bring food to the average Saudi household.

Although successful in raising massive output of several important crops and foodstuffs through the introduction of modern agricultural techniques, the agricultural development programme has not entirely met the objectives of raising the level of productivity in agriculture. The small size of farms, the use of traditional agricultural methods by the majority of farmers and a lack of adequate transportation facilities between producing areas and the markets limit much of the agricultural production to the subsistence level. Livestock production was increasing and supportive forage production was improved manifold in both quantity and quality by irrigation. An ambitious plan was set for agricultural development with concentration on the revival of all crops, most importantly wheat. The *General Organisation for Grain Silos and Flour Mills* find

regular markets with fixed principle prices so that farmers would remain safe and secure against any risk of price fluctuations or exploitation by merchants and set a policy of buying it at incentive prices to ensure the smooth sale of the harvest. This policy has helped to increase investment in wheat growing by attracting new farmers and large scale agricultural companies to this field of activity.

Rapid development of Kingdom's labour resources increases the number of both Saudis and non-Saudis in the labour force, raising the productivity of the labour force by education and training; creating a productive work environment and shifting labour out of the agricultural sector into other sectors with expanding opportunities for employment at higher levels of productivity and income. The government since 1962, increased its attention and allocations to agriculture in an effort to increase agricultural production through land reclamation, introduction of knowledge and technique of modern farming practices to increasing numbers of farmers, the distribution of imported seeds at low cost and the establishment of production and distribution cooperatives and an agricultural credit bank.

The state was looking forward to the implementation of an ambitious programme for the revival of the vast grazing grounds in the Kingdom through the utilisation of rainwater, which was collected behind dams for re-distribution. The government also provided some programme to conserve the soil, increase the quantity of water in the wells by facilitating the seepage of surface water through the soil and regulate the life of the grazing grounds by appointing specific dates for grazing and rotating it among the various regions, increase the area of pasturelands by the sowing of big quantities of fodder and stabilising of shifting sand dunes. Saudi Arabia has allocated substantial financial resources for improving roads linking producing areas with consumer markets to encourage private investment in the agricultural sector. Under the development plans, the government continues to assist new farmers in implementing capital-intensive projects with special emphasis on diversification and greater efficiency.

CHAPTER-III

SAUDI ARABIAN AGRICULTURAL POLICIES: 1975-1980

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CONDITIONS OF AGRICULTURAL SECTOR DURING FIRST FIVE-YEAR DEVELOPMENT PLAN PERIOD (1970-1975)

Agricultural Land Use

Crop Production

Livestock Production

Labour

TECHNOLOGICAL DEVELOPMENTS DURING THE FIRST FIVE-YEAR DEVELOPMENT PLAN PERIOD

Research and Extension

Agricultural Machinery

Agricultural Credit

CONDITIONS OF AGRICULTURAL SECTOR DURING SECOND FIVE-YEAR DEVELOPMENT PLAN PERIOD (1975-1980)

Government's Strategic Principles for Effective Agricultural National Policy

Policies Adopted for Agricultural Development

Agricultural Production

Land

Labour

Water

PROGRAMMES AND PROJECTS TAKEN UP DURING THE SECOND FIVE-YEAR DEVELOPMENT PLAN PERIOD

Production programmes

Crop production

Policies Adopted for Crop Production

CHAPTER-III

SAUDI ARABIAN AGRICULTURAL POLICIES: 1975-1980

For agricultural development in Saudi Arabia, the policies adopted are diversification of economic base through emphasis on increasing agricultural production, lay the foundation of food security through economic self-sufficiency, minimise the Kingdom's dependence on imported food. In Saudi Arabia, the first five-year agricultural development plan was started in 1970-1975 that provided guidelines for implementation of development programmes. The government increased its attention and allocations by providing incentives and subsidies by means of five-year development plans to increase agricultural production through various programmes and projects. This chapter examines the Saudi Arabia's policies on agricultural sector during the course of first and second development plan period.

3.1 Conditions of Agricultural Sector during First Five-Year Development Plan Period (1970-1975)

Traditionally Saudi Arabia's economy was based on subsistence arid-zone agriculture and desert pastoralism. Pastoralism was traditionally the most important source of agricultural income. In the mid 1960's the government made a serious effort to reclaim land for productive agriculture and animal husbandry by increasing and preserving the water supply.[1] The share of agriculture fell from 10.1 per cent in the period 1962/1963 to 4.9 per cent in 1970/1971.[2] Agricultural production constitutes 12 per cent of the national income in 1964 according to a study made by Professor Asfour.[3] In 1970, Saudi Arabia imported more than 50 per cent of its agricultural products.[4] The government's aim in 1970's was to expand the agricultural sector by diversifying the economy, increasing national wealth, raising income and living standards of the rural population, releasing surplus labour to other sectors, lessening dependence on oil through raising the

[1] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 213.
[2] Knauerhase, Ramon (1974), "Saudi Arabia's economy at the beginning of the 1970s", *Middle East Journal*, Spring, 28: p. 131.
[3] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 231.
[4] El- Khatib (1980) in Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215.

contribution of other productive sectors to the gross national product and reduce dependence on import of foodstuffs.[5]

Table 3.1
Structural Composition of GDP in the Period: 1966 to 1975
(Per cent of non-oil GDP based on 1969-1970 prices)

Sectors	1966-1967	1969-1970	1974-1975
Agriculture	13.9	12.6	9.1
Construction	13.3	12.0	19.1
Service	64.3	65.8	63.1
Non-oil Economy	100.0	100.0	100.0
Oil sector (including refining)	109.1	119.8	144.5

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 19.

Table 3.1 shows the share of agriculture in GDP was 13.9 in 1966-1967 which reduced to 12.6 per cent in 1969-1970 and reduced further to 9.1 per cent in 1974-1975. Compared to other sectors, construction sector contributed high in terms of percentage from 12.0 in 1969-1970 to 19.1 in 1974-1975. Service sector's contribution slightly declined from 65.8 per cent in 1969-1970 to 63.1 per cent in 1974-1975. Oil sector compared to non-oil sector contributed more from 119.8 per cent in 1969-1970 to 144.5 per cent in 1974-1975.

Table 3.2
The Growth of GDP in the Period 1966/1970 to 1970/1975
(Annual Compound Growth Per Cent Per Year in 1969-1970 prices)

Sectors	1966-1967 to 1969-1970	1970-1971 to 1974-1975
Agriculture	3.62	3.59
Mining	5.56	21.07
Manufacturing	11.76	11.39
Utilities	11.31	10.93
Construction	3.32	18.57
Service	42.76	53.91
Non-oil Economy	6.96	11.66
Oil sector (including refining)	10.34	14.80
Total Economy	8.75	13.41

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 20.

The above table shows the growth of agricultural GDP in the period 1966/1970 was 3.62 per cent which reduced to 3.59 per cent in 1970/1975. The non-oil economy grew from 6.96 per cent per year in 1966/1970 to 11.66 per cent in 1970/1975. Except agriculture,

[5] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 660.

manufacturing and utility sectors all other sectors had a considerable increase in annual compound growth in terms of percent from the period 1966 to 1975.

3.1 (a) Agricultural Land Use

The area of Saudi Arabia is 220 million hectares, while the area of lands under cultivation was 300,000 hectares according to IBRD Mission and FAO reports.[6] Eighty per cent of the lands are cultivated with well-established agricultural principles were under irrigation (70 per cent of agricultural lands under irrigation were supplied with water from wells and ditches with pumps and animals, and springs serve 10 per cent of the irrigated lands) and remaining Twenty per cent in the Southern mountains of Asir was irrigated by rainwater.

Table: 3.3
Comparisons of Cultivated Area and Land Use: 1970/1971 to 1975-1976

Cultivated Areas (in Hectares)						
Year	**No of Holdings**	**Area in Holdings**	**Dry land**	**Irrigated**	**Perennial and Orchard**	**Total**
1970-1971	180,789	1,391,274	403,654	78,362	42,709	524,725
1975-1976	180,670	1,213,462	35,713	91,126	143,162	592,001
Changes:						
Hectares	-119	-177,812	-45,941	12,764	100,453	67.276
Percent	----	-12.8	-11.4	16.3	235.2	12.8

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 139.

The cultivated area and land use patterns as shown in the above table clearly gives the picture that the number of holdings decreased from 180,789 in 1970-1971 to 180,670 in 1975-1976 with a difference of 119 hectares. The area of holdings also drastically decreased from 1,391,274 in 1970-1971 to 1,213,462 in 1975-1976. The dry land also decreased very drastically from 403,654 in 1970-1971 to 35,713 in 1975-1976. Irrigated areas increased from 78,362 in 1970-1971 to 91,126 in 1975-1976 with changes of 12,764 hectares. Perennial and orchard increased drastically from 42,709 in 1970-1971 to 143,162 in 1975-1976. The total cultivated areas increased from 524,725 in 1970-1971 to 592,001 in 1975-1976 with the increase of 67,276 hectares, 128 percent.

[6] Assah, Ahmed (1969), *Miracle of the Desert Kingdom,* London. p. 231.

Table: 3.4
Average Land Use Holding (Hectares)

Year	Cultivated	Uncultivated	Total
1970-1971	2.90	4.79	7.69
1975-1976	3.28	3.44	6.72
Changes:			
Hectares	+0.38	-1.35	-0.97
Percent	+13.1	-28.2	-12.6

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 139.

As shown in the above table, the average cultivated land in 1970-1971 was 2.90 hectares and increased to 3.28 hectares in 1975-1976. The average uncultivated land in 1970-1971 decreased from 4.79 hectares to 3.44 hectares. The total average land use holding was decreased from 7.69 hectares to 6.72 hectares.

3.1 (b) Crop Production

The area of cropped land in the Kingdom in 1970/1971 was about 525,000 hectares (0.2-0.3 percent of the total area) of which about 121,000 hectares were irrigated and 404,000 were rainfed. In 1970/1971, the total cultivated land was shared among 181,000 holdings. The average size of the cultivated land holding was less than 8 hectares in 1970/1971. In 1970, Saudi Ministry of Agriculture had set aside 87,029 acres of land in Al-Kharj for agricultural settlement.[7] Land area declined with an average of 6.7 hectares with 12.6 per cent in 1970/1971. Farmland was small with an average land holding of 6.7 hectares in 1975/1976.

The number of land holdings remained unchanged during the first development plan period. 42,500 hectares of virgin land have been distributed to farmers during the first five-year plan period. However, only a small portion was developed and utilised, due to shortages in credit and in well drilling and uneconomical small size of the allotments.[8] In Saudi Arabia, more land within the holdings was cultivated by means of traditional methods and greater yields were produced per unit of area. Average production of barley in Saudi Arabia was highest in the Middle East countries with 2,100 kg per hectare in Qassim and 1,980 kg in Northern Province in 1962 and 1,600 kg in the western province

[7] Riley, Carroll L. (1972), *Historical and Cultural Dictionary of Saudi Arabia*, Metuchen: The Scarecrow Press. p. 67.
[8] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 119.

in 1963. The average wheat production per hectares was 2,880 kg per hectare for the entire Kingdom according to the estimate made by the Saudi Ministry of Agriculture.[9] Output of wheat production rose from 42,000 tons per annum to 250,000 tons and vegetables rose from 276,000 tons to 300,000 tons per annum.[10] The Southern part of the country is suitable for the cultivation of cotton.

Table: 3.5
Comparison of Production by Crop (Thousand metric tons)

Crop	1970-1971	1975-1976	Percent Change
Wheat	74.2	92.5	+25
Sorghum	147.4	160.7	+9
Millet	162.5	16.6	-90
Barley	6.7	12.0	+79
Vegetables	176.4	259.8	+47
Melons	470.0	248.4	-47
Dates	224.3	256.9	+15
Citrus	13.1	20.6	+57
Alfalfa (Dry material)	36.0	108.3	+200

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 139.

The above table shows that the wheat production was increased from 74.2 thousand metric tons in 1970-1971 to 92.5 thousand metric tons in 1975-1976 with change in increase of 25 per cent. The sorghum production also increased from 147.4 thousand metric tons in 1970-1971 to 160.7 thousand metric tons in 1975-1976 with 9 per cent increase in production. Millet production drastically came down from 162.5 thousand metric tons in 1970-1971 to 16.6 thousand metric tons in 1975-1976 with change in reduction of 90 per cent. Barley production increased from 6.7 thousand metric tons in 1970-1971 to 12.0 thousand metric tons in 1975-1976 with 79 per cent change in increase of production. Vegetables also increased very well by 176.4 thousand metric tons in 1970-1971 to 259.8 thousand metric tons in 1975-1976 with change in increase of production to 47 per cent. In terms of fruit production, melon production came down from 470.0 thousand metric tons in 1970-1971 to 248.4 thousand metric tons in 1975-1976 with a 47 per cent reduction. Date production increased from 224.3 thousand metric tons in 1970-1971 to 256.9 thousand metric tons in 1975-1976 showing an increase of 15 per cent. Citrus production also increased from 13.1 thousand metric tons in 1970-1971

[9] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 232.
[10] Argus of Arab Economy (1975), *Economic Review of the Arab World*, 9:7. p. 35.

to 20.6 thousand metric tons in 1975-1976 with an increase of 57 per cent. Alfalfa showed an increase in production from 36.0 thousand metric tons in 1970-1971 to 108.3 thousand metric tons in 1975-1976 with 200 per cent enhancement in production. A sharp disparity between domestic food production and consumption was found in the first five-year plan.

However, with the exception of dates, the quantities produced did not suffice for local consumption and the country found it necessary to import all kinds of agricultural products, in view of the increasing demand on these products as a result of the living standards brought about in Saudi Arabia by the latest development of the Kingdom's economy.[11] In 1971, fifty-five per cent of the total food consumed was domestically produced and the remaining forty five per cent was made up by net imports.[12] In 1971 the total food import was 40 per cent compared to 1975 when it was 350 per cent. Ambitious production targets were set and overall agricultural output increased with 3.6 per cent a year for 1970-1975.[13] The actual requirement of fertiliser in the Kingdom for modern farming in the irrigated land was (about 121,000 hectares in 1970-1971, much of which was often cropped twice) 25,000 or 30,000 tons of nitrogen with the same amount of phosphates. The nation was using approximately 2,000 tons of insecticides and pesticides per annum.[14]

3.14 (c) Livestock Production

In 1970's, increasing income in urban areas stimulated the demand for meat and dairy products. Ministry of Agriculture and Water announced a programme to increase milk production by aiding farmers to purchase and breed cows for the production of milk and dairy products. Poultry feed plant in Al-Kharj, with a capital of SR17 million, was established for the production of 12,000 tons of feeds and 2 million chickens per annum. Saudi Arabia and New Zealand cooperated in joint agricultural projects by setting up cold storage facilities to develop sheep farming. Chickens and eggs contributed more to the

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[11] Assah, Ahmed (1969), *Miracle of the Desert Kingdom,* London. p. 232.
[12] *The Kingdom of Saudi Arabia,* (1977), London: Stacey International. p. 138.
[13] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey,* London: The Johns Hopkins University Press. p. 660.
[14] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning, p. 121.

consumption needs in Saudi Arabia. Output of animal feeds increased from 180,000 tons to 250,000 tons and meat from 39,000 tons to 75,000 in 1975.[15]

Table: 3.6
Comparison of Livestock Output (Thousand metric tons)

Product	1970-1971	1975-1976	Percentage Increase
Lamb	18.0	23.8	32
Beef	8.0	10.6	32
Eggs	3.6	8.4	133
Chicken	7.0	20.7	196

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 140.

Table 3.6 gives a comparative picture of livestock production in 1970-1971 and 1975-1976. In Saudi Arabia lamb shows an increase in production contributing from 18.0 thousand metric tons in 1970-1971 to 23.8 thousand metric tons in 1975-1976 with a 32 per cent growth in production. Next to lamb, beef shows enhanced production from 8.0 thousand metric tons in 1970-1971 to 10.6 thousand metric tons in 1975-1976 with a 32 per cent increase in production. Chicken also shows increase in production from 7.0 thousand metric tons in 1970-1971 to 20.7 thousand metric tons in 1975-1976 with a 196 per cent increase. Egg contributes relatively less in production from 3.6 thousand metric tons in 1970-1971 which increased to 8.4 thousand metric tons in 1975-1976 with a 133 per cent increase in production.

3.1 (d) Water

Prior to 1970, water development within the Kingdom was conducted through a more or less adhoc approach. In 1970, about half of the two million cubic meters of water used annually in agriculture came from non-renewable sources.[16] Fifteen dams constructed during the first five-year plan period give relief from flooding in areas and provide source of water for agricultural purposes. Water distribution to the agricultural land was done with 1,000 wells, along with 20 small dams for storage of surface runoff, flood protection and aquifer recharge.[17] The dams operated at the close of the plan period were 41 in number, in addition to 28 dams including the Jizan dam for irrigation of 6,000 hectares.[18]

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[15] Argus of Arab Economy (1975), *Economic Review of the Arab World*, 9:7. p. 35.
[16] Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self-Sufficiency or Self-Enrichment in Saudi Agriculture?". *MERIP Middle East Report*, March-April, 145: 8.
[17] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 49.
[18] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 117.

Floodwaters irrigate 20 per cent of the cultivated land with local dams, directing the use of water to the fields.[19] Large undertakings such as the rehabilitation of the Al-Hassa irrigation project were given special attention, whereas well drilling for both municipal and agricultural uses was done mostly on request by local authorities and landowners.

