

7.4 Distribution and Agricultural Produce Processing

7.4.1 Distribution

(1) Development Target

One of the problems in the distribution structure in Oman is the fact that the price regulation system does not function well enough to reflect the balance of supply and demand.

Wholesale markets would allow the system to work in a more balanced fashion. Thus the establishment of properly-functioning wholesale markets is essential for the distribution policy in Oman.

Secondly, farmer-level organization for collection and delivery has not been adequately developed in Oman. Farmer-level shippers deliver one product after another without considering the demand, which results in low profitability. Systematic collection and shipment is required.

Thirdly, statistical information for adjusting the relationship between demand and consumption has not been satisfactorily collected and collated; although some data are available such as the statistics on production of agricultural produce from MAF and trade statistics on agricultural produce from ROP.

Accordingly, statistical information which will clarify the present situation with regard to production, distribution and consumption is urgently required. Based on this information, the future demand for agricultural produce would be forecast. It is imperative to produce a stable supply of agricultural produce by referring to the planted crops and their areas.

(2) Development Strategy

(a) Establishment of the wholesale market

The wholesale market should be established gradually, through

the expansion and/or, reorganization of the existing system and its functions, without affecting the present distribution structure.

(i) 1st Stage: To conduct a feasibility study and expand the distribution volume of PAMAP.

(ii) 2nd Stage: To establish a pilot wholesale market through PAMAP.

(iii) 3rd Stage: To construct and operate central wholesale markets and to construct local wholesale markets on a step by step basis.

(b) Measures for adjustment of the supply and demand relationship

There are two ways to adjust farmers' shipments so that they correspond to fluctuations in demand. One way is to have farmers adjust shipment by themselves. The other is to have the government appoint specific agricultural produce which should be supplied in a stable manner, and impose shipping obligations on farmers.

A program for stabilizing shipments of agricultural produce in cases of marked price drops and increases is urgently required. However, measures mentioned above require adequate basic data regarding agricultural production, distribution and consumption before they can be implemented.

A survey for basic data such as agricultural production distribution and consumption is thus essential for the formulation of both of the projects mentioned above.

(c) Promotion of distribution efficiency

The promotion of distribution efficiency refers to timely delivery of agricultural produce from the farm to consumers through such activities as storage, transportation and distribution, paying particular attention to time, place, quality and cost of agricultural produce. Specifically:

(i) Storage:	Refrigerated storage
(ii) Transportation:	Refrigerator cars, Cold-chain system
(iii) Distribution techniques:	Grading, Packing
(iv) Facilities development:	Efficient arrangement of collection centers

7.4.2 Agricultural Produce Processing

At present, MAF is studying several plans for a complex processing factory for dates, limes and tomatoes, factories for pickled vegetables and fruits, and dry dates, and processing factories for coconuts. The following points ought to be taken into consideration while carrying out the study:

- (1) Stable and economical supply of agricultural produce for the necessary raw materials.
- (2) Maintenance of high operation efficiency of the factory by the introduction of a combined processing system for multiple products.
- (3) Training of technicians and workers in the agro-processing industry, which requires the introduction of new technology and facilities.
- (4) Government financial, institutional and human support during the initial operation period.

The development of agricultural produce processing should be considered from the view point that the sector will contribute to rural development through diversifying rural industries and creating job opportunities.

7.5 Subsidy Institution

7.5.1 Price policy

A price support policy is not in place at present in Oman. PAMAP determines the buying and selling prices by observing trends in market prices. There is a negative margin between PAMAP's buying and selling prices. This negative margin is subsidized by the government.

According to data from 1988, the selling prices of agricultural produce at the farmgate are higher than production costs, except for some crops. Therefore, it is probably not necessary to institute a price support policy at this stage. However, it is difficult to draw final conclusions concerning its necessity due to the lack of adequate data.

A study on price support policy will be required after collecting the necessary data.

7.5.2 Trade policy

PAMAP has issued import licenses for agricultural produce since 1987. However, this is not a strict protective trade measure at the border so much as a restriction of imported volume, based on the supply-demand balance determined by the analysis of trends of domestic production and consumption of the agricultural produce.

Provided that agricultural production increases and the distribution volume increases accordingly, the adjustment of the supply-demand ratio for agricultural produce, including imported products, is essential for the promotion of well balanced agricultural development.

The present import license system and tariff policies should be maintained for the time being. Reviews of trade policies by which both agricultural production and farmer income increases are evaluated should be conducted whenever necessary.

7.5.3 Financial and Subsidization Policy

The subsidy for agricultural inputs for small-scale farmers will be continued to reduce production costs. This could also be used as an incentive for farmers in order to improve production of specific crops which the government intends to promote in response to the changes in demand for agricultural produce. However it is necessary to decrease the subsidy rate gradually to zero within a specified period, except for agricultural machinery, in order to promote self-reliance of farmers.

In the mean time, it is desirable to conduct a study on a subsidy method for agricultural output, which should reflect the present conditions of agriculture in Oman, while collecting accurate basic data.

Subsidy rates are considered as follows:

- (1) Introduction of new farm technology: 100%

Strong demonstration impact and promotion of extension; however, risks are large.

- (2) Urgent programs with high government policy priority: 100%.

- (3) Subsidy to lowest income farmers: 100%.

- (4) National plant protection: 100%.

Particularly in the case of locust, whitefly, etc. which need to be controlled on a nation-wide scale.

- (5) Programs leading to development of farmer private assets: average 50% (25-75%).

OBAF loans are to be extended as follows:

- (1) To fund the balance not covered by subsidy for programs leading to development of farmer private assets

(2) To fund the balance not covered by government outlay in the case of projects to develop the private sector (processing of agricultural products, etc.).

CHAPTER 8

10-YEAR AGRICULTURAL DEVELOPMENT PLAN

CHAPTER 8 10-Year Agricultural Development Plan

8.1 Development Investment in Agriculture

(1) Current Government Investment in the Agricultural Sector

Investment by the government in agriculture in 1988 was 1.8 % of the total government investment. Although roughly the same as that targeted at the manufacturing sector (1.7 %), it is low in comparison to that invested in petroleum (21.0 %) and natural gas (6.2 %).

In terms of infrastructure as well, less emphasis was placed on the agricultural sector. Outlay for irrigation and water resources facilities was only 1.3 % of the total government investment, as compared with 6.0 % for municipal services, 5.7 % for roads and 4.7 % for various educational infrastructures.

Nevertheless, priority of outlay for the agricultural sector has remained low. In the Third Five-year Development Plan beginning in 1986, the government budget allocated to the sector is R.O. 76.4 million, only 3.6 % of the total. Given the fact that almost half the labor force of Omani nationality is engaged in agriculture, and that more than half of the total population resides in rural areas, it will be necessary in the future to accord increased priority on investment to this important sector.

(2) Investment Efficiency in the Agricultural Sector

An indicator of capital efficiency is the cost output ratio (COR) expressed as K/Y (K: capital, Y: output). However, the incremental cost output ratio (ICOR) is more conventionally applied due to the difficulty in evaluating K.

The JICA team estimates the 3-year moving average in Oman for ICOR for the period 1979-1985 to be 5.0-2.6 for the economy as a whole, and specifically 15.8-1.5 for the mining sector, 2.7-0.9 for the manufacturing sector, and 7.8-2.5 for the agricultural sector.

Although unavailability of complete data places a limit on the reliability of calculations, ICORs for all sectors appear to exhibit high values at the start of the 1980's, with a subsequent drop. This evidences an increase in investment efficiency with the passage of time.

However, in the case of the agricultural sector alone, it is possible that ICOR in the estimated period is the result of lesser investment in the sector, and the biased investment to relatively profitable areas of the sector. Consequently, the comparatively low ICOR for the agricultural sector is regarded here as strictly for reference.

Also, investment in physical infrastructure in the agricultural sector has commenced only recently, and as future investment in the sector increases with outlay directed at less efficient sub-sectors as well, the depressed ICOR value can be expected to rise.

(3) Investment Efficiency in the 10-year Agricultural Development Plan

In formulating the 10-year Agricultural Development Plan, it will be necessary to propose the scale of development investment to be allocated by the government. To achieve this, the ICOR for the agricultural sector is assumed and the GDP increment forecast. On this basis, the necessary total investment is estimated.

Necessary public investment during the two 5-year periods based on ICOR and GDP increments for 1990-1995 and 1995-2000 are calculated as shown in Table 8.1.1. For comparative purposes, investment amounts applying ICOR of 4, 6 and 10 are also computed.

It can be seen that R.O. 350 million is the appropriate value for government investment to achieve implementation of the 10-year Agricultural Development Plan where ICOR is 8 in the first five years. This is to decrease by 20 % in the subsequent 5-year period (a note of caution is recommended, however, regarding the above, as calculations are out of necessity based on certain hypothetical conditions, the fluctuations of any of which will subsequently raise or lower to some

degree the suspect figures).

In addition to cost effectiveness, the following criteria must also be considered in establishing the amount of agricultural investment:

- (a) Agricultural investment is by nature investment in rural society, and serves to rectify disparities in income distribution and social infrastructure development between urban and rural areas.
- (b) Linkage effects or intangible benefits beyond the strictly agricultural sector can be anticipated as almost half the labor force of Omani nationality is engaged in farming.
- (c) Investment in large-scale agricultural production infrastructure such as recharge dams, etc. due to their multipurpose nature can be anticipated to have a strong impact on stimulating economic activity outside the agricultural sector as well.

In addition to determining the ICOR as per above, it will also be necessary to establish the criteria for calculating the appropriate share that the agricultural sector should receive from total national investment. From the viewpoint of optimum allocation of resources it is recommended that at least 10 % of total government investment be directed at the agricultural sector (in 1988, outlay for agriculture by the government including production and infrastructure was only 3.0 % of the total investment). Although investment in the agricultural sector is less cost-effective due to its relatively low productivity, from the long-term viewpoint it is warranted in order to diversify the pillars supporting the Omani economy, which is currently overly dependent on the petroleum industry, as well as to improve the welfare of the farmers who comprise nearly half of the Omani labor force.

In this regard, the JICA team herein recommends that the minimum investment be R.O. 350 million for the coming 10-year Agricultural Development Plan. This macro-economic view provides a base for alternative 1 of the 10-year Master Plan as described in section 8.4.

Table 8.1.1 Required Government Investment in Agriculture Sector
Calculated through ICOR

Item	1988	1990	1990- 1995	1995- 2000	Total Investment
GDP (R.O. 1,000)	77,820.1	85,789.7	118,763.8	157,880.4	
GDP Increase			32,974.2	39,116.6	
Case 1 Assumed ICOR			4.0	3.2	
Necessary Investment			131,896.6	125,173.2	
Gov. Contribution to Total Investment(%)			70.0	65.0	
Gov. Investment			92,327.6	81,362.6	173,690.2
Private Investment			39,569.0	43,810.6	83,379.6
Case 2 Assumed ICOR			6.0	4.0	
Necessary Investment			197,844.9	187,759.8	
Gov. Contribution to Total Investment			70.0	65.0	
Gov. Investment			138,491.4	122,043.8	260,535.3
Private Investment			59,353.5	65,715.9	125,069.4
Case 3 Assumed ICOR			8.0	6.4	
Necessary Investment			263,793.2	250,346.3	
Gov. Contribution to Total Investment			70.0	65.0	
Gov. Investment			184,655.3	162,725.1	347,380.4
Private Investment			79,138.0	87,621.2	166,759.2
Case 4 Assumed ICOR			10.0	8.0	
Necessary Investment			329,741.5	312,932.8	
Gov. Contribution to Total Investment			70.0	65.0	
Gov. Investment			230,819.1	203,406.4	434,225.5
Private Investment			98,922.5	109,526.5	208,449.0

At a national policy-making level, a strong awareness of the importance of agriculture has emerged, and increased investment in the sector can be expected.

8.2 General Description of the 10-Year Agricultural Development Plan

In line with the development objectives formulated, the JICA team selected priority projects to achieve the targeted agricultural development over the period 1991 to 2000 and integrated these into a 10-year Agricultural Development Plan.

In selecting such projects, the team based its criteria not only on development potential elicited through its own field survey, but also on the findings of various project studies implemented to date by the Omani government as well as information obtained in discussions with concerned government officials of the Sultanate including H.E. the Minister of Agriculture and Fisheries.

The budget total of the 10-year Master Plan includes investment directly affecting the agricultural GDP (referred to hereinafter as "agricultural investment") as well as indirect investment in such related sectors as service (PAMAP projects) and industry (agricultural produce processing projects). However an additional recurrent budget to be incurred in relation to the projects has been tabulated separately. Also, in cases where government investment is joined by private sector investment or financing by OBAF, these are grouped by funding source.

Priority projects total R.O. 589 million, and encompass the sectors of irrigation and dams (18 projects), agriculture (including research, extension and general agricultural activities: 46 projects), livestock (28 projects), distribution (26 projects), agro-industry (4 projects) and inter-sectoral projects (5 projects). Projects include both regional and nation-wide programs, and are coordinated for integrated development to maximize impact.

8.3 Investment Frame for 10-Year Agricultural Development Plan

The required public budget for agricultural development under the full Master Plan is R.O. 589 million. Of this, outlay from MAF budget is R.O. 557 million, and that from PAMAP is R.O. 31 million. Expected private sector investment in the projects included under the 10-year Master Plan totals R.O. 30 million.

Funding participation by OBAF under the 10-year Master Plan is anticipated at R.O. 41 million.

The budget total represents the most rational project implementation possible which conforms to the above-discussed agricultural development targets and strategy under the Master Plan. ICOR for the target period 1991 - 2000 is 11.

Total budget for the first 5-year period is R.O. 324 million. Total budget for the second 5-year period is R.O. 265 million. ICOR for the first 5-year period is 12.4, and that for the second 5-year period is 9.8. (Table 8.3.1- 8.3.12, Figure 8.3.1, 8.3.2)

The foregoing is characterized by a relatively heavy outlay for the irrigation and dam sector, to include construction of modern irrigation facilities and recharge dams, due to the general backward state of the agricultural production infrastructure. This outlay is 61 % of the total at R.O. 357 million.

The 10-year Master Plan places emphasis on the vertical development of agricultural productivity. In order to achieve this, special weight in terms of budget outlay is given to strengthening and expanding extension and research activities at the core of the transfer of new technology to farmers. Total budget for extension, research and general farm related activities is 11 % of the total at R.O. 67 million.

Livestock has much potential for development. Small farms in Oman are generally engaged in a combination of both crop cultivation and animal

husbandry. In order to promote permanent settlement in rural areas and stem influx into urban centers, it is important to upgrade the productivity of this traditional form of farm management.

Towards this objective, a subsidy for poultry farmers is to be implemented during the first 5-year period.

Given the urgency of measures to combat serious livestock infectious diseases such as FMD, rinderpest, PPR and CCPP, the animal health and disease control project is to be implemented during the first five years. Livestock-related research is to be stressed throughout the 10-year period. The livestock-related budget is 13 % of the total at R.O. 79 million.

In the distribution sector, wholesale markets and collecting and shipping stations are to be implemented in a step by step manner over the entire 10-year period. Projects related to distribution of crop and livestock products are 5 % of the total at R.O. 31 million.

The agricultural produce processing projects aim at nurturing private sector participation through government subsidies. Construction of a coconut-processing plant in the Southern Region and other projects under the program will be commenced as the results of the feasibility studies in this regard become available. Total cost for this is R.O. 24 million, of which outlay by MAF would be 11 million.

Inter-sectoral projects include the integrated agricultural development project in Nejd, the project for improvement and maintenance of MAF facilities and on-going projects. The Nejd project is considered particularly promising, and will entail integrated implementation of research, extension and irrigation facilities with a view to increased agricultural investment efficiency. Budget for these inter-sectoral projects is R.O. 44 million or 7 % of the total.

Table 8.3.1 Budget Total - 10-Year Plan

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000RO)
			357,397
Irrigation and Dam	NW-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	60,990
	NW-2	Subsidy for New Irrigation System Project	37,500
	NW-3	Legal Framework for Agricultural Water Use	250
	NW-4	Recharge Dams	86,633
	NW-5	Sub-surface (Underground) Dams	5,000
	NW-6	Aflaj	113,420
	NW-7	Wells	30,240
	NW-8	Springs	5,914
	NW-9	Erosion Control and Protection of Agricultural Land against Floods	11,510
	NW-10	Survey and Monitoring	5,940
			18,200
Agricultural Research	NAR-1	Support for Agricultural Research Stations	5,300
	NAR-2	Establishment of New Research Units and Laboratories	5,600
	NAR-3	Development and Establishment of Experimental Farms and Nurseries	2,000
	NAR-4	Forestry-Improvement Program	2,000
	NAR-5	Establishment of Locust Survey and Central Unit	2,000
	NAR-6	Soil Surveys	1,300
			24,000
Agricultural Extension	NAE-1	Improvement and Development of Extension Centers and Facilities	4,470
	NAE-2	Establishment of Development Support Communication Center(DSCC)	1,190
	NAE-3	Training of Researchers, Extension Staff and Statistics Staff	2,520
	NAE-4	Intensive Extension Guidance Program	15,820
			25,060
Agricultural Production	NAA-1	Collection and Organization of Agricultural Statistics	2,560
	NAA-2	Agricultural Exhibitions and Festivals	1,400
	NAA-3	National Project for Plant Protection and Aerial Spraying	10,000
	NAA-4	Agricultural Technology Transfer to Farmers Project	10,000
	NAQ-1	Development and Improvement of Plant Quarantine	1,100
			79,320
Livestock	NLL-1	Rangeland Revegetation Project in Southern Region	3,552
	NLL-2	Animal Health and Disease Control Project	31,423
	NLE-1	Livestock Extension Development Project	632
	NLR-1	Livestock Research Development Project	6,550
	NLM-1	Livestock Marketing Improvement Project	7,604
	NLL-3	Livestock Input Company Project	1,359
	NLL-4	Small Farm Development Support Project	25,899
NLL-5	Livestock Specialized Services Program	2,301	
			30,067
Distribution	ND-1	Establishment of Wholesale Market	18,326
	ND-2	Supply and Demand Forecast of Agricultural Produce	444
	ND-3	Establishment of Shipping Organization for Farmers	1,220
	ND-4	Fortification of PAMAP	10,077
			10,918
Agricultural Produce Processing	NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	5,100
	NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	1,410
	NP-3	Establishment of Pickling and Vinegar-Processing Plant	1,782
	NP-4	Establishment of Coconut-Processing Plant	2,626
			43,644
Inter-Sectoral	NI-1	Integrated Agricultural Development Project in Nejd	16,553
	NI-2	Improvement and Maintenance of MAF Facilities	20,991
	NI-3	Artificial Rainfall Project	2,500
	OI-1	Citizen's Compensation against Natural Crisis	3,000
	OI-2	Master Plan for Development of Date Palm Cultivation	600
Total			588,606

