Ministry of Agriculture and Agrarian Reform

NAPC

National Agricultural Policy Center

Notes on the Use of the Syrian Agriculture Database for Policy Analysis

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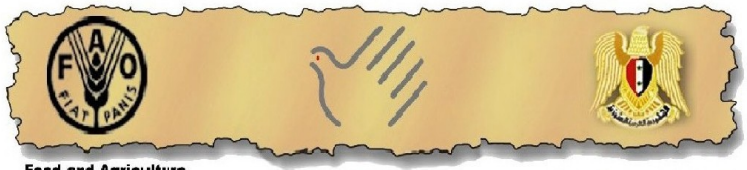

Food and Agriculture Organization of the United Nations

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Ministry of Agriculture and Agrarian Reform

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1. Composition of the Database and its Relevance to Policy Analysis

The database covers a considerable range of data types compiled from secondary sources with a substantial level of disaggregating to the lowest level that the nature of secondary data usually allows. It is organized in eight categories (domains), each with one or more collections of data subcategories addressing a certain field with more or less homogeneous datasets. As far as the available records provide, the data spans the period 1985-2001 and is generally disaggregated, depending on the nature of the topic, at levels that lend themselves to analyses that are relevant to policy issues. The data is categorized in the following subsets/domains and collections as can be seen from the opening page of the database:

***National Economic Data*:** comprising collections of agricultural production value, exchange rates, custom taxes and fees, commodity balance, agricultural credit and agricultural investment, each disaggregated according to the nature of its relevant variables.

***Land & Water*:** displaying collections of rainfall at various levels, land use by different types of land use variables and crop categories, and irrigation according to type and other criteria.

Agricultural Production: containing two domains (Crop & Tree Production; and Live Animals & Animal Products) and illustrating collections on production statistics of most of the field crops, vegetables and forestry detailed according to agroecological zones, governorates, crop category, production season, production system, and others. It also includes live animals and animal products with disaggregated statistics on stocks of sheep, cattle, goats and poultry as well as their different types of products.

***Agricultural Inputs*:** providing collections of data on the use of fertilizers, pesticides and agricultural machinery.

***Costs and Prices*:** comprising collections on annual and monthly retail and wholesale prices of major commodities at different locations (Governorates), time-series data on input prices, and itemized production budgets of the main crops over a considerable period of time.

***Agricultural Trade*:** depicting a collection on import and export quantities and monetary values of most of the agricultural commodities detailed by over 150 countries that are trade partners to Syria and covering the period 1996-2000.

***Agricultural Census*:** providing a collection of moderately detailed data on the Agricultural Census of 1994 covering statistics on different types of holders including cooperatives, land parcels, various types of land use, livestock, labor use and others. The items are predominantly disaggregated by governorate and categorized area classes of holdings.

With the easy accessibility to the original disaggregated statistics offered by the displayed format, the users have the opportunity to view the data and take what they need for further analysis and use. While whole sets of data can be taken out for analysis, many statistics can be directly derived from the database such as averages, standard deviations, trends and graphic presentations. Three points are to be taken into consideration with regard to the scope of these guidelines and the use of the data for policy analysis. First, it is obvious that the nature of use of the data for policy analysis depends on the objectives of the user. Accordingly, the guidelines apparently do not aim to provide a comprehensive account of the use of the data for all types of policy issues. Secondly, it is understandable that the database alone generally does not offer a sole source for all types of policy analyses. Its contents, however, provide a valuable source of basic information that in many cases might need to be complemented by other types of data and information to address policy issues. Third, it is difficult to identify a single manner that describes the way in which the data can be used for policy analysis. While these guidelines take into consideration an arrangement largely based on

sectoral classification, alternative perspectives might exist to address policy topics. Subject to these considerations, the following sections describe some of the possible ways of utilizing the data provided by the database for policy analysis. The sections are organized in line with major policy issues that are usually addressed within the domain of policy analysis and include macroeconomic variables; sectoral issues of land use and the related aspects of land distribution, production, productivity and resource use; input use; investment; commodity prices and enterprise budgets; and intra-regional international trade.

2. Macroeconomic Variables

A set of macroeconomic variables are relevant to consider for policy analysis on account of their impact on all sectors of the economy including agriculture. These include exchange rate policies, fiscal policies including those related to interest rates and credit, and monetarypolicies with those related to taxation and expenditure.

2.1 Exchange Rate Policy

The database contains statistics on the exchange rate regimes that would be useful for the analysis of their impact on agriculture. Some of the macroeconomic variables are included in the form of their sectoral dimension as related to the agricultural sector. The range of exchange rates regimes adopted in Syria is represented by a collection under the domain of "National Economic Variables". Table 1 depicts the multitude of those exchange rates in the period 1990-2000, which is derived from the data.

Table 1. Change in exchange rates in Syria (LS/US dollar) in the period 1990-2000

Exchange Rate Regime	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Official	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	46.50
Neighboring Countries	42.00	43.00	43.00	43.00	43.00	43.00	44.00	45.20	46.50	46.50	46.50
Beirut (Market)	46.45	45.84	50.48	49.67	51.20	50.00	51.00	51.00	51.00	51.00	51.00
Agricultural Exports	11.20	11.20	11.20	11.20	11.20	11.20	11.20	11.20	11.20	11.20	46.80
Agricultura Imports	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	46.90
Fertilizers Imports	11.25	23.00	33.00	43.00	43.00	43.00		45.00	46.50	46.50	46.60
Pesticides Imports	11.25	11.25						45.50	46.50	46.50	46.70
Trade-weighted	19.20	25.10						45.10	49.40	48.90	48.10

The major policy dimension of the exchange rate is reflected by the analysis of its impact on the prices of tradable and non-tradable commodities. Questions would arise as to whether the ruling exchange rates were taxing or subsidizing agriculture and therefore whether it is encouraging or discouraging domestic agricultural production in relation to imports. Further, it is relevant to enquire about their levels in relation to a real exchange rate that would have otherwise existed within a free-market economy, which might have increased efficiency in the use of domestic resources. While the Table depicts strict state control over the exchange rates as well as pursuing

policies of multiple exchange rates for different commodities, their development over time reflects a converging and accordingly a unification trend for the exchange rate. The trade-weighted average would probably provide a proxy for a real exchange rate. Exchange rates are indispensable in analyses of the comparative advantage of agricultural products, especially in the derivation of policy analysis matrices. However, under due attention to global changes and the opportunities that could be exploited through trade, a gradual shift in polices has been in place since the mid nineteen-eightieths that necessitated relaxation of exchange rates and more adoption of free-market policies with respect to commodity prices, despite the maintenance of price controls over strategic commodities (wheat, barley, cotton, chickpea, lentil, sugar beet and tobacco). The developments in many of the policy-related instruments such as exchange rates, import fees and customs and various levels of domestic agricultural input and output prices are accommodated in the database.

2.2 Taxation on agriculture

Related to macroeconomic variables is the taxation policy. The level of indirect taxation on agriculture is provided within the data on the value of agricultural production in the same domain under the collection "Value of Domestic Production by Output Sector" which also includes the GDP of the different sectors of the economy. Calculations that can be performed from the data show that indirect taxation in relation to the total value of agricultural production has remained at low levels that varied between about 1% and 2% for three methods of calculation, namely at current prices and at constant 1995 and 2000 market prices. Although the tax figures are confined to the agricultural sector, comparisons can be made with other sectors of the economy to evaluate the relative status of agricultural taxation.

