

FS 4: Farming systems of the central rainfed and irrigated plains and Al Ghab

Description of the system

The farming systems of the central rainfed and irrigated plains and Al Ghab³³ cover an area of approximately 1.16 Million hectares, equivalent to 6.25% of the national area, along the central section of the international road, which also connects Aleppo and Damascus. Due to its long settlement tradition and historic cities, its infrastructure has been regularly upgraded in recent decades, creating overall very good market access to large urban markets, combined with relatively good rainfall levels and water resources.

The western part of the system receives a rainfall average exceeding 350 mm (stabilization zone 1), which decreases towards the eastern boundary to 200 mm according to the north-south direction of the isohyets in central Syria.

The combination of a relatively favourable temperate climate with the good market access has led over time to a varied cultivation pattern with a number of local niche systems. The common feature is, however, a relatively modern, almost 162000 holders (17% of the national total) strong farming community with a very diverse cropping pattern (including a number of specialized pockets of production). Land use in the system is fairly intensive, frequently also including pump based irrigation.

95% of the cultivable land in this broad farming system is already cultivated. The importance of the system to the national crop production is best highlighted by pointing to the regional specialization in production. From the perspective of the share of the cultivated land, relatively typical crops at the national level, such as wheat, barley and lentils, dominate the cultivated land within the farming system (irrigated wheat: 14%, rainfed wheat 10%, barley 20%, olive 7%, cumin 5% and lentil 4% of cultivated land respectively).

The farming system has a particular importance in the national context for a number of products, such as pistachio (41% of the area of irrigated pistachio and 86% of rainfed pistachios are found there), almonds (68% share of the national land under the crop), potato, rainfed grapes and sugar beet (69%, 43% and 48% of national cropped area, respectively). These specialized products are far more important for income generation in their niches and sub-systems, but across the entire farming system occupy relatively small shares of cultivated land.

The high rural population density is indicated by a holding size of 4.54 hectares of cultivated land, but nonetheless varies widely within this broad farming system, particularly as it includes the special case of Al Ghab. After exclusion of this special zone, the holding size of 5.4 ha of cultivated land is almost identical to the national average (5.8 hectares). The small area of Al Ghab in contrast has a registered average holding size of 2.1 hectares.

³³ This section is based on the individual farming systems report prepared by Ahmed Sadiddin, which is available from NAPC as a separate document.

Table 12: The Farming Systems of the Central Plains and Al Ghab

	Syria	% of	FS 4 Al Ghab	% of	FS 4	% of	FS 4	% of
	Area	National	& central plains	National	central plain	national	Al-Ghab	national
Area (ha)	18,517,971	100%	1,155,945	6.24%	1,015,146	5.48%	140,799	0.76%
Rural Population (No.)	8,531,000	100%	1,723,164	20.20%	1,427,448	16.73%	295,716	3.47%
 Holders (No.)	938,748	100%	162,187	17.28%	120,904	12.88%	41,283	4.40%
		Avg. Holding (ha)		Avg. Holding (ha)		Avg. Holding (ha)		Avg. Holding (ha)
cultivable l. (ha)	5,911,020	6.30	772,628	4.76	685,322	5.67	87,306	2.11
cultivated l. (ha)	5,420,656	5.77	736,096	4.54	648,790	5.37	87,306	2.11
	Area (ha)	% of cultivated land	Area (ha)	% of cultivated land	Area (ha)	% of cultivated land	Area (ha)	% of cultivated land
a) land under crops (ha)	4,590,899	84.7%	663,226	90.1%	575,920	88.8%	87,306	100.0%
of which rainfed (ha)	3,258,115	60.1%	466,393	63.4%	459,385	70.8%	7,008	8.0%
of which irrigated (ha)	1,332,783	24.6%	196,833	26.7%	116,535	18.0%	80,298	92.0%
b) fallow (ha)	829,757	15.3%	72,870	9.9%	72,870	11.2%		
Main crops								
Rf. Barley	1,185,239	21.9%	144,391	19.6%	144,221	22.2%	170	0.2%
Ir. Wheat	752,488	13.9%	101,816	13.8%	60,561	9.3%	41,255	47.2%
Rf. Wheat	917,040	16.9%	71,150	9.7%	67,449	10.4%	3,701	4.2%
Rf. Olives	460,535	8.5%	54,760	7.4%	53,162	8.2%	1,598	1.8%
Rf. Cumin	130,133	2.4%	39,730	5.4%	39,618	6.1%	112	0.1%
Total	3,445,435	63.6%	411,847	56.0%	365,011	56.3%	46,836	53.6%

Source: constructed based on MAAR statistics for 2002.

The latter is a special region marked by high Government investment in public infrastructure and particularly intensive irrigation and influence of the agricultural plan. This Al Ghab-region represents therefore a separate farming system, which is treated at the end of this chapter.

Considering the most important crops by their share of cultivated land in the central plains (excluding Al Ghab), the above picture changes slightly from the above, but based on the relatively small size of the Al Ghab farming system, its exclusion is only noticeable where huge differences in share of cultivated land under certain crops exist. This is the case for rainfed barley and cumin (both almost inexistent in Al Ghab).

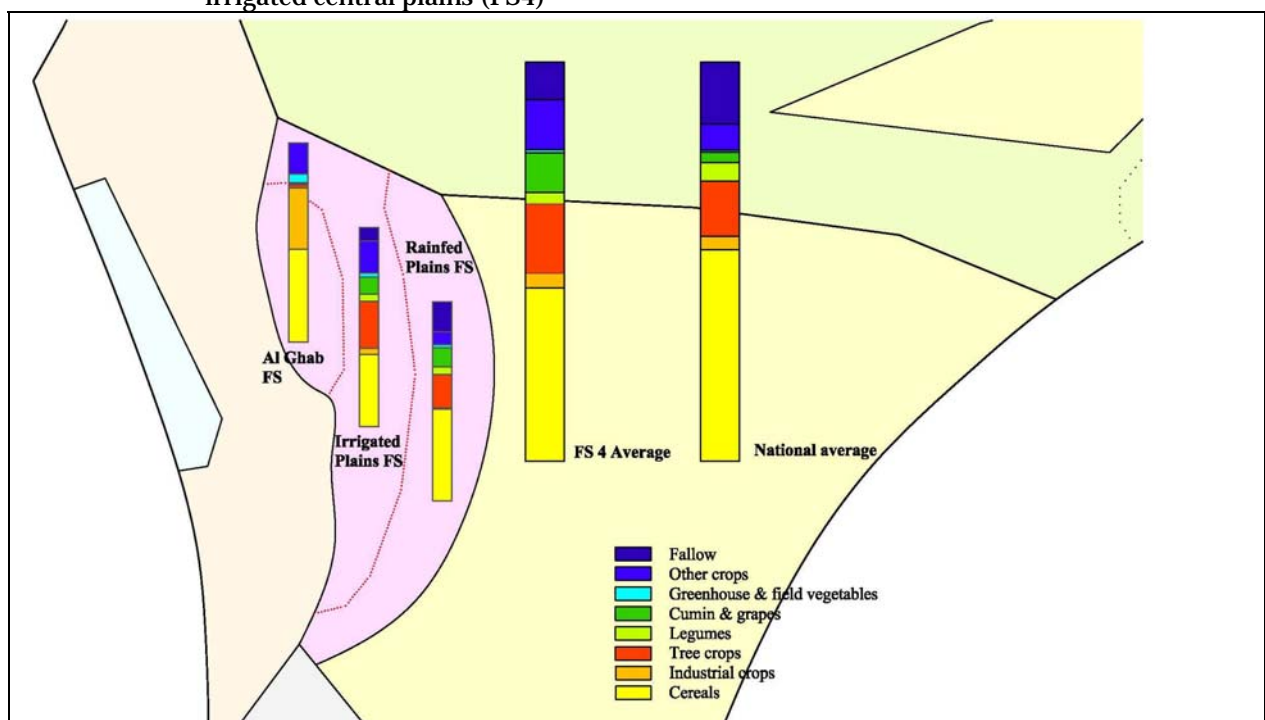
The less intensively cultivated parts outside al Ghab, i.e. the rainfed and irrigated plains have the following characteristics. They stretch over the stabilization zones on to three and cover partly or completely eight Mantikas in three Governorates: Homs (which includes Homs, Al-Rastan, Al-Kuseir and Mukharram), Hama (which includes Hama, Mhardeh, and Salamyah) and Idleb (including only Maa'rat Numan Mantika).