Table 8.3.2 Annual Budget Total - 10-Year Plan

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000000)	ANNUAL BUDGET REQUIREMENT										1991 - 1995	1996 - 2000	
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000			
Irrigation and Dam	NW-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	37,397	26,431	31,429	37,600	40,206	42,336	40,446	38,468	36,865	33,209	30,267	178,262	179,135	
	NW-2	Subsidy for New Irrigation System Project	50,990	740	1,100	5,810	8,820	9,840	9,940	8,500	8,460	5,400	3,300	26,510	34,680	
	NW-3	Legal Framework for Agricultural Water Use	37,500	1,250	2,500	3,750	3,750	3,750	3,750	3,750	5,000	5,000	5,000	15,000	22,500	
	NW-4	Recharge Dams	250	45	45	45	45	45	45	45	40	40	40	170	80	
	NW-5	Sub-surface (Underground) Dams	86,633	10,200	10,300	10,525	11,008	11,075	9,750	8,650	6,550	4,975	4,120	33,188	32,445	
	NW-6	Arfa	113,420	9,390	11,390	11,390	11,318	11,318	11,318	11,318	11,318	12,318	12,318	12,318	54,870	58,550
	NW-7	Wells	30,240	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	3,024	15,120	15,120	
	NW-8	Spring	5,914	545	550	553	591	605	590	535	538	637	650	2,644	3,070	
	NW-9	Erosion Control and Protection of Agricultural Land against Floods	11,512	70	760	1,042	1,030	870	1,550	1,550	1,540	1,500	1,500	3,870	7,640	
	NW-10	Survey and Monitoring	5,940	1,197	1,260	1,283	333	317	309	388	308	308	308	4,398	1,550	
Agricultural Research	NAR-1	Support for Agricultural Research Stations	19,200	2,430	2,200	1,700	1,595	1,101	1,836	1,476	1,706	1,456	423	2,718	2,580	
	NAR-2	Establishment of New Research Units and Laboratories	5,600	875	690	410	580	520	485	570	640	415	415	3,875	2,525	
	NAR-3	Development and Establishment of Experimental Farms and Nurseries	2,000	120	270	295	195	160	288	273	143	130	118	1,040	960	
	NAR-4	Forestry-Improvement Program	2,000	200	200	200	200	200	200	200	200	200	200	1,000	1,000	
	NAR-5	Establishment of Locust Survey and Control Unit	2,000	200	200	200	200	200	200	200	200	200	200	1,000	1,000	
	NAR-6	Soil Surveys	1,300	200	200	200	200	200	200	200	100	100	100	800	800	
Agricultural Extension	NAE-1	Improvement and Development of Extension Centers and Facilities	24,000	3,877	2,978	2,882	2,572	2,516	1,836	1,836	1,836	1,836	1,836	9,177	9,177	
	NAE-2	Establishment of Development Support Communication Center (DSCC)	4,470	504	924	884	774	724	50	50	50	50	50	4,220	250	
	NAE-3	Training of Researchers, Extension Staff and Statistics Staff	1,100	700	250	212	12	6						1,100		
	NAE-4	Intensive Extension Guidance Program	2,520	689	204	204	204	204	204	204	204	204	204	1,509	1,817	
	NAE-5	Collection and Organization of Agricultural Statistics	15,820	1,582	1,582	1,582	1,582	1,582	1,582	1,582	1,582	1,582	1,582	7,910	7,910	
Agricultural Production	NAP-1	Agricultural Exhibitions and Festivals	25,060	2,863	3,000	2,583	2,583	2,583	2,583	2,583	2,583	2,583	2,583	13,160	11,900	
	NAP-2	National Project for Plant Protection and Aerial Spraying	2,560	384	630	225	121	262	50	63	262	50	63	262	700	
	NAP-3	Agricultural Technology Transfer to Farmers Project	10,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	5,000	5,000	
	NAP-4	Development and Improvement of Plant Quarantine	1,100	200	400	300	200							1,100		
	NAP-5	Rangeland Rehabilitation Project in Southern Region	70,320	9,538	10,013	9,845	10,435	9,978	7,821	5,621	5,550	5,574	5,619	29,910	29,404	
	NAP-6	Animal Health and Disease Control Project	3,552	576	576	400	400	400	240	240	240	240	240	2,352	1,200	
	NAP-7	Livestock Extension Development Project	31,423	3,037	2,971	3,237	3,650	2,911	2,955	2,939	3,044	3,083	3,042	16,425	14,998	
	NAP-8	Livestock Research Development Project	6,550	887	842	842	842	842	842	842	842	842	842	4,300	2,250	
	NAP-9	Livestock Marketing Improvement Project	7,604	575	1,051	872	1,734	1,559	1,067	135	30			6,271	1,233	
	NAP-10	Small Farm Development Support Project	1,359	978	983									1,359		
Distribution	ND-1	Establishment of Wholesale Market	25,899	3,489	3,452	3,470	3,582	3,492	1,689	1,689	1,689	1,689	17,405	8,494		
	ND-2	Supply and Demand Forecast of Agricultural Produce	30,067	573	602	3,894	4,102	6,426	609	4,688	4,578	926	3,861	15,397	14,670	
	ND-3	Establishment of Shipping Organization for Farmers	19,225	243	40	111	439	2,803	689	4,698	4,578	320	3,861	3,056	14,670	
	ND-4	Fertilization of PAPP	444	150	114	60	120							444		
Agricultural Produce Processing	NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	10,918	1,770	4,554	3,318	622	290	31	275	18	120		10,474	444	
	NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	5,100	100	2,500	2,500								5,100		
	NP-3	Establishment of Pickling and Vinegar-Processing Plant	1,410	148	430	406	150							1,134	276	
	NP-4	Establishment of Coconut-Processing Plant	2,825	1,308	1,52	412	472							1,614	168	
Inter-Sectoral	NI-1	Integrated Agricultural Development Project in Najd	43,644	8,458	7,951	5,555	4,411	6,068	5,661	2,350	1,100	1,100	1,100	32,333	11,311	
	NI-2	Improvement and Maintenance of HAF Facilities	16,553	1,655	1,655	1,655	1,655	1,655	1,655	1,655	1,655	1,655	1,655	13,242	3,311	
	NI-3	Artificial Rainfall Project	24,991	5,895	5,895	3,800	800	800	800	800	800	800	800	16,991	4,800	
	OI-1	Citizen's Compensation against Natural Crises	2,500	300	300	300	300	300	300	300	300	300	300	1,500	2,500	
OI-2	Master Plan for Development of Date Palm Cultivation	3,000	800	800	800	800	800	800	800	800	800	800	1,500	1,500		
Total			588,606	55,987	62,322	67,282	66,631	71,768	60,278	57,886	53,749	46,400	323,990	264,616		

Table 8.3.3 Regional Budget Total of 10-Year Plan

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000RO)	REGION					MUSCAT	BATHNAH	SHARQIYA	DAKHLIYA	DHARARA	JANUBIYA	MUSANDAM
				MUSCAT	BATHNAH	SHARQIYA	DAKHLIYA	DHARARA							
Irrigation and Dam	NI-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	37,397	11,534	145,198	45,586	83,274	53,487	7,050	15,306	3,102				
	NI-2	Subsidy for New Irrigation System Project	60,290		36,960	3,000	9,300	7,050	4,620						
	NI-3	Legal Framework for Agricultural Water Use	37,500	750	20,085	4,875	5,250	3,375	2,250	375					
	NI-4	Recharge Dams	258	12	128	38	35	25	6						
	NI-5	Sub-surface (Underground) Dams	86,632	4,750	43,197	8,401	13,373	13,122	1,450	2,400					
	NI-6	Artificial Rainfall Project	5,800		2,765	95	2,120	35	25						
	NI-7	Wells	113,420	5,600	25,190	19,830	40,810	21,850							
	NI-8	Springs	30,240	205	9,427	7,638	5,434	7,824	307	205					
	NI-9	Erosion Control and Protection of Agricultural Land against Floods	5,914		3,195	1,050	5,700	1,850	525						
	NI-10	Survey and Monitoring	5,940	219	2,749	859	1,242	750	197	118					
Agriculture Research	NAR-1	Support for Agricultural Research Stations	18,208	168	9,240	2,350	2,185	1,400	2,985	180					
	NAR-2	Establishment of New Research Units and Laboratories	5,300		2,000	950	850	600	1,000						
	NAR-3	Development and Establishment of Experimental Farms and Nurseries	5,600		5,250	75			275						
	NAR-4	Forestry-Improvement Program	2,000		450	300	550	250	350	100					
Agriculture Extension	NAR-5	Establishment of Local Survey and Central Unit	2,000	80	500	300	280	200	900	40					
	NAR-6	Soil Surveys	1,300	80	1,040	300	280	200	60	40					
	NAE-1	Improvement and Development of Extension Centers and Facilities	24,000	1,950	7,285	4,676	4,520	3,420	1,277	852					
	NAE-2	Establishment of Development Support Communication Center (DSCC)	4,470	172	1,290	611	937	743	433	282					
	NAE-3	Training of Researchers, Extension Staff and Statistics Staff	1,190	1,190											
	NAE-4	Intensive Extension Guidance Program	2,520	77	1,145	265	326	285	334	88					
Agriculture Production	NAI-1	Collection and Organization of Agricultural Statistics	15,820	520	4,860	3,380	3,260	2,400	510	488					
	NAI-2	Agricultural Exhibitions and Festivals	25,060	1,948	12,151	3,255	2,629	2,527	2,025	522					
	NAI-3	National Project for Plant Protection and Aerial Spraying	2,560	77	1,280	384	358	256	154	51					
	NAI-4	Agricultural Technology Transfer to Farmers Project	1,400	971	71	71	71	71	71	71					
	NAI-5	Development and Improvement of Plant Quarantine	10,000	308	5,408	1,400	1,100	300	700	200					
	NAI-6	Rangeland Revegetation Project in Southern Region	10,900	300	5,400	1,400	1,100	300	700	200					
	NAI-7	Animal Health and Disease Control Project	1,100	300	5,400	1,400	1,100	300	700	200					
	NAI-8	Livestock Extension Development Project	79,320	2,455	17,045	7,580	9,388	8,851	23,061	1,748					
	NAI-9	Livestock Research Development Project	3,552	793	7,499	3,227	2,640	4,375	11,692	988					
	NAI-10	Livestock Marketing Improvement Project	6,550	9	2,448	1,900	1,973	30	271	9					
Distribution	ND-1	Establishment of Wholesale Market	7,604	91	190	108	108	108	6,988	13					
	ND-2	Supply and Demand Forecast of Agricultural Produce	25,899	518	6,088	3,933	4,831	3,956	7,021	588					
	ND-3	Establishment of Shipping Organization for Farmers	2,381	69	575	276	282	276	805	69					
	ND-4	Fortification of PAMAP	30,067	10,372	6,293	2,843	2,745	3,887	4,694	91					
	ND-5	Establishment of Demand Forecast of Agricultural Produce	18,325	7,243	2,468	1,582	1,682	2,468	2,783						
Agriculture Processing	NP-1	Supply of Agricultural Inputs and Services	1,220	165	397	165	165	165	165	165					
	NP-2	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	18,077	2,520	3,371	987	889	455	1,745	91					
	NP-3	Establishment of Pickling and Unleavened-Processing Plant	18,918	1,468	4,389	765	1,293	510	2,779	102					
	NP-4	Establishment of Coconut-Processing Plant	5,100	204	2,652	765	714	512	153	102					
Inter-Sectoral	NI-1	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	1,410	448	460		495								
	NI-2	Establishment of Prickling and Unleavened-Processing Plant	1,782	807	891		64								
	NI-3	Establishment of Coconut-Processing Plant	2,626												
	NI-4	Integrated Agricultural Development Project in Nejd	43,644	5,655	7,282	2,930	2,874	2,410	2,626	1,482					
	NI-5	Improvement and Maintenance of RRF Facilities	16,553												
Total	OI-1	Artificial Rainfall Project	20,881	5,511	5,478	2,458	2,370	2,050	1,790	1,478					
	OI-2	Citizen's Compensation against Natural Crisis Resilient Plan for Development of Date Palm Cultivation	2,580	120	1,560	450	420	300	90	68					
Total			598,606	26,543	208,393	89,746	100,912	74,901	83,070	8,070					

Table 8.3.6 Annual Budget of Agricultural Extension Sector
- 10-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	PRIO.	TOTAL BUDGET (1000000)	ANNUAL BUDGET										1991 -1995	1996 -2000		
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000				
NAE-1	IMPROVEMENT AND DEVELOPMENT OF EXTENSION CENTERS AND FACILITIES		4,470	904	934	384	774	724	50	50	50	50	50	50	50	4,220	250
NAE-1-1	ESTABLISHMENT OF EXTENSION CENTERS IN REMOTE AREA	A	650	100	150	100	50	50	50	50	50	50	50	50	50	400	250
NAE-1-2	IMPROVEMENT OF EXTENSION CENTER FACILITIES	A	1,620	364	344	344	284	284								1,620	0
NAE-1-3	DEVELOPMENT OF AGRICULTURAL TECHNOLOGY INFORMATION UNITS (ATIU)	A	2,200	440	440	440	440	440								2,200	0
NAE-2	ESTABLISHMENT OF DEVELOPMENT SUPPORT COMMUNICATION CENTER (DSCC)	A	1,190	702	258	212	13	6								1,190	0
NAE-3	TRAINING OF RESEARCHERS, EXTENSION STAFF AND STATISTICS STAFF	A	2,520	686	204	204	204	204	204	204	204	204	204	204	204	1,593	1,017
NAE-4	INTENSIVE EXTENSION GUIDANCE PROGRAM		15,020	1,582	1,582	1,582	1,582	1,582	1,582	1,582	1,582	1,582	1,582	1,582	1,582	7,910	7,910
NAE-4-1	SUPPORTING KEY-FARMER EXTENSION PROGRAM	A	3,000	300	300	300	300	300	300	300	300	300	300	300	300	1,500	1,500
NAE-4-2	DATE PALM REHABILITATION & IMPROVEMENT PROGRAM	A	11,820	1,182	1,182	1,182	1,182	1,182	1,182	1,182	1,182	1,182	1,182	1,182	1,182	5,910	5,910
NAE-4-3	PROVISION OF INPUTS FOR EXPERIMENTAL PURPOSES	A	1,000	100	100	100	100	100	100	100	100	100	100	100	100	500	500
TOTAL	DEVELOPMENT BUDGET TOTAL		24,000	3,877	2,978	2,892	2,572	2,516	1,936	1,838	1,836	1,836	1,836	1,836	1,836	14,823	9,177

Table 8.3.7 Annual Budget of Agricultural Production Sector
- 10-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	PRIO.	TOTAL BUDGET (1000000)	ANNUAL BUDGET										1991 -1995	1996 -2000		
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000				
NAA-1	COLLECTION AND ORGANIZATION OF AGRICULTURAL STATISTICS		2,360	384	630	225	121		500	600	100					1,360	1,200
NAA-1-1	AGRICULTURAL CENSUS	A	1,900	300	350	50	50		500	600	100					700	1,200
NAA-1-2	ANNUAL UPDATE OF IMPORTANT AGRICULTURAL STATISTICS	A	660	84	280	175	121									660	
NAA-2	AGRICULTURAL EXHIBITION AND FESTIVAL		1,400	275	50	63	262	50	63	262	50	63	262	50	63	700	700
NAA-2-1	INTERNATIONAL AGRICULTURE AND FOOD EXHIBITION	A	900	225	13	212			13	212				13	212	450	450
NAA-2-2	DOMESTIC AGRICULTURAL FESTIVAL	A	500	50	50	50	50	50	50	50	50	50	50	50	50	250	250
NAA-3	NATIONAL PROJECT FOR PLANT PROTECTION AND AERIAL SPRAY	A	10,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	5,000	5,000
NAA-4	AGRICULTURAL TECHNOLOGY TRANSFER PROJECT TO FARMERS	A	10,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	5,000	5,000
NAA TOTAL			23,960	2,659	2,680	2,288	2,383	2,050	2,563	2,862	2,150	2,963	2,262	2,262	12,060	11,900	
NAD-1	DEVELOPMENT & IMPROVEMENT OF PLANT QUARANTINE	A	1,100	200	400	300	200									1,100	
TOTAL	DEVELOPMENT BUDGET TOTAL		25,060	2,859	3,080	2,588	2,583	2,050	2,563	2,862	2,150	2,963	2,262	2,262	13,160	11,900	

Table 8.3.8 Annual Budget of Livestock Sector - 10-Year Plan

Number of Project	Name of the Project	Project Period	Annual Budget										Total	91-95 Plan	96-2000 Plan			
			1991	1992	1993	1994	1995	1996	1997	1998	1999	2000						
1	Rangeland Revegetation Project in Southern Region		576	576	400	400	400	400	400	240	240	240	240	240	240	3,552	2,352	1,200
1	Establishment of Rangeland Management	2	176	176												352	352	0
1	Grazing Control	10	400	400	400	400	400	400	400	240	240	240	240	240	240	3,200	2,000	1,200
1	Animal Health & Disease Control Project		3,037	2,371	3,237	3,650	3,530	2,911	2,955	2,955	2,955	2,955	3,044	3,059	3,123	31,423	16,425	14,998
1	Development of New Quarantines	5	395	395	395	395	395									1,975	1,975	0
1	Animal Clinics Improvements	5	238	238	238	238	238									1,188	1,188	0
1	Laboratory Development		306	20	20	20	20	30	30	30	30	30	30	30	30	319	659	150
1	CCPP Vaccine Development	3					30	30	30							90	90	0
1	National Vaccination	10	1,369	1,592	1,331	1,971	2,118	2,158	2,202	2,248	2,291	2,336	2,382	2,428	2,474	20,115	8,382	11,233
1	Supplies of Veterinary Equipment	10	600	600	600	600	600	600	600	600	600	600	600	600	600	6,000	3,000	3,000
1	Brucellosis Control in South	10	129	123	123	123	123	123	123	123	123	123	123	123	123	1,236	621	615
1	Livestock Extension Development		196	30	30	196	30	30	30	30	30	30	30	30	30	632	492	150
1	Extension Method Improvement	10	30	30	30	30	30	30	30	30	30	30	30	30	30	300	150	150
1	Demonstration of Using Equipment																	
1	Visual Extension																	
1	Establishment of Demonstration Unit																	
1	Training Center Development		166													332	332	0
1	Livestock Research Development		887	842	842	842	842	842	842	842	842	842	842	842	842	8,420	4,210	4,210
1	Development of Livestock Research Centers	10	450	450	450	450	450	450	450	450	450	450	450	450	450	4,500	2,250	2,250
1	Research Centers Management Consultancy	5	437	392	392	392	392	392	392	392	392	392	392	392	392	2,950	2,050	900
1	Livestock Marketing Improvement Project		575	1,661	872	1,734	1,539	1,067	136	30	30	30	30	30	30	7,804	6,371	1,233
1	Company for Livestock Products	7	50	866	200	200	200	200	100	100	100	100	100	100	100	1,716	1,516	200
1	Cattle Fattening	5				50	130	739	30	30	30	30	30	30	30	979	188	799
1	Cut Meat Processing	3				171	316	50								537	487	50
1	Milk Collecting and Processing	6	25	211	88	729	108	31								1,192	1,161	31
1	Hides and Skins Development	3				192	64	64								382	192	70
1	Cattle Destocking Subsidy	5	500	500	500	500	500	500	500	500	500	500	500	500	500	2,500	2,500	0
1	Marketing Promotion	5		84	84	84	84	84	84	84	84	84	84	84	84	418	335	83
1	Livestock Input Company Project	2		376	933											1,359	1,359	0
1	Small Farm Development Support Project		3,489	3,452	3,470	3,502	3,492	1,698	1,698	1,698	1,698	1,698	1,698	1,698	1,698	25,899	17,405	8,494
1	Smallholder Poultry Production	5	1,761	1,754	1,772	1,774	1,794									8,855	8,855	0
1	Intensive Livestock Production	10	1,698	1,698	1,698	1,698	1,698	1,698	1,698	1,698	1,698	1,698	1,698	1,698	1,698	16,984	8,492	8,492
1	A.I. Services for Dairy Cows		30			30										60	60	0
1	Livestock Specialized Services		778	111	111	111	111	111	635	111	111	111	111	111	111	2,301	1,222	1,079
1	Livestock Census	2	524						524							1,048	524	524
1	National Disease Survey	10	11	11	11	11	11	11	11	11	11	11	11	11	110	55	55	
1	Marketing Survey	1	143													143	143	0
1	Consultancy Services (Study)	10	100	100	100	100	100	100	100	100	100	100	100	100	100	1,000	500	500
	Total		9,538	10,019	9,945	10,435	9,979	7,021	5,621	5,559	5,574	5,619	5,619	5,619	5,619	79,328	49,816	29,494
	Percentage															62.9	37.1	