3. Sectoral Economic Policies

Sectoral variables can be multi-dimensional as related to the whole agricultural sector such as its significance in the economy and the levels of investment and credit in the sector, to a certain group of commodities such as food crops or cereals, to individual commodities, to various sectors such as irrigated or rainfed sectors, to use of resources such as land and water, or to other types of categorizations regarded as important by policy analysts. The following sections illustrate some of the ways in which the data on selected sub-sectors can be used for policy analysis

3.1 Agriculture and its importance in the economy

The importance of agriculture and its contribution to the economy provide useful indicators to the level of policy attention that should be commensurate with such importance. The contribution of agriculture to pursue the Syrian set objectives of growth, equity and stability, poverty reduction and sustainability is central on account of the crucial role that agriculture plays in the economy. One useful indicator for the importance of agriculture is provided in the database in the form of time-series data of its contribution in the GDP along with that of other sectors of the economy at three levels of estimation under the collection "Value of Domestic Production by Output Sector" within the domain of "National Economic Data". Table 2 provides a summarized extract from the data in two years and averages of three periods. With a share in GDP ranging between 24% & 28% in the period 1999-2001 and considerable consistency under the methods of estimation, agriculture is a key sector in the economy. With further examination of the data, it can be seen that it is at the forefront of other sectors.

Table 2. GDP at fixed 1995, 2000 and at current market prices and the share of agriculture in selected years & periods, 1985-2001

Estimation Level	1985	1990	Average		
			1993-1995	1996-1998	1999-2001
At 1995 Fixed Market Prices*	419536	389469	537483	625626	220799
Share of Agriculture (%)	27	30	29	31	28
At 2000 Fixed Market Prices	515986	510548	707449	878282	912388
Share of Agriculture (%)	24	25	24	24	24
At Current Market Prices	83225	268328	496944	731893	890281
Share of Agriculture (%)	21	28	28	28	25

* The average for 1999-2001 at 1995 fixed market prices refers only to the year 1999 since records were discontinued thereafter

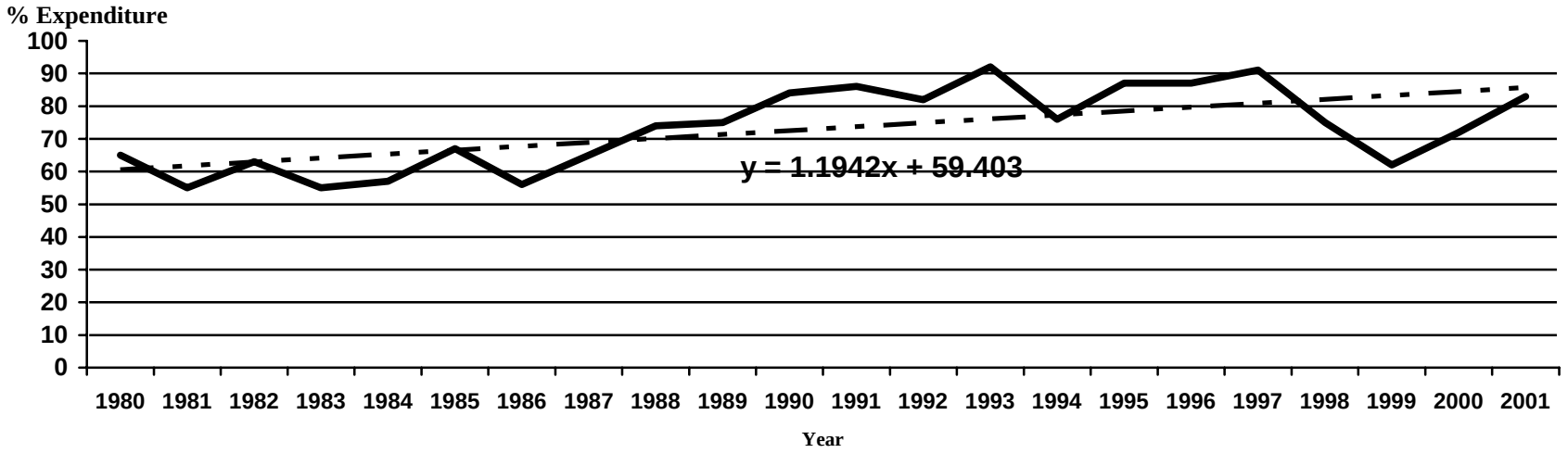
3.2 Investment in agriculture

Due to its high importance, the agricultural sector has witnessed major positive developments in terms of increased areas under diversified cropping, rising crop and livestock production and forestry improvement, which will be discussed later in these guidelines. This has been achieved under stable policies, high level of production and price control as well as State's provision of the main inputs and services. As a result, high levels of self-sufficiency in many food commodities have been achieved and agricultural exports have been boosted and diversified, including wheat; a former major import commodity. Among the instruments contributing to these developments is the rising investment allocated to various entities involved in agricultural activities. Table 3 summarizes total investments that went to different departments of the Ministry of Agriculture & Agrarian Reform (MAAR) in the period 1980-2001 and the details are shown in the database collection "Investments in Departments of MAAR". Successive increases in total allocations have been realized while the levels of actual expenditures have been improving. Compared with the situation in 1980, nominal allocations have increased by more than 25fold by 2001, while expenditure on the allocated items has improved by over 28%. The figure presented after the table is a visual illustration of the developments in actual expenditure in relation to total allocations, reflecting the trend and the related linear trend equation. It is to be taken into consideration that those nominal figures might not necessarily reflect the same level of improvement in real terms. An adjustment with the exchange rate, depending on the type of exchange rate used, is expected to provide more real approximation of the picture on development in expenditure.

Table 3. Allocations and Expenditures of Investment Funds to Different Departments of the Ministry of Agriculture & Agrarian reform (MAAR)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Allocation (m SP)	409	580	693	655	675	1001	1400	1120	1368	1478	1870	2084	2465	2282	3365	3245	4476	4534	5844	5944	8061	10360
Expenditure (m SP)	264	317	436	358	384	675	786	723	1009	1110	1575	1791	2009	2092	2541	2820	3874	4124	4397	3657	5766	8574
% Expenditure	65	55	63	55	57	67	56	65	74	75	84	86	82	92	76	87	87	91	75	62	72	83

Fig. 1. Actual expenditure as % of allocated investment funds to MAAR



3.3 Supply of major inputs

Supply and use of three major inputs, namely agricultural machinery & equipment, fertilizers, and pesticides is presented in this section. The annual development of use of those inputs can be directly obtained from the domain "Agricultural inputs". From those figures, trends or period averages may be delineated to reflect indicators for the development of technology use. Periodic averages are computed for machinery in Table 4, which reveal substantial absolute increases in all types of machinery. Also the averages computed from the data on areas served per tractor, plough and sprayer have favorable ranges and improving trends with time despite the absence of any noticeable increase in the cultivated area. The same pattern can be seen for seeders and harvesters-threshers. This implies that Syria has made successful strides in applying modern techniques of mechanical operations and accordingly, those inputs cannot be assumed to pose serious constraints to production. So constraints might be sought in other spheres of production. Noticeable is however the fast growth in the number of water pumps (by 72% over the four periods), which can be mainly associated with the development of tube wells that will be discussed earlier. The effect of this on underground water use and its repercussions on use of national resources constitutes an important policy issue.