The first two desalination plants in the Kingdom located at Al-Wajh and at Duba on the Red Sea coast near the Jordanian border went into operation in 1969 with a combined capacity of 576 cubic meters per day. Desalination plants were established in Jedda, Alkhobar, Khafji, Wajh, Dhiba, Umluj, Jubail and Ghadba.[20] In 1975, SR1.035.4 million was spent on drilling of wells, installation of water networks, construction of sea water desalination plants, launching of irrigation and drainage projects, water treatment plants and construction of dams. At the end of the first development plan period, total water demands by irrigated agriculture was 1,900 (in millions cubic meter/year).[21] In 1980, 40 per cent of the total, or 1,800 million cubic meters of water was used for agricultural purposes.[22]

3.1 (e) Labour

In 1969/1970, about 65 per cent of the total population lived in rural areas, and 46 percent of the total labour force was engaged in agriculture, including crop cultivation and livestock production, fishing and forestry.[23] About 75 per cent of the population was engaged in farming and herding.[24] During the first plan period, Saudi Arabia's labour force in agriculture declined by about 0.9 per cent annually from 445,800 or 40.4 per cent in 1970 to 426,100 or 28.0 percent in 1975. In 1974/1975, about 695,000 persons or 40 per cent of the civil labour force was engaged in agriculture.[25] The causes for the decline of national labour force in agriculture were due to low real income and increasing opportunities well-paid employment in other sectors. The decline of national labour force

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[19] Assah, Ahmed (1969), *Miracle of the Desert Kingdom*, London. p. 231.
[20] Argus of Arab Economy (1974), *Economic Review of the Arab World*, 8:5. p. 46.
[21] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 116.
[22] Mostyn T. (1981), "Saudi Arabia: A MEED Practical Guide", *MEED Special Report*, July. p. 111.
[23] CPO, Development Plan, 1970 (1390 A.H) (Riyadh, n.d.) in Knauerhase Ramon (1975), *The Saudi Arabian Economy*, New York: Praeger Publishers, p. 249.
[24] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 213.
[25] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 117.

in agriculture was reflected in abandoned farmlands and partly depopulated villages in the South-western region. Rapid increase in productivity in the agricultural sector released a part of the large agricultural labour force and alleviated the labour shortage in other sectors.[26] Hired farm hands constituted only 10 per cent of permanent agricultural labour, while the remaining labour consisted of landholder's families, which form about 60 per cent of the total population of the Kingdom.[27] The growth rate of labour force per annum for Saudis was 3.7 per cent and was lower than for non-Saudis with 4.2 per cent. But Saudis still comprised was about 80 per cent of labour force in 1975. The proportion of the total Saudi population contributing in the labour force rose from 22.2 to 23.3 per cent over the five years of the first development plan. The participation rate for Saudi men changed from 43.3 to 45.1 per cent and for Saudi women it rose to 0.54 per cent per annum. The rate for non-Saudi men grew very slightly, from 67.3 to 67.4 per cent and for non-Saudi women from 3.6 to 3.8 per cent.[28]

3.2 TECHNOLOGICAL DEVELOPMENTS DURING THE FIRST FIVE-YEAR DEVELOPMENT PLAN PERIOD

3.2 (a) Agricultural Credit

The *Saudi Arabian Agricultural Bank* (SAAB) was the principal institution providing credit for the agricultural sector of the Kingdom. Starting from a modest base, the bank grew rapidly during the first development plan period. In April 1963, the agricultural credit bank was created, with its head offices in Riyadh and a capital of SR30 million. Grants and credit was given to individuals, groups, institutions and organisations working in agriculture.[29] The bank established branches in Riyadh, Al-kharj, Jeddah, Burayda, Al-Hofuf, Al-Medina, Hail, Jizan, Tabuk, and Abha, serving with 52 sub-branches by the end of 1979.[30] The capital endowment of the bank of SR103 million in 1974-1975 (excluding the SR48.5 million allocated for payments of agricultural subsidies) satisfied the credit needs of 6 per cent of the farmers.

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[26] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 115.
[27] Assah, Ahmed (1969), *Miracle of the Desert Kingdom,* London. p. 242.
[28] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 12.
[29] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia,* Washington: The American University. p. 236.
[30] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 155.

Three types of loans were made by the bank for agricultural development. They are short-term seasonal loans for production inputs, medium-term loans for farm machinery and similar assets, and long-term loans for land purchase and development. In late 1970's only five per cent of farmers in Jizan had received subsidised loans.[31] In 1970/1971, the bank lend 4,381 loans amounting to 16.6 million riyals. Over 46 per cent of the loans were utilised for engines and pumps for irrigation purposes, and the rest for fertilisers, seeds and livestock.[32] In 1973 direct subsides were introduced to assist farmers to purchase mainly engines, farm machinery and pumps for groundwater extraction.[33] In 1973/1974, the Agricultural Bank granted 5,414 new loans amounting to SR36.3 million.[34] The number of loans also increased from 625 in 1964 to 16,251 in 1974/1975.[35]

Saudi Arabian Agricultural Bank during first nine months of 1974 gave 3522 loans to farmers which valued SR21,819,141 and provided assistance to farmers with feeds subsidy at SR4 million. The Bank also distributed 1,019 agricultural machinery valued at SR3,626,623, and 513 water pumps at SR1,645,767 in 1974. Agricultural Bank extended loans to farmers to buy cows in accordance with the loan procedures and subsidy was granted to agricultural machinery, including milking-machines.[36] The reasons contributed to the increased demand for agricultural credit during the first-five year plan period were: increased development activity which increased the demand for food that led to higher prices and better returns for producers.[37] The major stimulant to agricultural investment was the government's decision in 1974 to subsidise a wide range of agricultural machinery and agricultural supplies, including seeds and fertilisers.

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[31] US Department of Commerce, Report on International Market Research Survey on Agricultural Machinery and Equipment; Saudi Arabia, April 1982, p.43 in Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self-Sufficiency or Self- Enrichment in Saudi Agriculture?", *MERIP Middle East Report*, March-April, 145: 8.

[32] Knauerhase, Ramon (1974), "Saudi Arabia's economy at the beginning of the 1970s", *Middle East Journal*. Spring. 28: p. 137.

[33] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London. p.13. URL:http://www.soas.ac.uk/wa.occ48

[34] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 49.

[35] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 155.

[36] Argus of Arab Economy (1974), *Economic Review of the Arab World*, 8:8. p. 50.

[37] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 155.

3.2 (b) Research and Extension

There are 15 research stations and demonstration farms in Saudi Arabia. In addition, several contracts with foreign universities support agricultural research in Saudi Arabia. MOAW is strengthening its research programme with additional assistance from abroad. There are 62 extension units throughout the country. Due to the scattered nature of agriculture in around 8,000 villages, extension service has not been within the reach of all farmers in the Kingdom. Transfer of the body of knowledge in a suitable form for the extension service to the farmers have been limited, but services are being improved by increasing the number of agents, giving training, and raising the quality of the service.

3.2 (c) Agricultural Machinery

Agricultural Machinery has not found wide use in the Kingdom, due to small size of farms that does not utilise machinery in the field.[38] Agricultural subsidy in the form of a direct cash grant is provided to cooperative societies and farmers who wish to purchase new agricultural machinery amounting up to 45 per cent of the machinery value.[39] During first five-year plan period, machinery output also increased from 185,000 tons to 280,000 tons.[40] Over 20 small dams were constructed or initiated for flood protection with aquifer recharge done by Abha dam for storage of surface runoff and for water supply purposes. Al-Hassa irrigation and drainage project was used for agricultural purposes.

The programmes for agriculture, health, education and social services in the first five-year development plan included the nomadic Bedouin development. In 1932 the Bedouin population was 3 million and in 1962-1963 it was around 694,013, of whom 40 per cent was concentrated in and around villages and urban areas as semi-Bedouins. The rest 60 per cent of Bedouin population was clustered around water holes throughout the country. The Bedouin population dropped from 58 per cent in 1932 to 21 per cent in 1962 and to 15 per cent in 1970. In 1970, the Bedouin population was 423,000. Since 1970, the decline in the nomadic Bedouin population was one per cent per annum. The nomadic Bedouin population in 1974 was 1.88 million. In 1975 out of total population of

[38] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 121.
[39] Argus of Arab Economy (1974), *Economic Review of the Arab World*, 8:8. p. 50.
[40] Argus of Arab Economy (1975), *Economic Review of the Arab World*, 9:7. p. 35.

1,883,987, the nomadic population was of 7,021,642. In the Eastern Province of Saudi Arabia, the area bordering the Gulf region, out of the total population of 769,648, 79,460 belong to nomadic tribesmen. Income from livestock has got reduced for the Bedouin due to the declining productivity of rangelands. Financial assistance was extended to the tribes in times of hardship by the Bedouin affairs office in the Royal Bureau. The Ministry of Agriculture operate a training centre in Riyadh, which provided training for 487 persons in 1973-1974. It has also sent 40 members of its staff for higher education and training outside the Kingdom.

The Ministry of Education has also established five vocational agricultural schools, one in Buraydah in 1976-1977 and the others in 1978-1979. In the first five-year plan period, production in agriculture continued to grow slowly in face of many problems inhibiting rapid agricultural development. Sustained and steady growth of 3.6 per cent per annum in agricultural output was achieved during the period. Subsidies on farm inputs and outputs were also introduced to supplement research and extension programmes for stimulating agricultural production.

3.3 CONDITIONS OF AGRICULTURAL SECTOR DURING SECOND FIVE-YEAR DEVELOPMENT PLAN (1975-1980)

The second five-year development plan 1975-80 (1395-1400 A.H.) became effective from July 9, 1975, at the start of the fiscal year. Agricultural projects were given heavy emphasis during the second five-year development plan period. During the second development plan period real value added to the agricultural sector grew at approximately five percent per year compounded and ranked third among the non-oil sector. Agricultural productivity or value-added per head grew at the rate of eight percent per year during the period.[41] The second five-year development plan allocated SR39 billion to the development of agriculture and water resources of which SR4.685 billion were for agricultural development programmes (SAMA, 1976, 58).[42] In second development plan

[41] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 144.
[42] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, London, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London. p. 14. URL:http://www.soas.ac.uk/wa.occ48

period, 500 million riyals were allocated for agricultural development and 6.7 billion riyals for irrigation purposes.[43] The actual government expenditure for agricultural development during the second five-year plan was ten times more than the level in the first five-year plan.

3.3 (a) Government's Strategic Principles for Effective Agricultural National Policy was based on

1. Maximum feasible self-sufficiency in the production of farm machinery, seed, fertiliser and other inputs.
2. Development by the private sector participation in cooperatives for developing the facilities and services required for food processing, distribution and provision of public sector in physical infrastructure, safety and animal health services.
3. Expansion of credit available from both government and private sources for the development of agriculture, including fisheries.
4. Provision of special economic incentives and programmes to stabilise prices and support farm incomes.
5. Protection of the environment from pollution associated with agricultural activities and best use of water resources, especially non-renewable resources.[44]

3.3 (b) Policies Adopted During the Second Five-Year Plan for Agricultural Development:

To reduce the Kingdom's dependence on food imports and to develop its rural areas, the following policies were implemented. They were

1. Aiming to balance the economic and social rewards available from agricultural activities in the rural areas and the rewards available from other economic endeavours in the urban areas.
2. Expanding and integrating the vertical and horizontal long-term requirements of the objectives and polices in the agricultural sector.

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[43] *The Arab Economist,* (1980), "Saudi Arabia Agricultural Sector Shows Significant Improvement", July. 12. (130): 26.

[44] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 123.

3. Recognising future needs of the consumer and the producer in implementing agricultural programmes.
4. Assessing land and water resources and enhancing the level of hydrologic, biologic and economic research to support better utilisation of resources.
5. Recognising the Kingdom's importance of ground water resources as a contingency against possible drought and as a vital resource for national survival.
6. Initiating MOAW on ground water development and determining the structure, capacity and interdependence of aquifers.
7. Formulating and introducing effective measures for the utilisation, conservation and management of water, soil, range, forest and wildlife resources of the Kingdom.
8. Assessing the long-term social consequences of exploitation of ground water.
9. Encouraging use of modern inputs, continuing MOAW on the subsidy programmes, increase agriculture production and analysing various impacts of these programmes.
10. Encouraging private investment in the development of commercial agriculture by MOAW; confining its activities in food production, processing and marketing keeping in mind the short supply of entrepreneurial talent.[45]

3.3 (c) Agricultural Productions

In Saudi Arabia the expansion in farming was facilitated by direct and indirect support from the government in the form of free land distribution, subsidies (especially for wheat) and interest-free loans.[46] Structural composition of agricultural GDP in the second five-year plan period decreased from 9.1 per cent in 1974/1975 to 5.8 per cent in 1979/1980. However in 1979 and early 1980's agricultural production in Saudi Arabia entered a period of unprecedented growth.[47] From the below table 3.7 it can be seen that in the second five-year plan period, agricultural sector showed very less annual compound growth compared to the other sectors in terms of production to 5.40 per cent per year.

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[45]Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 123.
[46] Ministry of Agriculture (1984) in Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215.
[47] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215.

Table: 3.7
Growth of GDP (Annual compound growth per cent per year in 1969-1970 prices)

Sectors	Second Plan Period
Agriculture	5.40
Mining	17.14
Manufacturing	15.37
Utilities	24.41
Construction	17.78
Service	76.05
Non-oil Economy	15.13
Oil sector (including refining)	4.78
Total Economy	8.04

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 20.

In terms of gross domestic product, service sector contributed more with an annual compound growth of 76.05 per cent per year in second five year plan period. Next to service sector, utilities sector contributed 24.41 per cent per year of the annual compound growth in second five year plan period. In the same period, construction and mining sectors show 17.78 and 17.14 per cent annual compound growth rate respectively. Manufacturing sector showed annual compound growth rate of 15.37 per cent per year. Non-oil economy grew by 15.13 per cent per year of annual compound rate. Oil sector showed marginal growth in production with 4.78 per cent per year of annual compound growth rate in the second five-year plan period. The total economy contributed 8.04 per cent in terms of annual compound growth in production in the second five-year plan period.

Table: 3.8
Growth and Structure of GDP (Per cent of non-oil GDP on 1969-1970 prices)

Sectors	Percent Contribution	
	1974-1975	1979-1980
	Actual	Estimated
Agriculture	9.1	5.8
Mining	0.6	0.7
Manufacturing	5.6	5.6
Utilities	2.5	3.8
Construction	19.1	21.3
Service	63.1	62.8
Non-oil Economy	100.0	100.0
Oil sector (including refining)	144.5	89.5
Total	244.5	189.5

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 31.

Table 3.8 gives a clear picture of the growth and structure of GDP of all sectors in Saudi Arabia. Out of actual and estimated values, oil sector contributed 144.5 per cent in 1974-1975 compared to the total contribution of 244.5 per cent GDP, which got drastically reduced from 189.5 per cent of total value to 89.5 per cent in 1979-1980. Service sector still contributed higher contribution in terms of percentage, but a slight reduction in growth occurred from 63.1 per cent in 1974-1975 to 62.8 per cent in 1979-1980. Next to service sector, construction provided an increase in growth of GDP from 19.1 per cent in 1974-1975 to 21.3 per cent in 1979-1980. Agriculture sector stood third in terms of growth in GDP, contributing 9.1 per cent in 1974-1975 with drastic reduction to 5.8 per cent in 1979-1980.

Table: 3.9
Gross Domestic Product
(SR Millions in constant 1979-1980 prices)

Sectors	1974-1975	1979-1980	Second Plan Annual Growth Rates in Percent	
			Planned	Actual
Agriculture	2,505.8	3,259.4	4.0	5.4
Mining	679.1	1,497.5	15.0	17.1
Manufacturing	3,303.4	6,753.3	14.0	15.4
Utilities	117.5	350.1	15.0	24.4
Construction	20,291.9	45,994.3	15.0	17.7
Service	39,825.4	77,112.5	13.3	14.1
Non-oil Economy	66,723.1	134,967.1	13.3	15.1
Oil sector (including refining)	176,076.3	222,374.4	9.7	4.8
Gross Domestic Product	242,799.4	357,341.5	10.0	8.0

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 28.

The above table shows annual growth rate of GDP in the second five-year plan period from 1974/1975 to 1979/1980. Agricultural sector held fourth position in the GDP and its value in 1974-1975 was 2,505.8 SR million which increased to 3,259.4 SR million in 1979-1980. In the second five-year plan the annual growth rates for the agricultural sector was 4.0 per cent in 1974-1975 which increased to 5.4 per cent in 1979-1980. Compared to non-oil sector, the oil sector contributed more to the GDP which increased from 66,723.1 SR million to 176,076.3 SR million in 1974-1975 and 134,967.1 SR million to 222,374.4 SR million in 1979-1980. But the annual growth rates in the non-oil sector compared to oil sector decreased from 13.3 per cent to 9.7 per cent in 1974-1975 and from 15.1 per cent to 4.8 per cent in 1979-1980. The overall contribution to GDP of all sectors in the second five-year plan period increased from 242,799.4 SR million in 1974-

1975 to 357,341.5 SR million in 1979-1980, but the annual growth rate decreased from 10.0 per cent in 1974-1975 to 8.0 per cent in 1979-1980.

3.3 (d) Land

In Saudi Arabia major holdings are small which do not exceed 2.5 acres.[48] Irrigated surface land in 1980 was 609,000 hectares.[49] The area used for irrigation according to MOAW was 7.472 billion cubic meters in 1980.[50] Seventy per cent of the cultivable land in Saudi Arabia is in the Southern province.[51] By 1980, the Ministry had done detailed studies on Wadi Al-Dawassir, Wadi Damad, Wadi Bisha, Om Al-Radma, in areas south of Al Dir Al-Arabi and of Wadi Al-Dawassir region for land reclamation scheme over a 10,000 hectare are to be used for commercial farming. Up to Rabi II 1980, under the scheme for distributing barren land, 98,850 hectares were distributed to 14,554 individual recipients; and there were 60 projects in poultry breeding, dairy farming and sheep rearing.[52] Several problems became apparent in utilising the potential of the land, principally due to the continuation of small plot distribution and extensive requirement of expensive modern irrigation methods.

3.3 (e) Labour

The number of workers employed in agriculture continued to decline during the period, but an increase in productivity resulted in an average output growth of approximately 5 per cent per year.[53] By 1979/1980, agricultural employment declined sharply by about 96,000 persons, through the sector remained the largest employer, with about a quarter of the Kingdom's civil labour force. The labour force in agriculture declined by 0.9 per cent annually; a decline reflected in abandoned farmlands and partly depopulated villages, in South-western region. This was mainly due to low real incomes in agriculture and increasing opportunities for well-paid employment in other sectors.[54]

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[48] *The Kingdom of Saudi Arabia*, (1977), London: Stacey International. p. 136.
[49] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London. p.16. URL:http://www.soas.ac.uk/wa.occ48
[50] Ibid. p. 23.
[51] Argus of Arab Economy (1979), *Economic Review of the Arab World,* 13:1. p. 53.
[52] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 148.
[53] Ibid. p. 63.
[54] *The Kingdom of Saudi Arabia*, (1977), London: Stacey International. p. 138.