Table 8.3.10 Annual Budget of Agricultural Produce Processing Sector
- 10-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	PRIO	TOTAL BUDGET (10000R0)	ANNUAL BUDGET										1991-1995	1996-2000			
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000					
NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	A	5,100	100	2,500	2,500											5,100	
NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	A	1,410	140	430	406	150	18	120	18	120						1,134	276
NP-3	Establishment of Pickling and Ulinegar-Processing Plant	A	1,782	132	1,482						12	155					1,614	168
NP-4	Establishment of Coconut-Processing Plant	A	2,826	1,390	152	412	472	200									2,626	
	Coconut Farm		2,100	1,390	130	150	220	200									2,100	
	Coconut-Processing Plant		526	22	252	252											526	
TOTAL	DEVELOPMENT BUDGET TOTAL		10,918	1,770	4,564	9,318	522	200	31	275	18	120				10,474	444	

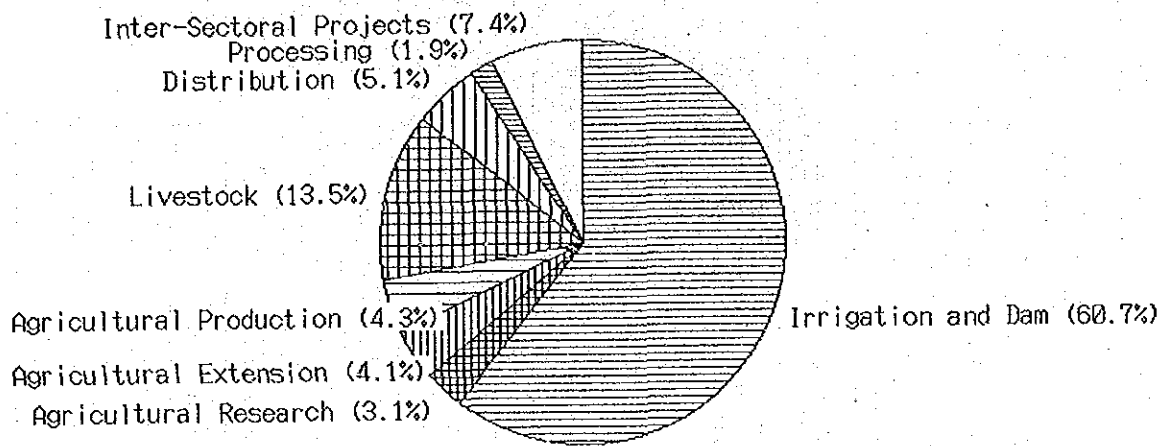
Table 8.3.11 Annual Budget of Inter-Sectoral Project
- 10-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	PRIO	TOTAL BUDGET (10000R0)	ANNUAL BUDGET										1991-1995	1996-2000				
				1991	1992	1993	1994	1995	1996	1997	1998	1999	2000						
NI-1	Integrated Agricultural Development Project in Nejd	A	16,553	1,655	1,655	1,655	3,311	4,366	3,311								13,242	3,311	
	1) Pilot Farm (50ha)		1,655	1,655													1,655		
	2) Main Development Project (450ha)		14,898														11,587	3,311	
NI-2	Improvement and Maintenance of MAF Facilities	A	20,091	5,395	5,396	3,500	800	800	800	800							800	16,931	4,000
	1) Ministry Building		5,191	2,595	2,596													5,181	
	2) Office Building for Directorate General of Agriculture in 6 Regions		7,800	2,500	2,500	2,800												7,800	
	3) Separate Consolidated Allocation for All Consultancies		8,000	800	800	800	800	800	800	800	800	800	800	800	800	800	800	4,000	4,000
NI-3	Artificial Rainfall Project	B	2,500								1,250	1,250						2,500	
OI-1	Citizen's Compensation against Natural Crisis	A	3,000	300	300	300	300	300	300	300							300	1,500	1,500
OI-2	Master Plan for Development of Date Palm Cultivation	A	600	600														600	
TOTAL	DEVELOPMENT BUDGET TOTAL		43,842	8,450	7,951	5,555	4,711	6,666	5,661	2,350	1,700	1,700	1,700	1,700	1,700	1,700	32,339	71,311	

Table 8.3.12 Budget Total by Finance Source - 10-Year Plan

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000000)	STATE GENERAL BUDGET (1,000000)			SHARED WITH PRIVATE	SELF FINANCE	OTHERS	REMARKS
				TOTAL	MAF	PRAMP				
Irrigation and Dam	NU-1	Improvement of Irrigation System and Centralized Controlled Water-Distribution System	394,897	394,897	357,397					
	NU-2	Subsidy for New Irrigation System Project	60,990	60,990	60,990					
	NU-3	Legal Framework for Agricultural Water Use	250	250						
	NU-4	Recharge Dams	86,633	86,633						
	NU-5	Sub-surface (Underground) Dams	5,000	5,000						
	NU-6	A[15]	113,428	113,428						
	NU-7	Dams	38,228	38,228						
	NU-8	Springs	5,914	5,914						
	NU-9	Erosion Control and Protection of Agricultural Land against Floods	11,510	11,510						
	NU-10	Survey and Monitoring	5,948	5,948						
Agricultural Research	NAR-1	Support for Agricultural Research Stations	18,280	18,280						
	NAR-2	Establishment of New Research Units and Laboratories	5,300	5,300						
	NAR-3	Development and Establishment of Experimental Farms and Nurseries	2,000	2,000						
	NAR-4	Forestry-Improvement Program	2,000	2,000						
	NAR-5	Establishment of Locust Survey and Control Unit	2,000	2,000						
	NAR-6	Soil Surveys	1,300	1,300						
Agricultural Extension	NAE-1	Improvement and Development of Extension Centers and Facilities	24,000	24,000						
	NAE-2	Establishment of Development-Support Communication Center (DSCC)	4,470	4,470						
	NAE-3	Training of Researchers, Extension Staff and Statistics Staff	1,190	1,190						
	NAE-4	Intensive Extension Guidance Program	2,520	2,520						
Agricultural Production	NRA-1	Collection and Organization of Agricultural Statistics	15,820	15,820						
	NRA-2	Agricultural Exhibitions and Festivals	25,000	25,000						
	NRA-3	National Project for Plant Protection and Aerial Spraying	1,400	1,400						
	NRA-4	Agricultural Technology Transfer to Farmers Project	10,000	10,000						
	NRA-5	Development and Improvement of Plant Quarantine	1,100	1,100						
	NRL-1	Rangeland Revegetation Project in Southern Region	92,909	92,971	79,114	3,286	2,251	3,398	6,717	118
	NRL-2	Rangel Health and Disease Control Project	6,316	6,198	3,552	2,646				118 UNDP (FAO)
	NLE-1	Livestock Extension Development Project	31,423	31,423						
	NLR-1	Livestock Research Development Project	532	532						
	NLR-2	Livestock Marketing Improvement Project	6,556	6,556						
Livestock	NLL-1	Livestock Health and Disease Control Project	12,382	7,604	6,398	1,208				
	NLL-2	Livestock Health and Disease Control Project	6,795	1,359				3,238	2,839	
	NLL-3	Small Farm Development Support Project	26,522	26,522						
	NLL-4	Small Farm Development Support Project	2,301	2,301						
	NLL-5	Livestock Specialized Services Program	35,992	36,067						
Distribution	ND-1	Establishment of Wholesale Market	24,251	18,326						
	ND-2	Supply and Demand Forecast of Agricultural Produce	444	444						
	ND-3	Establishment of Shipping Organization for Farmers	1,220	1,220						
	ND-4	Fertilization of PRAMP	18,077	18,077						
Agricultural Processing	NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	24,338	16,318	10,918					
	NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	7,048	1,410	1,410					
	NP-3	Establishment of Pickling and Vinegar-Processing Plant	2,452	1,782						
	NP-4	Establishment of Coconut-Processing Plant	4,730	2,626						
Inter-Sectoral	NI-1	Integrated Agricultural Development Project in Nejd	43,844	43,844						
	NI-2	Improvement and Maintenance of MAP Facilities	16,553	16,553						
	NI-3	Artificial Rainfall Project	20,991	20,991						
	OI-1	Citizen's Compensation against Natural Crisis	2,500	2,500						
OI-2	Master Plan for Development of Date Palm Cultivation	3,000	3,000							
Total			888,926	629,957	557,393	31,273	48,751	11,656	11,671	5,925

Share by Sector



Share by Region

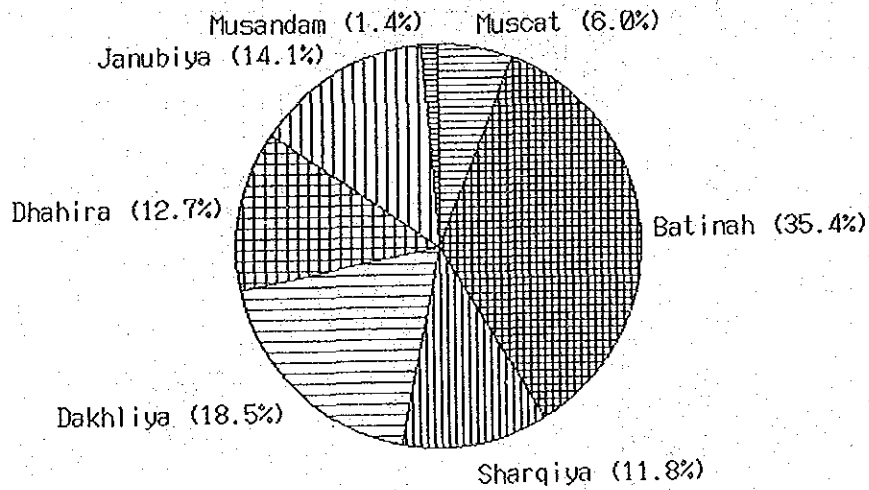
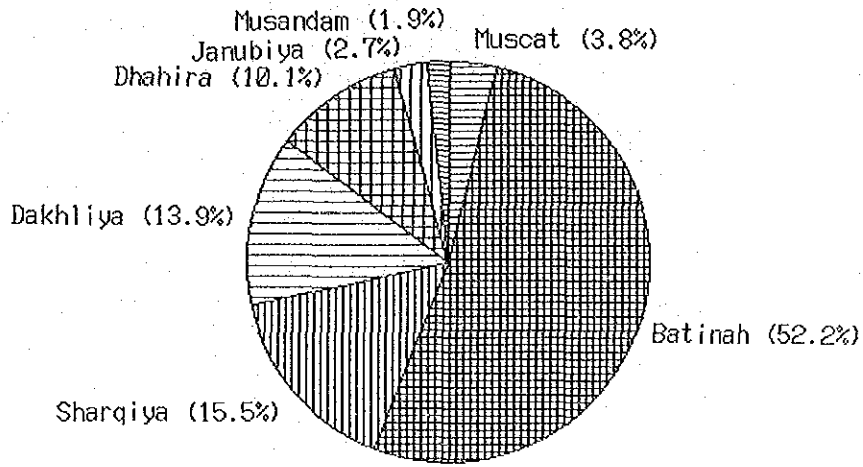


Figure 8.3.1 Sectoral and Regional Breakdown of the Budget Outlay for the 10-Year Agricultural Development Plan

Cultivation Area by Region



Population by Region (1988/1989)

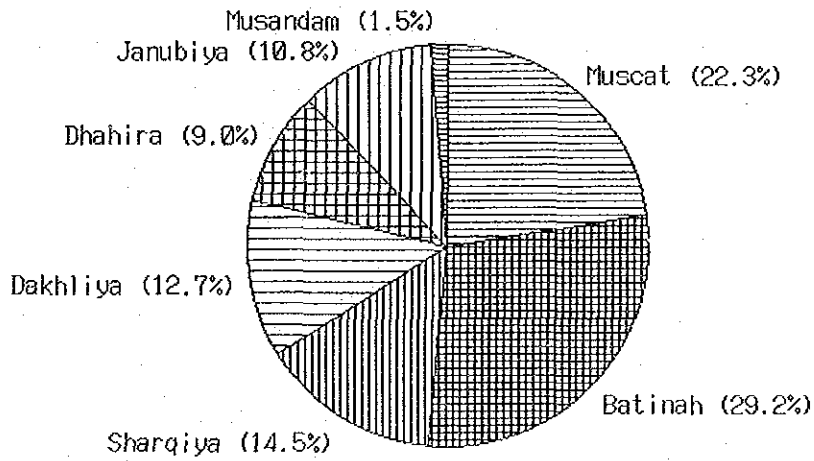


Figure 8.3.2 Share of Cultivation Area and Population

8.4 Development Alternatives

A rational project load was formulated for the full Master Plan on the basis of development goals and strategy. The long-list of projects so derived is considered the upper ceiling for the 10-year agricultural development budget.

In addition, two alternatives for the plan were developed. Alternative 1 proposes an agricultural investment frame of R.O. 350 million on the basis of strictly macro-economic considerations described in section 8.1.

Alternative 2 proposes the recommended floor for more appropriate investment in Omani agriculture taking into consideration a broader range of factors aiming at a firm foundation for stable agricultural growth over the long term. This alternative encompasses those projects of highest priority and envisages an agricultural investment frame of R.O. 427 million.

In formulating alternative 1 and 2, criteria for assigning priority were as follows:

- (1) Agricultural production infrastructure is seriously lacking in Oman. Accordingly, high priority is accorded to the construction and/or strengthening of such infrastructure as irrigation facilities, recharge dams, extension centers and branches, livestock sheds for small livestock holders, etc.
- (2) Vertical upgrading of agricultural productivity is essential to offset a population increase of 3.5 % per annum, as well as to move towards food self-sufficiency. Accordingly, focus is given to projects/programs which increase land and labor productivity.
- (3) It is important to promote permanent settlement in rural areas, and in this regard, projects/programs which increase farm income and otherwise serve to stimulate the rural economy are given high priority.

- (4) Projects which promote private capital participation are to be given maximum encouragement wherever feasible.
- (5) Training programs for Omani human resources development are to be given priority.
- (6) Any other programs warranting urgent implementation are to be given close attention.

8.4.1 Alternative 1

Alternative 1 proposes the budget outlay necessary strictly in terms of macro-economy. From a purely macro-economic standpoint, agricultural investment of R.O. 350 million would be necessary over the 10-year period.

This alternative cuts the full Master Plan outlay back from R.O. 589 million to R.O. 404 million. Total outlay for the first 5 years and for the second 5 years is envisaged at R.O. 245 million and R.O. 159 million, respectively. ICOR for the total 10-year period is 7. (Table 8.4.1)

The irrigation and dam sector experiences the largest cuts under alternative 1, with priority for inclusion given under this item to modern irrigation facilities and recharge dams. Under the full Master Plan, the target area for modern irrigation works is 30,000 ha, while under alternative 1 it is 25,000 ha. The pilot project for centrally-controlled irrigation shows a target area under the former of 6,300 ha and under the latter of 2,500 ha. Under alternative 1, the project load for maintenance and rehabilitation of traditional falaj irrigation works is reduced by 87% from the full Master Plan to 400 locations. Project load for well rehabilitation is likewise cut by one tenth.

The agricultural sector is given extremely high priority. To realize vertical expansion of agricultural production, linkage of the agricultural research and extension activities is considered particularly important with a view to prompt transfer of new technology to the farmer.

There are a number of urgent research issues which require attention and which are directly related to increasing agricultural production. These include identification of crop-water requirements, development of appropriate fertilizing and pest control methods, dispersion of the cropping season, selection of new varieties, etc. Demand at the farm level for a resolution of these issues remains high. Thus facilities, equipment and staff at the Rumais Agricultural Research Center will be upgraded to effectively carry out the above research. R.O. 18 million is targeted under alternative 1 for research facilities and equipment.

Establishment of a basic framework for the conduct of intensive extension activities is a major target under alternative 1. Also under this alternative, a nation-wide aerial pest-control project is to be carried out with 100 % subsidy from the government during the first 5-year period. During the second 5-year period, however, farmers would be expected to bear the cost of the pest-control agro-chemicals themselves.

Under alternative 1, instead of providing agricultural technology information units at each of the 44 extension centers as called for under the full Master Plan, a phased deployment limited to 30 key towns would be implemented.

In view of the importance of animal husbandry in the Southern Region, the Rangeland Revegetation Project and the Livestock Marketing Improvement Project have been accorded priority. The vaccination program under the Livestock Health and Disease Control Project requires urgent implication. However, under alternative 1, the target date for 100 % vaccination of livestock against infectious diseases is pushed back from 1995 under the full Master Plan, to 1998. The small farm-development support project would target 5 % of all holders for subsidy, down from 7 % under the full Master Plan.

The livestock input company project, to supply concentrated feed and breeder birds important for increasing productivity of animal husbandry, would be implemented as early as possible to encourage participation from the private sector.

Streamlining of the distribution system will provide incentive to farmers to expand production. All the projects under this sector are considered extremely important, and no change in that under the full Master Plan has been made.

The most highly feasible projects are to be implemented in the agricultural produce processing sector. As participation from the private sector is anticipated, no change has been made in the agenda called for under the full Master Plan.