Table 4. Agricultural machinery and equipment use in selected average periods, 1986-2001 (number)

Type	**Average (1986-1989)**	**Average (1990-1993**	**Average (1994-1997)**	**Average (1998-2001)**
Tractors (all sizes)	53445	67569	83712	97006
Ploughs (various types)	72380	82574	94267	100753
Seeders	6685	8816	12863	15668
Sprayers (manual & motorized)	62949	74870	87713	94956
Dusters (manual & motorized)	6927	7621	9183	9837
Combine harvesters	2778	3584	5147	4802
Threshers	3260	3812	4857	5171
Water pumps (< 10 inches)	88173	117545	147040	151460
Water pumps (> 10 inches)	1298	1605	2813	3420
Total Area ('000 ha)	5627	4951	5016	4863
Avg Area served (ha)				
Per tractor	89	66	57	51
Per plough	105	73	60	50
Per sprayer	78	60	53	48
Per seeder	842	562	390	310
Per harvester-thresher	932	669	501	488

Fertilizer use in the period 1985-2001, depicted in Table 5, is indicative of successive fertilizer application with main emphasis on nitrogenous and phosphate types. Use of the two types rose by 54% and 22%, respectively during 1999-2001 as compared with 19851987, and the totally applied

level increased by 42%. Considering the development in cultivated areas, average rates per ha were 45 and 22 kg of N and P, respectively in the earlier period as compared with respective figures of 33 and 20 kg/ha in the later period. Overall, average fertilizer use rose from 55 to 69 kg/ha; an increase of 26%. These figures illustrate marked developments in fertilizer application, but might as well imply excessive use, given the high proportion of areas under low and erratic rainfall that might have not received any fertilizers. The efficiency of fertilizer use and its economic levels would require careful investigations in various production systems.

Table 5. Quantities of fertilizers used by type of nutrient (t of nutrient)

Year	Nitrogen	Phosphate	Potash	Total
1985	126728	74222	5640	206590
1986	136994	85588	6184	228766
1987	143578	95487	6792	245857
1988	158390	99774	9405	267569
1989	165870	99808	8831	274509
1990	153563	91590	4601	249754
1991	184807	112000	6487	303294
1992	192046	137023	9176	338245
1993	204055	139031	5917	349003
1994	229982	138884	5948	374814
1995	217603	128393	6397	352393
1996	236295	128638	6549	371482
1997	227447	124011	5778	357236
1998	236815	117597	6951	361363
1999	218436	105068	7360	330864
2000	250565	113829	8253	372647
2001	160047	93236	7371	260654
Average 1985-1987	135767	85099	6205	227071
Average 1999-2001	209683	104044	7661	321388
% Increase	54%	22%	23%	42%
Average (kg/ha) 1985-1987	33	20	1	55
Average (kg/ha) 1999-2001	45	22	2	69

Considerable levels of expenditures are depicted for pesticides purchases, with expected high foreign costs (Table 6). Average annual expenditure increased from LS 238 million in the period 1987-1991 to about LS 952 million in 1995-1998. Average annual expenditure increased from LS 238 million in the period 1987-1991 to about LS 952 million in 19951998 with corresponding outlays (derived from the data) of LS 47 and LS 191 per ha in the two periods, respectively. However, an interesting feature is the decrease in the latter period (1999-2001) to a total expenditure of about LS 557 million and average outlays of LS 119/ha. Considering the changes in exchange rates, this forms substantial positive developments on account of the over-valued rates in earlier periods (see collection "Exchange Rates"). This should have positive impact on the environment and implies increasing environmental awareness. Policy should support such a trend and encourage research to develop alternative measures of pest control, e.g., IPM. Along with this, economic evaluation in this area is of paramount importance for supporting sound policy measures. The rise in absolute expenditure in veterinary medicine is a positive sign of animal health care. It might be related to the size of livestock in a way similar to that done for pesticide expenditure and crop areas to trace the trend in light of exchange rate developments and reveal policy situation and possible policy interventions.

Table 6. Expenditure on pesticides & veterinary medicine, 1986-2001 ('000 LS),

Year	Pesticides	Veterinary Medicines
1986	51247	48946
1987	217782	38030
1988	155000	36973
1989	230951	61910
1990	273953	31355
1991	309906	147797
1992	406726	109240
1993	400344	126216
1994	426319	326285
1995	855585	173161
1996	856067	198054
1997	1123792	141230
1998	974752	60031
1999	514789	398877
2000	601371	129878
2001	555828	237002
Average 1987-1991	237518	63213
Average 1992-1994)	411130	187247
Average (1995-1998)	952549	143119
Average (1999-2001)	557329	255252
Average outlays 1987-1991 (LS/ha)	48	
Average outlays 1992-1994 (LS/ha)	80	
Average outlays 1995-1998 (LS/ha)	191	
Average outlays 1999-2001 (LS/ha)	119	

3.4 Credit supply

In addition to the types of inputs mentioned above, supply of agricultural credit forms a crucial factor to improve the utilization of available natural potential and increase economic viability. Credit supply for different enterprises in the period 1985-1998 is given in the database by the collection 'Credit by Agric. Enterprise Type' and the total credit supply by type (in cash and in kind) is summarized in Table 7.Paramount increases in total credit supply have been achieved in the stipulated time span where it can be calculated that both in-cash and in-kind credit rose by over 6-fold during the last three years as compared with the average of 1985-1987. The computed indices depict the development over that period. This, however, happened along with developments in the scale of various enterprises and so an estimation of per unit supply would provide a more useful measure. Since the total amounts are supplied for a diversity of enterprises and economic activities, a crude indicator would be to derive credit per unit area of a crop group. Taking cereals for example, total credit and total cereals areas can be taken from the database to calculate the credit supply per ha as shown in Table 8. Despite the tremendous improvements, if the credit amounts per ha in later years are compared with the production costs of wheat alone, the gap is immediately apparent. Depending on the conditions of rural savings, which are hardly discernable under current levels of earned cash enterprise returns, this implies the need for consideration of the credit policy in terms of amounts as well as timing.

Table 7. Total Credit Supply 1985-2001

Item	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Credit in cash (SP m)	881	858	1177	2873	3626	4319	6311	6321	5551	6086	7185	6668	5908	5905	4420	3537	2605
Credit in kind (SP m)	372	532	570	1493	3220	4276	5344	6998	7986	8395	8334	8395	6194	6735	5789	5165	4923
Cash + Kind (SP m)	1254	1391	1747	4366	6846	8595	11655	13319	13537	14481	15520	15062	12101	12640	10209	8703	7528
Index 1985=100		111	139	348	546	686	930	1063	1080	1155	1238	1202	965	1008	814	694	601

Table 8. Credit Supply to cereals 1985-2001

Item	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Credit in cash (SP m)	60	82	110	235	343	3001	165	59	14	164	196	247	162	12	17	46	35
Credit in kind (SP m)	183	186	489	851	1912	420	3560	4914	5880	6097	5923	6116	4213	4378	2228	3461	3450
Cash + Kind (SP m)	243	268	599	1086	2255	3422	3725	4973	5894	6261	6119	6363	4375	4390	2246	3506	3485
Index 1985=100		110	247	447	929	1409	1534	2048	2427	2578	2520	2621	1802	1808	925	1444	1435
Cereals area ('000 ha)	2713	2709	2807	3008	4200	4142	3573	3727	3629	3524	3687	3255	3417	3346	3074	3058	3057
Average credit (LS/ha)	90	99	213	361	537	826	1043	1334	1624	1777	1660	1955	1280	1312	730	1147	1140

3.5 Commodity prices and crop budgets

The price and budgetary information contained in the database at various levels is indispensable for a diversity of policy considerations. For example, market wholesale and retail prices of a range of crops and fruits provided in part on yearly and in part on monthly basis given by the collection "Market Wholesale & Retail Prices" under the domain "Costs & Prices" allow inter- and intra-seasonal price analyses to trace price movements. This is especially important for commodities that are not subjected to state price controls. But also for controlled ones, the levels of the space and temporal variations would have important implications on production incentives, marketing and trade. Prices of inputs (seeds, fertilizers and containers) provided in the database can also be analyzed to detect trends in price movements and their reflection on production costs and profitability of various enterprises. Further, crop (enterprise) budgets under the collection with the same name provide information about the profitability of various enterprises and are highly affected by the price levels of inputs and products and their variation, which are influenced by policy decisions. Enterprise budgets can provide the basis for estimating the comparative advantage of crop production in different production regions according to the prevailing natural and economic circumstances. To illustrate some of the ways to utilize such information, Table 9 reveals average total and per kg production costs of tomato (a free-market commodity) and its average monthly wholesale market prices in the period 1997-2001.