Table: 4.0
Employment by Economic Activity

Economic Activity	Employment				Average Annual Growth 1974-1975 to 1979-1980 (Rate in Percent)
	1974-1975		1979-1980		
	Thousands	Percent	Thousands	Percent	
Agriculture	695.0	39.8	598.8	24.2	-2.9
Mining	3.4	0.2	7.3	0.3	16.5
Oil and refineries	27.4	1.6	36.0	1.5	5.6
Manufacturing	74.4	4.2	104.2	4.2	7.0
Utilities	16.1	0.9	31.5	1.3	14.4
Construction	172.3	9.9	330.1	13.3	13.9
Service	511.2	29.3	1,042.3	42.2	15.3
Government	246.7	14.1	321.0	13.0	5.4
Total	1,746.5	100.0	2,471.2	100.0	7.2

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 37.

The above table shows employment by economic activity in all sectors in Saudi Arabia from 1974 to 1980. In the second five-year plan period, agricultural sector contributed in the most in providing employment activity, but it decreased in real terms from 695.0 thousands in 1974-1975 to 598.8 thousands in 1979-1980 and the percentage decreased very drastically from 39.8 to 24.2. Compared to other sectors, the average annual growth rate from 1974-1975 to 1979-1980 of agricultural sector yielded negative results to -2.9 per cent which was at a very low rate.

Table: 4.1
Labour Requirements in Planned Programmes by Government Agencies

Ministry of Agriculture and Water	Employment (1974-1975) (Thousands)	Budgeted (1974-1975) (Thousands)	Planned Cumulative Positions (Thousands)				
			1975-1976	1976-1977	1977-1978	1978-1979	1979-1980
Water	264	378	580	742	927	1,102	1,204
Agriculture	3,682	4,498	5,997	6,920	7,653	8,223	8,635
Total	3,946	4,876	6,577	7,662	8,580	9,325	9,839
Agricultural Bank	538	913	1,014	1,014	1,304	1,453	1,606

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 221.

Labour requirements in planned programmes by government agencies regarding agricultural sector is shown in the above table. From the table it can be concluded that labour requirements increased rapidly from 1975 to 1980. Agricultural sector consumed more labour input which increased from 3,682 in 1975-1976 to 8,635 in 1979-1980 with an increase of nearly 2.5 per cent. From the table it can be concluded that employment in

agricultural related activities have increased in Saudi Arabia with the provision of more educational opportunities to the people.

Table: 4.2
Changes in Civilian Employment (Comparison by Economic Activity)

Economic Activity	Employment increase (Thousands)	Annual Growth Rate (Percent)
	1975-1980	1975-1980
Agriculture	96.2	2.94
Mining	3.9	16.51
Manufacturing	29.8	6.97
Utilities	15.4	14.37
Construction	157.8	13.89
Sub total	110.7	2.20
Service	605.4	12.46
Total non-oil economy	716.1	7.21
Oil sector	8.6	5.61
Total	724.7	7.19

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 101.

Table 4.2 shows changes in civilian employment and their comparison by means of economic activity. Agricultural sector contributed 96.2 thousand employments with a 2.94 per cent annual growth rate in the period 1975-1980 and stands fourth in terms of civilian employment activity. Non-oil economy provided more employment opportunities with 716.1 thousand, compared to oil sector with 8.6 thousand in 1975-1980.

Table: 4.3
Estimated Saudi Manpower by Occupational Group (Thousands)

Occupational Group	1975	1980	Increase (1975-1980)
Skilled workers	70.1	93.5	23.4
Semi-skilled workers	170.0	265.0	95.0
Unskilled workers	244.0	296.4	52.4
Farmers	311.2	281.0	30.2
Bedouins	114.9	98.7	16.2

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 217.

The above table explains the estimated Saudi manpower according to various occupational groups in the period from 1975 to 1980. Skilled workers contributed very less manpower compared to semi-skilled and unskilled workers. Semi-skilled workers showed a rapid increase in employment from 170.0 thousand in 1975 to 265.0 thousand in 1980 with an increase of 95.0 per cent in 1975-1980. Contribution of farmers to the occupational group decreased from 311.2 thousand in 1975 to 281.0 thousand in 1980

with a reduction of 30.2 per cent in the period from 1975 to 1980. Bedouins had a very small share in employment activity compared to farmers with 114.9 thousand in 1975 which drastically reduced to 98.7 thousand in 1980 with a reduction of 16.2 per cent in 1975-1980.

3.3 (f) Water

During the second five-year plan period, numerous groundwater studies were completed and 760 production wells drilled. Expansion of 150 potable water systems, construction of 28 dams for flood protection, aquifer recharging and water supply were completed and the water supply works for Riyadh and Jeddah were expanded during the second five-year development plan period.[55] Underground water sources supplied 1.85 billion cubic meter of water yearly for irrigation during this period.[56] Up to mid 1980's, 41 dams had been completed and five more were under construction.[57]

3.4 Programmes and Projects taken up during the Second Five-Year Development Plan Period (1975-1980)

The second five-year development plan emphasised production in the sub sectors with strategic importance to crops and livestock production, need for water conservation, relative value of crops in total agricultural production and potentials for rapid increase in yield.[58] Some of the production programmes are given below.

3.4.1 Crop Production

During the second development plan period the earlier trends in crop production were maintained with major gains in wheat, vegetables, grapes and citrus fruits. Expansion of agriculture received 19 per cent of expenditures during the second five-year development plan period.[59] The total wheat production of the Kingdom of Saudi Arabia in 1975 did not exceed three thousand tons.[60] The annual wheat production of approximately 4,200 tons

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[55] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 63.
[56] Cottrell, Alvin J. et al. (1980), *The Persian Gulf States- A General Survey*, London: The Johns Hopkins University Press. p. 660.
[57] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 148.
[58] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 125.
[59] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 149.
[60] Al-Farsy Fouad (1990), *Modernity and Tradition: The Saudi Equation*, London: Kegan Paul International. p.192.

was increased to 250,000 tons annually by the end of the second plan.[61] By the end of the second five year plan period, the Kingdom attained 90 per cent self-sufficiency in vegetables, 70 per cent in fresh milk and 27 per cent in wheat.[62] Despite the generally low crop yield and extreme climatic conditions, the growth in commercial agriculture was encouraging.

Table 4.4 shows production targets set for the crops that were grown during second five-year development plan period. The irrigated crop land in Saudi Arabia was 121,000 hectares in 1970-1971 and the production target set for the year 1980 was 171,000 hectares. Rainfed shows same pattern as there was no change in area cropped which was fixed to 404,000 hectares. Irrigated water supplied to the agricultural land was 1,850 million cubic meters per year in the period from 1970 to 1971 which had fixed the production target to 2,500 million cubic meters per year in 1980. The utilisation of fertilisers also increased drastically from 10,800 tons in 1970-1971 to the production target of 80,000 tons set for 1980.

Table: 4.4
Production Targets Set for Crops during Second Five-Year Development Plan

Crop land (hectares)	1970-1971	Target in 1980
Irrigated	121,000	171,000
Rainfed	404,000	404,000
Total	525,000	575,000
Irrigated water (million cubic meters per year)	1,850	2,500
Fertiliser (tons of available nutrients)	10,800	80,000

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 129.

Table 4.5 gives a picture of crop production in Saudi Arabia during second five-year development plan period. In this period melons contributed highest production with 470.0 thousand metric tons in 1975 which increased to 730.0 thousand metric tons in 1980. Next to melons, dates occupied the second highest position in terms of yield, which increased from 224.3 thousand metric tons in 1975 to 300.0 thousand metric tons in 1980. Alfalfa also yielded 180.0 thousand metric tons in 1975 which increased to 250.0 thousand metric tons in 1980. Vegetables (other than potatoes) contributed a yield of

[61] Al-Farsy Fouad (1990), *Modernity and Tradition: The Saudi Equation*, London: Kegan Paul International. p. 152.
[62] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 64.

176.4 thousand metric tons in 1975 which rapidly increased to 300.0 thousand metric tons in 1980.

Table: 4.5
Crop Production during Second Five-Year Development Plan

Crop Varieties	Estimated Production (Thousands of Metric tons)	
	1975	Target (1980)
Wheat	74.2	250.0
Sorghum	147.4	225.0
Millet	162.5	200.0
Barley	6.7	10.0
Vegetables (other than potatoes)	176.4	300.0
Melons	470.0	730.0
Dates	224.3	300.0
Citrus	163.1	20.0
Alfalfa	180.0	250.0
Cotton	-----	7.0

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 128.

Millet production increased from 162.5 thousand metric tons in 1975 to 200.0 thousand metric tons in 1980. Sorghum yield was 147.4 thousand metric tons in 1975 which increased to 225.0 thousand metric tons in 1980. Wheat showed high growth in the production of which increased from 74.2 thousand metric tons in 1975 to 250.0 thousand metric tons in 1980. Barley did not give a satisfactory production with a yield growth from 6.7 thousand metric tons in 1975 to 10.0 thousand metric tons in 1980.

3.4.1 (a) Policies adopted for Crop Production

In the second five-year plan period Saudi Arabia had followed the policies given below for crop production. They are

1. Undertaking intensive studies of 14 crops, including variety of selection and adaptive research programmes.
2. Concentrating research at Hakmah station (Jaizan) for increasing the yield of sorghum and millet.
3. Continuing the research on rice production at Hofuf and to initiate feasibility studies for commercial production.
4. Producing and distributing breeder and certified wheat seeds to 3,800 farmers and providing extension services necessary for their rapid adoption. Broadening

certified seed programme to include other cereal crops. Table 4.6 below shows targets for certified multiplication seed programmes that were adopted in Saudi Arabia from the period 1975 to 1980.

Table: 4.6
Targets for Certified Multiplication Seed Programmes
(Annual Target in Tons)

	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	Plan Total
Wheat						
Super x variety	1000	1,600	1,600	1,200	1,400	6,800
Durum variety	200	1,000	1,000	1,200	1,200	4,600
Breed wheat to replace super x	----	----	20	400	1.200	1,620
Barley	----	----	----	10	100	110
Grain sorghum	----	----	1	10	100	111

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 128.

5. Concentrating research and extension on increasing the yield of deciduous fruits.
6. Developing research and extension programmes to improve both the quality and quantity of vegetable production by introducing improved varieties, pure seeds and improving production, management and marketing procedures.
7. Developing production programme for bee care, honey production and fruit tree pollination during 1975-1977 periods.
8. Strengthening extension programmes for higher yields in citrus in existing areas and in the 1,000 hectares of new land for citrus production. The below table 4.7 shows targets for citrus improvement programmes that was followed in Saudi Arabia from the period 1975 to 1980.

Table: 4.7
Targets for Citrus Improvement Programmes
(Annual Target in Numbers)

Citrus Improvement Programmes	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	Plan Total
Rootstock seedlings	30,000	10,000	10,000	10,000	10,000	10,000
Budded seedlings	1,000	5,000	2,000	2,000	5,000	12,000
Transplants	----	300	300	400	----	1,000
Nursery trees	----	300	300	400	----	1,000
For distribution	----	1,700	4,000	2,500	3,000	11,900

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 128.

9. Developing detailed plan for the improvement of production and marketing of dates.[63]

3.4.2 Livestock and Dairy Production

In spite of large subsidies for livestock and animal feed, local production of red meat, supplied mainly by the traditional and nomadic sectors, did not expand much and rising consumption was met by increased imports. Poultry meat production expanded rapidly from 14 million fowls in 1975 to about 26 million in 1978. By the end of 1978, 276 commercial poultry farms had been established, of which 118 were primarily engaged in egg production and 12 dairy farms were in operation with an additional 16 licensed ones. Egg production was more than doubled from 204 million eggs to 490 million eggs in the second development plan period.[64] During this period, 12 commercial dairy farms were established and local fresh milk production increased from very low levels to around 20,000 tons in 1979. Commercial milk production also increased from 17,000 tons to 22,000 tons between 1976 and 1978. A further 16 dairy farms were in the process of establishment that had been in operation from the third five year development plan. The table below shows estimated livestock production programmes in Saudi Arabia in the period 1974-1975 and 1980.

Table: 4.8
Estimated Livestock Production
(Thousands of Metric Tons)

Livestock	1974-1975	Target (1980)
Sheep and Goats		
Milk	60.0	110.0
Meat	18.0	6.0
Camels		
Milk	40.0	50.0
Meat	6.0	10.0
Beef	5.0	11.0
Broilers	7.0	20.0
Eggs (millions)	90.0	140.0
Dairy		
Milk	85.0	120.0
Meat	3.0	8.0

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 129.

[63] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 127.
[64] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 146.

3.4.2 (a) Policies adopted for Livestock and Dairy Production

In the second five-year plan period Saudi Arabia had adopted some policies for Livestock and Dairy Production. They are as follows:

1. Meeting the production targets for livestock and derived products, with initiation of programme at Hofuf station to train extension staff in forage production.
2. Supporting domesticated animal production by improving sheep and goat production, including breed evaluation, management practices and nutrition with initiation of a study programme at Dirab.
3. Improving methods for managing commercial dairy operations at Dirab and Hofuf stations and expanding activities to other stations.
4. Expanding studies of poultry breeds, nutrition, management and sanitation at Qatif station and at the *Central Research Laboratory.*
5. Expanding research at Dirab, Hofuf and Medina. Testing, selecting local and crossbred strains of dairy and beef cattle and analysing nutrition, management and marketing aspects of the livestock.
6. Undertaking studies at Wadi ad-Dawasir in 1976-1977 to improve camel production, breeding, management and marketing.
7. Developing an extension veterinary treatment programme for disease and animal pest prevention, concentrating on dipping of sheep and inoculation and vaccination of livestock against communicable diseases (1976-1977).
8. Improving the existing quarantine stations in Jeddah, Halat Ammar and Dammam, and to establish new stations in Jaizan, Najran and Yanbu.
9. Increasing the production of marine food and expand studies at Jeddah with feasibility of fish culture and farming (1975-1977), feasibility of prawn culture and its production under controlled conditions (1978-1979), potentials of fish and fish by-products for livestock feed and in industrial use (1975-1976) and industrial utilisation of coral reef products.
10. Monitoring and evaluating continuously the dynamics of fish population to develop a plan for maximum long-term yield of marine resources.[65]

[65] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 130.

3.4.3 Fishery Production

Fish wealth was the staple food for the people of the Kingdom of Saudi Arabia.[66] The *Marine Resource Research Centre* at Jeddah initiated a number of studies and research projects for increasing the fishery potential.[67] A comprehensive survey was undertaken on Kingdom's shorelines and a number of experiments were made to determine optimum fishing methods. Proposals were made for the modification of fishing vessels and ports and improving marketing. The Jeddah centre also undertook a number of experiments in fish farming which could be technically and economically feasible. The Kingdom also formed the *Arabian Fisheries Company* in 1979. The Council of Ministries sanctioned the establishment of the *Saudi Fish Company* for the exploitation of marine wealth in Saudi territorial waters including fish processing and marketing.

3.4.4 Forestry and Conservation of Wild life

Council of Ministries approved a set of regulations for the protection of forestland and wild life in 1978. MOAW implemented several projects for preservation of range and forestland. National parks were established around Abha, between Jeddah and Mecca, between Mecca and Medina, Raghdon park in Al-Baha, Al Shaibany park in Al-Hassa, Samman park in Al-Zulfy, Kharis park east of Riyadh, and Sakran park in Baljirshi.[68] Al Sufa and Dalghan in Asir and Abu Hadak were made protected areas and a reforestation scheme of 300 hectares was completed in 1978.

3.4.4 (a) Polices adopted for Forestry and Conservation of Wild life

Some of the polices adopted for forestry and conservation of wild life in the second five-year plan period are

1. Drafting a set of regulations for the protection of forestry, conservation of wildlife and establishment of national parks.
2. Developing an afforestation programme to increase timber production and facilitate soil and wildlife conservation.

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[66] Argus of Arab Economy (1974), *Economic Review of the Arab World,* 8:5. p. 46.
[67] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 148.
[68] Ibid. p. 148.

3. Enforcing effective measures such as construction of firebreaks and windbreaks, pruning and thinning and control of commercial wood harvesting to safeguard forests in the Southwest.
4. Establishing six new national parks and improving the conditions in the three existing parks to help meet the recreational needs of the population.
5. Undertaking the following measures to preserve wildlife.
6. Establishing breeding centres and wildlife refugees for endangered species.
7. Developing public education activities aimed at increased appreciation for wildlife.
8. Developing and enforcing strictly appropriate laws on hunting.
9. Continuing sand stabilisation in Al-Hassa and establishing a new defence line.
10. Developing a plan for sand stabilisation in areas threatened by sand encroachment (1976-1977).[69]

3.4.5 Land Development and Conservation Programmes

During the plan period, comprehensive soil survey and classification programme was launched focusing on priority areas for land development within the one million hectares earmarked by earlier land and water surveys for potential in irrigation agriculture. Virgin land distribution was re-evaluated in 1975-1976 with keeping minimum distribution of virgin land for determining eligibility of grants, specification of areas for distribution to individual farmers and for large-scale farming. Comprehensive statement of policy was developed and issued in 1977-1978 with respect to land use and development for crop production, grazing and other purposes. During the early years of the plan, the Haradh project was further evaluated to increase social benefits, improve water use and evaluates progress in land development in Al-Hassa, Haradh and Wadi Jaizan projects, focusing on their effectiveness in increasing productivity and potential for successful application of the experience gained to future land development projects.

[69] Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 132.