This area is surrounded by four other farming systems. To the west by the coastal hills of Tartous governorate, which belong to FS 2 (part of the Mountains and Hills Rainfed Farming System), and by Al-Ghab Plain (the Intensive Irrigated Farming System of Al-Ghab) in Hama Governorate. To the east, it borders the agro-pastoral farming system (the limit being defined as the border to stabilization zone 4, but touches the pastoral farming system in the south), and Idleb Heights (belonging to FS 2) to the north.

Important public interventions over the last four decades (the construction of public canals and the Green Belt Project) influenced the systems' development. The former occurred in form of the construction of dams for irrigation development using water from the Orontes River. The second and ongoing so-called "Green Belt Project" started in 1980 with a focus on the establishment of orchards (pistachio, olive, almond, and grape). The major activities of this project focused on stabilization zones 2 and 3. As external effects of this project, the interest in pistachio and olive planting has spread into other stabilization zones.

The presence of two big cities (Homs and Hama) within this farming system jointly with the international north-south road created good market access, which supported non-agricultural activities such as trade and industry development, particularly since coming into force of Investment law No 10 in 1991. Therefore, the relative importance of agriculture in the livelihood system of a significant portion of households in this zone has declined, which was exacerbated by the drought of the last decade on agricultural profitability.

Figure 6: Share of cultivated land by crop groups in the farming systems of Al Ghab, the rainfed and irrigated central plains (FS4)



Private ownership is the dominant land tenure regime in this system. However, there is a small share of agrarian reform land, which had been distributed from *absentee land owners* (mostly living in Homs and Hama) to former sharecroppers of this land. The third land tenure regime relevant in this system is sharecropping, concentrated particularly in the eastern part of Hama Governorate, whereby in this case farmers have permanent sharecropping contracts protected by the *Agrarian Relations Law*.

In order to better represent the regional differentiation in the central plains, the area has been analyzed in two separate farming systems, i.e. the rainfed as well as the irrigated central plains, distinguished by the prevalence of irrigation use, hence a more intensively irrigated western part and a dominantly rainfed eastern part. Furthermore, several niche systems have been identified, such as pistachio cultivation in Mourek as an example of successful vertical integration and market development.

Table 13: Sub-division of the central plains of FS 4 according to their crop specialisation

	% of national area in central plains of FS 4	% of FS 4 in irrigated FS	% of FS 4 in rainfed FS
Rf. Barley	12.1	14.4	85.6
Ir. Wheat	8.0	82.7	17.3
Rf. Wheat	7.4	50.2	49.8
Rf. Olives	11.5	51.3	48.7
Rf. Cumin	30.4	31.2	68.8

Source: constructed based on MAAR statistics for 2002.

Table 13 supports this sub-division at the level of the crops, which at the level of the broad farming system (FS 4) contribute the highest share to the cultivated land. Among these, the largest differentiation occurs as expected by the dominance of irrigated wheat in the irrigated system, while 86% of the barley in the central plains belongs to the rainfed farming system of the central plains. In addition, a number of irrigated perennials occur almost exclusively in the zone defined as the irrigated farming system, notably irrigated apricot, grape, pistachio and apple. The most important perennial in the rainfed system is rainfed almond, which even exceeds the cultivated land under olive (27000 ha). As this differentiation is the result of a geographical division between the zones, followed by a calculation of the crops within these systems (and not vice versa) clearly supports this differentiation of farming systems.

The farming system of the central irrigated plains

Characteristics of the irrigated farming system

The *Irrigated Farming System* has benefited from public investment for the construction of the public irrigation schemes and canals, resulting in 32% of cultivated land being irrigated. This farming system includes all the land of the central plains located in stabilization zone 1 and part from stabilization zone 2, hence rainfall exceeds 300 mm and reaches up to 450 mm. The 474000 hectares under this system include 77000 holders, i.e. on average 3.7 ha cultivated land. Hence the system includes 2.6% of the national area, but accommodates 8% of the holders. Of the almost 286000 hectares of cultivated land, 266000 hectares are under crops, of which again 174000 hectares are rainfed. Only 7% of the cultivated land is fallow and therefore considerably less than the national or the central plains average (see Table 14³⁴).

³⁴ The distribution of crop areas between the rainfed and the irrigated part of the system is only an approximate distribution in absence of more disaggregated statistical information. Not all inconsistencies in the allocation of irrigated land between this and the rainfed farming systems can be removed with the available information, but these are sufficiently small to present the system characteristics. As a consequence, the table indicates for the rainfed system a negative figure of irrigated land.

Table 14: The farming systems of the irrigated and rainfed central plains in the national context

	Syria	% of	FS 4	% of	SZ 41	% of	SZ 42	% of
	Area	National	central plain	national	Irrigated	national	Rainfed	national
Area(ha)	18,517,971	100%	1,015,146	5.48%	474,185	2.56%	540,961	2.92%
Rural Popu- lation (No.)	8,531,000	100%	1,427,448	16.73%	1,079,444	12.65%	348,004	4.08%
 Holders (No.)	938,748	100%	120,904	12.88%	76,617	8.16%	44,288	4.72%
		Avg. Hol- ding (ha)		Avg. Hol- ding (ha)		Avg. Hol- ding (ha)		Avg. Hol- ding (ha)
cultivable l. (ha)	5,911,020	6.30	685,322	5.67	295,424	3.86	389,899	8.80
cultivated l. (ha)	5,420,656	5.77	648,790	5.37	286,494	3.74	362,297	8.18
	Area (ha)	% of culti- vated land	Area (ha)	% of culti- vated land	Area (ha)	% of culti- vated land	Area (ha)	% of culti- vated land
a) land under crops (ha)	4,590,899	84.7%	575,920	88.8%	266,324	93.0%	309,596	85.5%
of which rainfed (ha)	3,258,115	60.1%	459,385	70.8%	173,791	60.7%	285,594	78.8%
of which irrigated (ha)	1,332,783	24.6%	116,535	18.0%	92,533	32.3%	24,002	6.6%
b) fallow (ha)	829,757	15.3%	72,870	11.2%	20,170	7.0%	52,701	14.5%
Main crops								
Rf. Barley	1,185,239	21.9%	144,221	22.2%	20,822	7.3%	123,400	34.1%
Ir. Wheat	752,488	13.9%	60,561	9.3%	50,105	17.5%	10,457	2.9%
Rf. Wheat	917,040	16.9%	67,449	10.4%	33,869	11.8%	33,580	9.3%
Rf. Olives	460,535	8.5%	53,162	8.2%	27,254	9.5%	25,908	7.2%
Rf. Cumin	130,133	2.4%	39,618	6.1%	12,380	4.3%	27,238	7.5%
Total	3,445,435	63.6%	365,011	56.3%	144,429	50.4%	220,582	60.9%

Source: constructed based on MAAR statistics for 2002.