In view of priority selection criteria (3), priority is accorded the Integrated Agricultural Development Project in Nejd. The Master Plan for Development of Date Palm Cultivation would be limited to 1991. Due to the low urgency of the Artificial Rainfall Project, it is deleted from the agenda under alternative 1.

8.4.2 Alternative 2

Alternative 2 expands upon alternative 1 by adding funding to those projects where investment is considered to be critically lacking. The target of alternative 2 is to provide the minimum investment desirable in terms of the overall current condition of agriculture in Oman in the future with a view to establishing a sound foundation for development of Omani agriculture over the long-term. The total budget outlay under this alternative is R.O. 480 million, with R.O. 448 million to be provided by MAF and R.O. 31 million by PAMAP. ICOR is 8.7. Share in total budget outlay is 54 % for irrigation and dam facility construction, 13 % for agriculture, and 16 % for animal husbandry (Table 8.4.1).

Investment for the irrigation and dam, and livestock sectors has been increased under alternative 2 over that of alternative 1.

Target area for the subsidy for new irrigation system projects aimed at effective use of limited water resources is 30,000 ha. Target area under the Pilot Project for Centrally-controlled Irrigation is 65 % of

that under the full Master Plan. Project load for repair and maintenance of the traditional irrigation systems, aflaj and wells, is over half of that under the full Master Plan.

Due to the high urgency of the vaccination program under the Livestock Health and Disease Control Project, the target year for 100 % vaccination rate against infectious diseases is to remain the same as that under the full Master Plan at 1995.

8.4.3 Recommended Alternative

In order to strengthen investment efficiency in agriculture in the future, (1) upgrading of farm technology coupled with (2) establishment of modern agricultural production infrastructure will be necessary. Consequently, strengthening and expansion of research and extension activities to address (1), and construction of modern irrigation facilities, recharge dams, extension and research facilities, and animal sheds for small livestock holders to address (2), must be urgently pursued over the 10-year period.

In consideration of all factors of envisaged targets, strategies, funding environment and effectiveness of investment in agriculture over the long term, the JICA team has recommended the implementation of alternative 2 (Table 8.4.1-8.4.3, Figure 8.4.1).

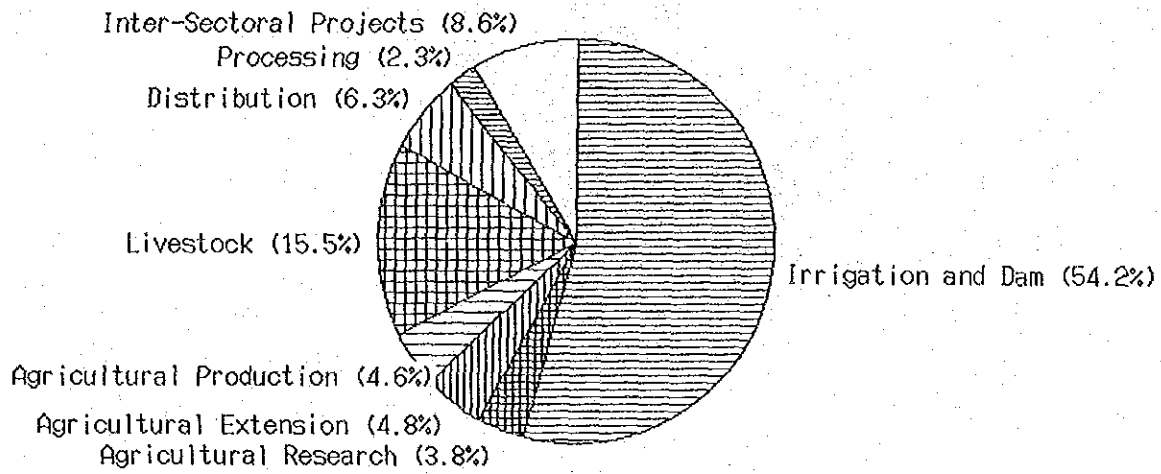
Table 8.4.1 Comparative Description of 10-Year Plan
- Full, Alternative 1 and Alternative 2

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	FULL (1000RO)	ALTERNATIVE	
				(1) (1000RO)	(2) (1000RO)
Irrigation and Dam		Subtotal	357,397	186,107	259,922
	NW-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	60,990	26,370	42,090
	NW-2	Subsidy for New Irrigation System Project	37,500	31,250	37,500
	NW-3	Legal Framework for Agricultural Water Use	250	250	250
	NW-4	Recharge Dams	86,633	79,240	81,645
	NW-5	Sub-surface (Underground) Dams	5,000	5,000	5,000
	NW-6	Aflaj	113,420	22,520	59,020
	NW-7	Wells	30,240	5,100	18,000
	NW-8	Springs	5,914	4,087	4,087
	NW-9	Erosion Control and Protection of Agricultural Land against Floods	11,510	6,510	6,510
	NW-10	Survey and Monitoring	5,940	5,780	5,820
Agricultural Research		Subtotal	18,200	18,200	18,200
	NAR-1	Support for Agricultural Research Stations	5,300	5,300	5,300
	NAR-2	Establishment of New Research Units and Laboratories	5,600	5,600	5,600
	NAR-3	Development and Establishment of Experimental Farms and Nurseries	2,000	2,000	2,000
	NAR-4	Forestry-Improvement Program	2,000	2,000	2,000
	NAR-5	Establishment of Locust Survey and Central Unit	2,000	2,000	2,000
	NAR-6	Soil Surveys	1,300	1,300	1,300
Agricultural Extension		Subtotal	24,000	23,050	23,050
	NAE-1	Improvement and Development of Extension Centers and Facilities	4,470	3,520	3,520
	NAE-2	Establishment of Development Support Communication Center(DSCC)	1,190	1,190	1,190
	NAE-3	Training of Researchers, Extension Staff and Statistics Staff	2,520	2,520	2,520
	NAE-4	Intensive Extension Guidance Program	15,820	15,820	15,820
Agricultural Production		Subtotal	25,060	21,860	21,860
	NAA-1	Collection and Organization of Agricultural Statistics	2,560	2,060	2,060
	NAA-2	Agricultural Exhibitions and Festivals	1,400	1,400	1,400
	NAA-3	National Project for Plant Protection and Aerial Spraying	10,000	7,500	7,500
	NAA-4	Agricultural Technology Transfer to Farmers Project	10,000	10,000	10,000
	NAQ-1	Development and Improvement of Plant Quarantine	1,100	900	900
Livestock		Subtotal	79,320	72,520	74,576
	NLL-1	Rangeland Revegetation Project in Southern Region	3,552	3,552	3,552
	NLL-2	Animal Health and Disease Control Project	31,423	29,367	31,423
	NLE-1	Livestock Extension Development Project	632	632	632
	NLR-1	Livestock Research Development Project	6,550	6,050	6,050
	NLW-1	Livestock Marketing Improvement Project	7,604	7,604	7,604
	NLL-3	Livestock Input Company Project	1,359	1,359	1,359
	NLL-4	Small Farm Development Support Project	25,899	21,655	21,655
	NLL-5	Livestock Specialized Services Program	2,301	2,301	2,301
	Distribution		Subtotal	30,067	30,067
ND-1		Establishment of Wholesale Market	18,326	18,326	18,326
ND-2		Supply and Demand Forecast of Agricultural Produce	444	444	444
ND-3		Establishment of Shipping Organization for Farmers	1,220	1,220	1,220
ND-4		Fortification of PAMAP	10,077	10,077	10,077
Agricultural Produce Processing		Subtotal	10,918	10,918	10,918
	NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	5,100	5,100	5,100
	NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	1,410	1,410	1,410
	NP-3	Establishment of Pickling and Vinegar-Processing Plant	1,782	1,782	1,782
	NP-4	Establishment of Coconut-Processing Plant	2,626	2,626	2,626
Inter-Sectoral		Subtotal	43,644	41,144	41,144
	NI-1	Integrated Agricultural Development Project in Nejd	16,553	16,553	16,553
	NI-2	Improvement and Maintenance of MAF Facilities	20,991	20,991	20,991
	NI-3	Artificial Rainfall Project	2,500	0	0
	OI-1	Citizen's Compensation against Natural Crisis	3,000	3,000	3,000
	OI-2	Master Plan for Development of Date Palm Cultivation	600	600	600
Total			588,606	403,866	479,737
		MAF Budget	557,333	372,593	448,464
		PAMAP Budget	31,273	31,273	31,273
		Agricultural Investment	535,524	350,784	426,655

Table 8.4.3 Regional Budget Total - 10-Year Plan (Alternative 2)

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000000)	REGION					MUSCAT	TOTAL BUDGET (1000000)
				SHARQIYA	DAKHLIYA	BAHARIYA	JANUBIYA	MUSUNDIRI		
Irrigation and Des	NI-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	259,922	8,277	112,091	32,142	56,115	33,918	13,950	3,928
	NI-2	Subsidy for New Irrigation System Project	42,890	27,960		3,980	2,550			
	NI-3	Legal Framework for Agricultural Water Use	37,500	750	20,625	4,675	5,250	3,375	2,250	375
	NI-4	Research Dams	250	10	128	38	35	25	8	6
	NI-5	Sub-surface (Underground) Dams	61,645	4,755	39,328	6,403	13,237	11,872	1,445	3,428
	NI-6	Wells	5,000	2,765		35	2,130		35	
	NI-7	Wells	59,620	2,420	13,310	9,950	22,230	11,110		
	NI-8	Springs	18,000	120	5,580	4,560	3,240	4,200	180	120
	NI-9	Erosion Control and Protection of Agricultural Land against Floods	4,887						4,887	
	NI-10	Survey and Monitoring	6,510			550	4,760	50		525
Agricultural Research	NI-11	Survey and Monitoring	5,820	222	2,649	667	1,263	700	200	119
	NI-12	Support for Agricultural Research Stations	18,200	160	9,240	2,050	1,485	1,400	2,985	188
	NI-13	Establishment of New Research Units and Laboratories	5,300		2,000	650	850	600	1,000	
	NI-14	Establishment of New Research Units and Laboratories	5,300		5,250		75		275	
	NI-15	Development and Establishment of Experimental Farms and Nurseries	2,000		450	300	550	250	950	100
	NI-16	Forestry-Improvement Program	2,300	80	500	300	230	200	600	40
Agricultural Extension	NI-17	Establishment of Local Survey and Control Unit	2,300	80	1,040	300	280	200	60	40
	NI-18	Soil Surveys	1,300			300	150	150	180	
	NI-19	Improvement and Development of Extension Centers and Facilities	2,850	1,959	6,835	4,828	4,328	3,328	1,127	852
	NI-20	Establishment of Development Support Communication Center (DSCC)	3,520	172	840	551	737	643	283	284
	NI-21	Training of Researchers, Extension Staff and Statistics Staff	1,190							
	NI-22	Intensive Extension Guidance Program	2,620	77	1,145	265	368	285	334	88
Agricultural Production	NI-23	Collection and Organization of Agricultural Statistics	15,820	520	4,850	3,880	3,260	2,480	510	480
	NI-24	Agricultural Exhibitions and Festivals	21,920	1,950	10,551	2,630	2,655	1,920	1,920	460
	NI-25	National Project for Plant Protection and Aerial Spraying	2,000	52	1,030	309	286	286	124	41
	NI-26	Agricultural Technology Transfer to Farmers Project	1,400	971	71	71	71	71	71	71
	NI-27	Development and Improvement of Plant Quarantine	7,500	225	4,050	1,050	85	675	525	150
	NI-28	Development and Improvement of Plant Quarantine	10,000	300	5,400	1,400	1,100	900	700	200
	NI-29	Development and Improvement of Plant Quarantine	900	300						
	NI-30	Development and Improvement of Plant Quarantine	74,576	2,328	15,384	7,071	8,484	7,542	31,575	1,612
	NI-31	Rangeland Revegetation Project in Southern Region	3,552							
	NI-32	Animal Health and Disease Control Project	31,423	793	7,499	3,227	2,649	4,575	11,692	988
Livestock	NI-33	Livestock Extension Development Project	432	2	241	36	36	36	271	9
	NI-34	Livestock Research Development Project	6,050		2,446		1,473		2,131	
	NI-35	Livestock Marketing Improvement Project	7,504	91	196	108	100	100	6,980	13
	NI-36	Livestock Input Company Project	1,359	983						
	NI-37	Small Farm Development Support Project	2,301	59	575	276	230	276	805	69
	NI-38	Livestock Specialized Services Program	21,655	282	5,027	3,424	3,686	2,547	6,136	533
	NI-39	Establishment of Wholesale Market	30,667	10,372	6,235	2,843	2,745	3,067	4,684	51
	NI-40	Supply and Demand Forecast of Agricultural Produce	18,326	7,243	3,468	1,582	1,682	2,488	2,783	
	NI-41	Establishment of Shipping Organization for Farmers	444	444						
	NI-42	Fortification of PAMAP	1,220	165	397	165	165	165	165	165
Distribution	NI-43	Supply and Demand Forecast of Agricultural Produce	10,977	2,520	3,371	397	639	455	1,746	91
	NI-44	Establishment of Shipping Organization for Farmers	78,979	3,260	4,283	765	1,293	510	2,773	182
	NI-45	Establishment of Wholesale Market	5,100	304	2,652	765	714	518	153	132
	NI-46	Supply and Demand Forecast of Agricultural Produce	1,410	449	466	495				
Agricultural Produce Processing	NI-47	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	1,792	807	891	84				
	NI-48	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	2,620							
	NI-49	Establishment of Pickling and Unseasoned Processing Plant	41,144	5,555	7,282	2,990	2,874	2,410	18,451	1,462
	NI-50	Establishment of Coconut-Processing Plant	20,591	5,511	5,410	2,450	2,378	2,050	1,750	1,410
Inter-Sectoral	NI-51	Integrated Agricultural Development Project in Nejd	16,553							
	NI-52	Improvement and Maintenance of MAF Facilities	3,000	120	1,560	450	420	300	90	60
	NI-53	Artificial Rainfall Project	500	24	312	90	82	60	18	12
Total		Master Plan for Development of Date Palm Cultivation	479,737	32,068	173,228	55,316	80,284	54,248	76,781	7,910

Share by Sector



Share by Region

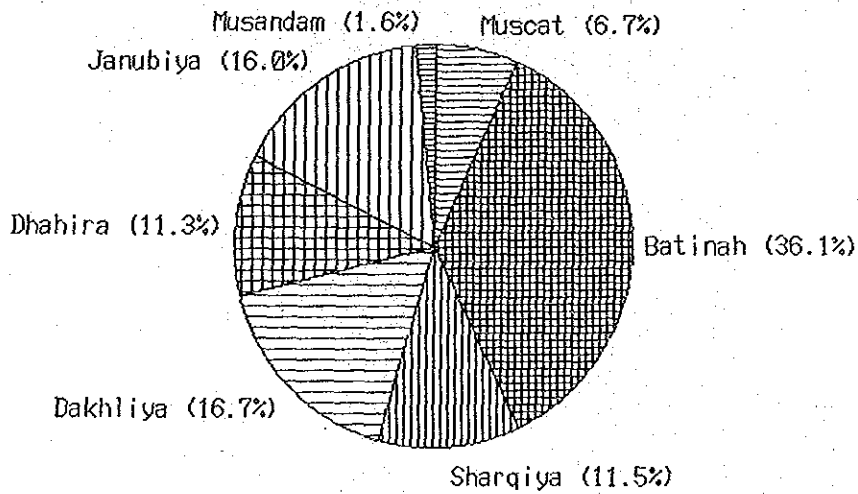


Figure 8.4.1 Sectoral and Regional Breakdown of the Budget Outlay for the 10-Year Agricultural Development Plan (Alternative 2)

8.5 Regional Development

8.5.1 Strategy

Regional development aims at integrated rural development, with agriculture at the center of a balanced regional economy also containing industrial and marketing components.

In formulating this type of regional development strategy, attention is given to the following:

- (1) Self-reliance of the regional community (establishment of a rural society capable of independently and vigorously pursuing agricultural activity)
- (2) Environmental conservation
- (3) Balance between population and land use
- (4) Balanced availability of goods, and improved income
- (5) Establishment of small-scale infrastructure (as opposed to large-scale conventionally emphasized)
- (6) Diversification towards a multi-culture production system and reassessment of traditional agriculture

To date, agricultural development has been pursued from a national standpoint in Oman, with the sectoral base being established in the capital region under the previous Five-year Development Plans. Consequently, it is appropriate in the future to disperse this base to the key cities in each region.

Under the 10-year Master Plan, the "upstream" agriculture and livestock production sector is to be developed through the new technology dissemination effect of agricultural research stations and extension centers in rural areas centering on the key regional towns. The services

and activities in the foregoing facilities would reach not only farmers in and around the key towns, but in remote areas as well. Distribution facilities and wholesale markets under PAMAP would also be established at the key towns to facilitate the movement of produce to the "downstream" consumer market.

At the same time, agricultural production infrastructures would be strengthened through projects to construct recharge dams, rehabilitate traditional falaj and well systems, and establish modern irrigation facilities for efficient management of limited water resources.

Regional divisions designated by the Development Council are as follows:

Muscat, Batinah, Sharqiya, Dakhliya, Dhahira, Janubiyah, Musandam.

8.5.2 Region-wise Budget Allocation

Programs formulated under the Master Plan to address regional development are as follows:

- (1) Groundwater recharge through construction of recharge dams.
- (2) Economical water use through introduction of efficient irrigation systems.
- (3) Strengthening of research and extension activities pertaining to new agricultural and livestock technology to upgrade farmer technical levels.
- (4) Subsidies for inputs, equipment and machinery as an incentive for farmers to adopt new techniques.
- (5) Promotion of farm management combining both cropping and animal husbandry as a measure to increase farm income of the small farmer in particular.
- (6) Improvement of distribution system efficiency through establishment of wholesale markets under PAMAP and other distribution facilities and organizations.
- (7) Diversification of the rural economy through promotion of rural

industries.

- (8) Stimulation of awareness and interest in agriculture to stem the migration of youth away from the agricultural sector.

Region-wise investment distribution (%) for the total budget under the Master Plan for projects and programs to achieve the above is as follows:

Muscat	6%
Batinah	35%
Sharqiya	12%
Dakhliya	19%
Dhahira	13%
Janubiyah	14%
Musandam	1%

Regional allocation of project load budget was determined on the basis of the following criteria:

- (1) Projects with a fixed project area have been included in the allocation for the region to which that area belongs.
- (2) Projects for which total project load is known, but specific region-wise outlay will not be clear until the implementation stage, proportional outlay per region has been preliminarily estimated on the basis of most probable criteria such as proportion of cropped area to occur in a particular region, etc.
- (3) In the case of strictly nation-wide projects and programs, region-wise outlay is estimated on the basis of arbitrary criteria such as number of head of livestock affected in a particular region, etc.

8.5.3 Regional Emphasis

The largest regional outlay is that for the Batinah Region. The

reasons for this is that it is the major agriculture production area in Oman. Next largest region-wise outlay is for Dakhliya, and the next being roughly equal amounts for Dhahira, Sharqiya and Janubiya.