3.4.5 (a) Specific Actions Followed to Reduce Pressure on the Range Lands

Some of the specific actions followed for the reduction of pressure on range lands in Saudi Arabia for the second five-year plan period are

1. Developing and enforcing a national range management code that recognises the traditional Hema system and encourage the integration of range production of livestock with irrigated agriculture by establishing commercial feedlots on irrigated land.
2. Conducting research to determine the carrying capacity of range sites and to identity plant species suited to range conditions.
3. Determining the feasibility of re-seeding and fertilising selected areas of rangeland.
4. Developing and implementing programme for the production and storage of supplemental forage by expand the grazing areas for reducing pressure on ranges and ensuring against shortages during drought periods.
5. Coordinating research at Al-Taif station with Arar range improvement work and demonstrate range improvement practices in selected areas of the Kingdom (1975-1977). [70]

3.4.6 Supporting Programmes for Agricultural Production

It includes all the research, training and data collection and analysis programmes that have a direct or indirect bearing on either the implementation or performance of the food production and land development programmes. Some of the supporting programmes for agricultural development followed during the second five-year development plan period in Saudi Arabia are

1. Establishing water-use efficiency with investigation on consumptive use of irrigated crops at Hofuf and publishes the results and initiate investigations in the three new stations of Qassim, Baljarshi and in the north during 1976.
2. Giving priority to broadening research activities at Dirab and Arar and make the rest of the research stations operational in the second year of the plan.

[70] Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 131.

3. Investigating optimum irrigation practices and alternative irrigation systems for major crops in each agro-climatic zone.
4. Establishing close coordination with the *Saudi Arabian Standards Organisation* for setting and implementing health and safety standards for agricultural commodities.
5. Completing the establishment and bring into operation all the research stations.
6. Establishing a prototype unit for experiments in hydroponics.
7. Re-orienting selected research activities toward problem-solving and practical research at Hofuf with the coordination between established research and extension programmes.
8. Initiating Specialisation programmes like *Animal Resource Department* in 1976, *Agricultural Subsidy Department* in 1978, *Statistics and Economic Studies Department* in 1979, and *Agricultural Development Department* in 1979.[71] The *Agricultural Development Department* was set up to supervise the government's agricultural development projects and provide agricultural guidance to the private sector.
9. Making the *Central Research Laboratory* in Riyadh operational in the first year of the plan and develop a research plan.
10. Establishing various agricultural centres to provide farmers technical advice, tools, seeds, fertilisers and animal breeding stations to aid in the improvement of local breeds.
11. Providing short courses at the training centres and on-the-job training under government departmental training centres.
12. Analysing and developing plant and animal protection methods by controlling pests, diseases and parasites.
13. Providing departmental training on administrative procedures, technical courses in agriculture, production and financial management by the Agricultural Bank.

[71] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 146.

14. Establishing several experimental farms with the aid of foreign experts by the government such as Al-Kharj, near Riyadh, to induce farmers and herders to use the new techniques, increase the yields of crops and improve their livestock.[72]
15. Establishing fifteen research stations, demonstration farms and sixty-two extension units throughout the country.[73] The below table 4.9 shows various agricultural research stations and experimental farms which were established for different purposes in Saudi Arabia.

Table: 4.9
Agricultural Research Stations and Experimental Farms in Saudi Arabia

Research Stations	Subjects
Hofuf	Dairy, castle, sheep and forage production; soil and water management; irrigation, re-use of drainage water; rice and vegetable production;
Qatif	Vegetable and fruit production; forage, rice; agro-climatology.
Unaiza (Qassim)	Cereals; vegetable and fruit production like grapes, dates, melons, papaya; production of Sudanese mango trees; poultry.
Jizan (Hakmah)	Sorghum, cotton, sesame, sunflower, alfalfa, papaya; Sudanese mango trees; citrus, vegetables, cereals, dates, grapes and olives.
Dirab	Horse, goat breeding; dairy; seed multiplication programme; Cereals production.
Al-Kharj	Cereals; vegetables; grapes; melons citrus; irrigation systems; dairy production.
Jeddah	Locust and insect control centre.
Haddah Asham	Tropical, citrus fruit and vegetable production.
Bajirishi	Deciduous fruits; irrigation systems.
Bishah	Citrus, dates, grapes and cereal production.
Medina	Poultry, dairy and cattle.
Marine development (Jeddah)	Fish movement and classification; fishing and training.
Range development (Arar)	Water spreading; extension, training and fodder storing.
Agricultureand Water Research Centre (Riyadh)	Soil and water analysis; crop production and protection; animal health; food science and nutrition; analytical chemistry.
Range and forest station (Taif)	Water spreading; fodder storage; extension, training.

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 145.

16. Adapting new crops and developing new production under science and technology with lessening the nation's dependence on food imports.[74]
17. Increasing community awareness for water-resource management, informing farmers about improved agriculture practices, developing market news service

[72] Walpole, Norman C. et al. (1965), *Area Handbook for Saudi Arabia*, Washington: The American University. p. 211.
[73] *The Kingdom of Saudi Arabia*, (1977), London: Stacey International. p. 141.
[74] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 553.

and increasing public appreciation of wildlife under potential public information programmes by Ministry of Agriculture and Water.[75]

3.4.7 Regional Development Programmes in Saudi Arabia

In Saudi Arabia, regional development programmes are based on studies to identify areas for suitable soil and adequate water supplies and implant agricultural infrastructure required to support small, medium and large-scale commercial farming enterprises with initiation stimulated by subsidies, credit and technical services. In 1977/1978, a third deputy minister position was established for agricultural research and development, including training. Some of the regional development programmes followed during the second five-year plan period were:

1. Decentralising the detailed planning and implementation of the programmes by means of strengthened and more effective field directorates organised in accordance with the model established at Abha for the Asir province.
2. Emphasizing Haradh project on providing wells for nomadic agriculturists, enabling the Bedouin to graze the animals over a region of 4,000 hectares.[76]
3. Formulating detailed regional development programmes for agriculture, water, conservation and recreation with drawing upon regional socio-economic development plans that are prepared by the *Central Planning Organisation.*[77] Cooperatives under a periodic review of the programmes for development of agricultural and marketing cooperatives in conjunction with the Ministry on Labour and Social Affairs. Continue to give subsidies to encourage the adoption of modern technology and to realise higher levels of production and to increase the levels of income in agriculture.
4. Agricultural agreements between Saudi Arabia and Taiwan had renewed a five-year agricultural co-operation agreement to increase the number of agricultural experts, set up three demonstration zones and help to grow

[75] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 359.
[76] *The Arab Economist,* (1980), "Saudi Arabia Agricultural Sector Shows Significant Improvement", July, 12. (130): 26.
[77] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 125.

vegetables in the region.[78] Saudi Arabia also sends farmer's mission to Taiwan to study the cultivation of rice, vegetables and other crops.

5. Initiating early in the plan period an economic research study to access the short and long run impacts of the subsidies. Table 5.0 shows agricultural development programmes of certain regions in Saudi Arabia for the period from 1975 to 1980.

Table: 5.0
Selected Agricultural Development Programmes by Region

Region and Location	Progress, Purposes and Plans
Southwestern	
Asir	Detailed development plan drafted in 1975. Asir field directorate was established to strengthen extension services, improve utilisation of water and inventory resources. Bee-keeping programme initiated in 15,000 hectares of fruit land and rehabilitation of 180,000 hectares of range land was done.
Wadi Bishah	Pre-design study conducted in 1975-1977 on a water storage and distribution network for irrigating 600 hectares of arable land.
Wadi Jaizan	Study of water development for the 7,000 hectares irrigated from Wadi Jaizan dam completed in 1976-1977 and land utilisation and farming methods improved throughout plan period.
Wadi Najran	Detail plan drafted with studies made on flood control (by dam if necessary) and potential supplies of irrigation and domestic water.
Wadi Baysh and South Tihamah	Pre-design study completed in 1977. The study includes runoff, rainfall, hydrology and hydrology date; soil classification; sites for flood retention; assessment of supplies of irrigation and domestic water.
Western	
Wadi Haly	Pre-design study conducted in 1975-1976 on rainfall storage and flood retention to increase arable land.
Central	
Wadi ad-Dawasir Al-Aflaj plain	Pre-design study (1975-1977) on reclamation of cropland of up to 8,000 hectares, development of infrastructure and optimum land utilisation.
Eastern	
Al-Hasa	Study of water resources (1975-1977) and land preparation (1976-1978) prior to constructing an irrigation and drainage system to increase the area under cultivation by 6,000 hectares as a result of more efficient water use and increased water supplies (including re-use of drainage water). A pilot extension programme launched which focus on improved irrigation and agronomic practices and on living conditions in the area.
Faisal Settlement	Evaluate the project to increase social benefits and improve water use in 1975.
Wadi al-Miyah	A pre-design study in 1975-1978 identifies scattered parcels of land of 50 to 60 hectares and focus on infrastructure development for 600 hectares and supplies of ground water.
Yabrin oasis	A six-month reconnaissance survey on analysing soil and water conducted in 1977-1979 to determine potential for the development of 13,000 hectares.
Northern	
Wadi as–sirhan Sakaka Al-Jawf Turaif and Wadi Arar	Exploratory studies conducted in five areas, focusing on availability of water for agricultural development.

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 126.

[78] Argus of Arab Economy (1976), *Economic Review of the Arab World,* 10:4. p. 18.

3.4.8 Ministry Organisation

The organisation of MOAW was strengthened during the second five-year development period. MOAW provides programmes for 2,500 trainees in a variety of agricultural related skill areas including agricultural engineering and administration. Table 5.1 below show targets for training of agricultural students to acquire special skills dealing with the agricultural sector from 1975 to 1980.

Table: 5.1
Target Numbers of Agricultural Students for Training

Programmes	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	Plan Total
Two-year technical training	55	65	80	90	95	385
Summer training for university students	250	250	300	350	400	1,500
Short courses in special skills	337	412	477	537	597	2,360
Other training	91	117	159	195	240	802
Scholarship programme						
BS	52	52	53	53	54	264
MS	10	12	14	16	18	70
Ph.D	3	4	5	6	7	25

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 134.

3.4.9 Agricultural Credit Programmes and Projects

The allocations of public finance summarised above reflect only part of the total allocation of national resources to development. They do not include investment by the private sector in agricultural development apart from that financed by agricultural credit. The costs of the agricultural development programmes were SR4,685 million, which did not include provision for regional development.[79] During the five years of the second development plan, SR3,054 million was disbursed in over 125,000 loans.[80] A market news service and survey was established for collection of agricultural commodity prices. Complete census of agriculture and Bedouins was taken in 1977-1978 and in 1976-1977. Table 5.2 shows financial requirements for agricultural development that were undertaken by Ministry of Agriculture and Water in Saudi Arabia in the period 1975 to 1980.

[79] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 530.
[80] Third Development Plan (1980-1985). Kingdom of Saudi Arabia, Ministry of Planning. p. 64.

Table: 5.2
Estimated Financial Requirements for Agricultural Development under the Ministry of Agriculture and Water (Excluding Regional Agricultural Development) (SR million)

	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	Plan Total
Recurrent	249.7	241.0	300.0	369.1	444.5	512.5	1,867.2
Project	248.4	432.8	427.9	437.3	370.3	323.2	1,991.5
Total	498.1	673.8	728.0	806.4	814.8	835.7	3,858.7

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 135.

A review of the vocational agricultural training programme was undertaken in the first year of the plan in conjunction with the Ministry of Education. Orientation programme for new employees was conducted and job-training programmes within the bank were undertaken to alleviate shortages in special categories of skills. Technical training in agricultural production and financial management for bank employees and accountant were provided and a long-term programme of study abroad for qualified employees to improve the capacity of the bank's management and technical services were initiated. During the second plan significant progress was achieved in the number and value of loans granted to the agricultural sector.[81] Table 5.3 shows loan finance of the agricultural bank for agricultural credit programmes that were adopted in Saudi Arabia for the period 1975 to 1980.

Table: 5.3
Planned Loan Finance of the Agricultural Bank for Agricultural Credit Programmes (SR million)

	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	Plan Total
Agricultural Production						
Agricultural Production requirements	64.4	74.1	84.2	96.4	108.3	427.4
Development of virgin land	14.4	14.4	14.2	14.4	14.4	72.0
Development of apiary industry	0.3	0.3	0.3	0.3	0.3	1.3
Nomadic herdsmen	2.5	3.0	3.5	4.0	4.5	17.5
Development of fisheries	2.0	2.0	2.0	2.0	2.0	10.0
Subtotal	83.6	93.8	104.4	117.1	129.4	528.2
Marketing and Processing						
Cold storage plants	5.0	5.0	5.0	5.0	5.0	25.0
Processing plants	5.0	5.0	5.0	5.0	5.0	25.0
Poultry and animal feed plants	3.0	3.0	3.0	3.0	3.0	15.0
Dairy farms, milk processing and collection centres	15.0	15.0	15.0	15.0	15.0	75.0
Subtotal	28.0	28.0	28.0	28.0	28.0	140.0
Total	111.6	121.8	145.1	157.4	157.4	68.2
Less estimated loan repayments	25.0	31.4	68.2	66.6	66.6	240.6
Net loan finance required	86.6	90.4	76.9	90.8	90.8	427.6

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 137.

[81] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 155.

Table: 5.4
Estimated Annual Requirements for Financing the Agricultural Bank
(Excluding Subsidies Provision in the Plan) (SR million)

	1974-1975	1975-1976	1976-1977	1977-1978	1978-1979	1979-1980	Plan Total
Recurrent	54.8	55.0	63.5	68.0	73.5	78.5	328.5
Loan finance	41.0	86.6	90.4	83.0	76.9	90.8	457.7
Project	----	13.0	15.0	12.0	10.0	10.0	60.0
Total	95.8	154.6	168.9	163.0	160.4	179.3	826.2

Source: Second Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 139.

Table 5.4 shows annual requirements for the financing agricultural bank in second five-year plan period. Saudi Arabian Agricultural Bank provides capital loan assistance to the agricultural sector of the Kingdom. It has continuously expanded the availability of interest-free credit to the farmers. Table below shows value and number of agricultural loans that had been disturbed by the agricultural bank for agricultural credit programmes in Saudi Arabia from the period from 1974 to 1979. The value of short-term loans almost doubled over the period, whereas the value of medium term loans increased more than five times.

Table: 5.5
Value and Number of Agricultural Loans

	1974-1975		1975-1976		1976-1977		1977-1978		1978-1979	
	SR Million	No	SR Million	No	SR Million	No	SR Million	No	SR Million	No
Short term	7.2	3,835	8.2	3,073	17.3	3,633	43.7	3,572	15.3	4,60
Medium term	138.3	12,416	261.2	16,629	472.6	17,744	541.9	16,726	693.98	19,14
Total	145.5	16,251	269.4	19,702	489.9	21,377	585.6	20,298	709.1	23,75

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 155.

In second five-year plan period, only 5 per cent of farmers in the Kingdom have received credit through the Bank.[82] Agricultural bank policy towards project lending changed during this period. The amount of agricultural credit disbursed also grew significantly in response to the growth in agricultural output. During the second five-year plan period all loans were made without interest or handling charges. An increasing proportion of agricultural credit was used for land improvement, well drilling, at the expense of machinery and supply purchases. Notwithstanding these developments a major stimulus

[82] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 121.

to borrowing from the agricultural bank was the removal of all cost associated with borrowing.

Table: 5.6
Agricultural Credits and Subsidies (in SR millions)

Year	Credits	Subsidies
1974/1975	145	46
1975/1976	269	134
1976/1977	490	182
1977/1978	586	237
1978/1979	709	348
1979/1980	1127	436

Source: Saudi Arabia Monetary Agency, Annual Reports in Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?", *MERIP Middle East Report*, March-April, 145: 9. The value of the Saudi Rival stood at 3.7 to the dollar in 1986.

The above table explains agricultural credits and subsidies that were provided in Saudi Arabia from the period of 1974/1975 to 1979/1980. Loans for engines, pumps, ploughs, fertilisers and seed maintained their share at between 18 per cent and 20 per cent over the period.[83] Regarding the structure of credit, by the middle of the second plan, the share of lending accounted for by construction activities and well drilling and casings had increased from 16 per cent in 1975-1976 to over 41 per cent. This increase was mainly at the expense of loans for vehicles, machinery, animal and feedstuff, which fell from 61 per cent to 33 per cent. A number of projects were undertaken in the second plan period, which was designed to improve the quality of lending and the efficiency of the bank in dealing with loan applications.

3.4.9 (a) Policies Adopted for Agricultural Credit Programmes

Some of the polices adopted for agricultural credit programmes in the second five-year plan period of Saudi Arabia are

1. Assisting farmers and processors in financial management and planning.
2. Training courses for bank employees to develop and enhance their skills in financial management.
3. Increasing the accessibility of the bank's services to the agricultural sector.

[83] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 155.

4. Decreasing the time and effort of borrowers who obtain loans in emergency situations.
5. Expanding credit in support of agricultural production, processing and marketing development in accordance with the requirements.
6. Estimating production credit requirements and make loans readily available for farmers and beneficiaries of the virgin land distribution programme, establishment of an apiary industry, modernisation and expansion of fisheries in the Gulf and Red sea.
7. Estimating processing and marketing credit requirements, developing repayment plans and making loans readily available for cold storage plants, construction and operation of processing plants for tomato juice and paste production, date packing, oil-seed extraction and other products.
8. Continuing to act as the fiscal agent for the government under the agricultural input subsidies programme.
9. Initiating a programme of facilitating and simplifying bank lending processes and procedures for recipients of loans.
10. Establishing additional regional bank centres, branches and offices as necessary.
11. Providing regular banking services to distant areas and villages by acquiring and using vans for a mobile banking programme.
12. Studying the potential for strengthening existing and newly created branches and offices through delegating additional lending authority.
13. Studying alternative methods of decentralising the bank's operations.
14. Expanding the use of automatic calculating and posting machines throughout all sections of the bank.
15. Applying modern bookkeeping and accounting techniques to reduce the number of forms and documents for processing and collection of loans.
16. Providing awareness to the farmers about bank services through audio-visual aids, radio and television announcements under information and research programme.
17. Facilitating credit transfer and credit requirements of various sizes of farms.
18. Establishing milk collection centres, modernisation of dairy production and processing units.