36% of cultivated land in this system is under cereals, most (29%) of which is wheat. The second most important crop group (1/3 of cultivated land) are trees, of which olive is dominant across the system, but others (such as pistachios and almonds) are extremely important in their specialized pockets of cultivation. The creation of these large areas of tree crops is also to be seen under public promotion of perennial crops under a number of special programmes, such as the Green Belt Project or the Ali-Ali Project (details are specified in the individual farming systems report), even though they focussed mostly on the neighbouring irrigated farming system. Special field crops are furthermore cumin, which occupies over 4% of the cultivated land.

Typical households

The household stratification in the irrigated system is mostly based on access to irrigated land, but depending on the pockets of production orientation, size limits vary. The calculation of an average household derived from published statistics would be particularly wrong in this system, as it would result in a very large number of crops, each supposedly cultivated in very small areas. Therefore, the reader particularly interested in details about this system should refer to the full farming systems report, while the following is only an illustrative example.

Poor households are those with less than 2 hectares of holding, which represents approximately 50% of households. They can be considered almost part-time farmers, as low-level employment or casual income is more important for their livelihoods than farm income.

Medium households operate 2-5 hectares with relatively good access to irrigation water and comprise 30-40% of the population. Off-farm employment does play a role for their livelihood system, but plays a relatively lower role than for the poor households. However, water availability and climatic risk on their rainfed part of land makes their agricultural income prone to risk.

Better off households are those with more than 5 hectares of cultivated land per holder, and due to their social status, these 10-15% of the population can rely on generally good access to irrigation water sources. Agricultural income is commonly their main source of livelihood and relatively stable based on the relatively large holding size.

It is interesting to observe that field data suggest that the better-off farmers of the irrigated system have a higher tendency to cultivate regulated crops (wheat, cotton, and sugar beet), while the poor and medium farmers have more focus on fruits, vegetables, and some spices such as cumin and anis. Poor farmers almost disregard regulated crops to concentrate their production on fruit and vegetables, in addition to some spice crops such as cumin and anis. Therefore, the better-off farmers are likely the ones who benefit from Government subsidies the most, since their production is concentrated on the regulated crops, which have fixed prices ensuring good stable profit margins.

One of the objectives of pricing policies of regulated crops (wheat, cotton, barley, and sugar beet) is to achieve equitable and stable, reasonable income for farmers. This objective was incompletely achieved due to some gaps in the administrative procedures of the production delivery to the relevant Governmental institutions (for cotton and wheat only). Credit access is a difficulty in this system, even though to a lesser degree than in Al-Ghab.

The presence of two big cities connected by the international road in this system created good market access for the majority of farmers, resulting in a big variation in the cropping patterns of the system and high off-farm income especially in the irrigated sub-system. However, the field survey results suggest that the better-off farmers of the irrigated farming system have higher tendency to cultivate regulated crops (wheat, cotton, and sugar beet), while the poor and medium farmers have more focus on fruits, vegetables, and some spices such as cumin and anis.

In the central plain system, i.e. including both this irrigated as well as the rainfed farming system, the research findings suggest that small (poor) farmers devote a major share of their production to home consumption (especially wheat, vegetables, and dairy products, the former through *burgul* and wheat flour). Hence, independently of the official wheat price is, small farmers income generates relatively low benefits compared to better-off farmers.

The farming system of the central rainfed plains

Characteristics of the rainfed farming system

The Rainfed Farming System is located to the east of the broad farming system and covers approximately 540000 hectares. The ban to expand well drilling out of environmental concerns restricts further expansion of the neighbouring irrigated farming system into it. Nevertheless, 6.6% of the cultivated land of 362000 hectares is irrigated (i.e. 24000 ha), rainfed land accounted for 78% of the invested land, out of which 18% was left for fallow in 2002 (a high rainfall year). The lower crop productivity in the drier eastern part of the central plains explains why the barley area exceeds wheat by 3:1. Tree crops play a role in the system, but almond exceeds olive areas (jointly 15% of cultivated land) in this farming system. Cumin is an important cash crop (7% of cultivated land), but at lower productivity levels than in the FS3. The Green Belt Project supported the establishment of a part of the perennial crops in the system.

The average holding size of 8.2 ha of cultivated land exceeds the national average and appears relatively large, but has a relatively low income generation potential due to the low average annual rainfall, reflected also in the focus on dry cereals, e.g. one third of the cultivated land

being under barley cultivation. Other major crops include rainfed wheat, cumin and olives (9.3%, 7.5% and 7.1% respectively; see Table 14).

Off-farm income sources in the rainfed farming system depend mainly on casual agricultural or non-agricultural labour. The reasons are mainly the low yields of agricultural crops due to the rainfed cultivation in area of low rainfall (less than 250 mm per year on average), coupled with the scarcity of other income sources. The rainfed cultivation is the consequence of the Government policy to prevent drilling wells in that area due to water conservation concerns.

Typical households

The criteria for household classification into the three household types were determined during the village survey and somewhat differed between the representative villages. In most cases, farm size was the dominant classification factor, complemented by the share of land under rainfed and irrigated cultivation as well as the relative importance of livelihood sources (including off-farm and non-agricultural income). However, farm size is interestingly consistent with the importance of off-farm income, i.e. large farms have also higher off-farm income.

Better-off farmers are those with a total farm size exceeding 60 dunums (more than half of which planted with fruit trees) or over 100 dunums regardless of the presence of fruit trees. They form about 10% of the farmers and are those with shallow wells, from which they cultivate some irrigated crops, especially in the good rainfall years.

Medium farmers in this farming system are those with a total farm size between 30 and 60 dunums (again more than half of which planted with fruit trees) or between 50 and 100 dunums regardless of the presence of fruit trees. About 30% of the farmers fall into this category.

Poor farmers are those with a total farm size below 20 dunums if more than half of it is planted with fruit trees. Farmers with less than 35 dunums likewise fall into this group, if they own few or no fruit trees. Approximately 60% from the farmers fall into this category.

Poor and medium farmers have many similarities, in that they form the casual agricultural labour force in this sub-system; therefore, they usually suffer from low income levels in combination with high income variability, i.e. both households are vulnerable, even though to a different degree.

The household classification in this farming system differs as a function of the prevalence of fruit trees between areas. In two selected villages, there are a few specialized sheep keepers, whose lifestyle resembles those of Bedouins as they follow a seasonal migration pattern. They move with their sheep flocks to Al-Badia for winter and spring grazing and return to the village with other Bedouins to graze their animals on wheat and barley stubbles. These households were excluded from the household analysis of this farming system, also because their sheep flocks are considered in the official statistics of MAAR as a part of Al-Badia flocks and they are registered in sheep keepers' cooperatives there.

Recent changes

The major reported recent changes in the farming system are the expansion of barley and cumin at the expense of the wheat area. Wheat occupied ten years ago about 50% of the total cultivated area, while it occupies presently no more than 20% in good rainfall years. This has been mainly the consequence of drought. Farmers started decreasing their wheat area due to its heavy yield depression in the low rainfall years and they shifted to barley or cumin for their lower yield depression under such conditions.

A second consequence of the drought is the decreased livestock (mainly sheep) number, both because of direct and indirect drought effects. The direct effect refers to the scarcity of the pastures in the agro-pastoral and the pastoral systems zones, while the indirect effect refers to the decreased barley grain and straw yield, which farmers use as winter

feed for their sheep. Consequently, farmers sold sheep to save them from starvation and to avoid high expenses caused by high prices of barley and straw.