Table 9. Tomato production costs and monthly average prices 1997-2001

Item		**1997**	**1998**	**1999**	**2000**	**2001**
Grand total costs (LS/ha		164300	166268	170054	170054	167116
Cost (LS/kg)		5	6	6	6	5
Average Tomato Wholesale	**Month**					
	Jan	23	25	13	17	8
	Feb	21	17	10	14	9
	Mar	20	20	11	16	14
	Apr	25	19	13	19	16
	May	25	16	11	14	11
	Jun	17	8	8	6	12
	Jul	8	4	6	5	7
	Aug	7	7	7	6	7
	Sep	5	13	8	7	9
	Oct	5	20	12	6	10
	Nov	10	12	13	6	15
	Dec	15	15	18	7	18
	Average	14.9	14.6	10.8	10.2	11.2
Index costs1997=100			101%	103%	103%	87%
Index prices 1997=100			98%	73%	69%	75%
Ratio price/cost index			97%	70%	66%	86%

Production costs on both total and per kg basis depict substantial stability, probably due to the price stability (control) of inputs that go into its production. holesale prices on the other hand, that could be assumed to simulate farm-gate prices, reflect a decreasing trend but with some increase in 2001. Relating the indices of prices to those of costs, shown as ratios at the bottom of the table, indicates a deteriorating trend of profitability. The decrease in domestic prices might be related to high supply, which could be verified by consulting the production figures under the domain on crop and tree production. Since tomato is an important export crop, trade policies that encourage exports would form a possible policy target. Such opportunities could be further traced by consulting trade figures under the domain "Trade in agricultural Commodities". Moreover, the monthly prices data show the price variation across the year where prices are generally at their lowest levels in the period July-October. Storage and trade policies that would lead to a better supply might be sought and strengthened during this period. Another use of the data may be through a comparison between wholesale and retail prices to trace total marketing margins, which are derived from the data and presented in Table 10.

Table 10. Monthly tomato marketing margins*, 1997-200

Month	1997	1998	1999	2000	2001
Jan	5	5	4	4	3
Feb	6	4	3	4	4
Mar	5	5	4	5	3
Apr	5	5	4	4	5
May	7	5	4	4	3
Jun	4	3	3	2	4
Jul	3	2	3	2	3
Aug	2	3	2	2	2
Sep	2	4	3	2	3
Oct	2	4	3	2	3
Nov	3	4	4	2	4
Dec	5	4	5	3	5
Average	4	4	3	3	3

* Computed as the difference between retail and wholes prices.

Generally, marketing margins are on the decrease, a situation that would influence future viability of marketing services. This is however dependent on the levels and trends of marketing costs. More inference can be derived from the data by computing the share of producers in the final retail price and trace the levels fairness of price spread and incentives to producers within the efficiency of the market system. Policy considerations would address marketing services and the price spread between producers and consumers for more efficient tomato production.

4. Natural Resources Utilization and Land Use Policy

Use of natural resources is a critical issue in agricultural development and is an important concern for policy formulation due to its impact on resource-use efficiency, income level and distribution, and various sustainability dimensions. Two pivotal natural resources are land and water on which

summaries of their major issues are provided in this section. The data are provided by five collections under the domain “National Aggregates on Production”, are displayed.

4.1 Land use patterns

From the collection “Total Land Use by Governorate or Agroecological Zone” time-series data for the development of land use in the period 1985-2001 can be extracted. A summary of the data is given in Table 9 showing the changes in land use as average figures calculated from the original data in selected periods, and Table 10 provides the average indices of these changes.

Table 9. Development of land use ('000 ha) 1985-2001

Land Use	Average 1985-1989	Average 1990-1993	Average 1994-1997	Average 1998-2001
Cultivated-Irrigated	656	850	1116	1219
Cultivated-Rainfed	3666	4265	3704	3407
Total Actually Cultivated	4322	5115	4820	4626
Cultivated – Fallow	1267	451	676	821
Total Cultivated Areas	5589	5566	5495	5447
Uncultivated	509	508	476	520
Steppe & Pastures	8224	8000	8297	8292
Forests	567	674	503	552
Other (no-agricultural	3630	3771	3747	3707
Grand Total	18518	18518	18518	18518

Table 10. Indices of development in land use, 1985-2001 (1985 = 100)

Land Use	Average 1985-1989	Average 1990-1993	Average 1994-1997	Average 1998-2001
Cultivated - Irrigated	101	130	117	100
Cultivated - Rainfed	110	171	27	100
Total Actually Cultivated	109	187	41	131
Cultivated – Fallow	77	129	50	97
Uncultivated	101	112	101	107
Steppe & Pastures	99	103	94	106
Forests	110	129	103	106
Other (no-agricultural)	102	121	96	105

The table of indices reflects paramount increases in irrigated areas. However, the rise in total areas, although substantial, was highly offset by the fluctuations in rain-fed areas. This depicts a major effect of low and erratic rainfall pattern. Average rainfall data in different agro-ecological zones under the same domain (derived from records of meteorological stations according to their location in different zones) is shown in Table 11. Especially in Zones (Settlement Areas) 3, 4 and 5, poor and

variable rainfall amounts were recorded. The high rainfall variability in these zones is reflected by the high standard deviations (SD) and coefficients of variation (C.V.) in Table 11.

Table 11. Average annual rainfall (mm) by agro-ecological zone 1989-2001

Zone	Average	SD	C.V.
Zone 1	642	135	21
Zone 2	279	56	20
Zone 3	237	72	30
Zone 4	199	54	27
Zone 5	143	42	29
Grand Average*	*442*	*89*	20

* Average of all met stations

Yet, rain-fed agriculture remained as the dominant sector in Syrian agriculture. Its share in total cultivated land (including fallow) fluctuated around two-thirds in later years (Table 12). The share of the fallow has been small and declining relative to the situation in the late 1980s. This has important implications for the use and sustainability of land resources.

Table 12. Rainfed and fallow areas as percent of total cultivated areas

land use	Average 1985-1989	Average 1990-1993	Average 1994-1997	Average 1998-2001
Rainfed areas	66	77	67	63
Fallow	23	8	12	15

Nevertheless, cropping has been remarkably more in high-potential zones with a decreasing trend as rainfall decreases (Table 13). Although this would be related to land availability, it reflects awareness about sustainable land use. Likewise, the fallow areas follow the opposite trend whereby they have been on the increase, both in absolute and relative terms, with the decrease in rainfall. Historical developments, especially in poorer zones, depict an increasing ratio of the fallow to the areas under rain-fed cropping over time (Table 13).