As projects are agriculture-related, investment proportion for Muscat is low.

In terms of sector-wise agricultural investment allocation by region, the irrigation and dam sector accounts for 61 % of the investment. Next in weight is that for the livestock sector. Region-wise allocation trends are basically the same for Batinah, Sharqiya, Dakhliya, Dhahira and Musandam. However, in the case of Muscat, investment ratio for distribution is relatively higher, while that for livestock and inter-sectoral (including Nejd) development is higher for Janubiya.

Investment per cropped hectare is largest in Janubiya for the five regions excluding Muscat and Musandam. However, it must be noted that the cropped area for Janubiya does not include the 200,000 ha of rangeland and 70,000 ha of natural pasture in the region. Unit area investment for Sharqiya, Dakhliya, Dhahira regions are all larger than for Batinah, reflecting the need to address the particularly backward levels of agriculture in these regions.

In per capita terms, investment rate is highest for Janubiya out of the five regions excluding Muscat and Musandam. The reason for this is that numerous high priority projects are concentrated in this region. Differential rate in per capita investment among the 5 regions is a factor of 1.9, which is within acceptable limits.

Also, a comparison of per capita investment in Batinah and the other regions of Sharqiya, Dakhliya and Dhahira reveals that with the exception of Sharqiya, investment rate in this regard is higher than for Batinah, indicating that region-wise allocation of funding is directed at balancing skewed levels of development between regions.

8.6 Human Resources Development

8.6.1 Generation of Employment

Human resources development will ultimately be the determining factor in the degree to which success is achieved under the Master Plan.

In order to achieve the goals under the 10-year Agricultural Development Plan, human resources must be deployed in a variety of sectors, including agriculture, livestock, irrigation and dams, etc.

Increased agricultural production will create farm labor demand in 2000 estimated by the JICA team at 161,090 workers. Of this, 145,144 are assumed to be Omani. As a result, it can be seen that the labor market in agriculture will readily be able to absorb in 2000 the estimated agricultural labor population at the time of 138,455.

Implementation of the 10-year Master Plan will create other employment opportunities as well. In particular, specialists will be needed to strengthen research and extension, agricultural statistics survey, livestock health and disease control, plant quarantine, etc. Specialists will include various engineers, experts, veterinarians, and government technocrats. PAMAP staff will need to be reinforced to promote expansion of farm-product-distribution system and establishment of wholesale markets. Management personnel and labor will also be needed in the agricultural produce processing area.

Total increase in MAF-related professional jobs is 1,487 (excluding distribution and agro-industry sectors as well as livestock marketing and Livestock Input Company). In addition, various support staff such as experimental farm workers, drivers, secretaries, etc. will be increased.

8.6.2 Training Programs

In order to achieve the goals of the Master Plan and promote the high priority policy of Omanization, training and technology transfer to the

Omani labor force is necessary. An outline of the training program envisaged under the 10-year Master Plan is as follows:

(1) Farmer training

In addition to training to be provided by the Agricultural Technology Information Units to be attached to each extension office, practical introduction of agricultural practices will be performed at the demonstration fields of the key farmers. Audio-visual teaching media to be developed at the Development Support Communication Center, will also be utilized.

3,000 key farmers are targeted for the first 5-year period, and another 3,000 in the second.

In the case of livestock holders, training aimed at 6,500 farmers will be conducted through a combination of subsidy (Small Holder Poultry Production Project and Intensive Livestock Production Project) and extension through demonstration units. Through the Grazing Control Project, 1,000 livestock holders in the Jabal region will be instructed in rangeland management techniques.

(2) Staff training

Research, extension and statistical survey staff will be trained at the training centers to be established at Rumais and in the Southern Region. Selected extension officers will also receive training outside Oman. During the 10 years of the agricultural development plan, 100 research staff, 2,000 extension staff, and 500 statistical staff would be expected to receive training through the above training centers. Also, 80 extension officers will be dispatched to overseas for study.

The 2,000 extension officers in the livestock sector will receive training in modern livestock husbandry techniques, including health and disease control, artificial insemination, rangeland management guidance, effective feeding methods, etc. This will also be performed at the centers at Rumais and in the Southern Region.

CHAPTER 9

FIRST 5-YEAR AGRICULTURAL

DEVELOPMENT PLAN

CHAPTER 9 First 5-Year Agricultural Development Plan

9.1 General

The 5-year Agricultural Development Plan comprises the projects to be implemented in the first 5-year period of the Master Plan, alternative 2 as recommended by the JICA team.

Essential targets, priorities and sector emphasis are the same as under the 10-year Master Plan.

9.2 Investment Frame for 5-Year Agricultural Development Plan

The required budget for agricultural development over the first 5 years under the 10-year Master Plan is R.O. 278 million (Table 9.2.1, 9.2.2, 9.2.3, Figure 9.2.1). Of this, outlay from the MAF budget is R.O. 261 million, and that from PAMAP is R.O. 17 million. Agricultural investment is R.O. 240 million.

Sector-wise outlays for the 5-year Agricultural Development Plan are R.O. 136 million for irrigation and dams (49 % of total), R.O. 37 million for agriculture (13 %), R.O. 48 million for livestock (17 %), R.O. 15 million for distribution (6 %), R.O. 10 million for agro-industry (4 %) and R.O. 32 million for inter-sectoral projects (12 %).

Of note, however, under the 5-year Agricultural Development Plan is the fact that 13,000 ha out of the total 30,000 ha of the subsidy for a New Irrigation System Project under the 10-year Master Plan would be implemented during the first 5 years. Also, target area under the pilot project for centrally-controlled irrigation for the first 5 years is 47 % of that under the 10-year Master Plan.

Extension and general farm-related activities are one of the highest priority sectors under the Master Plan. Establishment of a basic framework for the conduct of intensive extension activities is thus a major target.

Establishment of extension facilities is concerned in the first 5-year period to provide the essential framework for future activities.

Agricultural technology information units at each of the extension centers in 30 key towns will be implemented over the 5 years.

The Development Support Communication Center will be constructed in an early stage of the 5-year Agricultural Development Plan as well.

Livestock has much potential for development. Subsidy for poultry farmers is to be implemented during the first 5-year period. However, to encourage independence of farmer effort no subsidies would be provided farmers during the second 5-year period.

Intensive livestock production under the Small Farm Development Support Project would target 5 % of all holders for subsidies.

Given the urgency of measures to combat serious livestock infectious diseases such as FMD, rinderpest, PPR and CCPP, the Animal Health and Disease Control Project is to be implemented during the first 5-years period.

In the distribution sector, wholesale markets and collecting and shipping stations are to be implemented in a phased manner over the entire 5-year period.

Construction of a coconut plant in the Southern Region and other projects under the agricultural produce-processing program will be commenced as the results of the feasibility studies in this regard became available.

The Nejd project is considered particularly promising, and will entail an integrated implementation of research, extension and irrigation facilities with a view to increased agricultural investment efficiency.

Table 9.2.1 Budget Total - 5-Year Plan

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000RO)
			135,518
Irrigation and Dam	NW-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	19,800
	NW-2	Subsidy for New Irrigation System Project	16,250
	NW-3	Legal Framework for Agricultural Water Use	170
	NW-4	Recharge Dams	48,025
	NW-5	Sub-surface (Underground) Dams	2,500
	NW-6	Aflaj	29,670
	NW-7	Wells	9,000
	NW-8	Springs	1,969
	NW-9	Erosion Control and Protection of Agricultural Land against Floods	3,870
	NW-10	Survey and Monitoring	4,264
Agricultural Research			9,625
	NAR-1	Support for Agricultural Research Stations	2,710
	NAR-2	Establishment of New Research Units and Laboratories	3,075
	NAR-3	Development and Establishment of Experimental Farms and Nurseries	1,040
	NAR-4	Forestry-Improvement Program	1,000
	NAR-5	Establishment of Locust Survey and Central Unit	1,000
NAR-6	Soil Surveys	800	
			14,123
Agricultural Extension	NAE-1	Improvement and Development of Extension Centers and Facilities	3,520
	NAE-2	Establishment of Development Support Communication Center(DSCC)	1,190
	NAE-3	Training of Researchers, Extension Staff and Statistics Staff	1,503
	NAE-4	Intensive Extension Guidance Program	7,910
			12,960
Agricultural Production	NAA-1	Collection and Organization of Agricultural Statistics	1,360
	NAA-2	Agricultural Exhibitions and Festivals	700
	NAA-3	National Project for Plant Protection and Aerial Spraying	5,000
	NAA-4	Agricultural Technology Transfer to Farmers Project	5,000
	NAQ-1	Development and Improvement of Plant Quarantine	900
			47,546
Livestock	NLL-1	Rangeland Revegetation Project in Southern Region	2,352
	NLL-2	Animal Health and Disease Control Project	16,425
	NLE-1	Livestock Extension Development Project	482
	NLR-1	Livestock Research Development Project	4,050
	NLM-1	Livestock Marketing Improvement Project	6,371
	NLL-3	Livestock Input Company Project	1,359
	NLL-4	Small Farm Development Support Project	15,285
	NLL-5	Livestock Specialized Services Program	1,222
			15,397
Distribution	ND-1	Establishment of Wholesale Market	3,656
	ND-2	Supply and Demand Forecast of Agricultural Produce	444
	ND-3	Establishment of Shipping Organization for Farmers	1,220
	ND-4	Fortification of PANAP	10,077
			10,474
Agricultural Produce Processing	NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	5,100
	NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	1,134
	NP-3	Establishment of Pickling and Vinegar-Processing Plant	1,614
	NP-4	Establishment of Coconut-Processing Plant	2,626
			32,333
Inter-Sectoral	NI-1	Integrated Agricultural Development Project in Nejd	13,242
	NI-2	Improvement and Maintenance of MAF Facilities	16,991
	NI-3	Artificial Rainfall Project	0
	OI-1	Citizen's Compensation against Natural Crisis	1,500
	OI-2	Master Plan for Development of Date Palm Cultivation	600
Total			277,976

Table 9.2.2 Annual Budget Total - 5-Year Plan

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (180000)	ANNUAL BUDGET REQUIREMENT				
				1991	1992	1993	1994	1995
Irrigation and Dam	NW-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	135,518	29,132	23,117	27,835	22,538	34,896
	NW-2	Subsidy for New Irrigation System Project	19,800	620	500	3,800	6,360	8,040
	NW-3	Legal Framework for Agricultural Water Use	16,250	2,500	2,500	3,750	3,750	3,750
	NW-4	Recharge Dams	48,825	9,350	9,150	9,450	9,600	11,475
	NW-5	Sub-surface (Underground) Dams	29,670	5,150	6,270	6,110	6,070	6,070
	NW-6	Wells	3,200	1,800	1,800	1,800	1,800	1,800
	NW-7	Spring	1,969	370	375	378	476	430
	NW-8	Erosion Control and Protection of Agricultural Land against Floods	3,870	70	760	1,040	1,030	970
	NW-9	Survey and Monitoring	4,264	1,197	1,137	1,282	332	316
	NW-10	Support for Agricultural Research Stations	3,625	2,430	2,200	1,700	1,700	1,595
Agricultural Research	NAR-1	Establishment of New Research Units and Laboratories	2,710	1,035	640	395	325	315
	NAR-2	Development and Establishment of Experimental Farms and Nurseries	3,875	875	690	410	580	520
	NAR-3	Forestry-Improvement Program	1,000	200	200	200	200	200
	NAR-4	Establishment of Locust Survey and Central Unit	1,000	200	200	200	200	200
	NAR-5	Soil Surveys	800	200	200	200	200	200
	NAR-6	Improvement and Development of Extension Centers and Facilities	14,123	9,137	2,930	2,742	2,432	2,376
Agricultural Extension	NAE-1	Training of Researchers, Extension Staff and Statistics	3,920	764	794	744	634	584
	NAE-2	Intensive Extension Guidance Program	1,190	702	258	212	12	6
	NAE-3	Collection and Organization of Agricultural Statistics	1,593	680	204	204	204	284
	NAE-4	Agricultural Exhibitions and Festivals	7,910	1,582	1,582	1,582	1,582	1,582
	NAE-5	National Project for Plant Protection and Aerial Spraying	12,968	2,859	3,080	2,583	2,583	2,050
	NAE-6	Development and Improvement of Plant Quarantine	1,360	384	330	225	121	121
Livestock	NAL-1	Range and Revitalization Project in Southern Region	700	275	50	63	262	50
	NAL-2	Animal Health and Disease Control Project	5,000	1,000	1,000	1,000	1,000	1,000
	NAL-3	Livestock Research Development Project	5,000	1,000	1,000	1,000	1,000	1,000
	NAL-4	Livestock Marketing Improvement Project	800	200	400	100	200	200
	NAL-5	Small Farm Development Support Project	47,548	9,364	9,545	9,471	9,961	9,505
	NAL-6	Establishment of Wholesale Market	2,352	576	576	300	400	400
	NAL-7	Livestock Extension Development Project	16,485	3,037	2,971	3,237	3,950	3,530
	NAL-8	Livestock Research Development Project	482	196	30	196	30	30
	NAL-9	Livestock Marketing Improvement Project	4,050	837	792	792	792	837
	NAL-10	Livestock Input Company Project	6,371	575	1,561	872	1,734	1,520
Distribution	ND-1	Supply and Demand Forecast of Agricultural Produce	1,359	376	376	383	383	383
	ND-2	Establishment of Shipping Organization for Farmers	15,285	3,055	3,028	3,046	3,078	3,068
	ND-3	Fertilization of PHAP	1,222	778	111	111	111	111
	ND-4	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	15,397	573	602	3,694	4,102	6,426
Agricultural Processing	NP-1	Establishment of Pickling and Vinegar-Processing Plant	3,656	243	40	111	459	2,803
	NP-2	Establishment of Coconut-Processing Plant	444	150	114	60	120	120
	NP-3	Establishment of Limes and Tomatoes	1,220	160	320	320	320	420
	NP-4	Establishment of Integrated Agricultural Development Project in Najd	10,877	1,700	288	3,203	3,203	3,203
Inter-Sectoral	NI-1	Improvement and Maintenance of NAF Facilities	18,474	1,100	4,562	3,318	622	286
	NI-2	Artificial Rainfall Project	1,124	148	430	406	150	150
	NI-3	Citizen's Compensation against Natural Crisis	1,614	132	1,482	412	472	200
	NI-4	Master Plan for Development of Date Palm Cultivation	2,626	1,320	152	412	472	200
	NI-5	Integrated Agricultural Development Project in Najd	32,339	8,450	7,851	5,555	4,411	6,066
	NI-6	Artificial Rainfall Project	13,242	1,655	1,655	1,655	3,311	4,966
Total			16,991	5,895	5,896	3,600	800	800
			1,500	300	300	300	300	300
Total			277,976	49,014	59,796	56,703	63,114	63,114

Table 9.2.3 Regional Budget Total of 5-Year Plan

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000RD)	REGION					MUSCAT	TOTAL BUDGET (1000RD)	JANUBIYA	MUSANDAM
				BATINAH	SHARQIYA	DAKHLIYA	DHAHIRA	JANUBIYA				
Irrigation and Dam	NW-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	135,516	1,982	15,310	32,474	19,722	7,710	19,800	3,120	2,557	
	NW-2	Subsidy for New Irrigation System Project	16,250	325	2,113	2,275	1,463	975	163			
	NW-3	Legal Framework for Agricultural Water Use	17,170	7	89	24	17	5	3			
	NW-4	Recharge Dams	48,385	325	23,819	4,819	3,526	7,983	1,254	2,250		
	NW-5	Sub-surface (Underground) Dams	2,500		300	35	2,895	35				
	NW-6	Afaj	29,670	1,220	6,580	5,800	11,190	5,580				
	NW-7	Wells	9,000	50	2,990	2,200	1,620	2,080	120	30		
	NW-8	Springs	1,969						1,969			
	NW-9	Erosion Control and Protection of Agricultural Lands against Floods	3,870	70	50	3,700	85	25				
	NW-10	Survey and Monitoring	4,284	45	1,981	427	944	549	207	111		
Agricultural Research	NAR-1	Support for Agricultural Research Stations	9,525	80	5,150	695	1,425	290	1,385	110		
	NAR-2	Establishment of New Research Units and Laboratories	2,710	1,200	235	600		675				
	NAR-3	Development and Establishment of Experimental Farms and Nurseries	3,075	2,800		50		165				
	NAR-4	Forestry-Improvement Program	1,000	40	250	150	140	100	300	20		
	NAR-5	Establishment of Locust Survey and Central Unit	1,800	40	520	150	140	100	30	20		
	NAR-6	Soil Surveys	800		160	80	80	80	480			
Agricultural Extension	NAE-1	Improvement and Development of Extension Centers and Facilities	14,123	1,661	4,830	2,594	2,530	1,986	755	568		
	NAE-2	Establishment of Development Support Communication Center (ADSCC)	3,520	172	840	561	737	643	293	264		
	NAE-3	Training of Researchers, Extension Staff and Statistics Staff	1,190	1,190								
	NAE-4	Intensive Extension Guidance Program	7,310	280	2,425	1,300	1,630	1,200	255	240		
	NRA-1	Collection and Organization of Agricultural Statistics	12,960	1,127	6,116	1,640	1,272	1,217	1,217	263		
	NRA-2	Agricultural Exhibitions and Festivals	1,360	41	690	204	190	136	82	27		
	NRA-3	National Project for Plant Protection and Aerial Spraying	5,000	485	36	36	36	36	36	36		
	NRA-4	Agricultural Technology Transfer to Farmers Project	5,200	150	2,700	700	550	450	350	100		
	NRA-5	Development and Improvement of Plant Quarantine	900	150	2,700	700	550	450	350	100		
	NRA-6	Rangeland Revegetation Project in Southern Region	47,546	305	9,630	4,415	6,353	4,886	20,323	955		
Livestock	NLL-1	Animal Health and Disease Control Project	2,352									
	NLE-1	Livestock Extension Development Project	16,425	365	3,841	1,519	1,225	2,867	6,046	561		
	NLR-1	Livestock Research Development Project	482	5	204	18	15	18	219	5		
	NLL-2	Livestock Marketing Improvement Project	4,050		1,890		979		1,381			
	NLL-3	Small Farm Development Support Project	1,359	370	143	72	66	72	5,992	10		
Distribution	ND-1	Establishment of Wholesale Market	15,285	191	3,435	2,659	2,969	1,762	3,907	342		
	ND-2	Supply and Demand Forecast of Agricultural Produce	1,222	37	306	147	122	147	428	37		
	ND-3	Supply of Agricultural Inputs and Services	3,656	15,387	6,705	1,161	1,063	619	1,811	91		
	ND-4	Supply and Demand Forecast of Agricultural Produce	444	3,577	79							
	ND-5	Establishment of Shipping Organization for Farmers	1,220	155	397	165	165	165	165	165		
Agricultural Processing	NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	10,474	1,194	3,925	765	1,209	510	2,779	192		
	NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	5,103	204	2,652	765	714	510	153	102		
	NP-3	Establishment of Pickling and Vinegar-Processing Plant	1,134	173	460		495					
	NP-4	Establishment of Coconut-Processing Plant	1,814	897	807							
Inter-Sectoral	NI-1	Integrated Agricultural Development Project in Field	32,323	5,435	4,422	2,165	2,104	1,880	14,975	1,372		
	NI-2	Improvement and Maintenance of RAF Facilities	13,242									
Total	OI-1	Artificial Rainfall Project	18,991	5,351	3,330	1,850	1,810	1,550	1,242	1,330		
	OI-2	Citizen's Compensation against Natural Crisis	0	0	0	0	0	0	0	0		
Total		Master Plan for Development of Date Palm Cultivation	600	24	312	90	94	60	18	12		
			277,976	19,159	96,841	28,744	46,485	31,134	51,565	6,058		