Trends and development options in the central rainfed and irrigated plains farming systems

Several cross-cutting themes will influence the further development of this large and diverse farming system: Population growth will predictably increase pressure on land resources and reduce the average farm size, unless off-farm jobs opportunities absorb the excess labour outside of the agricultural sector. Constraints in the land market prevent adjustments in the holding structure. Inflated land prices in the irrigated farming system render land purchases unfeasible for most holders. Some sub-division of land goes unreported in statistics, while the families effectively divided it. The *Agrarian Reform Law* makes such approaches a necessity, while in the other two farming systems it occurs due to slow administration of the cadastral system. The backlog of issuing updated land titles causes difficulties even on private land.

One of the objectives of pricing policies of regulated crops (wheat, cotton, barley and sugar beet) is to achieve a stable, reasonable farm income and has been a long instrument in agricultural policy of Syria similar to many OECD countries. Farmers eagerly grasped these stabilizing possibilities, even though the income supporting effect of the pricing policies are in reality only partly achieved due to administrative procedures for the delivery of cotton and wheat to the Establishments. Part of poor farmers even in the irrigated plain farming system is unable to obtain credit even for regulated crops due to accumulated debt with the ACB (even though this is most serious in Al-Ghab). Consequently, these farmers resort to private credit at high interest rates and part of the subsidies is transferred to the traders who provided the credit. In both central plains farming systems, small (poor) farmers devote a major share of their production to home consumption. This refers particularly to wheat, vegetables, and dairy products, although surplus sale occurs in good rainfall years. Hence, administratively increased wheat prices result in marginal additional cash income for small farmers compared to large ones.

Due to the increasing integration into international markets, price reductions of the strategic crops wheat, cotton, and sugar beet are likely to occur. These reductions in turn would probably have a negative impact on the profit margins of farmers, which mainly affects better-off farmers in the irrigated farming system, as poor and medium farmers there focus more on fruit and vegetable production.

Farmers' reaction to such changes would differ between farming systems and household types. Poor and medium farmers in the entire broad farming system are likely to diversify production, including into dairy keeping or expanding crops such as peanuts or cabbage. However, if the markets for such products do not develop, these adjustments could slow down or might not occur at all. Underdeveloped urban milk markets are probably behind an under-utilized potential of dairy production.

The negative impact of the policy change upon better-off farmers is probably lower in both systems, due to their higher flexibility in adapting to new conditions. Part of the flexibility is due to the relatively good liquidity situation, which allows them to operate and make their decisions depending on their own financial resources. In the absence of well-developed capital markets, this possibility gives them a large advantage to take up arising commercial opportunities, which include the adoption of new cost-saving technologies.

In order to support the income generating possibilities of poor farmers, Government policies should focus more on intensifying and increasing the value of products such as fruit and vegetables. Syria has a comparative advantage for these products, which in this system is mainly produced by poor and medium farmers. Government policy towards better-off farmers should focus more on increasing their efficiency.

The land use intensity in both plains farming systems is relatively low (R-value almost 1). Therefore, increasing cropping intensity could have a positive impact on farmers' incomes

especially after consideration of the potential of crop-livestock integration. The latter can be encouraged through the introduction of fodder crops in the crop rotation, coupled with an enabling environment for improved markets for local livestock products. Both changes would improve soil management and soil fertility, land use intensity and a higher return to the public investment in irrigation infrastructure.

In the rainfed farming system, water scarcity has caused the cropping pattern to be rather simple (compared to that of the irrigated sub-system), as farmers have fewer cultivation options. Moreover, water scarcity causes the crop yields to be low (the entire sub-system is located in stabilization zones 2 and 3). Such a constraint results in very low-income levels for the majority of people, even though some cultivate barley (a regulated price crop). Barley is only harvested about once every five years and is usually grazed in the others.

Low yields are also a concern in olive and almond production, which represent the main two perennials in the rainfed system and are often affected by late winter frosts. Furthermore, their cultivation represents a price risk for producers even in the good yield years since they are as unregulated crops subject to marketing risks. Taking into account the low education levels in most areas, most people (especially poor and medium households) highly depend on off-farm income sources, among which casual agricultural labour is of special importance.

Public investment, particularly in irrigation canals, shaped the distribution of the production systems, without reaching so far its full potential in these farming systems. Among the most important barriers for further development are the low irrigation efficiency and limited credit access especially for poor farmers. Their removal would increase production intensity, conserve water and lead to productive employment creation for the increasing population. More attention should further be given to the potential of using rainfall runoff for increased crop production. Runoff farming increases crop yields and reduces yield variation, as has been reported by an ongoing FAO study. However, the selection of promoted technologies should be based on a combination of technical as well as economic analysis, as some techniques lead to decreasing returns to labour in the initial years, which poor households will find difficult to accept.

The Al Ghab farming system

Characteristics of Al Ghab

The Intensive Irrigated Farming System of Al-Ghab Plain (Al-Ghab farming system) represents as a separate unit in the agricultural statistics of the Ministry of Agriculture and Agrarian Reform (MAAR) and is characterized by intensive irrigation, coupled with the intensive cultivation of three crops considered strategic by the Government: wheat, cotton and sugar beet. This farming system comprises approximately 141000 hectare, which makes it similar in size than the coastal farming system and a population of almost 300000 inhabitants, all of which considered rural. The very high population density, indicated by an average holding size of 2.1 hectares, compared to 5.8 hectares per holder as the Syrian average is another characteristic.

This system has been target to a huge Government investment in draining the swamps since 1960 and by the construction of large public canals that form its main irrigation water source. In addition, most of Al-Ghab was the target of the *Agrarian Reform Law*, which also explains the relatively homogenous holding sizes and land tenure regime. For that reason, and in combination with factors such as its settlement history and the natural conditions, Al Ghab represents the most homogenous among all the farming systems. A special feature is the high share of strategic crops in the overall cropping pattern: Wheat, cotton and sugar beet jointly cover 86% of cultivated land in the system. In terms of relevance at the national level, its importance at national level is relatively highest in case of sugar beet, of which 32% of the total area in the country was located in 2002 in Al Ghab and which produced 35% (532000 tons) of the total national harvest (see individual farming systems report for details).

Over 11% of the cultivated land in Al Ghab are under with sugar beet (2002), representing over 33% of the national cultivation area. The contribution of cotton from Al-Ghab to the national cotton area is obviously less, but still the almost 14% of cultivated land under cotton represent close to 6% of the 2002 cotton area. The latter figures have to be seen in the context to the small size of the farming system (0.8% of the national land area and 1.5% of its cultivated land).

Topographically, Al Ghab is a large basin surrounded in the west by the coastal mountains and is limited on the other sides by undulating hills, which are dominated by perennial cultivation. The Orontes River was the main river bringing drainage water from the surrounding mountains. As the plain lacks proper natural drainage, it was considered for centuries a natural pasture area and had the characteristics of a swamp prior to its drainage. This process started in the 1970ties, followed by land reclamation conversion from pastoral to agricultural land. After reclamation, the new land was distributed within the favoured institutional form of socio-economic organization, i.e. the co-operative structure. Until the present day, more than 90% of the land is held according to the Agrarian Reform Law, which includes many villages completely, while particularly in the south, part of the farmers own private land in addition to their of agrarian reform land.

Socio-economic stratification in Al Ghab

As mentioned earlier, the land reform process had a strong impact of the starting point for the natural trend for socio-economic stratification in this farming system. The original land attribution per holder was set to 25 dunums, i.e. 2.5 hectares.