19. Constructing and operating poultry feed mixing plants and top-leather tanning plants and light-leather preserving plants.[84]

3.5.0 Bedouin Affairs

The basic goal of the second five-year development plan relative to the Bedouin nomads was to formulate and implement a series of programmes specifically oriented towards improving their economic and social well-being. The Bedouin programmes had an economic rather than a welfare basis and were adapted and operated in accordance with the special needs and situation of the Bedouins. Settlement of Bedouins was one of the priority areas of the second five-year development plan. The programmes and policies for Bedouin development in the second five-year development plan were to extend health, education and social services. A few of the policy measures were: research projects undertaken to collect data on Bedouin development, review existing legislation for the implementation of new Bedouin programmes, initiate literacy programmes for them, train Bedouin women to produce traditional handicrafts and establish centralised or co-operative organisations for marketing the produce. The main aim of *fallow land distribution system* was to settle the Bedouins and increase food production in the country. By the end of 1975 and 1980, the government had distributed 48,500 and 123,163 hectares of fallow land to the Bedouins.[85]

3.5.0 (a) Polices Formulated for Bedouin Development Programmes

The polices that are formulated for Bedouin development programmes in Saudi Arabia for the second five-year plan period were

1. Providing a new unit in the Ministry of the Interior with appropriate administrative machinery exclusively concerned with all aspects of Bedouin development policy and programmes, securing the support and cooperation of the tribal leaders.
2. Coordinating the work of the new unit for Bedouin development with specialised agencies that are directly responsible for implementing relevant projects.

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[84] Third Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 156.
[85] Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 423.

3. Undertaking work of the new unit research necessary for successful implementation and acceptance of Bedouin programmes for their development.
4. Taking special care to familiarise the Bedouin and especially their leaders, with the programmes available for their advancement by obtaining cooperation required from both individuals and tribes.[86]

3.5.0 (b) Projects for Development of Bedouin Population

The projects that were adopted for development of Bedouin population for the second five-year plan period in Saudi Arabia were

1. Establishing a unit for Bedouin programmes within the Ministry of Interior and ensuring realisation of government's policy for economic and social development of the Bedouin nomads.
2. Establishing a research programme to collect all available data with relevance to Bedouin development.
3. Providing research programme for study of basic economics of the Bedouin system and its integration with the national economy.
4. Preparing specific coordinated projects for implementation in cooperation with other government agencies for the Bedouin.
5. Reviewing existing legislation for the implementation of new Bedouin programmes and submitting, where necessary, draft legislation to the Council of Ministries for promulgation.
6. Training competent Bedouins to fill central roles in the new unit as soon as possible.
7. Organising an international conference on the economic and social development of nomadic populations.
8. Estimating financial requirements to establish unit for Bedouin programmes. [87]

[86]Second Development Plan (1975-1980), Kingdom of Saudi Arabia, Ministry of Planning. p. 423.
[87] Ibid. p. 425.

3.5.0 (c) Special Programmes for Bedouin Population

For educating Bedouin children boarding schools were provided at locations where Bedouin tribes concentrated their marketing activities. Radio programmes for Bedouins reinforced with occasional visits of teachers and summer programmes in specified locations were conducted in some areas. Literacy programmes for adult Bedouins were are also initiated by organising educational caravans in conjunction with the ministries concerned. For social affairs, Bedouins were ensured to have access to all social and welfare programmes for which they were eligible by the government programmes. Bedouin women were organised to design and produce traditional handicrafts with establishing a centralised or cooperative organisation for the mutual teaching and marketing of handicrafts. Government made efforts in disseminating dialects to familiarise the Bedouins to prepare them for an active role in the mass media programme. Regular programmes on matters relating directly to the Bedouin economy, regarding information on pasture conditions and lamb prices were also broadcast.

3.5 Constraints of Second Five-Year Development Plan for Agricultural Development in Saudi Arabia

The continued migration of labour has made the labour input expensive and in short supply which affected the traditional sector where, dates in some areas are only partially harvested because of lack of labour. Mechanisation to replace labour was impeded in much of the sector by the small size of farming tracts, by palm trees planted on a random basis, by the lack of farmer's organisations and cooperatives, as well as restrictions on the use of credit for farm machinery. Some more remote areas have suffered from a lack of infrastructure, in particular roads and well drilling. Although nearly 99,000 hectares were distributed under the scheme for distribution of barren lands, most of this was in small parcels, exacerbating the existing limitations of small-scale holdings.

Wasteful use of modern irrigation of the potential land has led to early salination of some of the best oases croplands and increased drainage to the land. The general decline in the quality of the Kingdom's extensive rangelands continued. The existing subsidy system, although increasing some farmer's income, did not always result in the

desired production or improvement. In particular, the various livestock subsidies did not increase the domestic supply of meat and the date subsidy and guaranteed wheat price was paid regardless of produce quality. The subsidisation of some food imports effectively lowered farm prices or maintained some of them at low 'real' level. Consequently, the subsidy and price support programmes were the subject of extensive review during the third five-year development plan period.

CONCLUSION

Saudi Arabia is usually pictured as a country which is a capable of progressing in the domains of mineral resources, industry, education, health, communications, economy and defence, but is unlikely to advance in the field of agriculture because cultivable lands in its are scarce and even more scarce are its water resources. Until the late 1970's, low priority was given to agriculture in Saudi development mainly because of the Kingdom's limited experience in agriculture and greater long-term potential of industrial development, particularly downstream hydrocarbon ventures. The sign of the failure to diversify the economy was reflected in the development of the agricultural sector during the first five-year plan period.

Saudi Arabia's aim was to achieve self-sufficiency in the agricultural domain. A number of minor agricultural development projects existed in 1960's, but with the rise of oil revenues in 1973, the government put major subsidy schemes into effect and interest-free agricultural credit was also increased. Agricultural sector contributed in creating more employment activity by providing more educational opportunities to the people during the second five-year plan period. Since 1970, there has been a marked decline in the sector. In 1970's Saudi Arabia was one of the world's fastest growing markets for processed food. The share and growth of agriculture in GDP decreased drastically from 1966 to 1975. But the annual growth rates for the agricultural sector were increased from 1974 to 1980. In the second five-year plan period, agricultural sector showed very less annual compound growth compared to the other sectors in terms of percentage of production per year.

Compared to agricultural sector, the other sectors like construction, service, manufacturing and utility sectors yielded a considerable increase in annual compound growth in terms from 1966 to 1975. Agricultural sector stood third next to service and construction sectors in terms of growth in GDP, with drastic reduction from 1974 to 1980. The total average land use holding drastically decreased from 1970 to 1976. But perennial, orchard and irrigated areas increased rapidly from 1970 to 1976. Crop production was limited to sale in local markets because the country lacked efficient refrigeration facilities and a canning industry.

During the 1970's and 1980's, the government of Saudi Arabia undertook a massive restructuring of the agricultural sector. The government also mobilised substantial financial resources to support the raising of crops and livestock. During the first and second five-year development plan period, wheat, sorghum, barley, dates, citrus, alfalfa, vegetables, lamb, beef, chicken and eggs showed increase in production. The country was entirely dependent on food imports with the exceptions of dates and millets to meet the demand of their people. Growth rate of total agricultural demand in 1961-1970 and 1970-1980 was 6.1 and 14.3 per cent per year respectively. Growth rate of total agricultural production in 1961-1970 and 1970-1980 was 3.1 and 5.1 per cent per year. The self-sufficiency ratios of agricultural production in 1961-1963, 1969-1971 and 1979-1981 were 64, 59 and 25 per cent. Growth rate of total agricultural exports in 1961-1970 and 1970-1980 was 14.2 and 15.2 per cent per year. Growth rate of total agricultural imports in 1961-1970 and 1970-1980 was 9.7 and 18.3 per cent per year. There was no exports share of agriculture in total economy in 1969-1971. The imports share of agriculture in total economy in 1969-1971 was 30 per cent.

The share of agriculture in total GDP in 1980 was 1.2 per cent. The calories per caput per day in the period 1961-1963, 1969-1971 and 1979-1981 were 1832, 1887 and 2827 respectively. The total cereal production in 1969-1971 was 741 thousand tonnes. The totals demand and production of cereals in 1969-1971 was 807 thousand tonnes. The net trade of cereal production in 1969-1971 was -522 thousand tonnes. The self-sufficiency ratio (SSR) of cereal production in 1969-1971 was 53 per cent. Labour was

by far the most source of power into crop production, followed by draught animals. The percentage of total labour force in 1970 and 1980 was 64 and 48 respectively. The growth rate of agricultural labour force in 1970-1980 was 2.7 per cent.

In this chapter, Saudi Arabian policy on agriculture during the course of the second development plan that aimed at its integration into the national economy was examined. It has achieved self-sufficiency in some of the products by allocating more resources in the third five-year plan period to further develop the agricultural sector in Saudi Arabia.

CHAPTER-IV

SAUDI ARABIAN AGRICULTURAL POLICIES: 1980-1985

CHAPTER-IV

SAUDI ARABIAN AGRICULTURAL POLICIES: 1980-1985

Objectives of Agriculture Development

Policies adopted for Agricultural Development

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CHAPTER-IV

SAUDI ARABIAN AGRICULTURAL POLICIES: 1980-1985

The third five-year development plan 1980-85 (1400-05 A.H.) came into effect from 15 May 1980. The agricultural sector grew rapidly, increasing to 8.1 per cent per annum during this period. The third five-year plan allocated SR72 billion (SAMA, 1981, 65), of which SR7.975 billion were for agricultural development programmes (Europa Year Book, 2002, 909).[1] Improving Saudi Arabia's agricultural sector was the main emphasis for third five-year development plan.[2] Meeting five-year targets for agriculture was one of the great challenges of the third plan.[3] The planning Ministry wanted "prudent self-sufficiency" and "reasonable" agricultural incomes to maintain the social structure in rural Saudi Arabia. This chapter examines the Saudi Arabian policies in agricultural sector during the third development plan period, that aimed at attaining self-sufficiency in some of its agricultural products.

(a) Objectives of Agriculture Development during the Third Five-Year Plan Period

The main objectives of the Kingdom agriculture development during the third five-year plan period were:

1. To establish and maintain a prudent level of self-sufficiency in food production, recognising both producer and consumer interests.
2. To provide opportunities for attaining reasonable agricultural incomes and to raise the welfare of rural people.
3. To achieve a balance between the economic and social rewards attainable in rural and urban areas.
4. To optimise the use of the Kingdom's water, marine and land resources.
5. To improve the skill level in the agricultural sector.
6. To protect the agricultural (including marine) environment.
7. To secure water to cope with increasing agricultural expansion in the Kingdom.

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[1] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London. p.15. URL:http://www.soas.ac.uk/wa.occ48

[2] Argus of Arab Economy (1980), *Economic Review of the Arab World*, 14:2. p. 48.

[3] Mostyn T. (1981), "Saudi Arabia: A MEED Practical Guide", *MEED Special Report*, July. p. 107.

8. To conserve and develop the water resources efficiently.
9. To seek new water resources in the region.
10. To encourage investment in the agricultural sector by broadening the agricultural base of the Kingdom and to improve the quality of production, marketing and processing facilitating the attainment of an appropriate degree of self-sufficiency.[4]

(b) Policies adopted for Agricultural Development during the Third Five-Year Plan Period

In achieving the above objectives, the policies pursued were:

1. Continuing the detailed evaluation of the Kingdom's available water and land resources.
2. Continuing the improvement of efficiency in traditional agriculture sector by adoption of modern farming methods that minimised labour and water inputs, assisted by improved crop selection, formation of farming cooperatives, improved subsidy schemes and the continuation of extensive services.
3. Continuing the encouragement of private sector in the development of larger scale agricultural projects ranging from major integrated agricultural projects, such as the Haradh project to individual crop, diary and livestock projects.
4. Improving range management through protective measures and discouragement of overgrazing.
5. Continuing the efficient development of major reclamation projects.
6. Improve the sector's data to provide reliable information for analysis by both public and private sectors and assisting overall management of the agricultural sector.
7. Reviewing the agricultural subsidies available and improving their overall effectiveness.
8. Reviewing the scheme for barren land distribution and making appropriate adjustments to expedite its contribution to agricultural production.
9. Increasing the research effort concentrating on practical problems of production and marketing.

[4] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 150.

10. Increasing and promoting training programmes available for both public and private sectors.
11. Continuing to implement projects to provide for agricultural needs and ensuring adequate distribution networks accompanying major supply projects.
12. Improving knowledge of the water resource base and making detailed hydrological studies on major wadis, including the feasibility of dam construction.
13. Continuing to introduce modern labour and water saving irrigation techniques in agricultural areas irrigated by traditional and gravity irrigation systems located within economic distances from existing water sources and supply facilities.
14. Preparing the way for enforcement of national water plan on an inter-agency basis, take into account the technical and economic factors of supply and demand; accompanying environmental and social aspects; legal requirements under Islamic law of all public and private water based developments in the Kingdom.
15. Maximising the use of available water supply at the least cost and without unnecessary rates of decrement of non-renewable, fresh water sources by means of a rational plan of water resources development through appropriate coordinated measures.
16. Continuing government's policy of providing interest free loans for seasonal agricultural input requirements, plant and machinery, development projects, cold stores, land development and development of dairy and fisheries.
17. Increasing the availability of the bank loans, decentralise the operation and extend with regional basis.[5]

4.1 CONDITIONS OF AGRICULTURAL SECTOR DURING THIRD FIVE-YEAR PLAN PERIOD (1980-1985)

Improving Saudi Arabia's agricultural sector was the main emphasis for third five-year development plan.[6] Meeting five-year targets for agriculture was one of the great challenges of the third plan.[7] Total area of the agricultural field during third five-year plan period was 465,000 dunums. The number of agricultural holdings remained

[5] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 150.
[6] Argus of Arab Economy (1980), *Economic Review of the Arab World,* 14:2. p. 48.
[7] Mostyn T. (1981), "Saudi Arabia: A MEED Practical Guide", *MEED Special Report,* July. p. 107.

substantially unchanged during this period. Dry land agriculture declined with increase in irrigated land by 16 per cent. Total cultivated land in 1980 was 609,000 hectare.[8] The Tebrak area was one of the main agricultural regions in Saudi Arabia.[9] There was a rapid expansion in irrigated agriculture in 1980 in Tebrak area of Central Saudi Arabia.

The richest farming areas (dates were the principal crop) were traditionally found nearer the Gulf coast, in the large oases of Al-Hassa and Qatif with high water tables, natural springs and relatively good soils. Everywhere outside Asir, cultivation depended on simple irrigation, which determined both the location and scale of agriculture holdings. Farms were mostly owner-occupied and small.[10] Commercial farming using medium lift pumps grew in the Central region. Bulk of the agricultural resources of Saudi Arabia remained in the Western and Southern regions, where three-quarters of the country's farm population cultivated 53 per cent of the total cropped area. Many farms in the traditional sector have slowly become more commercialised and are making greater use of modern inputs, especially irrigation equipment.

Among the major changes in the agricultural sector were the emergence of factory-style production units for poultry and eggs, large integrated meat and dairy farms, greenhouses for vegetables and vast wheat farms established in virgin land with technologically sophisticated and capital intensive techniques. Saudi government was putting great emphasis on farming, spending $2.4 billion on agricultural development in its third five-year development plan and offering an unusually attractive package of incentives to private farmers to secure an adequate home-grown food supply for the future period. Agricultural sector grew with a rate of about 12 per cent in 1985 as compared to 10 per cent in 1984.[11] During the third five-year plan period, structural composition of GDP was declining from 5.8 to 5.1 per cent. Table 5.7 shows the

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[8] Elhadj, Elie (May 2004), "Camels Don't Fly, Deserts Don't Bloom: an Assessment of Saudi Arabia's Experiment in Desert Agriculture", Occasional Paper No: 48, Water Issues Study Group, School of Oriental and African Studies (SOAS)/ King's College London, University of London p.28. URL:http://www.soas.ac.uk/wa.occ48

[9] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 217.

[10] Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?", *MERIP Middle East Report*, March-April, 145: 7.

[11] Argus of Arab Economy (1985), *Economic Review of the Arab World,* 19:7. p. 13.

structural composition of GDP in the third five-year plan period. The share of agriculture in the overall GDP was 5.8 per cent in 1979-1980 which reduces to 5.1 per cent in 1984-1985. Compared to other sectors, service sector showed drastic reduction in terms of yields from 62.8 to 19.1 in percentage from 1979-1980 to 1984-1985. But construction sector showed drastic decline from 21.3 per cent in 1979-1980 to 12.6 per cent in 1984-1985. Oil sector also declined from 89.5 per cent in 1979-1980 to 64.1 per cent in 1984-1985.

Table: 5.7
Structural Composition of GDP in the Third Plan Period
(Per cent of non-oil GDP based on 1969-1970 prices)

Sectors	1979-1980	1984-1985
Agriculture	5.8	5.1
Construction	21.3	12.6
Service	62.8	63.8
Non-oil Economy	100.0	100.0
Oil sector (including refining)	89.5	64.1

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning, p. 19.

Table: 5.8
Growth of GDP in the Third Plan Period
(Annual compound growth per cent per year in 1969-1970 prices)

Sectors	Third Plan 1980-1981 to 1984-1985
Agriculture	5.35
Mining	9.78
Manufacturing	18.83
Utilities	29.46
Construction	2.48
Service	38.75
Non-oil Economy	6.19
Oil sector (including refining)	1.34
Total Economy	3.28

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning, p. 20.

From table 5.8, it can be seen that the annual compound growth per cent per year in agricultural sector in the third five-year plan period was 5.35 per cent which had reduced from 5.40 per cent per year in the second five-year plan period. The non-oil economy in this period was 6.19 per cent per year which also had reduced from per cent per year in the second five-year plan period. Oil sector contributed even less with a gross domestic product 1.34 per cent per year in the third five-year plan period compared to 4.78 per cent per year of annual compound growth in the second five-year plan period. Non-oil

economy gave an annual compound growth rate of 6.19 per cent per year in the third five-year plan period. The total economy's contribution to third five-year plan period was 3.28 per cent per year in terms of annual compound growth in production. And it is much less compared to second five-year plan period which was 8.04 per cent per year.

Table: 5.9
Changes in the Sectoral Composition of Non-Oil GDP
(Percentage shares in non-oil GDP based on 1979-1980 prices)

Sectors	1979-1980	1984-1985
Agriculture	2.11	2.32
Mining	1.11	1.31
Manufacturing	5.00	8.78
Utilities	0.26	0.70
Construction	34.08	22.26
Sub total	42.86	35.37
Service	57.14	64.63
Total	100.00	100.00

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning, p. 95.