Table 13. Land use patterns ('000 ha) in different agro-ecological zones (1985-2001)

Land Use	Zone	Average 1985-1989	Average 1990-1993	Average 1994-1997	Average 1998-2001
Irrigated Areas	Zone 1	243	319	388	413
	Zone 2	156	217	311	352
	Zone 3	41	53	82	97
	Zone 4	56	79	103	120
	Zone 5	160	182	233	236
Rainfed Areas	Zone 1	1156	1141	1107	1091
	Zone 2	1176	1410	1357	1284
	Zone 3	512	648	590	567
	Zone 4	558	649	522	456
	Zone 5	264	417	128	8
Fallow Areas	Zone 1	36	23	10	21
	Zone 2	522	110	88	125
	Zone 3	326	99	126	163
	Zone 4	377	152	241	311
	Zone 5	6	68	211	200
Fallow % of Rainfed Areas	Zone 1	*3*	*2*	*1*	*2*
	Zone 2	*44*	*8*	*6*	*10*
	Zone 3	*64*	*15*	*21*	*29*
	Zone 4	*68*	*23*	*46*	*68*
	Zone 5	*2*	*16*	*165*	*2500*

More disaggregated data by governorate, agroecological zone, crop category, production season and the source of water can be drawn from the collection "Crop Areas by Governorate, Zone, Crop Category, Season and Water Source". Summarized average from the data are depicted in Table 14. Winter cropping of both field crops and vegetables acquires high importance. While this is more evident for rain-fed agriculture, irrigated winter cropping has been remarkably rising relative to that of summer cropping. On average, winter cropping accounted for about three-quarters of the total cultivated areas, followed by fruit trees (15%) and summer crops (10%). On the other hand, areas under fruit trees reflected a slightly rising trend under both modes of production, although the main thrust has been on rain-fed production.

Table 14. Development of areas ('000 ha) according to cropping season and irrigation-water source

Water Source/Crop Season	Average 1985-1989	-Average 1990-1993	Average 1994-1997	Average 1998-2001
Irrigated				
Winter Crops	283	476	721	763
Summer Crops	267	311	338	361
Winter Vegetables	36	29	28	27
Summer Vegetables	94	70	69	59
Fruit Trees	94	115	113	124
Rainfed				
Winter Crops	3042	3526	3018	2690
Summer Crops	50	40	32	26
Winter Vegetables	11	10	6	6
Summer Vegetables	111	53	49	31
Fruit Trees	555	628	605	671
Total Irrigated	774	999	1268	1334
Total Rainfed	3769	4257	3709	3424
Winter Crops Total	3325	4001	3739	3453
Winter Vegetables Total	47	39	34	33
Summer Crops Total	317	351	369	387
Summer Vegetables Total	206	123	117	90
Total Winter	3372	4040	3773	3486
Total Summer	522	474	487	477
Fruit Trees Total	649	742	718	795
Grand Total	4543	5256	4977	4757

However, an apparent feature of cropping trends is the relatively rapid increase in irrigated agriculture. It can be computed that areas under irrigation rose on average by about 72% in the period 1985-2001. Such developments must have put much pressure on the available water resources and could have jeopardized long-term sustainability. This is especially true for poorly replenishable water resources such as underground water.

4.2 Irrigation-water sources and use

While irrigation sources are primarily rivers, springs, lakes and wells, most expansions in irrigated farming relied on pumping from wells (Table 15). The areas by source and method of irrigation can be computed from the data in the collection "Irrigated Areas by Source & Method"). Pumping from wells increased by about 162% in the period 1985-2001 and their share in total irrigated lands expanded from about 22% to about 46%.

Table 15. Distribution of areas ('000 ha) by source and method of irrigation 1985-1999

Irrigation Source	Irrigation Method	Average 1985-1989	Average 1990-1993	Average 1994-1997	Average 1998-2001
Rivers, Springs and Lakes	Pumping	198	226	234	265
	Without Pumping	340	630	704	142
Wells	Pumping	149	191	366	390
Grand Total		*687*	*1047*	*1303*	*797*
% Share of Wells Irrigation		*22*	*18*	*27*	46

The development of irrigation from different types of wells is provided for the period 1996-2001 in the collection "Development of Wells by Governorate, Type & License". Table 16, derived from that collection, indicates that significant expansions took place since the mid 1990s. Developments of tube wells reveal fairly balanced shares of surface and deep wells till the year 2000. The year 2001 witnessed a steep rise in the areas under the former type and a slight decrease of the latter. This might have a policy dimension of allowing the expansion of surface wells depending on the level of replenishment from seasonal water flows, while paying attention to the sustainability of utilization of deep water. It can also be calculated that average irrigated area per well was fluctuating between about 4.52 and 5.22 ha with a discernable decreasing trend, especially within the last three years. This may imply increasing water shortages on account of the ever-sinking water table and may also reflect that, to maintain a reasonable area over time, producers had to dig deeper. It is to be noted that the total irrigated areas in Table 16 do not conform to those of Table 15, the difference being the areas under intensive cropping.

Table 16. Development of tube-well irrigation 1996-2001

Item	1996	1997	1998	1999	2000	2001
No. of surface wells	63930	66646	67140	64849	72158	109704
No. of deep wells	71058	71712	72759	70240	65844	57087
Total no. of wells	134988	138358	139899	135089	138002	166791
Irrigated area (ha)	683773	701634	723696	704905	698151	754282
Average area per well (ha)	5.07	5.07	5.17	5.22	5.06	4.52

Although irrigation from wells should be licensed, unlicensed digging has commenced on a considerable scale. Statistics, available for the period 1999-2001 (Table 17) reveal that unlicensed digging was especially widespread for surface wells and was around twice as much the pace in licensed digging. The distribution of wells under both conditions in different Governorates can be extracted from the reference table in the database. The data displayed here and in the reference table signal the need for balanced policy measures for sustainable underground water use.

Table 17. Number of tube wells & areas irrigated 1999-2001

Item	1999	2000	2001
No. of licensed deep wells	50858	49255	32126
No. of licensed surface wells	21153	24579	38123
No. of un-licensed deep wells	19382	16589	24961
No. of un-licensed surface wells	43696	47579	71581
Total licensed	72011	73834	70249
Total un-licensed	63078	64168	96542
Total licensed & unlicensed	135089	138002	166791
Area irrigated (ha)	704905	698151	754282

4.3 Cropping structure in different agro-ecological zones

Related to the land resource utilization and environmental concerns, it is of interest to investigate in the cropping structure in different agro-ecological zone. In the absence of farm-level data, aggregation is made with respect to each agro-ecological zone irrespective of geographical location. This is based on the fact that on account of rainfall homogeneity within a zone, the resulting farming system would be fairly homogeneous. Crop areas of over 53 field crops, vegetables and fruit trees were compiled from the collections under the domain "Crop & Tree production". The total areas of these crops form about 97% of the total areas under cropping. Besides individual crop statistics the collection provides categorization according to crop groups such as cereals, vegetables, etc. Of interest, however, are the categories of cereals and legumes due to their effect on soil fertility and long-term sustainability. A summary of the total areas in the form of calculated averages in selected periods in each zone and irrigation type is provided here along with the percentages of cereals (including cereals fodder) and legume crops (including legume fodder) are provided for both irrigated and rainfed crops in Tables 18 and 19.