Given the prevalence of agrarian reform land in the farming system, average holding sizes are relatively homogenous. Privately held land from the pre-reform period as well as location within the system are the two factors leading to some variation in holding sizes. In the northern part, where land was considered rainfed during the agrarian reform process, 50 dunum of land were originally assigned per holder compared to 25 dunum in areas considered irrigated from the onset. Some variation in average holding sizes also occurs in villages, where holders owned land outside the land attributed in the agrarian reform process and hence originally had two sources of access to land. Apart from these smaller parts of the system with variation in holding sizes, the household status generally varies more based on the water access, i.e. location along the canal, as well as livestock availability and off-farm income. Particularly the latter is of high importance for income generation, and employment is sought both for peak labour operations within the system as well as in neighbouring regions.

Poor households

Poor farmers, comprising 80-85% of local farmers, are defined as those cultivating less than 25 dunum, or holders with farmers managing between 25 and 50 dunum and poor access to irrigation water. Household income depends in these cases more on casual agricultural labour than on income from own agricultural land, which makes them vulnerable to extreme poverty due unstable casual income and low wage rates. The latter is particularly important in the north-west of Al Ghab, where farm income is particularly low due to salinity-induced low yields. Instead, for the farmers with livestock (usually 1-3 dairy cows) casual labour is less important (since livestock, when exists, forms about 10% of the family income).

Overall, this household type is a main provider of casual agricultural labour within Al-Ghab as well partly to other areas such as Hama (especially for cotton and sugar beet) and the coastal areas (e.g. for olives and citrus harvest).

Ten years ago, crops and livestock had a higher relative importance for income generation, resulting from two factors: firstly, the decreased area of labour-intensive crops (cotton and sugar beet) and the increase in crops with low labour requirements (wheat) in combination with decreasing yields. Secondly, the declining livestock numbers, caused by losses in grazing areas, increasing feeding costs and low milk prices.

The cropping pattern of poor households is dominated by wheat, cotton, and sugar beet, complemented by small areas of intensive crops. The latter are usually cultivated on wheat land plots after its harvest, if water is availability. In some southern areas, peanut is also of relevance for this household type. However, the precise cropping pattern differs between villages, as is illustrated in more detail in the individual farming systems report. Cotton is more important in the south than in the north, even though the wheat importance is similar in both regions. This is possible, because farmers of the south cultivate cotton and wheat in the same year, harvesting the latter as *freekeh*, which sufficiently reduces the cultivation period to accommodate the second crop. Farmers usually successfully sell the cotton produced in these often unlicensed areas through an overestimation of cotton yields by the extension units in the *cotton certificates of origins*. The latter is used by ACB to differentiate licensed and unlicensed cotton prices.

Several changes occurred to the cropping patterns of this household type during the last decade. The share of wheat has increased considerably in the north at the expense of cotton and sugar beet, which formerly occupied 30% and 35% of the total farm area. This change resulted from decreasing water availability through deficiencies in the irrigation water availability and the stricter application of the agricultural plan, which reduced unlicensed cotton areas. Peanut was introduced in the south of the system during the last decade on suitable soils after water became available through deep wells drilled during the last decade. Beans and cucumber are cultivated in small areas intensively after wheat, but their importance differs according to water availability. Their importance according to the area is small, but they offer potential for future strategies. Most farmers of this type cultivate up to 5% of their land with vegetables (tomato, cucumber, eggplant, etc), but given the small holdings, this represents only up to 1 dunum and therefore destined only to home consumption.

Livestock in this farming system has become less important in the last decade and since poor farmers' posses at most a few animals, they generate very little income. For poor households, the regularity of such potential income is quite important, though, especially at the beginning of winter when liquidity becomes a crucial issue to cover school expenses and to purchase fuel. It also improves nutrition security of children.

Exit from agriculture is a relatively highly ranking strategy of poor farmers of this farming system, even though its importance differs for economic and social reasons between villages. The low returns to land are associated with low productivity stemming from poor soil management. The situation is worsened by the prospect of increasing population pressure. The increasing orientation towards off-farm income occurs across the farming system. Casual agricultural labour was already important in the past, generated about half of farm income, and is expected to gain more importance due to a lack of other work opportunities.

Diversification is the most different strategy for small farmers in several villages and the distribution is consistent with the land productivity by villages. It was further noticeably stronger in the south, due to more favourable climatic and soil conditions (see peanut discussion). Apart from the crop diversification (e.g. peanut, onion, apple, olive, and peach), expanding livestock is a second diversification path, even though one requiring considerable capital. The intensification is mentioned by poor farmers most homogeneously across the system (10-20%) in the sense of reclaiming land (especially in villages with the least fertile land by adding manure and soil taken from other places in addition to cultivating intensive crops such as beans, watermelon, peanut after wheat.

Medium farmers

Medium farmers include 15-20% of the local farmers and operate between 25 and 50 dunums with good access to irrigation water. Agricultural land forms the main income source (usually more than 50%). Non-agricultural income sources (Government employment mainly) are also important and lead to higher income stability compared to the poor.

The livelihood sources for these households are similar to the poor farmers, with the main difference in the lower importance of income from casual agricultural labour. The latter results from the higher productive employment potential on own land and crop production is the most important for income source. Ten years ago, crops and livestock were much more important for income generation than poor farmers. The general trend in livelihood sources over time is relatively similar to poor farmers. The importance of casual agricultural labour was negligible ten years ago for this household but already had some importance for the poor household.

The cropping pattern of this household type is similar to that of poor farmers and likewise differed between south and north of the system. These farmers principally cultivate wheat, cotton and sugar beet in the entire system. Wheat has approximately the same share of the entire land of these farmers, while the share of cotton is much higher in the south than in the north. Peanut is relevant in the south and onion is cultivated on a small share of the land (mostly for home consumption). The importance of such crops relative to the main crops is small since they are not state-controlled, so their prices fluctuate according to the market circumstances. Consequently, they cannot assure stable income. In addition, their areas vary widely with the annual water availability.

Strategies of medium households in Al-Ghab generally exclude the option to leave the agricultural sector, as it provides the main source of income. Simultaneously, there is no possibility of expanding agriculture due to financial constraints. Therefore, the only available strategies for these households are intensification, diversification and increased off-farm income. Intensification for medium farmers in the south can only be pursued by increasing land use intensity. However, in the north, farmers can reclaim the land by adding manure to increase its productivity. Diversification is the most important strategy of medium farmers in the south, but this is not the case in the other part of the system. This strategy has two aspects: to diversify the cropping patterns of the land and to raise livestock. The first aspect is the one that makes the difference in the magnitude of this strategy among medium farmers from different villages. In the south, farmers have the possibility to diversify because they have more access to irrigation water, so they can cultivate more irrigated crops (e.g. peanuts). It is noticeable that farmers restart raising local cow breeds, despite being less productive, since the cost for raising them is much lower and they are accustomed to local conditions, i.e. can graze the hard remains of cotton (which are usually discarded after sheep grazed the leaves). There is no tendency for these farmers to leave the agricultural sector, but there is a strong tendency to increase off-farm income. In spite of the main role of farms in income generation, this strategy is of special importance because farm income has become insufficient (especially when considering the population increase and the resulting land division). The possible sources of increasing the off-farm income are casual agricultural labour, state-employment, and small shops.