Table 9.2.4 Annual Budget of Irrigation and Dam Sector
- 5-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	5 YEAR TOTAL (1000000)	ANNUAL BUDGET REQUIREMENT				
			1991	1992	1993	1994	1995
NW-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	19,800	620	980	3,000	6,360	8,040
	Study Phase (P/S,F/S)	1,500	320	480	300	240	240
	Pilot Project	18,220	300	500	3,500	6,120	7,800
NW-2	Subsidy for New Irrigation System Project for 30,000ha	15,250	2,500	2,500	3,750	3,750	3,750
NW-3	Legal Framework for Agricultural Water Use	170		45	45		80
NW-4	Recharge Dams	48,025	8,350	9,150	9,450	9,600	11,475
NW-4-1	Groundwater-Recharge Scheme						
	Study Phase	3,750	750	750	750	750	750
	Construction Phase	38,200	6,600	7,400	7,500	7,500	9,200
NW-4-2	Maintenance and Improvement of Existing and Newly Constructed Dams	2,325	250	250	450	600	775
NW-4-3	Recharged Water Effective Use Pilot Project (Study)	250	50	50	50	50	50
NW-4-4	Identification of New Groundwater-Recharge Schemes	3,500	700	700	700	700	700
NW-5	Sub-Surface (Underground) Dams	2,500	75	100	100	100	1,965
	Reconnaissance Study	75	75				
	Preliminary Study	150		100	50		
	Feasibility Study	300			100	150	50
	Pilot Project (Construction)	1,900					1,900
	Observation and Monitoring	75			30	30	15
NW-6	Aflaj	29,670	5,150	6,270	6,110	6,070	6,070
NW-6-1	Repair and Maintenance of Aflaj	24,000	4,800	4,800	4,800	4,800	4,800
NW-6-2	Distribution System Improvement Pilot Project in Oasis (Study)	750	150	150	150	150	150
NW-6-3	Improvement and Maintenance of Major Aflaj						
	Study	920	200	320	160	120	120
	Construction	4,000		1,000	1,000	1,000	1,000
NW-7	Wells	9,000	1,800	1,800	1,800	1,800	1,800
NW-7-1	Subsidy for Repair of Existing Open Wells	3,000	600	600	600	600	600
NW-7-2	Assistant Wells for Aflaj	6,000	1,200	1,200	1,200	1,200	1,200
NW-8	Springs	1,989	370	375	378	416	430
NW-8-1	Improvement of Springs	1,750	350	350	350	350	350
NW-8-2	Annual Maintenance of Open Channel for Spring	219	20	25	28	66	80
NW-9	Erosion Control and Protection of Agricultural Land against Floods	3,870	70	760	1,040	1,030	970
	Study Phase	270	70	50	50	50	50
	Construction Phase	3,600		710	990	980	920
NW-10	Survey and Monitoring	4,264	1,197	1,137	1,282	332	316
NW-10-1	Long-term Plan for Aerial Photography and Ortho-photo Mapping	1,118	250	217	217	217	217
NW-10-2	Establishment and Operation of hydrological Monitoring Network for Recharge Dams	3,146	947	920	1,065	115	99
TOTAL	DEVELOPMENT BUDGET TOTAL	135,518	28,132	23,117	27,835	29,538	34,896

Table 9.2.5 Annual Budget of Agricultural Research Sector
- 5-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000RO)	ANNUAL BUDGET				
			1981	1982	1983	1984	1985
NAR-1	SUPPORT FOR AGRICULTURAL RESEARCH STATIONS	2,710	1,035	640	395	325	315
NAR-1-1	AGRICULTURAL RESEARCH FACILITIES AT RUMAIS	600	200	100	100	100	100
NAR-1-2	AGRICULTURAL RESEARCH FACILITIES AT JEMMAH	600	350	70	60	60	50
NAR-1-3	AGRICULTURAL RESEARCH FACILITIES AT SALALAH	675	350	130	65	65	65
NAR-1-4	AGRICULTURAL RESEARCH FACILITIES AT SOHAR	600	60	300	120	60	60
NAR-1-5	AGRICULTURAL RESEARCH FACILITIES AT SHARQIYA	235	75	40	40	40	40
NAR-1-6	AGRICULTURAL RESEARCH FACILITIES AT DHARIRA						
NAR-2	ESTABLISHMENT OF NEW RESEARCH UNITS AND LABORATORIES	3,075	875	620	410	500	520
NAR-2-1	AGRICULTURAL MACHINERY RESEARCH UNIT AT RUMAIS	475	215	65	65	65	65
NAR-2-2	TOXICOLOGY LABORATORY (RUMAIS)	235	75	100	30	15	15
NAR-2-3	SEED AND TUBER PRODUCTION RESEARCH UNIT (RUMAIS)	70		20	20	10	10
NAR-2-4	CENTRAL SOIL, PLANT AND WATER ANALYSIS LABORATORY (RUMAIS)	600	300	75	75	75	75
NAR-2-5	LIBRARY AND DOCUMENTATION CENTER (RUMAIS)	240		160	30	25	25
NAR-2-6	PLANT WATER REQUIREMENT DETERMINATION UNIT (SALALAH)	100		100			
NAR-2-7	MEDICAL AND PERFUME PLANT RESEARCH UNIT (SALALAH)						
NAR-2-8	DISEASE AND PEST FORECASTING UNIT (RUMAIS)	100					
NAR-2-9	SALT TOLERANT PLANTS AND HALOPHYTES RESEARCH UNITS (RUMAIS)	200					
NAR-2-10	HONEY BEE LABORATORY (RUMAIS)	140	50	25	25	20	20
NAR-2-11	HONEY BEE RESEARCH UNIT (SALALAH)	85	20	15	10	10	10
NAR-2-12	HONEY BEE RESEARCH UNIT (JEMMAH)	50	15	15	10	5	5
NAR-2-13	DATE PALM RESEARCH UNIT (RUMAIS)	800	200	115	95	195	195
NAR-3	DEVELOPMENT AND ESTABLISHMENT OF EXPERIMENTAL FARMS AND NURSERIES	1,040	120	270	295	195	160
NAR-3-1	DEVELOPMENT OF ARABIC COFFEE EXPERIMENTAL FARM IN SALALAH	135			50	45	40
NAR-3-2	DEVELOPMENT OF NURSERIES AT RUMAIS AND BARKA	220	120	40	30	20	10
NAR-3-3	DEVELOPMENT OF NURSERIES AT SOHAR	100		40	20	20	20
NAR-3-4	DEVELOPMENT OF NURSERIES IN INTERIOR	300		150	30	40	30
NAR-3-5	DEVELOPMENT OF NURSERIES IN SOUTHERN REGION	100		40	20	20	20
NAR-3-6	DEVELOPMENT OF EXPERIMENTAL FARM AT WADI QURIYAT	115			65	25	25
NAR-3-7	DEVELOPMENT OF EXPERIMENTAL FARM AT MUSANDAQ	70			30	25	15
NAR-3-8	DEVELOPMENT OF EXPERIMENTAL FARM AT SHARQIYA						
NAR-3-9	DEVELOPMENT OF EXPERIMENTAL FARM AT DHARIRA						
NAR-4	FORESTRY-IMPROVEMENT PROGRAM	1,000	200	200	200	200	200
NAR-5	ESTABLISHMENT OF LOCUST SURVEY AND CENTRAL UNIT (RUMAIS, ALL REGION)	1,000	200	200	200	200	200
NAR-6	SOIL SURVEYS	800		200	200	200	200
TOTAL	DEVELOPMENT BUDGET TOTAL	9,625	2,430	2,200	1,700	1,700	1,595

Table 9.2.6 Annual Budget of Agricultural Extension Sector
- 5-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	PRIO.	TOTAL BUDGET (1000RO)	ANNUAL BUDGET				
				1991	1992	1993	1994	1995
NAE-1	IMPROVEMENT AND DEVELOPMENT OF EXTENSION CENTERS AND FACILITIES		3,520	764	794	744	634	564
NAE-1-1	ESTABLISHMENT OF EXTENSION CENTERS IN REMOTE AREA	A	400	100	150	100	50	
NAE-1-2	IMPROVEMENT OF EXTENSION CENTER FACILITIES	A	1,620	364	344	344	284	284
NAE-1-3	DEVELOPMENT OF AGRICULTURAL TECHNOLOGY INFORMATION UNITS (ATIU)	A	1,500	300	300	300	300	300
NAE-2	ESTABLISHMENT OF DEVELOPMENT SUPPORT COMMUNICATION CENTER (DSCC)	A	1,190	702	258	212	12	6
NAE-3	TRAINING OF RESEARCHERS, EXTENSION STAFF AND STATISTICS STAFF	A	1,503	699	294	204	204	204
NAE-4	INTENSIVE EXTENSION GUIDANCE PROGRAM		7,910	1,582	1,582	1,582	1,582	1,582
NAE-4-1	SUPPORTING KEY FARMER EXTENSION PROGRAM	A	1,500	300	300	300	300	300
NAE-4-2	DATE PALM REHABILITATION & IMPROVEMENT PROGRAM	A	5,910	1,182	1,182	1,182	1,182	1,182
NAE-4-3	PROVISION OF INPUTS FOR EXPERIMENTAL PURPOSES	A	500	100	100	100	100	100
TOTAL	DEVELOPMENT BUDGET TOTAL		14,123	3,737	2,838	2,742	2,432	2,376

Table 9.2.7 Annual Budget of Agricultural Production Sector
- 5-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000RO)	ANNUAL BUDGET				
			1991	1992	1993	1994	1995
NAA-1	COLLECTION AND ORGANIZATION OF AGRICULTURAL STATISTICS	1,360	384	630	225	121	
NAA-1-1	AGRICULTURAL CENSUS	700	300	350	50		
NAA-1-2	ANNUAL UPDATE OF IMPORTANT AGRICULTURAL STATISTICS	660	84	280	175	121	
NAA-2	AGRICULTURAL EXHIBITION AND FESTIVAL	700	275	50	63	262	50
NAA-2-1	INTERNATIONAL AGRICULTURE AND FOOD EXHIBITION	450	225		13	212	
NAA-2-2	DOMESTIC AGRICULTURAL FESTIVAL	250	50	50	50	50	50
NAA-3	NATIONAL PROJECT FOR PLANT PROTECTION AND AERIAL SPRAY	5,000	1,000	1,000	1,000	1,000	1,000
NAA-4	AGRICULTURAL TECHNOLOGY TRANSFER PROJECT TO FARMERS	5,000	1,000	1,000	1,000	1,000	1,000
NAA TOTAL		12,060	2,659	2,680	2,288	2,383	2,050
NAA-1	DEVELOPMENT & IMPROVEMENT OF PLANT QUARANTINE	900	200	400	100	200	
TOTAL	DEVELOPMENT BUDGET TOTAL	12,960	2,859	3,080	2,383	2,583	2,050

Table 9.2.8 Annual Budget of Livestock Sector
- 5-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	PRIO.	TOTAL BUDGET (1000RO)	ANNUAL BUDGET				
				1991	1992	1993	1994	1995
NLL-1	Rangeland Revegetation Project in Southern Region		2,352	576	400	400	400	400
NLL-1-1	Establishment of Rangeland Management	A	352	176	176			
NLL-1-2	Grazing Control	B	2,000	400	400	400	400	400
NLL-2	Animal Health & Disease Control Project		16,425	3,037	2,971	3,237	3,650	3,530
NLL-2-1	Development of New Quarantines	A	1,975	395	395	395	395	395
NLL-2-1-1	Animal Clinics Improvements	A	1,198	238	238	238	238	238
NLL-2-2	Laboratory Development	A	659	306	30	20	293	30
NLL-2-3	CCPP Vaccine Development	C	98			30	30	30
NLL-2-4	National Vaccination	A	3,822	1,369	1,595	1,831	1,971	2,116
NLL-2-5	Supplies of Veterinary Equipment	B	3,000	600	600	600	600	600
NLL-2-6	Brucellosis Control in South	B	621	129	123	123	123	123
NLE-1	Livestock Extension Development		432	196	30	30	196	30
NLE-1-1	Extension Method Improvement	A	150	30	30	30	30	30
	Demonstration of Using Equipment							
	Visual Extension							
	Establishment of Demonstration Unit							
NLE-1-2	Training Center Development	B	332	166				166
NLR-1	Livestock Research Development		4,050	837	792	792	792	837
NLR-1-1	Development of Livestock Research Centers	A	2,028	409	409	409	409	409
NLR-1-2	Research Centers Management Consultancy	A	2,050	437	392	392	392	437
NLM-1	Livestock Marketing Improvement Project		6,371	575	1,661	872	1,734	1,529
NLM-1-1	Company for Livestock Products	A	1,516	50	868	282	289	282
NLM-1-2	Cattle Fattening	B	130				50	130
NLM-1-3	Cut Meat Processing	C	487				171	316
NLM-1-4	Milk Collecting and Processing	B	1,161	25	211	88	729	106
NLM-1-5	Hides and Skins Development	C	182					182
NLM-1-6	Cattle Destocking Subsidy	A	2,500	500	500	500	500	500
NLM-1-7	Marketing Promotion	C	335		84	84	84	83
NLL-3	Livestock Input Company Project	B	1,358		376	933		
NLL-4	Small Farm Development Support Project		15,295	3,065	3,028	3,046	3,078	3,069
NLL-4-1	Smallholder Poultry Production	A	8,955	1,761	1,754	1,772	1,774	1,794
NLL-4-2	Intensive Livestock Production	A	6,370	1,274	1,274	1,274	1,274	1,274
NLL-4-3	A.I. Services for Dairy Cow	B	60	30				30
NLL-5	Livestock Specialized Services		1,222	778	111	111	111	111
NAA-1-1	Livestock Census	B	524	524				
NLL-5-1	National Disease Survey	B	55	11	11	11	11	11
NLM-2	Marketing Survey	A	143					
NLL-5-2	Consultancy Services (Study)	A	586	182	182	182	182	182
	Total		47,548	9,064	9,545	9,471	9,961	9,595
	Percentage			19.1	20.1	19.9	21.0	20.0

Table 9.2.9 Annual Budget of Distribution Sector - 5-Year Plan

DESCRIPTION PROJECT NUMBER	NAME OF PROJECT/PROGRAM	PRIO. 5 YEAR					ANNUAL BUDGET					
		TOTAL	1991	1992	1993	1994	1995					
ND-1	NM-1											
	NM-1-1	ESTABLISHMENT OF WHOLESALE MARKET (STUDY)	322	243	40	39						
	NM-1-2	STUDY ON ESTABLISHING WHOLESALE MARKET	210	210								
	NM-1-3	STUDY ON EXPANION OF DISTRIBUTION VOLUME IN PAPAP	33	33								
ND-2	NM-1-4	IMPLEMENTATION ON EXPANSION OF DISTRIBUTION VOLUME IN PAPAP										
	NM-2	TRAINING STAFFS OF PAPAP FOR IMPLEMENTATION OF THE PILOT	79		40	39						
	NM-2-1	PILOT WHOLESALE MARKET	524			72	388					
	NM-2-2	OPERATION OF PILOT WHOLESALE MARKET (SUPPORT BY CONSULTANT)	216			72	72					
ND-3	NM-3	DETAIL DESIGN ON WHOLESALE MARKET	308				308					
	NM-3-1	CONSTRUCTION AND OPERATION OF WHOLESALE MARKET	2,810					79	2,731			
	NM-3-2	CONSTRUCTION OF WHOLESALE MARKET	2,526						2,526			
	NM-3-3	PHASE-1 MUTTRAH										
	NM-3-4	CONSTRUCTION OF WHOLESALE MARKET (SUPERVISION BY CONSULTANT)	126									
	NM-3-5	PHASE-1 MUTTRAH										
	NM-3-6	TRAINING STAFFS FOR OPERATION OF WHOLESALE MARKETS (SUPPORT)	158					79	79			
	NM-3-7											
	NM-3-8											
	NM-3-9											
ND-4	SUBTOTAL		3,656	243	40	111	459	2,803				
	NM-4	BASIC DATA COLLECTING PROGRAM	240	150	66	12	12					
	NM-4-1	BASIC DATA COLLECTING PROGRAM (STUDY)	98	98								
	NM-4-2	BASIC DATA COLLECTING PROGRAM (EQUIPMENT)	43				43					
	NM-4-3	BASIC DATA COLLECTING PROGRAM (SUPPORT BY CONSULTANT)	47				23	12	12			
ND-5	NM-4-4	PREPARATION & PUBLICATION OF SUPPLY AND DEMAND FORECAST	26									
	NM-4-5	INTRODUCTION FOR PRICING POLICY (STUDY)	26									
	NM-5	PREPARATION & PUBLICATION OF SUPPLY AND DEMAND FORECAST (SUPPORT)	144					48	48			
	NM-6	MEASURES FOR ADJUSTMENT OF SUPPLY AND DEMAND (STUDY)	60						60			
	NM-7											
	NM-8	ESTABLISHMENT OF SHIPPING ORGANIZATION FOR FARMERS (STUDY)	444	150	114	60	120					
ND-6	NM-8-1	ESTABLISHMENT OF SHIPPING ORGANIZATION FOR FARMERS	160				160					
	NM-8-2	ESTABLISHMENT OF SHIPPING ORGANIZATION FOR FARMERS (SUPPORT)	1,050					320	320			
	NM-8-3	ESTABLISHMENT OF SHIPPING ORGANIZATION FOR FARMERS (EQUIPMENT)	60				20	20	20			
ND-7	SUBTOTAL		1,000					300	300			
	NM-9											
	NM-10	STRENGTH PROGRAM FOR MAIN DISTRIBUTION CHANNELS IN PAPAP (STUDY)	1,220					160	320	320		
TOTAL	SUBTOTAL		468	180	288							
	SUBTOTAL		9,609					3,203	3,203			
TOTAL	SUBTOTAL		10,877	180	288			3,203	3,203			
	SUBTOTAL		15,397	573	602			3,694	4,192			