Table 5.9 explains the sectoral composition of non-oil GDP and their changes in the third five-year plan period. Service sector contributed the largest share in the sectoral composition of non-oil GDP with a production of 57.14 per cent in 1979-1980 which increased to 64.63 per cent in 1984-1985. Agricultural sector's contribution was still very less with 2.11 per cent in 1979-1980 increased to 2.32 per cent in 1984-1985.

4.1 (a) Food Demands

Projections of the Kingdom's food demand on the basis of population growth to cope up with continued rapid increase in the consumption of eggs, poultry, fish, fresh meat, fresh vegetables, fruit, milk, pulses and tinned fish; fairly static consumption of tinned meats, tinned fruits, vegetable oils, sugar and decrease for rice, flour, melons and dates were observed.[12] The table below explains projected demand for selected food items of Saudi Arabia expressed in terms of thousand metric tons in third five-year plan period. The demand of the flour products in 1980 was 694 thousand metric tons which decreased to 649 thousand metric tons in 1985.

[12] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 141.

Table: 6.0
Projected Demand for Selected Foods (Thousands metric tons, rounded value)

Food Group	1980	1985
Flour products	694	649
Fresh meat, fish, poultry, eggs and frozen material	228	349
Dairy products (Milk fresh and powdered, cheese, butter/margarine)	97	132
Fresh vegetables	631	957
Fresh fruits includes dates and melons	931	1,038
Beverages includes tea, coffee, soft and fruit drinks	105	139
Oil and fats	37	39

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning, p.142.

The demand for fresh meat, fish, poultry, eggs and frozen material products in 1980 was 228 thousands metric tons which increased drastically to 349 thousands metric tons in 1985. The demand for dairy products especially fresh and powdered milk, butter/margarine and cheese increased from 97 thousands metric tons in 1980 to 132 thousand metric tons in 1985. The demand for fresh fruits included dates and melons which was 931 thousands metric tons in 1980, increasing to 1,038 thousand metric tons in 1985. The demand for beverages (including tea, coffee, soft and fruit drinks) was 105 thousand metric tons in 1980 which increased to 139 thousand metric tons in 1985. Oil and fat demands in 1980 was 37 thousand metric tons which increased to 39 thousand metric tons in 1985.

4.1 (b) Crop Production

The effect of improved seed programmes results in significantly higher yields of wheat and barley production compared to sorghum, millet and corn. Wheat, barley and other cereals were widely distributed in their initial stages of distribution. Wheat production was continued and became an important cash crop during the third plan period.[13] Wheat, vegetables and forage production increased with a decline in the traditional crops like sorghum, millet and melons. Saudi Arabia was investing a great deal of money in large numbers of agricultural projects enabling the Kingdom to increase its wheat production to 400,000 tons in 1982 from 135,000 tons in 1981, and thereby to attain self-sufficiency in wheat output.[14] Wheat production exceeded the country's needs by mid-1980.[15] Saudi

[13] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 146.
[14] Argus of Arab Economy (1982), *Economic Review of the Arab World,* 16:4. p. 77.

Arabia has achieved self-sufficiency in wheat with output of hard winter wheat in 1984 of 1.3 million tonnes and domestic consumption of around 900,000 tonnes. As part of an overall drive for food self-sufficiency, the government guaranteed to buy wheat from Saudi farmers at a rate of around $ 1,000 a tonne, which is over seven times the world price.[16]

From 1979, Saudi Arabia started to buy domestic wheat at a high fixed price of SR 3.5 per kilogram.[17] Grain Silos and Flour Mills Corporation achieved the target of 561,000 tons per annum in third development plan period compared to 381,000 tons per annum at the end of second five-year plan.[18] Grain Silos and Flour Mills Corporation provided farmers more than $70 a ton above prevailing market prices for wheat, a factor that lead to a greater shift to wheat cultivation. Wheat subsidy has attracted both traditional and commercial producers, accounting for the dramatic rise in wheat production. By 1985, the price of domestic wheat which bought by the Saudi government was reduced to SR 2 per kilogram.[19] The total wheat production of the Kingdom of Saudi Arabia in 1985 was 1,700,000 tons, representing an astronomical rise in wheat production in the Kingdom in eight years.

Thus by 1985, Saudi Arabia exceeded its own requirements for this major globally strategic crop.[20] Two million hectares of arable land produced 1.3 million tonnes of grains in 1984, resulting in wheat self-sufficiency within the Kingdom and 300,000 tonnes of wheat exports to neighbouring states.[21] In 1984, Saudi Arabia gave Bangladesh 50,000 tons in food aid and in 1985 it started selling wheat to several Gulf States.[22] Table 6.1 explains about the estimated total crop area and production of wheat in the third five-

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[15] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215.
[16] Argus of Arab Economy (1984), *Economic Review of the Arab World*, 18:10. p. 213.
[17] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 220.
[18] Argus of Arab Economy (1980), *Economic Review of the Arab World*, 14:2. p. 42.
[19] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 220.
[20] Al-Farsy Fouad, *Modernity and Tradition: The Saudi Equation* (Kegan Paul International, London, 1990). p. 192.
[21] Argus of Arab Economy (1985), *Economic Review of the Arab World*, 19:10. p.18.
[22] Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?", *MERIP Middle East Report*, March-April, 145: 7.

year plan period. Total crop area of wheat production in 1980 was 608,652 hectares which increased to 946,359 hectares in 1985. Area of wheat production in 1980 was 67,225 hectares which increased to 587,421 hectares in 1985. The area of wheat production had increased from 11 per cent in 1980 to 62 per cent in 1985. The production of wheat had tremendously increased from 141,732 tons in 1980 to 2,134,930 tons in 1985.

Table: 6.1
Estimated Total Crop Area and Production of Wheat

Year	Total Crop Area (Hectares)	Area (Hectares)	Wheat Area (Percentage)	Production (Tons)
1980	608,652	67,225	11	141,732
1981	434,841	73,502	17	187,231
1982	574,315	134,660	23	358,121
1983	731,265	245,071	33	817,497
1984	782,695	404,079	52	1,401,644
1985	946,359	587,421	62	2,134,930

Source: Central Department of Statistics, (1983-1985) Statistical Year Book, Riyadh cited in Abdullah Al-Saleh. Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia". *The Geographical Journal*, July, 158 (2): 216.

Wheat surplus was exported to several Arab, Asian, African and European countries as well as Soviet Union and China (Ministry of Agriculture and Water, 1989).[23] Between the mid-1970 and 1985, wheat output grew more than tenfold to over 2 million tons.[24] In 1975, Saudi Arabia produced 3,000 tons of wheat.[25] In 1979, it produced 150,000 tons. In 1984, 1.3 tons of wheat was produced. Wheat production in Saudi Arabia increased from 141,732 tons in 1980 to 2,134,930 tons in 1985.[26] Increase in Saudi Arabian production of wheat from 1970 to 1985 accounted for four-fifths of the rise in the output for the entire West Asia and North Africa.[27]

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[23] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215.

[24] US Department of Agriculture, Middle East and North Africa: Situation and Outlook Report, April 1986 cited in Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?". *MERIP Middle East Report*, March-April, 145: 7.

[25] *The Middle East*, (1987), "The Greening of the Desert", January, (147): 53.

[26] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215.

[27] Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?". *MERIP Middle East Report*, March-April, 145: 7.

4.1 (c) Livestock and Poultry Production

Commercial poultry farms greatly benefited from government incentives and grew rapidly during the 1980's. Egg production also increased rapidly during the 1980's. The numbers of broiler chickens in 1984 was 143 millions and production of eggs was 1,852 millions. In early 1980's government, programmes were only partially successful in increasing domestic production of livestock and poultry. Bedouins continued to raise a large number of sheep and goats. Payments for increased flocks had not resulted in a proportionate increase of animals for slaughter. Commercial feedlots for sheep and cattle were established with modern ranches. However, by the early 1980's much of the meat consumed was imported. Livestock imports were high and modern meat production techniques were not encouraged because of detrimental effect on traditional Bedouin producers. Saudi Arabia's level of self-sufficiency in dairy products has grown from four per cent in 1980 to 14 per cent in 1985.[28]

4.1 (d) Fishery and Forestry Production

The Saudi Arabian coastline is 1,760 kilometres long on the Red Sea and 560 kilometres long on the Arabian Gulf. Although there was an abundance of fish in the coastal waters, the fishery resource has hardly been exploited so far. The annual catch was 16,000 tons, while the potential estimated by FAO was high as 300,000-500,000 tons annually.[29] Saudi Arabia's annual fish harvest was more than doubled due to the introduction on modern methods, which yield 31,000 tons a year in 1985 compared to 15,000 tons in 1975.[30] The fishing fleet was in operation on the Red Sea coast with 1,200 boats in six to eight meter range supporting 2,400 full-time fishermen. In the Gulf area, the fleet was ranging in size from eight to twenty meters and supporting about 2,000 full-time fishermen. Domestic needs of fish are from the Red Sea and the Gulf waters provided 38 per cent of the Kingdom's needs. Saudi Fisheries were established as a direct result of the emphasis on food production in the Kingdom's third five-year plan, to exploit the Gulf and Red Sea for both fish and shrimps.[31]

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[28] *The Middle East*, (1987), "The Greening of the Desert", January, (137): 28.
[29] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 141.
[30] Argus of Arab Economy (1985), *Economic Review of the Arab World*, 19:10. p. 19.
[31] *The Middle East*, (1983), "Saudi Fisheries", March, (101): 74.

The area of natural forestry in the Kingdom amounted to approximately 160,000 hectares, most of which was in the Sarwat Mountains.[32] These forests, which were extremely important to the ecology of the region, were subject to unregulated continuous cutting operation, which has seriously decreased the forestry resources. As a result, in 1978, the Council of Ministries approved a set of regulations for the protection of the Kingdom's forestry and wild life. Afforestation programmes were conducted in Ghamid region in an area 98,000 dunums with 1,552,500 trees and in Zahran region with 520,000 trees covering 35,500 dunums.[33] Forest areas were also concentrated in Almandak region, north of the country as well as in Abha, Balgurashi, Asir and Taif regions with a total area of 700,000 hectares.

4.1 (e) Water

Large quantities of water were in demand during the third five-year plan period due to expansion of irrigated agriculture in Saudi Arabia. In 1980 demand for agricultural water rose fast to less than 2 billion cubic metres per year.[34] In 1985, agricultural sector was using 7,430 million cubic meters of water.[35] The volumes of water pumped from the aquifers for irrigation was in excess of prevailing natural recharge rates that resulted in continuous decline of water levels in the aquifers.[36] The construction of flood-retention dams for recharging local alluvial aquifers at feasible locations continued unabated during the third development plan.[37]

Annual water extraction from non-renewable groundwater resources had increased more than ten folds because of the rapid expansion of agriculture and wheat production.[38] All new irrigated agricultural developments were planned and implemented, utilising water efficiently and using labour saving irrigation techniques.

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[32] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 141.
[33] Argus of Arab Economy (1980), *Economic Review of the Arab World,* 14:4. p. 36.
[34] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215.
[35] Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?", *MERIP Middle East Report*, March-April, 145: 11.
[36] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215.
[37] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 126.
[38] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 215-216.

Traditionally irrigated areas were converted to more efficient water application techniques replacing the wasteful practices of irrigation by gravity. The available conventional water supplies were increasingly diverted from the traditional irrigation sector to meet the demands for potable water in the South-western region and the Western portion of the Central region.

In the Al-Hassa and Qatif areas in the Eastern region, indiscriminate water use in the traditional irrigation sectors had caused severe reduction in the productive capacity of the soil. An early discontinuation of local ground water pumping, except for stand-by purposes in the former and an early conversion to modern irrigation and farming methods in the latter areas was planned for implementation during the third development plan period.[39] The reclamation of water from urban wastewater at seven largest cities of the Kingdom (i.e. Riyadh, Jeddah, Mecca, Medina, and Taif, Damman and Hofuf with populations over 100,000 in the 1974 census), constituted a valuable additional and economical source of water for agriculture and livestock production.

Water Conservation Measures Followed During Third Five-Year Plan Period

The water conservation measures followed during third five-year plan period in Saudi Arabia were:

1. Coinciding water utilisation with the objectives of water development in Saudi Arabia for self-sufficiency in a number of food crops.
2. Considering reduction of the area under wheat production.
3. Restricting new irrigated agriculture development in the sand dunes.
4. Shifting agricultural production to meet the demands of Riyadh population.
5. Determining and apply crop irrigation requirements (consumptive use and leaching requirement).
6. Using only modern and efficient irrigation methods.
7. Encouraging cultivation in green houses.
8. Monitoring water consumption for agricultural purposes.[40]

[39] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 126.
[40] Abdullah Al-Saleh, Mohammed (1992), "Declining Groundwater Level of the Minjur Aquifer, Tebrak Area, Saudi Arabia", *The Geographical Journal*, July, 158 (2): 222.

4.1 (f) Labour

Agriculture remained the largest sector in terms of employment with one quarter of the civil labour force to 600,000 workers. In 1981, 40 per cent of the agricultural labour force was expatriates.[41] The geographical distribution of expatriates was 55 and 23 per cent in Central and Southern region respectively. The country's continued need for foreign agricultural workers undermine the rationale of "*infant agriculture*" protection in the region. Agricultural sector employed over 60 per cent of the labour force growing at a rate of 6.6 per cent annually.[42]

The table 6.2 explains employment and GDP by sector in the non-oil economy in Saudi Arabia. Employment activity in agriculture sector contributed about 598.8 thousands in 1979-1980 which decreased to 528.8 thousands in 1984-1985. GDP contribution to agricultural sector in 1979-1980 was 3,259.4 SR million which increased to 4,229.2 SR million in 1984-1985.

Table: 6.2
Employment and GDP by Sector in the Non-Oil Economy (in 1979-1980 prices)

Economic Activity	1979-1980		1984-1985	
	Employment Thousands	GDP SR Millions	Employment Thousands	GDP SR Millions
Agriculture	598.8	3,259.4	528.8	4,229.2
Mining	7.3	1,497.5	9.8	2,387.7
Manufacturing	104.2	6,753.3	164.2	16,001.8
Utilities	31.5	350.1	47.0	1,273.0
Construction	330.1	45,994.3	245.1	40,560.5
Producing sectors	1,071.9	57,854.6	994.9	64,452.2
Excluding agriculture	473.1	54,595.2	466.1	60,223.0
Services	1,363.3	77,112.5	1,585.3	117,780.0
Government	321.0	21,036.4	421.0	29,722.1
Total	2,435.2	134,967.1	2,580.2	182,232.2

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p.93.

[41] Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?", *MERIP Middle East Report*, March-April, 145: 11.
[42] *The Middle East*, (1987), "The Greening of the Desert", January, (147): 53.

Table: 6.3
Changes in Civilian Employment in the Third Five-Year Plan Period

Economic Activity	Percent change 1979-1980 to 1984-1985	Percent Distribution	
		1979-1980	1984-1985
Agriculture	11.7	24.2	20.1
Mining	34.2	0.3	0.4
Manufacturing	57.6	4.2	6.3
Utilities	49.2	1.3	1.8
Construction	25.7	13.4	9.3
Sub total	7.2	43.4	37.9
Service	16.3	55.2	12.9
Total non-oil economy	6.0	98.6	98.2
Oil sector	27.8	1.4	1.8
Total	6.3	100.0	100.0

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p.100.

The above table explains changes in civilian employment in the third five-year plan period in Saudi Arabia. The percentage change in agriculture sector in the third five-year plan period was 11.7. The per cent distribution of agriculture sector was 24.2 per cent in 1979-1980 which decreased to 20.1 per cent in 1984-1985.

Table: 6.4
Changes in Civilian Employment (Comparison by economic activity)

Economic Activity	Employment increase (Thousands)	Annual Growth Rate (Percent)
	1980-1985	1980-1985
Agriculture	70.0	2.46
Mining	2.5	6.07
Manufacturing	60.0	9.52
Utilities	15.5	8.33
Construction	85.0	5.78
Sub total	77.0	1.48
Service	222.0	3.06
Total non-oil economy	145.0	1.16
Oil sector	10.0	5.02
Total	055.0	1.22

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p.101.

Table 6.4 explains changes in civilian employment in the third five-year plan period in Saudi Arabia. Employment increase in agriculture sector was 70.0 thousand in 1980-1985. Annual growth rate in agricultural sector was 2.46 per cent in 1980-1985.

Table: 6.5
Annual Compound Growth Rates for GDP and Productivity in the Non-Oil Economy: 1980/1985

Economic Activity	GDP (SR Millions)	Productivity	Components of Productivity	
			Employment Shifts	Cost/Price Effects
Agriculture	5.35	8.0	-NA-	-NA-
Mining	9.78	3.5	-NA-	-NA-
Manufacturing	18.83	8.5	-NA-	-NA-
Utilities	29.46	19.5	-NA-	-NA-
Construction	2.48	3.5	-NA-	-NA-
Producing sectors	2.18	3.72	1.34	5.13
Excluding agriculture	1.98	2.29	2.53	4.94
Services	8.84	5.61	1.16	4.40
Government	7.16	1.50	-NA-	5.50
Total/Average for non-oil economy	6.19	4.97	0.30	4.65

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 94.

The above table explains annual compound growth rates for GDP and productivity in the non-oil economy of the third five-year plan period in Saudi Arabia. GDP contribution to agricultural sector was 5.35 in 1980-1985. The productivity of agricultural sector in 1980-1985 was 8.0 per cent.

4.2 Third Five-Year Development Plan Programmes in Saudi Arabia

The third five-year development plan strategy gives principal emphasis to developing producing sectors. The government disbursed SR 5 billions in loans and SR 2.5 billion in subsidies to the private agricultural sector in this period.[43] Attention was also paid to improve the quality of loans and a number of projects reducing the complexity of borrowing and the time between applications and receipt of cash. The third development plan programmes incorporated the ongoing and successful second development plan projects and were concerned with both the short/medium and long-term development of a strong viable agricultural sector. Much greater emphasis was given to evaluate the national economic and social benefits of agricultural projects rather than relying on financial evaluation. During the third development plan period, 41,500 hectares were equipped with modern water and labour saving irrigation systems, of which 19,000 hectares (5,000 in the Al-Hassa Oasis and 14,000 included in agricultural plan section)

[43] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 151.

were on new lands and the remainder 22,500 hectares in traditional irrigated areas. The various projects implemented by the public and private sectors are given below.