Better-off households

Better-off farmers, i.e. 1-2% of the farmers, are those whose total farm size exceeds 50 dunum with good access to irrigation water. Agriculture is the most important and in some cases the only income source (especially very large farmers in the south). Relevant non-agricultural income sources of this group are trade, fishery, and other activities related to their higher education level.

The livelihood sources of this household type are dominated by agricultural income from their large cultivated land (70-80% of income). The remainder stems from mainly Government employment, trade or private business. Some of these farmers are *absentee land lords* residing mainly in Hama and they contract farm managers. During the last decade, no significant change adjusted the relative importance of income sources, although the economic returns of agricultural activities have slightly decreased.

Farmers of this household usually cultivate only state-controlled crops, so their cropping pattern is very simple compared to that of poor or medium households. Regional differences in the importance of the main three crops between households of this type follows a similar pattern to the one discussed above. The only difference is that farmers of the north cultivate some vegetables, which are almost negligible in the south. In addition, sugar beet area is relatively larger in the north as it is substituted by cotton in the south. A decade ago, the three main crops were allocated equally in the field. Recently, the share of each crop began to differ between villages, caused by differences in water availability, as reflected in the agricultural plan. This decrease affected above all the north of Al-Ghab, resulting in increased wheat and reduced sugar beet and cotton areas. In the south, water availability changed little, while the agricultural plan imposed stronger restrictions: farmers had to reduce sugar beet in favour of wheat.

The only excluded strategy for those farmers is “leaving the agricultural sector”, while farmers of this group are the only ones who consider an expansion strategy. Between the other strategies, their relative importance depends on individual investment preferences: some prefer non-agricultural activities due to the relatively low economic returns of agriculture compared to industry and trade. However, this strategy is related to diversification and increased off-farm income, e.g. by expanding the total area of the farm or cultivating new crops suitable for processing such as tomato, or investing in livestock. Intensification can only be achieved by adopting new technologies, either new varieties to increase yields or to reduce labour cost, e.g. by adopting harvesting machines especially for cotton. The latter is the main interest of rich and concern of poor farmers in the south of the system zone.

Recent changes in Al Ghab

Several changes have occurred in the system zone during the last decade. The strict application of the agricultural plan, coupled with a considerable decrease in the available water especially in the late nineties, has changed the relative importance of the three strategic crops in the cropping patterns. This resulted in a declining cotton and sugar beet area in favour of wheat. However, the expansion of the irrigated area in the southern part of the system, which was the result of drilling deep wells, has partly offset the change, where the area of cotton increased at the expense of wheat (which had been rainfed crop before). Furthermore, the cultivation of cotton and sugar beet (which are overexploiting crops), accompanied with land mismanagement by farmers, caused considerable soil deterioration especially in the northern part of Al-Ghab. This phenomenon, in turn, resulted in decreasing yields and farm income.

Trends and development options in Al-Ghab

The degree of land pressure varies within Al Ghab slightly, but this is only a temporary relief and a relative difference in the degree of urgency with which the further development of the agricultural potential in the area and land scarcity problems need to be addressed. One generation after the original land attribution and because of intensive agricultural use, the system is experiencing at present a series of internal challenges:

- Legal inflexibility leads to complex land management structures, as the land remains registered in the name of the original holder, even if the original agrarian reform beneficiary has passed away;
- Increased effective land fragmentation due to raising pressure on the scarce land resources has led to a situation, where effective landlessness becomes a concern as well as situations where entire villages fall on average below the limit of viable farm sizes. The decision making process in the farming families becomes increasingly difficult;
- Increasing soil fertility problems in part of the area due to intensive land use, irrigation with deficient concern for proper drainage;

- Water scarcity is increasingly becoming an issue in parts of the system;
- High dependence on strategic crops, mostly only wheat, cotton and sugar beet.

Due to the increasing integration of the Syria into international markets, the internal challenges are combined with external ones and economic costs and international agreements might result in a modified Government policy with regard to the three strategic crops (wheat, cotton, and sugar beet) and lastly in a price reduction. This would directly affect farm income, especially in Al-Ghab, while it would mainly affect the surplus of better-off farmers in the irrigated sub-system, where poor and medium farmers focus more on fruit and vegetable production.

Farmers' reactions would probably vary according to the three farming systems and by household types. Most likely, poor and medium farmers in the entire broad system would diversify their agricultural activities by raising dairy cows. Another option could be expanding crops cultivated presently in small areas, such as peanut and cabbage. However, the income effect of such changes might be small if market access for the new products does not improve. This would be particularly important for dairy products, where internal marketing efficiency as well as limits to total demand could be constraints to production development. Changing consumer preference for dairy compared to small ruminant-based milk products would possibly only compensate for part of this production expansion.

The negative impact of the policy change upon better-off farmers is expected to be lower in the Al Ghab farming system, due to their higher flexibility in adapting to new conditions and in combination with the absence of liquidity constraints, they can operate independent from credit.

The increase in the land use intensity could have a positive impact on farmers' incomes especially if crop-livestock integration is considered. The latter can be encouraged by introducing fodder crops into the cropping pattern, coupled with encouraging livestock production. These two activities are likely to protect the soil and improve its fertility. However, the strong focus on crops considered strategic has slowed the adjustment processes and prevented a full consideration of the farm level benefits of a focus on increased land use intensity. Given the strong interest of farmers in crops providing access to credit and income security has lead them to accept the negative impact associated with the long cultivation season of cotton and sugar beet, as long as extremely small holdings (informal sub-division of already small farms) did not force farms to increase returns to land considerably.

Finally, Government investment shaped production systems mainly through the construction of public canals for drainage and irrigation. However, the farming system offers additional improvement potential, as indicated by the low cropping intensity in combination with the high irrigation potential. Market access is not as good as from some parts of the neighbouring central system, which benefits from the presence of two big cities (Homs and Hama). Therefore, the key barriers preventing the achievement of Government objectives should be addressed, i. e. low irrigation efficiency, tenure inflexibility and market access and constraints to credit especially for poor farmers. In addition, efforts should be made to identify feasible economic solutions to these issues mainly through increasing the production intensity and improving the environment as a whole to create new job opportunities.

FS 5: Farming Systems of The Southern Semi-Arid Plains And Mountains

Description of the system

The “farming systems of the southern semi-arid plains and mountains”³⁵ cover an area of almost 1.1 Million hectares and contain a rural population of 1.64 Million and 115000 agricultural holders. They are bordered by the agro-pastoral farming system to the east and north-east, which is characterized by only very marginal cultivation possibilities and dominance of grazing land. Jebel Sheikh, which belongs to the hilly farming system of FS2 (i.e. the coastal mountains), borders the system towards the north-west.

The farming system is characterized by a highly market integrated production structure, good market access to the main national market in Damascus as well as a strong tradition of export to neighbouring countries. Crops under private production and marketing arrangements dominate cultivation, which benefits from generally good rainfall conditions and is in the west complemented by a large number of private wells. The latter are increasingly receiving licenses.

The cultivable land in the system totals 670000 hectares of the area of the broad farming system, of which in 2002, 79% are cultivated and of this, 66% is rainfed, 13% is irrigated and 21% fallow. The irrigated area greatly increased since 1998 due to the rapid increase in the number of drilled wells after the 1998 to 2000 drought period. The following table shows the major land use categories of the system and its respective share of the total country. It is noticeable, that the farming system has an important share of the national production of some crops, which vastly exceeds its share of cultivated land (8%). Most noticeable are rainfed chickpea (56%), field tomato and cucumber (rainfed tomato 19%, irrigated tomato 38% and rainfed cucumber: 35%), irrigated grapes (35%) and apples (37%).