Table 18. Development of total irrigated crop areas and cereals and legumes in different agro-ecological zones in selected period (1985-2001)

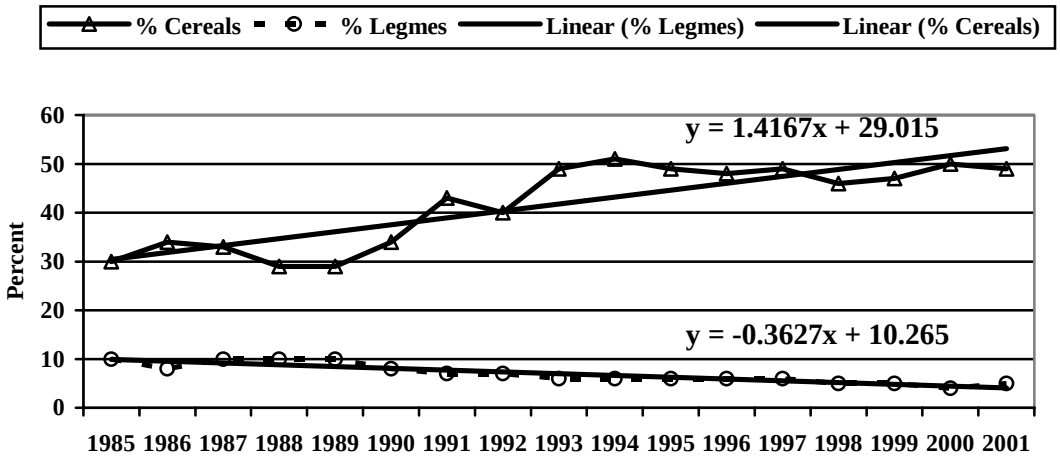
Zone	Item	Average 1985-1989	Average -1991-1993	Average 1994-1997	Average 1998-2001
Zone 1	Total area (ha)	272361	356219	417894	444443
	% Cereals	31%	42%	49%	48%
	% Legumes	9%	7%	6%	5%
Zone 2	Total area (ha)	163062	228557	320063	353904
	% Cereals	49%	58%	66%	69%
	% Legumes	6%	4%	2%	2%
Zone 3	Total area (ha)	39797	59505	87641	95907
	% Cereals	43%	51%	62%	61%
	% Legumes	6%	2%	2%	1%
Zone 4	Total area (ha)	50716	80822	107694	125272
	% Cereals	50%	66%	70%	61%
	% Legumes	3%	1%	1%	1%
Zone 5	Total area (ha)	199133	233660	292254	273777
	% Cereals	47%	49%	60%	61%
	% Legumes	5%	3%	2%	1%

Table 19. Development of total rainfed crop areas and cereals and legumes in different agro-ecological zones in selected period (1985-2001

Zone	Item	Average 1985-1989	Average 1991-1993	Average 1994-1997	Average 1998-2001
Zone 1	Total area (ha)	1097881	1102186	1076513	1066304
	% Cereals	45%	48%	48%	46%
	% Legumes	11%	10%	11%	11%
Zone 2	Total area (ha)	1140032	1366556	1316039	1254333
	% Cereals	81%	81%	80%	76%
	% Legumes	6%	6%	6%	9%
Zone 3	Total area (ha)	499155	629856	588498	552670
	% Cereals	96%	95%	93%	88%
	% Legumes	1%	1%	1%	1%
Zone 4	Total area (ha)	572145	657164	517037	467009
	% Cereals	98%	99%	97%	95%
	% Legumes	0%	0%	0%	0%
Zone 5	Total area (ha)	333888	393060	135359	9192
	% Cereals	99%	99%	84%	42%
	% Legumes	0%	0%	0%	0%

One of the apparent features of the crop structure is that the majority of the same crops are grown in all zones. This implies that specialization according to the potential provided by each zone is quite limited. Another feature of crop mixes under irrigation is the trend of rising areas of cereal and decreasing areas of legumes. This trend is two-dimensional, both over time and from high-rainfall to low-rainfall zones. With respect to rain-fed cropping, the trend is such that, while the cereal portion has been fairly constant over time in various zones, it tends to increase with the decrease in rainfall. The legumes portion, on the other hand, is rather low and has a clear tendency to diminish over time and from high- to low-potential agro-ecological zones. Given this situation, important policy concerns would arise with respect to the land-resource sustainability. A graphic presentation on the development and trends of areas and legumes under irrigation in Zone 1 are shown by Fig. 2, which has been developed from the original data.

Fig. 2. Trends of cereals & legumes areas under irrigation in Zone 1



Further analyses according to location (Governorates) can be conducted by extracting data from the tables of individual crops and crop groups that contain such stratification under the same collection.

5. Agricultural Census data, 1994

The database contains statistics on the Agricultural Census that was conducted in 1994 under a domain with the same name. Detailed statistics are available within the collection "Data Files on Agricultural Census" under that domain covering eight areas on holders, namely:
– Demographic and social characteristics.
– Economic characteristics.
– Agricultural holdings and investment methods.
– Agricultural animals
– Agricultural machines.
– Irrigated land and sources and methods of irrigation.
– Employment in agriculture.
– Holders in cooperative.
The data provides information on the status of those variables classified according to Governorate, holding size and, in several situations according to agroecological zone. The data will be useful in many policy applications as well as in designing surveys and delineating research topics. Further, with the future possibility of inclusion in thedatabase of the other two agricultural censuses conducted in Syria in 1970 and 1981, temporal comparisons can be made and the developments over time can be traced. In bringing up some of the uses of the census data, Table 20 (extracted from Table 07 of the above-mentioned collection) illustrates the distribution by agroecological zone of holders and parcels for holders having land.

Table 20. Holdings, parcels & areas by zone for holders having land, 1994

Item	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
Number of holdings	306854	128692	35582	28968	73097	573193
Number of parcels	1038163	393251	103050	74535	149973	1758974
Total area (ha)	1472569	1692050	542761	409651	570516	4687547
Average holding size (ha)	4.80	13.15	15.25	14.14	7.80	8.18
Average parcel size (ha)	1.42	4.30	5.27	5.50	3.80	2.66

In general, although holdings have a reasonable size on average, variations among different producing areas are expected. Significantly smaller holdings prevail in Zone 1, but the size increases significantly in low-rainfall zones. This is understandable in light of the need for more extensive agriculture in poorer zones. Usually high-rainfall zones coincide with high population pressures that push the farm size down, but it is to be investigated whether the increase in size would compensate for the production hazards imposed by variable and poor rainfall. Comparing the numbers of holdings and parcels, fragmentation of holdings is immediately apparent. With an average of over three parcels per holding producers are to manage plots that range in size from 1.42 to 5.5 ha and average 2.66 ha. Depending on the location of parcels, more insight is needed to realize the problems related to managing such separated and small land plots. Obviously, the size is further influenced by land availability and is further illustrated by its distribution in different Governorates that can be drawn from the same table in the database. Table 21 illustrates high variability in the average size of holdings with Governorate that ranges from 1.8 to 25.73 ha, accompanied by similar variability in average parcel size. Further stratification can be derived from the source table by considering the combination of both zones and Governorates. In fact, aspects of farm size and holdings fragmentation pose important policy issues that relate to productivity, economies of scale, efficient use of resources and producers' incomes.

Table 21. Distribution of holdings' and parcels' size by governorate for holders having land, 1994

Governorate	Number of Holdings	Number of parcels	Total Cultivated Area	Average Holding Size	Average Parcel Size
Rural	37019	101185	122040.9	3.30	1.21
Damascus City	7074	14426	19868	2.81	1.38
Dara	28358	93649	197504	6.96	2.11
Al-Sweida	22158	88518	166449	7.51	1.88
Quneitra	3853	13390	18744	4.86	1.40
Homs	45987	146166	378196	8.22	2.59
Hama	60879	185738	408241	6.71	2.20
Idleb	53178	162186	288234	5.42	1.78
Aleppo	89367	293346	1076526	12.05	3.67
Tartous	58079	276395	105225	1.81	0.38
Lattakia	47434	155723	92752	1.96	0.60
Al-Hassakeh	55028	92518	951705	17.29	10.29
Al-Rakka	25524	46037	656856	25.73	14.27
Deir-ez-Zor	39255	89697	205206	5.23	2.29

Another aspect related to gender is the distribution of holders according to sex as depicted in Table 22 (extracted from Table 01 of the Census Collection of Tables).