4.2.1 Production Programmes

Production programme consisted of continuation of various projects to directly increase farm output, distribute improved seed varieties to farmers. Production programmes also included poultry and dairy producers with common processing facilities and to produce animal vaccines locally. Table 5.0 explains main projects and their production programmes that are followed during third five-year plan period in Saudi Arabia.

Table: 6.6
Main Projects and their Production Programmes

Projects	Targets/ Comments
Cereal propagation	60,000 hectares of cereal grain.
Potato propagation	2,500 hectares of potatoes.
Fruit tree improvement	3,000 hectares of fruit trees.
Date palm improvement	160 hectares of date palms.
Vegetable improvement	Demonstration greenhouses.
Poultry farmers organisations	Establish; process annually 1.3 million chickens; 75 million eggs.
Dairy farmers organisations	Establish; process annually 17,000 tons of milk.
Animal vaccine production	Laboratory for the production of one vaccine and one serum essential for Kingdom wide use.
Bee-Keeping	Distribute 4,400 beehives, mainly to fruit growers.

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. pp.151-152.

4.2.2 Land Development Programmes

Land development programme developed new land for irrigated agriculture, reclaimed existing areas and assembled the production potential of range and forest areas. The public lands distribution ordinance issued in 1968 were aimed at settling Bedouins provided for the allocation of five to ten hectare of land to individuals free of charge and allowed land grants of up to 400 hectares to companies and organisations and up to 4,000 hectares for special projects.[44] Table 6.7 explains major projects and targets of agricultural land development programmes that are followed during third five-year plan period in Saudi Arabia.

[44] Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?", *MERIP Middle East Report*, March-April. 145: 9.

Table: 6.7
Major Projects and Targets of Agricultural Land Development Programmes

Projects	Coverage
Dhamad	6,000 hectares (Improvement)
Qatif	4,500 hectares (Improvement)
Al-Jawf	1,500 hectares (Improvement)
Wadi Dawassir	10,000 hectares (Improvement)
Qassim, Northern, Eastern Regions	4,000 hectares (Improvement)
Wadi Jizan	2,500 hectares (Improvement)
Al-Aflaj	1,280 hectares (Improvement)
Al-Ghowahah	6,000 hectares (Improvement)
Dammam	700 hectares (Improvement)
Land distribution	80,000 hectares (Improvement)
Range improvement	Whole Kingdom.
Forest survey	70,000 hectares (Improvement)
Agricultural data bank	Whole Kingdom.

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 152.

4.2.3 Agricultural Research Programmes

Agricultural research programmes emphasised the adaptation of modern agricultural technology to the Kingdom. This includes major projects dealing with problems of crop and livestock production, fish and locust research, sand stabilization and land classification. The Riyadh research complex was interdependent with *Saudi Arabian National Centre for Science and Technology* (SANCST) on various agricultural and water-related problems and the work of the other agricultural research centres were concentrated particularly on regional problems. Sand stabilisation work at Al-Hassa was continued and activities were extended for the development of fresh and salt fish farms and shrimp production (under controlled), processing and marketing.

4.2.4 Extension Service Programmes

Extension service programme provided off-farm services that farmers could not provide for themselves, established new farm organisations of cooperatives, maintain and expand public park area. There were 93 extension offices spread throughout the Kingdom providing technical assistance and guidance to farmers.[45] The services of extension offices were directed mainly at achieving a higher yield and better quality agricultural production. MOAW furnished spraying equipment and pesticides to farmers free of charge. Free veterinary care was provided to interested farmers. Table 6.8 explains major

[45] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 142.

targets of agricultural service programmes that were followed during third five-year plan period in Saudi Arabia.

Table: 6.8
Major Targets of Agricultural Service Programmes

Projects	Coverage
Plant protection	24,000 hectares a year.
Locust control	Adopted for the whole Kingdom and expansion of crop dusting.
Mobile veterinary units	The range area is of 30 additional units.
Animal disease laboratories	To be established in three regions.
Agricultural information	Improved dissemination methods, including 15 mobile projection vans.
Public parks	Improve 6 existing, establish 7 new parks and rest centres.
Farmer's organisations	Assist the establishment of 10 farmer's organisations for production/ processing.
Agricultural extension	Expand the provision of improvement services for the whole Kingdom.

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p.153.

4.2.5 Agricultural Credit Programmes

The major part of the plan dealt with the disbursements of loans and subsidies. The three categories of loans disbursed were long, medium and short term.[46] The loan programmes increased the emphasis of lending to apiary and fishery industries. An additional 20 sub-branches were established in areas where services were not available to increase the regional availability of agricultural loans. The accounting departments of 29 sub-branches not recognising during the second plan period are also strengthened during the third five-year plan period. Efforts were continued to reduce the complexity of loan procedures. Particular attention was given to lowering the present high default rate and extent of loan abuse and to increase the availability of credit to small farmers. Two new projects of particular significance were providing employment to agricultural extension workers and village agents.

Saudi Arabian Agricultural Bank extended 38,886 loans totaling 1.19 billion dollars to farmers and project investors during 1982-1983 financial years, which was 42 per cent more than 1981-1982 figures of $844 million for 37,446 loans. Agricultural loans totaling SR13 billion greatly aided the Kingdom to increase wheat production from 3,000 tons in 1981 to 1,300,000 tons in 1983. Agricultural loans totaling SR13 billion

[46] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 155.

greatly aided the Kingdom in boosting the processing of meat and poultry from a combined 12,000 tons in 1970 to 206,000 tons in 1983. Prominent feature of the Kingdom's green revolution was in providing farmers interest-free loans up to an amount of $6 million.[47] The government had also extended 23,578 loans at SR709.1 million for the entire farming sector to ensure a green revolution to further strengthen the national economy. The government distributed a total of SR7.5 billion in loans and subsidies to the private agricultural sector and to farmers and introduced latest agricultural techniques in the third five-year plan period.[48] Saudi farmers received 35 to 50 per cent of subsidies for the cost of machines, fertilisers and irrigation pumps and seed supplies.

Table 6.9 explain agricultural credits and subsidy programmes that were followed during third five-year plan period in Saudi Arabia. In October 1984, Al-Hassa Agricultural Bank gave loans and subsidies to farmers, poultry breeders and dairy producers totaling SR15.8 million. In 1985, the average value of loans by the bank exceeded SR4 million.[49] The government's attractive subsidy programme included 50 per cent of the cost of fertilisers, animal feed and most agricultural equipment, 100 per cent of the cost of pesticides and 30 per cent of the cost of dairy and poultry equipment.[50] Subsidies for key agricultural projects have also provided an important incentive for businessmen to invest in agriculture.

Table: 6.9
Agricultural Credits and Subsidies (SR millions)

Year	Credits	Subsidies
1980/1981	2551	616
1981/1982	2933	979
1982/1983	4166	1321
1983/1984	3496	1023
1984/1985	2322	1378
1985/1986	1551	----

Source: Saudi Arabia Monetary Agency, Annual Reports cited in Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?", *MERIP Middle East Report*, March-April. 145: 9. The value of the Saudi Rival stood at 3.7 to the dollar in 1986.

[47] Argus of Arab Economy (1982), *Economic Review of the Arab World*, 16:4. p. 77.
[48] Ibid. p. 77.
[49] Nowshirvani, Vahid (1987), "The Yellow Brick Road: Self- Sufficiency or Self- Enrichment in Saudi Agriculture?", *MERIP Middle East Report*, March-April, 145: 8.
[50] *The Middle East*, (1983), "New Records in Agriculture", March, (101): 70.

4.2.6 Construction Programmes

The construction programmes were designed to provide new buildings for directorates and branches; storage depots and animal quarantine stations throughout the Kingdom. 10 new directorates and 25 new branches; 7 animal quarantine stations and 25 storage depots were also constructed during the third development plan period.[51] Table 7.0 explain main projects and targets for agricultural research programmes that were followed during third five-year plan period in Saudi Arabia.

Table: 7.0
Main Projects and Targets for the Agricultural Research Programmes

Projects	Targets/Comments
Riyadh Centre	Kingdom/Gulf region; research agricultural/ water problems.
Hofuf Centre	Regional crop and marketing research.
Qassim Centre	Regional crop and marketing research.
Jizan Centre	Regional crop and marketing research.
Taif Centre	Fruit and forestry specialization.
Al-Jawf Range Research Centre	New centre concentrating on range improvement.
Locust control	Kingdom-wide continuous research/control.
Fish research	Fishery research; establish fish farms.
Machinery testing	Approval/ recommendations for the use of agricultural machinery suitable for the Kingdom.
Animal resources survey	Establish reliable, Kingdom-wide data for policy analysis.
Land classification	550,000 hectares to be classified.
Eastern sand stabilization	3,000 hectares
Al-Hassa sand stabilisation	4,000 hectares

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. pp.153-154.

4.2.7 Economic Studies Programmes

Economic studies programme involved improving the sector's database, processing and policy analysis, subsidies, pricing, marketing, agro-industry in Saudi Arabia.[52]

Table: 7.1
Main Project Areas and Targets for the Economic Studies Programmes

Projects	Targets/Comments
Subsidies	Comprehensive review; administration of subsidies.
Current statistics	Regular sample surveys of agricultural production.
Comprehensive census	Complete enumeration of all agricultural holdings in the Kingdom.
Fresh produce prices	Regular survey/analysis of prices.
Economic studies	Selected marketing, supply/demand studies, project analysis, review of agro-industry potential.
Computer services	Expansion of capability to handle new data and analysis demands.

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p.154.

[51] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 151.
[52] Ibid. p. 154.

It also includes data processing, guiding public and private sector investment in the agricultural sector. Table 7.0 explains the main project areas and targets for the economic studies programmes that were followed during third five-year plan period in Saudi Arabia.

4.2.8 Agricultural Production Incentives Programmes

The government actively supported increased agricultural production by providing many incentives, which are extended equally to traditional and commercial producers, as well as to agricultural firms of both Saudi and non-Saudis.[53] Table 7.2 explains incentives to agricultural productions followed during third five-year plan period in Saudi Arabia.

Table: 7.2
Incentives for Agricultural Production

Type	Amount	Source
Production input		
Fertiliser	50% of cost	MOAW
Animal feed	50% of cost	SAAB
Potato seed	5 tons free, SR 1,000/tons thereafter up to 15 tons.	MOAW
Machinery and equipment		
Poultry equipment	30% of cost	SAAB
Dairy equipment	30% of cost	SAAB
Engines and pumps	50% of cost	SAAB
Fish trawlers	Variable conditions	SAAB
Air transportation of cows	100% of cost	SAAB
Output		
Wheat	SR 3.50/kg (Purchase as on 1978-1979)	GSFMA
Rice	0.30/kg	MOAW
Corn	0.25/kg	MOAW
Millet/barley	0.15/kg	MOAW
Dates	0.25/kg	MOAW
Date palms planted	50.00/tree	MOAW
Agricultural credit	Variable conditions	SAAB
Agro-industrial credit	Variable conditions	SIDF
Land acquisition	Free	MOAW

Source: Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 143.

4.2.9 Support Programmes

The support programmes dealt with training, labour development and costs of foreign experts and advisors. Three new training centres were added during 1980/1981.

[53] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 142.

Specialised institutional training through extension services and demonstration were also provided for 3,731 trainees during the third development plan period.[54]

Some of the other support programmes for agricultural development were:

1. The *Al-Hassa Irrigation and Drainage Authority* as the first fully independent government agency in agricultural water supply which supported agricultural extension services to the local farming community. It also produced and delivered water to the farm inlet gate, ensured the safe disposal of excess water from its collection points to the farms by means of drainage facilities.
2. Riyadh's *National Agriculture Development Company* (NADEC) was the Saudi Arabia's first joint-stock farm company involving large-scale agricultural development programmes.[55]
3. Private sector constituted the water consuming public; agricultural and livestock operation and industrial enterprise to maximise the efficient use of water delivered or produced on-site through user techniques; re-use of water with and without in-plant treatment; to abide by the conservation regulations imposed and permits granted by the government.[56]
4. Masstock, an Irish-based farming company and Saudi landowners have developed desert farming to compete with production levels throughout the world.[57]
5. *National Water Plan* organised the activities of implementing and operating government agencies and of water-consuming private sector. It also involved activities like compiling an inventory and projection of available conventional water resources including recycled sewage and industrial wastewater; environmental and socio-economic impacts of water use and disposal; legal aspects governed by Islamic Law; monitoring water extraction and compliance with water use and disposal regulations and the institutional arrangements necessary for enforcing the *National Water Plan.*[58]

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[54] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 154.
[55] Argus of Arab Economy (1984), *Economic Review of the Arab World,* 18:9. p. 193.
[56] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 129.
[57] *The Middle East,* (1987), "The Greening of the Desert", January, (147): 53.
[58] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 130.

4.3 Major Development Projects during the Third Development Plan Period

The government of Saudi Arabia has taken several steps in developing projects during the third development plan period. In 1981, Ministry of Agriculture and Water granted licenses for five wheat projects and poultry farms at SR132 million. Ministry of Agriculture and Water had approved the establishment of agricultural and animal husbandry projects at a total cost of SR90.5 million in 1981. A cattle breeding in Kharj at the cost of SR3.1 million producing 12,000 head of cattle was also established in 1981. A SR407 million sheep husbandry farm was established in 1981 with a capacity of 2,500 heads of sheep a year in the Sirr area. Poultry farms were also built in the Qassim area at a cost of SR70.6 million in 1981.

Ministry of Agriculture and Water in 1981 had approved licenses for establishing five agricultural projects at a total cost of SR38.98 million which involved greenhouses for producing vegetables in Al-Kharj area with annual production of 2,544 tons of vegetables and another in Hail at a cost of SR3 million producing 150 tons of cucumbers and 150 tons of tomatoes.[59] A dairy project was set up in Hail at a cost of more than SR48.6 million, to produce an average of 3.17 million litres of milk annually in 1981. In Kharj for production of eggs a SR4.7 million project was set up yielding 11.6 million eggs annually. In Dhara 576,000, chickens were produced annually at a cost of SR4.4 million.

The Ministry of Agriculture and Water licensed agricultural and livestock projects worth SR26324 million in various areas. SR40712 million projects in Qassim province was done for the production of 550 tons of wheat and 1,250 tons of grass. SR5969 million projects in Tabuk provided for producing 540 tons of wheat and 1,575 tons of animal fodder. SR4947 million livestock-breeding projects in Medina produced 47,040 heads of sheep. SR40958 million projects in Tabuk produced 11 million eggs annually. SR5736 million projects in the Western province produced 36,000 heads of cattle every year.

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[59] Argus of Arab Economy (1981), *Economic Review of the Arab World,* 15:4. p.196.

The Ministry of Agriculture and Water approved five agricultural projects costing SR35147 million to produce wheat and fodder. A SR6587 million project was established in Tabuk to produce a capacity of 272 tons of wheat and 9,336 tons of fodder. SR5286 million projects in Kharj produced 580 tons of wheat and 870 tons of fodder. SR14176 million projects at Al-Quwaiiya yielded 1,250 tons of whet and 4,000 tons of fodder. SR944 million projects in Tabuk produced 600 tons of wheat and 7,500 tons of fodder. SR3722 million projects in Kharj produced 550 tons of wheat and 785 tons of fodder. SR4933 million projects in Tabuk produced 508 tons of wheat and 508 tons of fodder.

In 1984 Minister of Agriculture and Water approved a number of agricultural projects in different parts of the Kingdom at the total cost of more than SR26.5 million. The first project included SR4.6 million sheep-fattening projects at Muzahimia for 24,000 heads annually. Second project included production of 850 tonnes of vegetables annually in green houses at Amariah costing SR11.4 million. The third project produced 620 tonnes of wheat and 3600 tonnes of green fodder annually at Qassim region costing SR5.6 million. The fourth project involved production of 360 tonnes of wheat and 3365 tonnes of fodder annually in Quwaiiya costing SR 5.2 million financed by the agricultural bank.

The agricultural projects costing SR47.63 million included 36 million units annually for the production of eggs in Kharj costing SR13.26 million. A green house vegetable project in the Eastern province with SR13 million giving annual return of 240 tons of tomatoes and 960 tons of cucumber was established. Egg project in Asir produced 11 million eggs annually costing SR4.46 million. In Al-Hassa for breeding of 501,120 chickens annually costing SR428 million was produced, and in Qassim 945,564 chickens was produced annually costing SR8.58 million. Baha Agriculture and Water expanded the forest nursery in Biljirshi by introducing improvements in Mindaq nursery, establishing a nursery for pastoral plants in Aqiq and expanded natural forests in the Baha region by mean of afforestation programme.[60]

[60] Argus of Arab Economy (1982), *Economic Review of the Arab World,* 16:2. p. 36.

As a part of the efforts to optimise water and land utilisation, MOAW has embarked several other ambitious projects like

1. In Wadi Jizan project, construction of a large dam was completed to provide irrigation water for 6,000 hectares.
2. In Tehama project, study was completed for Wadi Bisha and Wadi Haly for optimum utilisation of water resources and increasing cultivable land.
3. In Al-Hassa project, the *Al-Hassa Irrigation and Drainage Authority* managed large irrigation and drainage system for 20,000 hectares in the Eastern Region. Over 3,000 hectares was reclaimed and water was available for 10,000 hectares of winter crops and 8,000 hectares of summer crops in this region.
4. In Haradh project, reclamation was intended to encourage Bedouin settlement with the construction of 50 wells and reclamation of 4,000 hectares were managed further for milk and fodder production by a new company with 25 per cent participation by the Government.
5. In Wadi Najran project a dam was constructed for flood control and irrigation purposes.[61]

CONCLUSION

In the third five-year development plan period, Saudi economy was in a transitional stage of development emerging from a construction-base economy into a more solid, production-based growth economy. At the beginning of the third five-year development plan, the government had adopted a policy of concentration on expanding the arable areas through intensive guidance of various programmes to increase the productivity of existing farm lands and emphasis was given more on production of wheat, potatoes and dates.