Within the farming system, a closer and more detailed analysis suggests a sub-division into two units, which are used for analyzing in the remainder of the report the major characteristics of the system, its trends and development options. These sub-systems are the hill and the plain farming systems, which are described separately in the following sections.

The FS 5 is most important in terms of its contribution to products to the national production as specified in Table 15f below. It is noticeable that only chickpeas appear among the five crops with the highest share in cultivated land as well as in the contribution of FS 5 to the national agricultural sector. In total, FS 5 contributes 56% of all chickpea area (almost equally located in the mountain FS and the plains FS).

³⁵ This section is based on the individual farming systems report prepared by Samira Al Zoghbi, which is available from NAPC as a separate document.

Table 15: The Farming System of the Southern Mountains and Plains in the National Context

	Syria Area	% of National	FS 5	% of national	SZ 51 Mountain	% of national	SZ 42 Plains	% of national
Area(ha)	18,517,971	100%	1,079,290	5.84%	342,036	1.85%	737,254	3.98%
Rural Population (No.)	8,531,000	100%	1,639,115	19.21%	219,000	2.57%	1,420,115	16.65%
 Holders (No.)	938,748	100%	114,698	12.22%	37,231	3.97%	77,467	8.25%
cultivable l. (ha) cultivated l. (ha)	5,911,020	Avg. Holding (ha)	668,493	Avg. Holding (ha)	196,411	Avg. Holding (ha)	472,082	Avg. Holding (ha)
		6.30		5.83		5.28		6.09
	5,420,656	5.77	433,654	3.78	153,050	4.11	280,604	3.62
	Area (ha)	% of cultivated land	Area (ha)	% of cultivated land	Area (ha)	% of cultivated land	Area (ha)	% of cultivated land
a) land under crops (ha)	4,590,899	84.7%	341,371	78.7%	121,784	80%	219,587	78.3%
 of which rainfed (ha)	3,258,115	60.1%	283,359	65.3%	119,144	78%	164,215	58.5%
 of which irrigated (ha)	1,332,783	24.6%	58,012	13.4%	2,640	2%	55,372	19.7%
b) fallow (ha)	829,757	15.3%	92,283	21.3%	31,266	20%	61,017	21.7%
Main crops								
Rf. Wheat	917,040	16.9%	81,415	18.8%	30,008	19.6%	51,407	18.3%
Rf. Chickpea	101,103	1.9%	56,447	13.0%	28,334	18.5%	28,113	10.0%
Rf. Barley	1,185,239	21.9%	38,603	8.9%	19,818	12.9%	18,785	6.7%
Rf. Olives	460,535	8.5%	31,173	7.2%	7,033	4.6%	24,140	8.6%
Ir. Wheat	752,488	13.9%	19,250	4.4%	251	0.2%	18,999	6.8%
Total	3,416,406	55.36%	226,888	52.3%	85,444	55.8%	141,444	50.4%

Source: constructed based on MAAR statistics for 2002.

Table 16: Sub-division of the central plains of FS 5 according to their crop specialisation

	% of national area in FS 5	% of FS 5 in Mountain FS	% of FS 5 in Plains FS
Rf. Chickpea	55.8	50.2	49.8
Ir. Tomato	38.4	14.6	85.4
Rf. Apple	37.4	96.3	3.7
Rf. Cucumber	35.5	63.7	36.3
Ir. Grape	35.2	1.0	99.0

Source: constructed based on MAAR statistics for 2002.

All four crops following in rank (by importance in their share of the national production area) are extremely specialized in their agro-climatic requirements and therefore indicative of the two sub-systems of FS 5. All of them contribute between 35% and 40% of the national production and are crops under private marketing arrangements. The plains farming system produces the irrigated crops field tomato and grapes, while the mountain FS produces particularly rainfed apples as well as rainfed cucumber (whereby rainfed cucumber is overall much less important than irrigated cucumber, which is not important in FS 5 in the national context).

Farming system of the southern Mountain

The Mountain near the city of Sweida is located in the eastern part of the system. The corresponding farming system is completely located in Sweida Governorate and some smaller parts belonging to Salkhad and Sha'ba Mantikas. The largest part of the this farming system lies at altitudes ranging between 700 and 1000 meters and are cultivated with rainfed apple, grapes, and other perennials. Based on the difference in land use along the catena, the villages on the upper part of the western side of the Mountain were included in the mountain and those below (approx. 800 meter above sea level) in the plain farming system. The mountains farming system covers in total approximately 342000 hectares. Agro-geographically, it is a marginal production area due to the dominance of basalt rock and cold winters, but due to large public investments, the former small pockets of perennial crop cultivation could be expanded considerably. Towards the borders, such investment was unprofitable due to decreasing rainfall levels and marginal cereal cultivation is the only possible land use. Towards the east, with rapidly decreasing rainfall levels, the cereal-dominated part of the system is more based on a combination of average annual rainfall and low water retention capacity than rainfall alone.

As a farming system, the area is most renowned in Syria for its production of grapes and apples, while the marginal cereal area is much less in the consciousness of the general public. The famous perennial crop cultivation is focused on the western slopes receiving above average annual rainfall levels. Towards the drier eastern and southern part of this zone, marginal cereal cultivation occupies an increasing share of agricultural land. Rock outcrops seriously hamper agricultural production, which explains while draft animals provide most of the farm power. Off-farm income and the proceeds from migration are of high importance in the entire farming system, the higher education levels under influence of the higher population density make higher-level employment more prevalent in the orchard dominated part.

An area of low productivity cereal cultivation surrounds the intensive orchard cultivation on the upper western part of the mountain. The limits to cultivation are in this case more determined by soil conditions (rock) than by rainfall. Consequently, the boundaries of this system are skewed to the west compared to the stabilization zone, which otherwise would mark the boundary to the agro-pastoral/pastoral farming system neighbouring in the east.

The mountain farming system contains market oriented orchards with a high prevalence of off-farm income, while the marginal cereal production in the south and east of the sub-system is basically a basket case region. Most poor households inhabit the basket case region of that system, with exception of a few marginal households from the orchard-based part of the mountain. The majority of families from the orchard-based part are in the middle and better-off household group.

Household typology

A simple calculation of extension unit information used for constructing an average household would result in a 40-dunum holding, cultivating in winter 20% with wheat, barley and chickpeas, 60% used as fruit trees orchard (apple, grapes, pears and olives) and 20% of marginal, uncultivated land. This average household would further own one to two cows for home consumption of milk and seek off-farm work as an important source of income.

The author of the individual farming systems report developed three household types, which reflect the socio-economic variation within the system (see Table 17).

Table 17: The cropping pattern by household type in the mountain farming system

Marginal/poor HH		Medium HH		Better-off HH	
25-30% of HH		60% of HH		10-15% of HH	
Less than 10 dunum, mostly located in the marginal zones of the Mountain		10-50 dunum, mostly located in the western parts of the Mountain		More than 50 dunum, mostly located in the western parts of the Mountain	
Marginal/poor HH		Small Medium HH		Better-off HH	
Winter	Summer	Winter	Summer	Winter	Summer
30% uncultivable land		20% uncultivable land		10% uncultivable	
40% rainfed wheat & chickpeas	40% fallow	20% field crops (wheat, barely & chickpeas)	20% fallow	5% rainfed wheat	5% fallow
Up to 30% marginal orchards (almond)		60% fruit trees (apple, grapes & pears with some olives)		85% fruit trees (apples, grapes, olives, and pears)	
No livestock		1-2 cows 40% of the total cow's number in the sub-system is owned by the medium HH..		More than 2 Cows 60% of the total cows number in the sub-system is owned by the better-off HH.	
Production of marginal cereals as a type of poor producer.		Production of variety of perennials and cereals as a type of medium producer.		Production of specialized variety of perennials and cereals as a type of large producer.	