Table 22. Total number of holders by sex, 1994 Census

Sex	Number
Male	581212
Female	32445
Total	613657
% Female holders	5.3%

With a share of about only 5% of the total holders, female holders are quite a minority. This might rest on land law considerations but have far reaching implications on the gender issue, rural women participation, division of responsibilities and decision-making. Policy issues will need to take the role of women and their comparative advantage in managing certain types of agricultural business into account. On the other hand, employment of family members by sex and age group is provided by Table 56 of the census data collection and a summary of the family payment status is given in Table 23. Comparing the numbers of paid and unpaid family labor, it is evident that the paid group outnumbered the unpaid by close to three-fold. Most of the males fall within the paid group while the ratio is less for females, implying a gender bias whereby a larger proportion of the females are employed without payment. It may also be deducted that a family-business dimension of farming is not prevalent; even it existed in the past. This might imply high levels of commercialization where policy consideration should be made accordingly. This is further confirmed by the fact that the number of family workers per ha of cultivated land can be calculated at an average of only 0.46, indicating the low level of participation of family members, but probably reflects the high levels of mechanization mentioned earlier. This may be indicative for low incentives in farming and possibly high levels of rural unemployment, both of which need to be addressed through policy. Further, female workers form a negligible part of family labor engagement (4.2%) in farming, a fact that reflects a possibility of gender imbalances in rural employment.

Table 23. Paid & unpaid family members employed by sex for total agriculture holdings (Table 56)

Item	Number
Unpaid males	487908
Paid males	1369175
Unpaid females	25112
Paid females	55948
Total males	1857083
Total females	81060
% of total female workers	4.2%
% of unpaid females of total female workers	31%

The census also provides useful information on a variety of variables according to the farm size. One general and at the same time important aspect is the distribution of holders, holdings and areas with respect to classes of farm size extending from 0.1 to over 300 ha. This is shown in Table 24 along with additional simple calculations (% of holders, holdings and areas according to area class) that represent useful indicators.

Table 24 distribution of holders, holdings and parcels by area class for holders having land, 1994 census (table 06)

Area Class (ha)	No of Holders	No of Holdings	Total Area (ha)	% Holders	% Holdings	% Area
000.1	8836	8749	1157	1.5%	1.6%	0.02%
000.2	40349	39847	13468	7.0%	7.1%	0.29%
000.5	62697	61851	43848	10.9%	11.0%	0.94%
001.0	92889	91421	129448	16.2%	16.3%	2.76%
002.0	113063	111034	317161	19.7%	19.8%	6.77%
004.0	59304	58133	282488	10.3%	10.4%	6.03%
006.0	65979	64454	492734	11.5%	11.5%	10.51%
010.0	44553	43340	530332	7.8%	7.7%	11.31%
015.0	25826	25018	427434	4.5%	4.5%	9.12%
020.0	27939	26979	649020	4.9%	4.8%	13.85%
030.0	20108	19175	722638	3.5%	3.4%	15.42%
050.0	8609	8066	542825	1.5%	1.4%	11.58%
100.0	2691	2461	365627	0.5%	0.4%	7.80%
300 &Above	350	306	169367	0.1%	0.1%	3.61%
Total Country	573193	560834	4687546	100%	100%	100%

Most of the holders and holdings (around 76%) fall within the 0.2-6 ha range, implying a majority of small holders. This has repercussions on many policy issues such as crop choice, labor versus machinery use, finance and credit supply, technology development and transfer, product marketing and commodity processing. Further, while about 77% of the holdings and 78% of the holders fall within the 0.1 to 6 ha range, around 82% of the area is under relatively large holdings with 10 and more ha. This means that most of the production comes from large-size farms, also with due need to consider land distribution issues, mechanization, commercialization level and the like.

6. Yield Levels and Variability

Related to the high risks faced in rain-fed areas with respect to early-mentioned variability in rainfall are the risks of crop failure. In order to illustrate the situation, Table 25, derived from the "Field Crops & Vegetables" collection for individual crops, shows irrigated and rain-fed yields of selected crops along with their variability as reflected by the coefficient of variations (C.V.) in different agro-ecological zones. The figures represent simple averages over the period 1985-2001 of the originally area-weighted average yields in individual years. While yields of irrigated crops were fairly stable or vary slightly over agro-ecological zones, those under rain-fed conditions were both substantially low and highly variable. Especially in low-rainfall zones, yields are so low that economic viability might be jeopardized. The figures in the database provide the possibility of further yield analyses by Governorates and zones that would lead to suggestions of various policy measures.

Table 25. Average yields (kg/ha) of selected crops and their variability (C.V. in brackets) by agroecological zone over the period 1985-2001

Crop/Water source	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Wheat, irrigated	3572	3311	3026	3216	3368
	(16)	(14)	(15)	(20)	(13)
Wheat, rainfed	1794	965	555	418	334
	(31)	(41)	(66)	(91)	(85)
Barley, irrigated	2457	2481	2252	2036	1892
	(38)	(24)	(26)	(30)	(34)
Barley, rainfed	1608	972	521	377	283
	(36)	(48)	(79)	(110)	(121)
Lentil, irrigated	1387	1241	1154	1157	1008
	(34)	(36)	(38)	(55)	(41)
Lentil, rainfed	970	655	432	311	136
	(35)	(37)	(54)	(90)	(141)
Chickpea, irrigated	1445	1144	925	293	899
	(26)	(32)	(47)		(37)
Chickpea, rainfed	871	404	269	158	68
	(19)	(41)	(68)	(100)	(150)
Broad beans, irrigated	2007	1936	1898	1907	2003
	(13)	(19)	(14)	(17)	(24)
Broad beans, rainfed	1180	938	1505		
	(19)	(48)			
Sesame, irrigated	787	907	833	854	642
	(21)	(15)	(26)	(26)	(16)
Sesame, rainfed	330	237	128	271	
	(38)	(52)	(75)	(15)	
Sunflower, irrigated	1677	2221	2256	2921	1466
	(23)	(36)	(59)	(138)	(36)
Sunflower, rainfed	1059	821	1237		
	(26)	(52)	(68)		

Estimation of yield trends over time for different agroecological zones would provide information on technology development. By applying linear trend models to time-series yield data of the database, the results are shown in Table 26 where the first term denotes a constant and the second the trend value (all in kg/ha) with respect to the year (x).

Table 26. Trend equations of wheat and barley yields (1985-2001) in various agroecological zones

Crop/Zone	Trend Equation
Irrigated wheat, Zone 1	3233 + 37.6 x
Irrigated wheat, Zone 5	3001 + 40.7 x
Rainfed wheat, Zone 1	1557 + 26.3 x
Rainfed wheat, Zone 3	534 + 2.34 x
Rainfed wheat, Zone 4	423 - 0.591 x
Rainfed wheat, Zone 5	352 - 2.16 x
Rainfed barley, Zone 1	1246 + 40.3 x
Rainfed barley, Zone 3	460 + 6.8 x
Rainfed barley, Zone 4	423 -5.1 x

The table shows that the yield trend for irrigated wheat is positive and similar for Zones 1 and 5. This is understandable within irrigated farming systems where the main differences are related to rainfall amounts. However, for rainfed wheat, the yield trends decrease as production moves from high-rainfall to low-rainfall areas. The trends are even negative for Zones 4 and 5, a situation that sheds doubt on the long-term financial profitability of the crop and at the same time reflects

limitation of technology generation tailored to low-rainfall areas probably in terms of drought-resistant varieties, water harvesting techniques and water-use efficiency considerations. A similar situation applies for barley, although the decrease in yield trend with the falling rainfall axis is less dramatic due to the higher barley tolerance to drought. The utilization of barley as an intermediate input as feed for livestock production also gives it a dimension different from that of wheat in terms of profitability considerations. Yet, the declining yield trend in Zone 4 is alarming and needs to be put under focus for land use and technology generation considerations. Economic analysis according to agroecological zone gains high importance for policy decisions related to better utilization of the comparative advantage as related to natural resource use.