Table 9.2.10 Annual Budget of Agricultural Produce Processing Sector
- 5-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000RO)	ANNUAL BUDGET				
			1991	1992	1993	1994	1995
NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	5.100	100	2.500	2.500		
NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes	1.134	148	430	406	150	
NP-3	Establishment of Pickling and Vinegar-Processing Plant	1.614	132	1.482			
NP-4	Establishment of Coconut-Processing Plant	2.626	1.390	152	412	200	200
	Coconut Farm	2.100	1.390	130	160	220	200
	Coconut-Processing Plant	526		22	252	252	
TOTAL	DEVELOPMENT BUDGET TOTAL	10.474	1.770	4.564	3.318	622	200

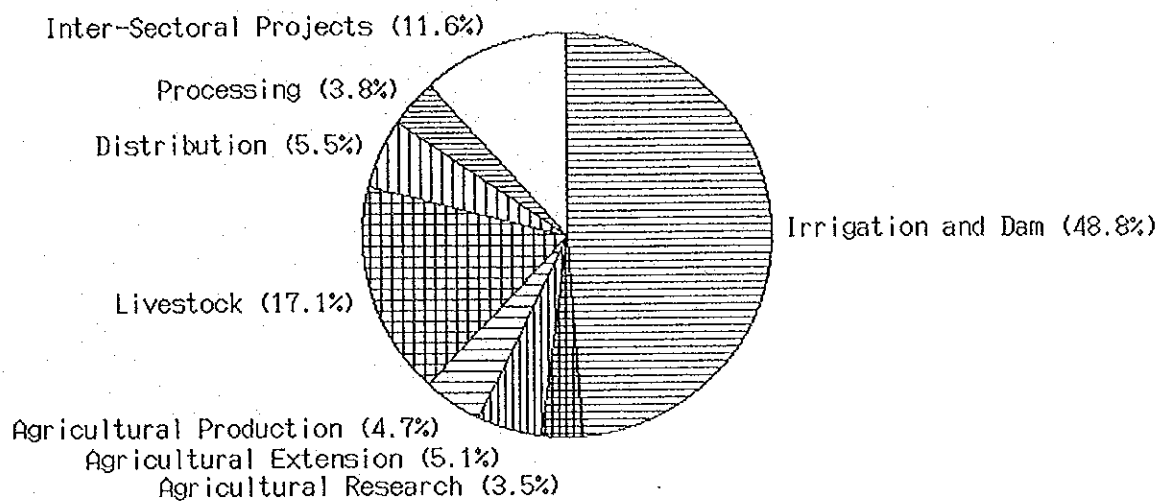
Table 9.2.11 Annual Budget of Inter-Sectoral Project - 5-Year Plan

PROJECT NUMBER	NAME OF PROJECT/PROGRAM	PRIO.	TOTAL BUDGET (1000RO)	ANNUAL BUDGET				
				1991	1992	1993	1994	1995
NI-1	Integrated Agricultural Development Project in Nejd 1) Pilot Farm (50ha) 2) Main Development Project (450ha)	A	13.242	1.655	1.655	1.655	3.311	4.966
			1.655	1.655				
			11.587		1.655	1.655	3.311	4.966
NI-2	Improvement and Maintenance of MAF Facilities 1) Ministry Building 2) Office Building for Directorate General of Agriculture in 6 Regions 3) Separate Consolidated Allocation for All Consultancies	A	16.991	5.895	5.896	3.600	800	300
			5.191	2.595	2.596			
			7.800	2.500	2.500	2.800		
			4.000	800	800	800	800	800
OI-1	Citizen's Compensation against Natural Crisis	A	1.500	300	300	300	300	300
OI-2	Master Plan for Development of Date Palm Cultivation	A	600	600				
TOTAL	DEVELOPMENT BUDGET TOTAL		32.333	8.450	7.851	5.555	4.411	6.066

Table 9.2.12 Budget Total by Finance Source - 5-Year Plan

SECTOR	PROJECT NUMBER	NAME OF PROJECT/PROGRAM	TOTAL BUDGET (1000RD)	STATE GENERAL BUDGET (1000RD)			SHARED WITH PRIVATE	PRIVATE	SELF FINANCE	OTHERS	REMARKS
				TOTAL	MAF	OBAP					
Irrigation and Dam	NH-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	151,768	151,768	135,518	16,250					
	NH-2	Subsidy for New Irrigation System Project	32,530	32,530	16,250	16,250					
	NH-3	Leak Framework for Agricultural Water Use	170	170	170						
	NH-4	Recharge Dams	48,025	48,025	48,025						
	NH-5	Sub-surface (Underground) Dams	2,500	2,500	2,500						
	NH-6	Afleej	29,670	29,670	29,670						
	NH-7	Wells	3,000	3,000	3,000						
	NH-8	Springs	1,969	1,969	1,969						
	NH-9	Erosion Control and Protection of Agricultural Land against Floods	3,870	3,870	3,870						
	NH-10	Survey and Monitoring	4,264	4,264	4,264						
Agricultural Research	NAR-1	Support for Agricultural Research Stations	9,625	9,625	9,625						
	NAR-2	Establishment of New Research Units and Laboratories	2,710	2,710	2,710						
	NAR-3	Development and Establishment of Experimental Farms and Nurseries	3,875	3,875	3,875						
	NAR-4	Forestry-Improvement Program	1,000	1,000	1,000						
	NAR-5	Establishment of Locust Survey and Control Unit	1,000	1,000	1,000						
	NAR-6	Soil Surveys	800	800	800						
Agricultural Extension	NAE-1	Improvement and Development of Extension Centers and Facilities	14,123	14,123	14,123						
	NAE-2	Establishment of Development Support Communication Center (DSCC)	3,550	3,550	3,550						
	NAE-3	Training of Researchers, Extension Staff and Statistics Staff	1,190	1,190	1,190						
	NAE-4	Intensive Extension Guidance Program	1,503	1,503	1,503						
Agricultural Production	NAP-1	Collection and Organization of Agricultural Statistics	7,910	7,910	7,910						
	NAP-2	Agricultural Exhibitions and Festivals	12,360	12,360	12,360						
	NAP-3	National Project for Plant Protection and Aerial Spraying	1,360	1,360	1,360						
	NAP-4	Agricultural Technology Transfer to Farmers Project	700	700	700						
	NAP-1	Development and Improvement of Plant Quarantine	5,000	5,000	5,000						
	NAL-1	Rangeland Revegetation Project in Southern Region	800	800	800						
	NAL-2	Animal Health and Disease Control Project	57,003	47,339	46,381	392	3,398	5,549	118		
	NAL-3	Livestock Extension Development Project	16,425	16,425	16,425						
	NAL-4	Livestock Research Development Project	482	482	482						
	NAL-5	Livestock Marketing Improvement Project	4,050	4,050	4,050						
	NAL-6	Livestock Input Company Project	9,882	6,372	5,205	1,186	3,398	3,510	118		
	NAL-7	Small Farm Development Support Project	6,795	1,359	1,359	227	3,398	2,039			
Distribution	ND-1	Establishment of Wholesale Market	15,397	15,397	15,397						
	ND-2	Supply and Demand Forecast of Agricultural Produce	3,656	3,656	3,656						
	ND-3	Establishment of Shipping Organization for Farmers	444	444	444						
	ND-4	Fertilization of PAMAP	1,220	1,220	1,220						
Agricultural Produce Processing	NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services	10,077	10,077	10,077						
	NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Dates and Tomatoes	22,112	10,474	10,474	11,638	3,000	2,000			
	NP-3	Establishment of Pickling and Vinegar-Processing Plant	10,100	5,100	5,100	5,000	1,149	4,489			
	NP-4	Establishment of Coconut-Processing Plant	5,668	1,134	1,134	2,834	1,700				
Inter-Sectoral	NI-1	Integrated Agricultural Development Project in Nejd	1,614	1,614	1,614						
	NI-2	Improvement and Maintenance of MAF Facilities	32,333	32,333	32,333						
	NI-3	Artificial Rainfall Project	13,242	13,242	13,242						
	OI-1	Citizen's Compensation against Natural Crisis	16,991	16,991	16,991						
Total	OI-2	Master Plan for Development of Date Palm Cultivation	1,500	1,500	1,500						
			315,921	294,619	281,414	16,563	10,547	10,038	118		

Share by Sector



Share by Region

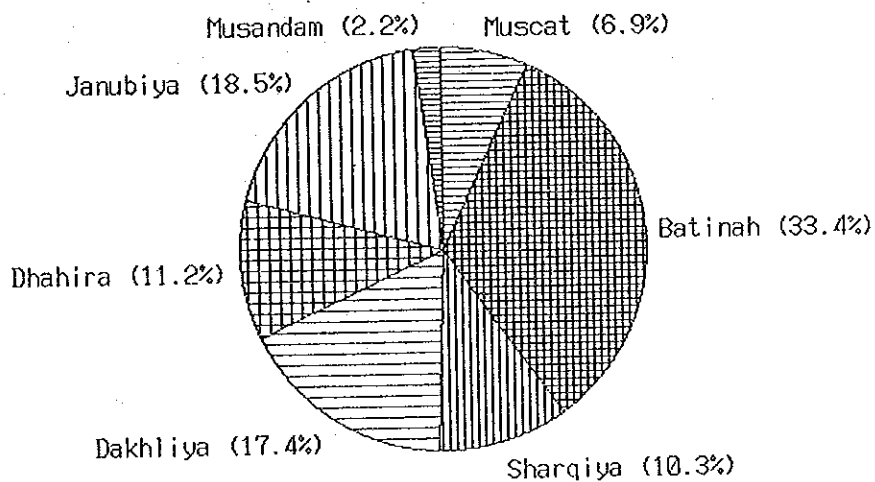


Figure 9.2.1 Sectoral and Regional Breakdown of the Budget Outlay for the 5-Year Development Plan

CHAPTER 10

CONCLUSION AND RECOMMENDATIONS

CHAPTER 10 CONCLUSION AND RECOMMENDATIONS

10.1 Conclusion

(1) Constraints on Omani Agriculture

Principal constraints on Omani agriculture are as follows:

- (a) Natural constraints consisting of limited water resources and high summer temperatures
- (b) Low level of farmer technical expertise
- (c) Lack of agricultural production infrastructure
- (d) Lack of marketing entities
- (e) Agriculture-related industries including farm-product processing, etc. are undeveloped.

These constraints must be comprehensively addressed in the formulation of the 10-year Agricultural Development Plan.

(2) Agricultural Development Targets

Taking into account the above, the basic objectives of the 10-year Agricultural Development Plan are as follows:

- (a) Improvement of food production self-sufficiency from 44 % to 55 %
- (b) Upgrading of agricultural productivity
- (c) Development and efficient use of water resources
- (d) Structural improvement of the agricultural sector
- (e) Stimulation of the rural socio-economy through promotion of agriculture
- (f) Human resources development
- (g) Achievement of annual GDP growth rate in the agricultural sector of 6.3 %.

The role of each sector in achieving the above is elaborated in terms of sector-wise targets and strategies to be pursued.

(3) Omani Diet and Caloric Demand Forecast

Caloric supply per capita in Oman is 2,800 kcal per day, and PFC balance is satisfactory. Per capita caloric supply per day is increasing, and is expected to rise to 3,000 kcal per day by 2000.

The 10-year Agricultural Development Plan proposes to maintain the current balanced Omani diet, and to expand food production to meet the forecast increase in food consumption. Under the plan, self-sufficiency in food production would be increased from 44 % (1988) to 55 % by 2000. The food production increase plan is carefully tailored to suit Omani resources of land and available water.

(4) Setting of Growth Rate in the Agricultural Sector under the 10-year Master Plan

According to data supplied by the Development Council, the GDP growth rate was 9.7 % for the agriculture and fisheries sector in the 3-year period 1985 - 1988 (the Third Five-year Development Plan). However, this was due in large part to a 20.5 % growth contribution from the fisheries sector. Growth in the agriculture/livestock sector alone was only 4.9 %.

Nevertheless, an agricultural sector growth rate of 4.9 % is considered satisfactory, given the current conditions and constraints affecting Omani agriculture. Applying real prices from 1989, the 10-year Agricultural Development Plan accordingly sets GDP growth targets for agriculture of 6.7 % during the first five years of the Master Plan (1990-1995) and 5.9 % during the second five years (1995-2000), which are considered to be realistic. The average for the entire 10-year period is 6.3 %. Within this figure, growth in the agricultural sector is targeted at a modest 4.5 %. Growth rate for animal husbandry, however, is set at 11.7% due to the considerable development potential seen in this sector.

Furthermore, setting the above GDP growth rate for the agricultural sector takes into account the following premises:

(a) Agricultural Sector

- (i) Ample availability of water resources for agriculture through groundwater recharge (recharge dam construction) and efficient water use (irrigation projects)
- (ii) Upgrading of farmer technical expertise through agricultural research and extension activities.
- (iii) Stable supply of agricultural inputs
- (iv) Strengthening of the distribution system for farm products, and trading of farm products at appropriate prices.

(b) Livestock Sector

- (i) Effective implementation of livestock disease prevention
- (ii) Improvement in livestock breeds
- (iii) Stable supply of feed
- (iv) Strengthening of the distribution system for livestock products, and trading of livestock products at appropriate prices.

(5) Agricultural Development Plan

The JICA team selected priority projects for agricultural development by applying criteria of agricultural-development goals and strategies, and formulated a full plan with an implementation cost of R.O. 589 million.

Subsequently, a macro-economic oriented analysis was done and alternative plans proposed. Finally, it was proposed that a R.O. 480 million, 10-year Agricultural Development Plan serve as the basis for formulating the Fourth Five-year Development Plan. To this end, the first half of the 10-year Master Plan was arranged into the 5-year Agricultural Development Plan.

10.2 Recommendations

(1) Human resources development

Human resources development, i.e. education, training and technology

transfer to Omani personnel, is perhaps the single most important factor that will determine the degree of success of the agricultural development plan. Programs to develop human resources have been formulated under the Master Plan, and it is recommended that these be vigorously pursued.

(2) Strengthening of MAF

In conjunction with human resources development it is necessary to strengthen the organization and activities of MAF. This includes the regional structure of the agency which will deploy the extension personnel. The units to be established under the Master Plan will play a particularly important role in promoting crucial projects such as new irrigation schemes, etc.

(3) Farm organizations

Farm organizations will be essential to effective implementation of the agricultural development plan. Autonomous farm-level organizations will be expected to contribute in the areas of collecting and shipping of farm produce, implementation and operation of irrigation projects and creating an environment for effective extension activities.

(4) Integrated strengthening of both agricultural production and the rural living environment

In principle, the Master Plan is primarily an agenda to stimulate agricultural production. However, to promote permanent settlement in rural areas, improved farmer income and the enhancement of health and disease control, nutritional and educational aspects of the rural living environment must be addressed.

In this regard, appropriate integrated rural development projects to integrate essential social infrastructure with the agricultural production infrastructures would be considered necessary in the future.

At present, women in rural areas play an important part in agricultural production. In the future, it is anticipated that their

participation in the areas of health, nutrition and other aspects of improved day to day living will increase as well. Participation by women in these vital activities should be vigorously promoted.

(5) Natural environment

With the population increase, threats to the natural environment have intensified. Future development projects must give the most serious attention to their environmental impact.

In particular, it is essential that measures be considered to prevent groundwater contamination. This would include, among others, the study of toxicity and residual behavior of agro-chemicals, the formulation of standards for agro-chemical application, and the prohibition of specific substances.

(6) Coordinated effort among agencies

The Master Plan includes programs which would be difficult for MAF to implement alone. In such cases, coordinated efforts in planning and implementation must be maintained with all concerned agencies to effectively carry out the development plan.

In executing programs, thorough dialogue and liaisons between MAF, PAMAP (distribution), MWR (water resources), MRM (slaughterhouses), MH (land distribution) and MCI, for example will be extremely important.

ANNEX

1. STUDY TEAM MEMBERS

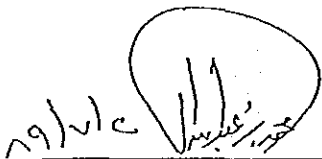
Assignment of Each Member

Name	Assignment
Hitoshi NAKAJIMA	Leader/Agricultural Development Economy
Koji HATTORI	Regional Development (Sub-Leader)
Takashi KOBAYASHI	Farming/Cultivation
Tomozo TAKASHIMA	Soil/Land Use
Yoshiya TAKASHIMA	Farmers' Organizations/Supporting Systems
Kazuhiko MARUYAMA	Water-Resources Development (Coordinator)
Yasuyuki NAKANISHI	Irrigation Plan/Operation and Maintenance, and Rehabilitation
Masaya OKAMOTO	Geology/Groundwater
Naoya SHIMIZU	Livestock Development
Kazuo OKANO	Livestock Reproduction, Sanitation, and Management
Masayuki TSUJI	Marketing and Finance
Eiji MATSUBARA	Socio-Economic and Financial Evaluation

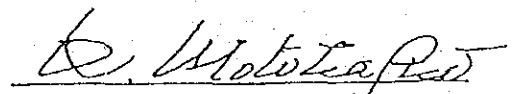
2. SCOPE OF WORK

SCOPE OF WORK
FOR
THE STUDY
ON
MASTER PLAN
FOR
THE AGRICULTURE DEVELOPMENT
IN
THE SULTANATE OF OMAN
AGREED UPON BETWEEN
MINISTRY OF AGRICULTURE AND FISHERIES
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY

MUSCAT , JULY 20th, 1989



H.E. SHEIKH MOHAMED BIN
ABDULLA BIN ZAHIR AL-HINAI
Minister
MINISTRY OF AGRICULTURE
AND FISHERIES



HE. KAORU MOTOHASHI
LEADER OF THE PRELIMINARY
SURVEY TEAM,
THE JAPAN INTERNATIONAL
COOPERATION AGENCY

I . INTRODUCTION

In response to the request of the Government of the Sultanate of Oman, the Government of Japan decided to conduct the Study on Master Plan for Agriculture Development in the Sultanate of Oman (hereinafter referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Sultanate of Oman.

The present document sets forth the scope of work for the Study.

II . OBJECTIVES OF THE STUDY

The objectives of the Study are:

1. to formulate master plan of the agriculture development for the purpose of achieving harmonious socio-economic and physical development in consideration of the past and on-going National Development Plans.
2. to formulate appropriate programmes and to identify priority projects within the context of the above mentioned.

III . OUTLINE OF THE STUDY

1. Study area

The Study area covers the whole country.

2. Scope of the Study

The activities to be undertaken by the Japanese study team will be divided into the two phases as follows:

(1) Phase I study:

to analyze the present situation and to establish the development targets on the basis of the analysis.

(2) Phase II study:

to formulate the ten-year development plan and to identify priority programmes and projects.

2-1 Work plan for the phase I study

The study covers the following items categorized by three stages:

1) Stage 1: Analysis of the present situation

- (1) to analyze the present natural-physical conditions and socio-economic situations.
- (2) to review the past and on-going studies and plans.
- (3) to identify the current constraints for development.
- (4) The study includes the following items:
 - a. Meteorology and hydrology
 - b. Geology and soil
 - c. Land use
 - d. Vegetation
 - e. Agriculture
 - f. Irrigation
 - g. Animal production
 - h. Support system
 - i. Agro-economy including marketing
 - j. Agro-industry
 - k. Others

2) Stage 2: Identification of development potentials

- (1) to identify development potentials on the basis of the study conducted in the stage 1.