The dramatic change in Saudi Arabia's economic development was due to the sudden and large inflow of revenues from crude oil exports along with the quadrupling of oil prices from 1973 oil boom. The government policies during the period were to support agriculture at every stage. Thus, the farmers were given free arable lands, long-

[61] Third Development Plan (1980-1985), Kingdom of Saudi Arabia, Ministry of Planning. p. 144.

term interest free loans to purchase seeds, machinery, fertilisers and so on. At the end of the agricultural cycle, the government guaranteed "buyback" of the hundred percent of the produce at a premium price.

Conscious efforts were made to integrate agriculture into the overall economic system by building forward and backward linkages with the industry. Local manufacturing of fertilisers, pesticides and agricultural implements represented the backward linkage, while meat-processing, dairy products, packing and preservation of fruits and vegetables represented the forward linkage. In addition, various programmes were instituted to expand arable areas, improve utilisation, conservation and management of water, encourage modern inputs and preserve forest, marine and wildlife resources and so on. Farming co-operatives were formed and farmers were advised on crop selection, water saving methods and lowering costs.

The main objective of agricultural development in Saudi Arabia during the third five-year plan period was to establish and maintain a level of self-sufficiency in food production and to optimise the use of water resources. The share of agriculture in the overall GDP decreased from 5.8 per cent in 1979-1980 to 5.1 per cent in 1984-1985. The productivity and GDP contribution to the agricultural sector was 5.35 and 8.0 per cent in 1980-1985. Compared to the agricultural sector, other sectors like oil, service and construction showed drastic reduction from 1979 to 1985. Agriculture sector contribution to non-oil GDP was still less with 2.11 per cent in 1979-1980, but it increased rapidly to 2.32 per cent in 1984-1985. The annual compound growth per year of agricultural sector during this period was 5.35 per cent which had reduced from 5.40 per cent per year in the second five-year plan period. Annual growth rate in agriculture sector was 2.46 per cent in 1980-1985.

Labour is by far the most important major source of power in crop production followed by draught animals. The percentage of total labour force in 1980 and 1985 was 48 and 44 respectively. The growth rate of agricultural labour force in 1980-1985 was 2.3 per cent. Employment activity in agriculture sector decreased during 1979 to 1985. The

distribution of changes in civilian employment of agriculture sector decreased from 24.2 per cent in 1979-1980 to 20.1 in 1984-1985. Growth of employment in agricultural sector was 70.0 thousand in 1980-1985.

Saudi Arabian government has spent vast sums of its oil wealth on price supports, grants, input subsidies and interest-free credit for the agriculture sector, which grew at an unprecedented average annual rate of 8 per cent. The Kingdom's agricultural and animal resources sectors witnessed gigantic development during 1981-1982 with large-scale projects implemented to increase the arable land, boosting irrigation and achieve self-sufficiency in major food items. Saudi Arabia has achieved self-sufficiency in grain and corn production through scientific planning and continuous support by the government. Subsidies on imported fed grains have undermined the cultivation of coarse grains, which were the mainstay of peasant farming in the southern region.

Growth rate of total agricultural demand in 1970-1980 and 1980-1985 and 1961-1985 was 14.3, 11.7 and 11.7 per cent per year respectively. Growth rate of total agricultural production in 1970-1980 and 1980-1985 and 1961-1985 was 5.1, 20.8 and 7.2 per cent per year respectively. The self-sufficiency ratio of agricultural production in 1979-1981 and 1983-1985 was 25 and 32 per cent. Growth rate of total agricultural exports in 1980-1985 and 1961-1985 was -3.8 and 14.6 per cent per year. Growth rate of total agricultural imports in 1980-1985 and 1961-1985 was 6.0 and 13.3 per cent per year. There was no export share of agriculture in total economy in 1969-1971 and 1983-1985 respectively. The import share of agriculture in total economy in 1969-1971, 1983-1985 was 30 and 14 per cent respectively.

The share of agriculture in total GDP in 1980 was 1.2 per cent. The calorie per caput per day in the period 1983-1985 was 3092. The total cereal production in 1983-1985 was 4295 thousand tonnes. The total demand and production of cereals in 1983-1985 was 1373 thousand tonnes. The growth of total demand and production of cereals in 1970-1985 was 11.8 per cent per year. The net trade of cereal production in 1983-1985 was -5703 thousand tonnes. The self-sufficiency ratio (SSR) of cereal production in

1983-1985 was 18 per cent. The demand for fresh meat, fish, poultry, eggs, oil, fat, beverages, frozen material, dairy products, dates and melons increased drastically from 1980 to 1985. But the demand of the flour products decreased from 1980 to 1985.

The wheat production area was increased from 1980 to 1985 with tremendous increase in production. Government put the wheat price support programme into effect in 1979 setting the original purchase price at SR3500 per ton, about six times the world market price. Government lowered the support price of wheat to SR2000 in 1984 (with guarantees to maintain until 1989). Wheat production continued to climb up and the government imposed delivery quotas on the largest produces. High wheat subsidy had produced intense development of arable farming, leaving other important areas of agriculture relatively undeveloped. In 1983, the government brought back hundred per cent of farm produce at more than six times the world market price. Wheat production was expanding rapidly because of the government policy to buy at advantageous price all the wheat offered for sale, which placed large demands on the water resources in the Minjur Aquifer, resulting in an imbalance between water recharge and water discharge.

In this chapter it can be concluded that Saudi Arabia's agricultural sector improved by attaining self-sufficiency in some of the agricultural products and exporting some of the products. However, as the arid country does not support agriculture it has to depend mostly on water resources for the production of the crop, as there is less available water, and thereby creating a barrier to further agricultural production.

SPECIAL AGRICULTURAL PROGRAMMES IN SAUDI ARABIA

Development Programmes for Bedouin Population

Problems Facing Development of Agriculture in Saudi Arabia

CONCLUSION

CHAPTER-V

CONCLUSION

CONCLUSION

This chapter restates the problem briefly and summarizes the main findings. The study examines Saudi Arabian policies and implications of five-year development plans and analyses the feasibility of agricultural development in Saudi Arabia. The study also scrutinises its agricultural policies during the decade of the peak of its oil-generated affluence and traces the developmental phases of Saudi agriculture during the modern period, especially from 1976 to 1985.

The Kingdom of Saudi Arabia has achieved mammoth agricultural development, surmounting the difficulties of scarce rain, meager subterranean water, limited local manpower and widely dispersed cultivatable lands. The agricultural sector has achieved a complete revolution by applying state of the art scientific technology to farming methods, irrigation and fishing resources. This unique revolution stemmed from a clear notion of concentrating on agricultural self-development. Saudi government chose the course of expensive agricultural development for an arid country despite its persistent and large budget deficits during the 1980's.

Saudi agriculture has shown rapid growth in agricultural production over the last several years by encouraging private investment in projects that use modern irrigation with minimal water use, protecting the environment from pollution and preserving natural resources. The country has become self-sufficient in wheat, dates and other agricultural products. The State drew policies and set aims, supported and guided the public and private sector and implemented all stages of productive operation. The current policy of the Saudi government reflects its heightened concern with efficiency. This strategy is manifested in encouraging local farmers to diversify their production away from water-intensive crops, into the cultivation of alfalfa, dates, corn, rice, millet, fruits and vegetables. Local farmers are increasingly diversifying their production with modern methods of irrigation, including axial irrigation successfully for the production of vegetables.

The principal resources of the country were agricultural produce and petroleum but greater proportion of the population followed a traditional way of life based on nomadic pastoralism or oasis agriculture which played a key role in the history of the Saudi population. Although oil is the basis of Saudi Arabia's current wealth, agriculture is a key area of development and the country's economic growth was based entirely on exploitation of its oil resources. As the main economic development phase of the country began in 1960's, it had direct and immediate control of its income flow and major decisions affecting its economic life. The escalation of oil prices in the mid 1970 has played a major role in making Saudi Arabia diversify its economy.

The dramatic change in its economic development between 1975 and 1985 resulted from the sudden and large inflow of revenues from crude oil exports along with the quadrupling of oil prices from 1973 oil boom. The major motivating factors for the agricultural development in Saudi Arabia are conscious decision to diversify the economy, attaining self-sufficiency in agriculture and settle the nomadic Bedouin populations. The great transformation from a traditional to a modern agricultural system makes the farmers and herders achieve a higher standard of living and decrease the country's dependence on the imported agricultural products.

The factors that led to a decline in nomadic pastoralism are decreased importance of the camel as a means of transportation and because of rapid deterioration in rangelands in most areas by overgrazing, increasing crop production, lack of immediate access to social, educational and other services and significant migration to urban areas due to employment opportunities in the cities. Apart from lack of water, the major constraint on Saudi agriculture is shortage of labour, as the population is drawn away from rural areas by the attractions of urban development and most farm workers are expatriates. Lack of trained and skilled agrarian labour force hindered the introduction of modern machinery and management.

Low priority was given to agriculture in Saudi development till late 1970's, mainly because of the Kingdom's limited experience in agriculture and greater long-term potential of industrial development. A number of minor agricultural development projects existed in 1960's, but with the rise of oil revenues in 1973, the government has spent vast sums of its oil wealth on price supports, grants, input subsidies; increased its attention and allocations through land reclamation, distribution of imported seeds at low cost, interest-free credits, introduction of knowledge and technique of modern farming practices. These paved way for the unprecedented growth in average annual rate of production in agriculture sector.

From the first five-year development plan onwards, Saudi Arabia has been allocating huge investment in all non-oil sectors. Agricultural development is given priority with many projects and programmes to meet the demand of the population and make great progress in achieving self-sufficiency in food production. During the 1970's and 1980's, the government undertook a massive restructuring of the agricultural sector by mobilising substantial financial resources to support raising crops and livestock.

During the third five-year plan period, the government adopted a policy of concentration on expanding the arable areas through intensive guidance of various programmes. These included giving free arable lands and long-term interest free loans to farmers to purchase seeds, machinery, fertilisers to increase the productivity of existing farm lands. Emphasis was given more to achieve self-sufficiency in the production of wheat, potatoes and dates by allocating more resources. Under the five-year development plans, the government continued to assist new farmers in implementing capital-intensive projects with special emphasis on diversification and greater efficiency.

At the end of the agricultural cycle, the government guaranteed "buyback" of hundred per cent of produce at the premium price. Conscious efforts were made to integrate agriculture into the overall economic system by building forward and backward linkages with industrial sector. Local manufacturing of fertilisers, pesticides and agricultural implements represented the backward linkage, while meat-processing, dairy

products, packing and preservation of fruits and vegetables represented the forward linkage. Saudi Arabia allocated substantial financial resources for improving transport facilities connecting areas of produce with consumer markets to encourage private investment in the agricultural sector. The government provided various programmes to improve utilisation, conservation and management of water in the wells by facilitating the seepage of surface water through the soil, encouraging modern inputs, preserving forest, marine and wildlife resources and regulating the life of the grazing grounds by appointing specific dates for grazing and rotating it among the various regions. Other steps by the government included increasing the area of pasture lands by the sowing of big quantities of fodder and stabilising shifting sand dunes. Farming co-operatives were formed and farmers were advised on crop selection, water saving methods and lowering costs.

As agriculture is so dependent on scarce water resources, it has to be efficiently tapped from its sources and carefully preserved. Much water was wasted due to lack of knowledge about water requirements for different crops in different environments and no modern dams and reservoirs existed. The amount of water that was sufficient for the agricultural development of the Saudi population required immense efforts and vast expenditure for discovery and utilisation. Saudi agriculture consumed more non-renewable water reserves for growing cereals, alfalfa, meat and milk in the forbidding sun of the Arabian Desert. The fossil-water aquifers, which underlie about two-thirds of the Kingdom, are vital for long term survival. They already serve agricultural, industrial and domestic purposes.

The small size of farms, the use of traditional agricultural methods by the majority of farmers and a lack of adequate transportation facilities between producing areas and the markets limit much of the agricultural production to the subsistence level. The agricultural education runs parallel with the rapid development and expansion of agricultural productivity. The level of education among farmers is very low and until the training of farmers is improved it is most likely that increasing mechanization will have little effect on output. However, for the entire production process considered, the import of fertilisers, equipment and labour have made the kingdom even more dependent on

foreign inputs to bring food to the average Saudi household. The key elements of development strategies in Saudi five-year agricultural development plans were diversification of economic base through emphasis on increasing agricultural production and laying the foundation of economic self-sufficiency in the future as a precautionary measure against the gradual depletion of oil, when revenues and foreign exchange from oil may decline.

Because of the oil-fuelled economic boom, increasing numbers of farmers and nomads are attracted by higher economic rewards and living conditions in relation to agriculture. The farmers and ranchers who remained in agriculture plus investors in large-scale poultry and dairy enterprises who were attracted by subsidy payments and investment incentives attained growth in the agricultural sector. The regional projects and existing agriculture and livestock raising were supported by coordinated research programmes and extension services designed to increase domestic production of cereals (wheat, barley, and sorghum), livestock, vegetables and fruit.

Saudi Arabia has made some progress in realising the long-held objective of achieving self-sufficiency in food production. Saudi Arabia's agricultural development is one of the major accomplishments of modern agriculture in West Asia. Concerning self-sufficiency, the Kingdom produced a sufficient surplus to export limited quantities of food. Today, the agricultural sector employs a significant number of people and utilises the latest techniques to produce a variety of goods, stocking shelves in stores in Saudi Arabia and exporting excess supplies to countries across the globe. The training of skilled personnel in agriculture has not been carried out on a significant scale mainly because incentives for following agricultural careers are not enough to overcome the hardships; commercial agriculture does not yet offer many opportunities for skilled agriculturalists and training institutions have not yet been established in rural areas.

The Kingdom's most dramatic agricultural accomplishment, noted worldwide, was its rapid transformation from importer to exporter of wheat. By 1984, it had become self-sufficient in wheat. Shortly thereafter, Saudi Arabia began exporting wheat to some

thirty countries, including China and the former Soviet Union. In addition, Saudi farmers grew substantial amounts of other grains such as barley, sorghum and millet. Today, in the interest of preserving precious water resources, production of wheat and other grains has been considerably reduced.

Under current international prices of agricultural crops, had Saudi Arabia not subsidised desert irrigation, the cost of growing unsubsidised agricultural crops would have been much higher than the market prices for similar imports. This could have led capital funds to be deployed away from loss making desert irrigation schemes into rewarding industries, provided that there were no protective tariffs in favour of local produce. Saudi Arabia is usually pictured as a country which is capable of progressing in the domains of mineral resources, industry, education, health, communications, economy and defence, but is unlikely to advance in the field of agriculture because cultivable lands are scarce and even more scarce are its water resources. Financial pressures forced the Saudi government into a policy reversal on subsidising wheat and barley beyond the country's domestic needs.

It is a lamentable fact that food production in the West Asian countries has not been keeping pace with population growth. The importance of food production in the West Asian countries cannot be over emphasized. As long as the rate of population growth exceeds the rate of increase in agricultural production, the population of the area will continue to be dependent upon the importation of food. The threat of food shortages in the 1970s and balance of payments problems and debt crises of the 1980s have led to policy reforms which recognise the essential role of agriculture in economic growth.

One inescapable conclusion drawn from any objective study of West Asian agriculture is that the peasants are imprisoned within the walls of their own agricultural system: year by year their numbers grow and the walls remain unchanged. The difficulties in attempting to break it are great. Except in areas where irrigation is possible, climatic conditions rule out any system of agriculture like the one now practised in climates with a well-distributed rainfall.

After 1985, as the arid country does not support agriculture and water resources also scarce the country has withdrawn its support to agricultural development and started importing agricultural related products to meet their demands. More threatening in the future is the inevitable consequence of continuing the extraction of the country's non-renewable water reserves at the present levels. Accurate reserves estimates of groundwater are at best challenging. Regardless of how vast the Saudi's non-renewable water reserves might be, extraction will sooner or later, deplete the aquifers; thus forcing the abandonment of desert agriculture altogether. Natural springs which discharge many aquifers have dried up in most parts of the Western, Central and Eastern regions along with seawater intrusion in areas of the East Coast. As a result of poor quality sanitary and drainage systems and the unmonitored use of inorganic fertilisers and pesticides, the quality of water in most aquifers has become brackish.

The cost of Saudi agricultural policies in terms of water consumption was gigantic. During the past twenty years, over extraction from "renewable" water sources has turned the balance in the aquifers into negative as water extraction has been greater than rainfall. If over extraction continues it will cause water levels to go down. These will increase salinity and amounts of degrading minerals in the water. Partially renewable aquifers extraction will lead to deterioration in the water quality and gradual depletion. Unless water extraction is reduced to the level of water sources, these aquifers will eventually run dry.

Sustained food independence in Saudi Arabia's is impossible to achieve because of high rate of population growth. The government is countering the drift to the towns by improving rural facilities, but the future of Saudi agriculture must lie in capital-intensive, water-efficient farming. Although successful in raising massive output of several important crops and foodstuffs through the introduction of modern agricultural techniques, the agricultural development programmes has not entirely met the objectives of raising the level of productivity in agriculture.

Future Prospects of Development Plans in Saudi Arabian Agriculture

As agricultural sector in Saudi Arabia is productive and fast expanding economic sector, the government has taken several measures to improve the techniques adopted with latest developments that are followed in other countries. Some of the future prospects of development plans in Saudi Arabian agriculture are

1. Diversifying the economic base, raising income levels and improving rural living standards for both settled and nomadic communities.
2. Establishing a comprehensive industry for the storage of grains, production of flour and forage.
3. Introducing other food processing activities related to grains.
4. Purchasing grains and maintaining adequate reserves in case of emergency.
5. Shifting some of the fodder and cereals areas from high water consumption zones to lower water consumption zones and cultivating crops of lower water requirements.
6. Providing more financial assistance to farmers and achieving self-sufficient.
7. Developing better water management techniques to store water even in the absence of available water resources.
8. Implementing the effective irrigation schedules at farm level by delivering irrigation water according to actual crop need.
9. Implementing additional water harvest and diversion systems to prevent loss from floods and to salvage water for useful purposes in rainfed areas.
10. Introducing water meters at farm level by controlling pumping water.
11. Marketing the products at home and abroad.
12. Giving priority to development activities like agricultural services, research and expansion, land improvement, marketing, forestation, agricultural credit, farm management and equipment servicing.
13. Expanding education and training in agriculture to farmers to cope with the requirements, needs of the Saudi labour market and the modern development.
14. Inducing large-scale mechanised agriculture by structural change in the economy.

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