7. Trade in Agricultural Commodities

Trade statistics provide invaluable information that is related to indispensable policy decisions. The domain under the same name contains the collection "Agric. Trade Data 1996-2000" in which the imports and exports in quantity and value according to trading partners (countries) are presented for most of the agricultural commodities. While the uses of trade statistics are quite diverse and relate to tariffs, quota restrictions (as past policies), trade balances, terms of trade, foreign exchange, domestic consumption needs, comparative advantage and others, one example dealing with trade balance and terms of trade for total agricultural trade and trade in cereals is presented here to illustrate the use of trade data for policy analysis. Table 27 depicts total figures for agricultural trade (taken from an earlier version of the database and may be subject to later amendments) from which the trade balance and the terms of trade in agricultural commodities are derived by simple computations.

Table 27. Total agricultural trade balance (LS billion) 1996-2000

Item	1996	1997	1998	1999	2000
* Quantity imported (million tons)	1.512	1.854	1.776	2.708	2.960
Import value (LS billion)	9.345	9.315	8.882	9.912	9.310
Quantity exported (million tons)	1.544	1.954	1.369	0.929	0.970
Export value (LS billion)	9.531	11.713	10.431	8.887	8.658
Trade balance (LS billion)	0.185	*2.398*	*1.549*	*-1.025*	*-0.652*
Average price of exports (LS/t)	6182	5025	5001	3660	3145
Average price of imports (LS/t)	6171	5995	7618	9571	8925
Index price - exports (1996=1)		0.72	0.71	0.52	0.45
Index price – imports(1996=1)		0.54	0.69	0.86	0.80
Terms of trade (%)		132%	104%	60%	56%

* It is to be noted that the export and import values for the year 2000 have been adjusted to match the respective export and import exchange rate prevailing in the three previous seasons (LS 11.20 & 11.25 to the USD – refer to the exchange rate data).

Despite the short period of analysis (only five years), the deteriorating situation of trade in agriculture is apparent. The trade balance that witnessed improvement in 1997 as compared with the previous year decreased considerably in 1998 and registered negative values in both 1999 and 2000. A trade policy that results in boosting of exports and prudent management of imports might need to be thought of. The terms of trade, computed as the percent value of the export price index to the import price index, has witnessed a similar deterioration from a high of 132% in 1997 (taking 1996 as the base year) to as low as 56% in 2000. In such a situation, tariff policies and polices that are conducive to boosting of high-value exports may need to be put in place. For more illustration of the issue, trade figures for cereals that form an important trade component, especially with respect to imports, are presented and analyzed for the trade balances in quantity and value as well as for their terms of trade (Table 28). The list of compiled cereals commodities comprises barley, maize, rice, wheat, rye and others.

Table 28. Trade in cereals, 1996-2000

Item	1996	1997	1998	1999	2000
Quantity imported ('000 t)	403	780	559	1284	1717
Import value (LS m)	1213	1712	1197	1965	2568
Quantity exported ('000 t)	835	1182	357	61	0.060
Export value (LS m)	1653	2613	878	157	0.397
Quantity balance (exports-imports)	431	402	-202	-1223	-1717
Trade balance (exports-imports) (LS m)	440	901	-319	-1808	-2568
Average price exports (LS/t)	3007	2196	2140	1530	1495
Average price imports (LS/t)	1981	2211	2461	2576	7070
Index price exports (1996=1)		0.73	0.71	0.51	0.50
Index price imports (1996=1)		1.12	1.24	1.30	3.57
Terms of trade (%)		65%	57%	39%	14%

The deteriorating situation by both indicators is apparent that probably contribute significantly to the situation of total agricultural trade. Policies that would encourage domestic production of cereals with due consideration to the problems stated under the section of land use will be important to consider. A variety of other uses of the trade data can be sought to improve trade policies. For instance, data on trade with other Arab countries can be directly derived and compared with international trade to trace possibilities and benefits of intra-regional trade and the opportunities of exploitation of regional treaties such as the envisaged Greater Free Trade Arab Region. Trade data can also be related to the figures on custom fees and taxes available in the database.

8. Commodity Balance

The achieved developments have enabled considerable levels of availability of agricultural commodities in the domestic market, partly covered by imports, as well as substantial levels of self-sufficiency. This can be seen from the balances of various commodities in the "Commodity Balance" collection under the National Economic Data domain. Yet, the contribution of local production to domestic market supply varied among commodities. For example, a summary of the commodity balance for all cereals is shown in Table 29, as derived from the data.

Table 29. Commodity balance for cereals, 1988-2000 ('000 t)

Item	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Commodity Balance	5500	2527	4282	5158	4600	5648	5402	5757	5434	3735	5347	4405	5067
Exports	184	11	10	0	34	163	390	653	834	1182	428	112	0
Imports	686	1128	1194	1577	275	426	400	317	279	597	505	1217	1557
Production	4999	1410	3098	3581	4359	5385	5392	6093	5989	4320	5270	3300	3510
% Contributionof Production	91	56	72	69	95	95	100	106	110	116	99	75	69

The lower levels of the contribution of local production to the commodity supply in the period 1988-1993 was reversed to positive levels of export/import balances and over-proportional contribution of domestic production. In the last two years (1999 -2000), however the contribution of local production underwent sharp deterioration, where serious consideration of policy remedies becomes necessary. Detection of the balances of important cereal commodities might throw some

light on the situation. Table 30 depicts the situation in terms of average figures in selected periods for wheat and barley that can be derived fro the database.

Table 30: Average commodity balance figures for wheat & barley in selected periods (1988-2000) ('000 t)

Item	Average 1988-1991	Average 1988-1991	Average 1988-1991
Wheat:			
Production	1877	3683	2898
Exports	7	243	112
Imports	913	24	9
Commodity Balance	2783	3464	2851
Self-sufficiency ratio	66%	108%	102%
Barley:			
Production	1238	1334	319
Exports	44	283	0
Imports	53	12	586
Commodity Balance	1247	1062	905
Self-sufficiency ratio	97%	127%	34%

Both wheat and barley depict improvements in local production in the second period as compared with the first one, with higher rates for the former. This is reflected on the high increase in exports and decrease in imports. In the third period, high deterioration in barley production was experienced, resulting in high levels of importation. The original figures also reflect the high variability in barley production. The results are indicative of the need to look at production policies of both crops and the trade-off between the needs for food cereals (wheat) and feed cereals (barley), taking weather factors (rainfall) into consideration. On the other hand, extraction from the same collection shows continuous net exports for legumes, although both production and exports significantly decreased in the third period (Table 31).

Table 31: Average commodity balance figures for legumes in selected periods (1988-2000) ('000 t):

Item	Average	Average	Average
Production	202	231	152
Exports	57	96	48
Imports	0	0	0
Commodity Balance	145	135	104
Self-sufficiency ratio	221%	236%	169%

9. General Note

With this overview, the user may formulate objectives of the intended policy analysis and utilize the available information along with other specific information that might need to be collected in order to reach the stated objectives. The database is expected to undergo continuous development in terms of updating, filling in the gaps of missing information, improvement in quality and expansion of the scope to cover more areas of information.