3) Stage 3: Establishment of development targets

- (1) to establish development targets considering the following items and in consistent with the national policies and development potentials identified in stage 2.
 - a. Water use and management
 - b. Land use
 - c. Farming system
 - d. Cropping pattern
 - e. Animal production
 - f. Irrigation system
 - g. Marketing
 - h. Agro-economy
 - i. Agro-industry
 - j. Support system
 - k. Others

2-2 Work plan for the phase II study

The Study, based on the results of the phase I study, covers the following items categorized by the two stages:

- 1) Stage 4: Establishment of development strategies
 - (1) to establish development strategies in accordance with the development targets set up in stage 3.
- 2) Stage 5: Formulation of ten-year development plan and identification of priority programmes and projects
 - (1) to formulate ten-year development plan.
 - (2) to identify priority programmes and projects for the selected areas.
 - (3) Preparation of the implementation schedule
 - (4) Estimation of the project costs and benefits
 - (5) Evaluation of the project
 - (7) Recommendation

IV . WORK SCHEDULE

The Study will be executed in accordance with the tentative work schedule.(See APPENDIX)

V . REPORTS

JICA shall prepare and submit the following reports in English to the Government of the Sultanate of Oman:

1. Inception Report
Twenty (20) copies at the commencement of the Phase I Study.
2. Progress Report I
Twenty (20) copies at the end of the field works of the Phase I Study.
3. Interim Report
Twenty (20) copies at the commencement of the Phase II Study.
4. Progress Report II
Twenty (20) copies at the end of the field works of the Phase II Study.
5. Draft Final Report

Twenty (20) copies within one (1) month after the end of the Phase II Study.

The Government of the Sultanate of Oman is requested to comment on the Draft Final Report to JICA through Embassy of Japan within one (1) month after the submission of the Draft Final Report.

6. Final Report

Fifty (50) copies within two (2) months after receiving the comments of the Government of the Sultanate of Oman on the Draft Final Report.

VI . UNDERTAKING OF THE GOVERNMENT OF THE SULTANATE OF OMAN

1. To facilitate smooth conduct of the Study, the Government of the Sultanate of Oman will take necessary measures:

- (1) to secure the safety of the Japanese study team.
- (2) to permit the members of the Japanese study team to enter, leave and sojourn in the Sultanate of Oman for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees.
- (3) to exempt the members of the Japanese study team from taxes, duties, fees and any other charges on equipment, machinery and other materials brought into the Sultanate of Oman for the conduct of the Study.
- (4) to exempt the members of the Japanese study team from income tax and charges of any kind imposed on or in connection with any emoluments or allowance paid to the members of the Japanese study team for their services in connection with the implementation of the Study.
- (5) to provide necessary facilities to the Japanese study team for the remittance as well as the utilization of funds introduced into the Sultanate of Oman from Japan in connection with the implementation of the Study.
- (6) to secure permission for entry into private properties or restricted areas for the conduct of the Study.
- (7) to secure permission for the Japanese study team to take all data and documents (including photographs) related to the Study out of the Sultanate of Oman to Japan.

- (8) to prepare medical services as needed. Its expense will be chargeable on the members of the Japanese study team.
2. The Government of the Sultanate of Oman shall bear claims, if any arises against members of the Japanese study team, resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.
3. Ministry of Agriculture and Fishery (hereinafter referred to as "MAF"), shall act as the counterpart agency to the Japanese study team and also as the coordinating body in relation with other government and non-government organizations concerned for the smooth implementation of the Study.
4. MAF shall, at its own expense, provide the Japanese study team with the following, in cooperation with other relevant organizations:
 - (1) available data and information related to the Study,
 - (2) aerial photographs of the Study area,
 - (3) counterpart personnel,
 - (4) suitable office space with necessary equipment in Muscat,
 - (5) appropriate number of vehicles with driver, in the Study area with their running cost, and
 - (6) credentials or identification cards.

VII . UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures;

1. to dispatch, at its own expense, the Study Team to the Sultanate of Oman, and
2. to perform technology transfer to the Omani counterpart personnel in the course of the Study.

VIII . CONSULTATION

JICA and MAF shall consult with each other in respect of any matter that may arise from, or in connection with the Study.

TENTATIVE SCHEDULE

Item Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
WORK IN OMAN		▬▬▬▬							▬▬▬▬						▬	○			
WORK IN JAPAN		▭					▭						▭						
REPORTS	△				△		△					△	△		△				
	Inc.R				P.R. I		Int.R					P.R. II	D.F.R.		F.R.				
PHASE	← PHASE I →						← PHASE II →												

(Remarks) Inc.R.: Inception Report P.R. I, II: Progress Report
 Int.R.: Interim Report D.F.R.: Draft Final Report
 F.R. : Final Report
 ○ Comments on D.F.R. by Omani side

▬▬▬▬ : Field Work
 ▭ : Home Office Work

12. v

3. TABLE OF CONTENTS (VOLUME 2 - VOLUME 5)

VOLUME 2 PRESENT SITUATION

TABLE OF CONTENTS

TABLE OF CONTENTS	i
LIST OF TABLES AND FIGURES	iii
CHAPTER 1 OUTLINE OF NATURAL SITUATION	
1.1 Topography -----	1
1.2 Climate -----	1
1.3 Geology -----	5
1.4 Soil -----	12
1.5 Natural Resources -----	27
CHAPTER 2 OUTLINE OF SOCIAL SITUATION	
2.1 Population -----	32
2.2 Labor Force -----	36
2.3 Education -----	36
2.4 Medical Care -----	39
2.5 Electricity -----	42
2.6 Water Supply -----	42
2.7 Posts and Telecommunication -----	44
2.8 Communications -----	44
2.9 Housing -----	46
CHAPTER 3 OUTLINE OF ECONOMIC SITUATION	
3.1 Trend of Economic Growth -----	47
3.2 Gross Domestic Product -----	47
3.3 Investment -----	54
3.4 Trade Balance -----	60
3.5 Public Finance -----	69
CHAPTER 4 OUTLINE OF REGIONS	
4.1 Classification of Regions -----	74

4.2	Present Situation of Regional Development -----	81
CHAPTER 5 OUTLINE OF AGRICULTURAL SECTOR		
5.1	Land Use -----	87
5.2	Water Resources and Irrigation -----	99
5.3	Cultivation -----	134
5.4	Farming -----	154
5.5	Agricultural Research -----	168
5.6	Extension Services -----	180
5.7	Livestock -----	191
5.8	Distribution and Agricultural Produce Processing -----	237
5.9	Subsidy Institution -----	270
CHAPTER 6	PROGRESS OF THE THIRD FIVE-YEAR DEVELOPMENT PLAN -----	309
ANNEX 1	PROGRESS OF WATER RESOURCES AND IRRIGATION UNDER THE THIRD FIVE-YEAR DEVELOPMENT PLAN -----	317
ANNEX 2	ANNEX TABLES AND FIGURES -----	330

VOLUME 3 TEN YEAR MASTER PLAN FOR AGRICULTURAL DEVELOPMENT

TABLE OF CONTENTS

TABLE OF CONTENTS	i
LIST OF TABLES AND FIGURES	iii
CHAPTER 1 FUTURE SOCIO-ECONOMIC CHARACTERISTICS -----	1
CHAPTER 2 ESTABLISHMENT OF DEVELOPMENT TARGETS -----	3
CHAPTER 3 OUTLINE OF DEVELOPMENT STRATEGY	
3.1 Principles of Development Strategy -----	15
3.2 Basic Framework of Development Strategy -----	15
CHAPTER 4 DEVELOPMENT TARGET AND STRATEGY BY SECTOR	
4.1 Water Resources and Irrigation -----	21
4.1.1 Development Target -----	21
4.1.2 Development Strategy -----	22
4.2 Agriculture -----	30
4.2.1 Development Target -----	30
4.2.2 Development Strategy -----	34
4.3 Livestock -----	76
4.3.1 Development Target -----	76
4.3.2 Development Strategy -----	77
4.4 Distribution and Agricultural Produce Processing -----	103
4.4.1 Distribution -----	103
4.4.2 Agricultural Produce Processing -----	123
4.5 Subsidy Institution -----	127
4.5.1 Development Target -----	127

4.5.2	Development Strategy -----	134
CHAPTER 5 AGRICULTURAL DEVELOPMENT PLAN		
5.1	Development Investment in Agriculture -----	139
5.2	Required Budget for 10-Year Agricultural Development Plan --	148
5.2.1	Definition -----	148
5.2.2	Required Budget for Agricultural Development -----	149
5.3	Alternatives for 10-Year Agricultural Development Plan -----	152
5.3.1	Criteria for Priority Ranking -----	152
5.3.2	Description of Development Alternatives -----	154
5.4	Recommended Alternative -----	159
CHAPTER 6 REGIONAL DEVELOPMENT		
6.1	Regional Development Approach -----	216
6.2	Regional Development Strategy under the 10-Year Agricultural Development Plan -----	219
6.3	Regional Allocation of Agricultural Development Budget -----	221
6.4	Regional Development Plan -----	226
CHAPTER 7 HUMAN RESOURCES		
7.1	Demography -----	244
7.2	Demography in Oman -----	247
7.3	Agricultural Labor Population -----	253
7.4	Generation of Agricultural Employment in the 10-year Master Plan -----	253
7.5	Upgrading Human Resources -----	259
ANNEX	-----	261

VOLUME 4 FIRST FIVE YEAR AGRICULTURAL DEVELOPMENT PLAN

TABLE OF CONTENTS

TABLE OF CONTENTS	i
LIST OF TABLES AND FIGURES	v
CHAPTER 1 FUTURE SOCIO-ECONOMIC CHARACTERISTICS -----	1
CHAPTER 2 ESTABLISHMENT OF DEVELOPMENT TARGETS -----	3
CHAPTER 3 OUTLINE OF DEVELOPMENT STRATEGY	
3.1 Principles of Development Strategy -----	15
3.2 Basic Framework of Development Strategy -----	15
CHAPTER 4 DEVELOPMENT TARGET AND STRATEGY BY SECTOR	
4.1 Water Resources and Irrigation -----	21
4.1.1 Development Target -----	21
4.1.2 Development Strategy -----	22
4.2 Agriculture -----	30
4.2.1 Development Target -----	30
4.2.2 Development Strategy -----	34
4.3 Livestock -----	76
4.3.1 Development Target -----	76
4.3.2 Development Strategy -----	77
4.4 Distribution and Agricultural Produce Processing -----	103
4.4.1 Distribution -----	103
4.4.2 Agricultural Produce Processing -----	123
4.5 Subsidy Institution -----	127
4.5.1 Development Target -----	127
4.5.2 Development Strategy -----	134

CHAPTER 5 AGRICULTURAL DEVELOPMENT PLAN

5.1	Development Investment in Agriculture	139
5.2	Budget for 5- Year Agricultural Development Plan	148
5.2.1	Definition of Components Included in Budget	148
5.2.2	Required Budget for Agricultural Development	148
5.3	Regional Development	184
5.3.1	Regional Development Approach	184
5.3.2	Regional Development Strategy under the Agricultural Development Plan	187
5.3.3	Regional Allocation of Agricultural Development Budget	189
5.3.4	Regional Development Plan	194
5.4	Human Resources	212

CHAPTER 6 DESCRIPTION OF PROJECT/PROGRAM BY SECTOR

6.1	Irrigation and Dam	229
NW-1	Improvement of Irrigation System and Centrally-Controlled Water-Distribution System	229
NW-2	Subsidy for New Irrigation System Project	236
NW-3	Legal Framework for Agricultural Water Use	239
NW-4	Recharge Dams	241
NW-5	Sub-surface Dams	246
NW-6	Aflaj	250
NW-7	Wells	252
NW-8	Springs	254
NW-9	Erosion Control and Protection of Agricultural Land against Floods	256
NW-10	Survey and Monitoring	257
6.2	Agriculture	267
NAR-1	Support for Agricultural Research Stations	267
NAR-2	Establishment of New Research Units and Laboratories	270
NAR-3	Development and Establishment of Experimental Farms and Nurseries	277

NAR-4	Forestry-Improvement Program -----	279
NAR-5	Establishment of Locust Survey and Central Unit -----	281
NAR-6	Soil Surveys -----	283
NAE-1	Improvement and Development of Extension Centers and Facilities -----	292
NAE-2	Establishment of Development Support Communication Center(DSCC) -----	301
NAE-3	Training of Researchers, Extension Staff and Statistics Staff -----	304
NAE-4	Intensive Extension Guidance Program -----	309
NAA-1	Collection and Organization of Agricultural Statistics --	314
NAA-2	Agricultural Exhibitions and Festivals -----	318
NAA-3	National Project for Plant Protection and Aerial Spraying -----	320
NAA-4	Agricultural Technology Transfer to Farmers Project -----	322
NAQ-1	Development and Improvement of Plant Quarantine -----	327
6.3	Livestock -----	331
NLL-1	Rangeland Revegetation Project in Southern Region -----	331
NLL-2	Animal Health and Disease Control Project -----	336
NLE-1	Livestock Extension Development -----	350
NLR-1	Livestock Research Development -----	355
NLM-1	Livestock Marketing Improvement Project -----	361
NLL-3	Livestock Input Company Project -----	379
NLL-4	Small Farm Development Support Project -----	384
NLL-5	Livestock Specialized Services -----	393
6.4	Distribution -----	431
ND-1	Establishment of Wholesale Market -----	431
ND-2	Supply and Demand Forecast of Agricultural Produce -----	446
ND-3	Establishment of Shipping Organization for Farmers -----	449
ND-4	Fortification of PAMAP -----	452
6.5	Agricultural Produce Processing -----	461
NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services -----	461

NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes -----	463
NP-3	Establishment of Pickling and Vinegar-Processing Plant ---	467
NP-4	Establishment of Coconut-Processing Plant -----	471
6.6	Inter-Sectoral Projects -----	477
NI-1	Integrated Agricultural Development Project in Nejd -----	477
NI-2	Improvement and Maintenance of MAF Facilities -----	484
OI-1	Citizen's Compensation against Natural Crisis -----	487
OI-2	Master Plan for Development of Date Palm Cultivation -----	488
ANNEX	-----	490

VOLUME 5 APPENDIX

TABLE OF CONTENTS

TABLE OF CONTENTS	i
LIST OF TABLES AND FIGURES	iv
CHAPTER 1 GDP FORECAST -----	1
CHAPTER 2 PROSPECTS FOR DEMAND AND PRODUCTION FOR AGRICULTURAL PRODUCTS -----	20
2.1 Trend and Perspective of Production and Demand for Agricultural Products -----	21
2.1.1 Trend of Production and Demand for Each Product -----	21
2.1.2 Prospects for Demand for Each Product -----	31
2.1.3 Trends and Prospects for Nutrition Supply Levels -----	49
2.2 Production Prospects for Agricultural Products -----	52
2.3 Trends and Prospects for Integrated Self-Sufficiency Rates of Edible Agricultural Products -----	70
2.4 Basis of the Definitions and Assumptions for "Prospects for Demand and Production for Agricultural Products" -----	74
CHAPTER 3 DESCRIPTION OF PROJECT/PROGRAM IN 10-YEAR MASTER PLAN FOR AGRICULTURAL DEVELOPMENT	
3.1 Irrigation and Dam -----	82
NW-1 Improvement of Irrigation System and Centrally- Controlled Water-Distribution System -----	82
NW-2 Subsidy for New Irrigation System Project -----	89
NW-3 Legal Framework for Agricultural Water Use -----	92
NW-4 Recharge Dams -----	94
NW-5 Sub-surface (Underground) Dams -----	103
NW-6 Aflaj -----	107
NW-7 Wells -----	109

NW-8	Springs -----	111
NW-9	Erosion Control and Protection of Agricultural Land against Floods -----	113
NW-10	Survey and Monitoring -----	114
3.2 Agriculture -----		124
NAR-1	Support for Agricultural Research Stations -----	124
NAR-2	Establishment of New Research Units and Laboratories ----	127
NAR-3	Development and Establishment of Experimental Farms and Nurseries -----	134
NAR-4	Forestry-Improvement Program -----	136
NAR-5	Establishment of Locust Survey and Central Unit -----	138
NAR-6	Soil Surveys -----	140
NAE-1	Improvement and Development of Extension Centers and Facilities -----	149
NAE-2	Establishment of Development Support Communication Center(DSCC) -----	158
NAE-3	Training of Researchers, Extension Staff and Statistics Staff -----	162
NAE-4	Intensive Extension Guidance Program -----	167
NAA-1	Collection and Organization of Agricultural Statistics --	172
NAA-2	Agricultural Exhibitions and Festivals -----	176
NAA-3	National Project for Plant Protection and Aerial Spraying -----	178
NAA-4	Agricultural Technology Transfer to Farmers Project ----	180
NAQ-1	Development and Improvement of Plant Quarantine -----	185
3.3 Livestock -----		189
NLL-1	Rangeland Revegetation Project in Southern Region -----	189
NLL-2	Animal Health and Disease Control Project -----	194
NLE-1	Livestock Extension Development Project -----	208
NLR-1	Livestock Research Development Project -----	213
NLM-1	Livestock Marketing Improvement Project -----	219
NLL-3	Livestock Input Company Project -----	237
NLL-4	Small Farm Development Support Project -----	241
NLL-5	Livestock Specialized Services Program -----	250

3.4	Distribution -----	286
ND-1	Establishment of Wholesale Market -----	286
ND-2	Supply and Demand Forecast of Agricultural Produce -----	302
ND-3	Establishment of Shipping Organization for Farmers -----	305
ND-4	Fortification of PAMAP -----	308
3.5	Agricultural Produce Processing -----	324
NP-1	Establishment of Private Company for Agro-Industry and Supply of Agricultural Inputs and Services -----	324
NP-2	Establishment of Agro-Industrial Complex for Processing of Dates, Limes and Tomatoes -----	326
NP-3	Establishment of Pickling and Vinegar-Processing Plant -----	333
NP-4	Establishment of Coconut-Processing Plant -----	338
3.6	Inter-Sectoral Projects -----	344
NI-1	Integrated Agricultural Development Project in Nejd -----	344
NI-2	Improvement and Maintenance of MAF Facilities -----	351
NI-3	Artificial Rainfall Project -----	354
OI-1	Citizen's Compensation against Natural Crisis -----	356
OI-2	Master Plan for Development of Date Palm Cultivation -----	357
 CHAPTER 4 IMPROVEMENT PLAN FOR CULTIVATION AND FARMING		
4.1	Cultivation -----	359
4.2	Farming -----	385
 ANNEX		
	Linkage between Projects in Regional Development Plan Projects and JICA Master Plan Study Report -----	445