Source: Al Zoghbi 2004

Marginal/poor households include in the more fertile part of the mountain households with less than 10 dunum of cultivated land and represent 25-30% of the families. They occasionally obtain income from cereals (40% of land under wheat and legumes, which are fallow in summer), while their almond trees (up to 30% of land) provide little income due to their old age and low production, particularly in dry years. The productivity of cereal crops is low due to low rainfall and low soil fertility in the area. Agricultural employment possibilities for casual agricultural labour are limited, leaving migration and remittances to the farms the dominant non-agricultural income source (50% of income). Remittances are the main source of income for marginal households, as the milk is used for home consumption, if cows are owned at all. Livestock is on average the second source of income (30%) and crop production the least importance livelihood source (20% of income).

Marginal/poor households own not only small, but also fragmented plots of land. The steep and rocky land implies that mechanized agriculture is difficult and the soil is prone to erosion. Current agricultural plans attempt to reduce the share of land under wheat, which is insufficient to generate a relevant household income, in favour of a greater use of legumes, also aiming at soil fertility restoration.

Vulnerable households in the dry, marginal eastern slope of the mountain depend mostly on their income as employees in administrative centres, where they hold low-level employment and obtain salaries of up to 6000 SP/month. These families often have a high dependency ratio. Remittances from relatives working abroad represent the second most important source of income, which mainly stem from unskilled labour in construction. Agriculture does not provide a sufficient and sustainable source of income for these households, due to the rocky terrain and the very low productivity of the eroded soil, on which wheat yields do not exceed 40kg/dunum during the good seasons. The land is left fallow during the dry season. Only few households in this category are able to keep livestock for agricultural work.

The perception of farmers about the returns to their main production factors determines their interest in pursuing future household strategies. These main factors are family labour, land and capital, where the subjective perception of scarcity is an important consideration in the decision making process. The detailed results from the gross margin calculations performed as part of the fieldwork are presented in the individual farming systems report.

Regarding the poor farmers, in terms of returns and returns per dunum, apples are the most important crop. The apple output reaches more than 1500 kg/du with an average price of 17 SP/kg. However, farmers mentioned apples jointly with pears as the most risky crop, as they can suffer from heat, wind and frosts, all of which are rather common in the area. Both crops are in addition subject to price risk and not all farmers are used to the price differentiation by product quality. Farmers often consider the marketing margins excessive. In 2004, high production resulted in capacity constraints for refrigerated storage, with a strong price decline of the fruit sold immediately. Farmers highlighted the heavy cash needs of grape cultivation for chemical control and fertilizers. Livestock was mentioned as entailing some risk if cash is required at critical periods in case of veterinary emergencies.

Medium households typically own between 10 and 50 dunum of land and include 60% of the agricultural population. They cultivate 60% of their land with trees, which also provides one third of their agricultural income. In addition, medium households see in livestock and off-farm work a major source of income. The balance of the land is distributed between field crops for home consumption and uncultivable land (20% each). They earn, however, income from livestock (approximately 10%), while off-farm work generates the main income (almost 60%).

On average, 70% of the area under trees is planted with apples, followed by pears (20%) and grapes (10%). Medium households own approximately 30% of the total number of cows in the sub-system and generate some income from the sales of surplus dairy production, even though the bulk is destined for household consumption. Furthermore, cattle is rented to other families in the village for draft power in ploughing and other agricultural work on the difficult terrain.

Discussions with the farmers of the medium household type revealed the following points with reference to the return to production factors. The highest return to land is provided by apple orchards, followed by pears and livestock (field crops were mentioned last). Livestock requires the highest labour input, while apple and pears show the highest price risk. Grape for wine production is considered safe from price risks, while it high for table grapes. The latter are also sensitive to price differentiation according to different qualities and seasons.

Better-off households comprise approximately 15% of the holders in this system, who own over 50 dunum of land each. The presence of better-off households within the farming system is not homogeneously distributed, as their prevalence depends on the unevenly distributed favourable natural conditions. Kanawat is a village on the northern peak of the mountain, in which this household type is well represented. Among the livelihood sources of this household type, dairy production and off-farm work (migration and the governmental employment) contribute each approximately 20%. This particular village is known for its high share of educated people that allows finding job opportunities inside and outside the village. Trees are on average, however, the main source of income and provide approximately 60% of the livelihoods. For that reason, the cropping pattern is very simple, as $\frac{3}{4}$ of the agricultural land of the better-off are devoted to relatively well-maintained orchards, while cereals dominate the remaining quarter in winter, which is left fallow in summer.

Better-off as well as medium households regard off-farm work as their main income source, which is exacerbated by their education, allowing them access to non-agricultural formal employment. The second most important income source is agriculture (apple orchards and dairy). Remittances are least important for household income because opportunities to work abroad have recently declined.

Better-off farmers also mentioned apples and pears as the best crops in terms of returns to land and overall profitability, but also require most family labour. Better-off farmers suffer from apple and pear price instability overall quite strongly, particularly if heavily invested in them. These two crops in combination with table grapes are most sensitive because of the need for speedy marketing after harvesting.

Strategies for the future

The strategies and plans for the future depend on the household type, but the perspective also changes whether a family is large or small, as it defines the number of children between which traditionally a holding will be divided. *Ceteris paribus*, farmers of all types hope to expand their agricultural land (expansion strategy); however, this option is not accessible for most of the poor and medium households. Better-off households may pursue expansion more realistically, but also address intensification as a pursued strategy. In contrast, only 10% of medium and better-off farmers intend to diversify and plant new crops in order to increase their income. Off-farm work is the most important strategy for poor households, which is an extrapolation for the already extreme dependence on casual income (90% of their income at present). The younger generation belonging to the poor household type expresses a strong focus on public sector employment compared to casual employment according to the perception of the elder generation in the poor households.

The medium and the better-off households chose similar future strategies: intensification and diversification, especially in response to the scenario of regular transfers of small amounts of money. Instead, access to larger quantities of money is preferably invested in land expansion in consideration of their children. None of the farmers in this system can conceive exit from agriculture due to a strong attachment to their land. However, the young generation wishes to work for the public sector for its higher and secure income as off-farm activities.

Main changes within the Mountain farming system in the last decade

In the last decade, medium and better-off households implemented a substantial shift in their orientation of crop cultivation: The area allocated to apple trees increased from 20% to 80% of the total trees, while the area under grapes decreased simultaneously from 80% to 20%. New land was reclaimed by the Southern Regional Development Project and was planted mostly with apple and pears, which contributed to the relative reduction of grapes, parallel to the diffusion of the pest "Floxxera". The areas under field crops were reduced and better-off farmers do not rely on crop production any more. During the last decade, dairy production decreased drastically, since sheep grazing on the mountain was forbidden. Overall, the past opportunities to work abroad in non-agricultural employment (mainly Gulf countries) decreased, as did the importance of both casual work and non-agricultural work as source of income.

Farming system of the rainfed and irrigated southern plains

In the farming system of the rainfed and irrigated southern plains encompasses the larger part of the broad farming system and has a total area of approximately 740000 hectares as well as the larger part of the holders (77000 of the total 115000). Of the total plains area, 58% is rainfed, 20% is irrigated and 22% were fallow in 2002. This distribution between rainfed and irrigated parts is not homogenous, but within this farming system, there is a differentiation between the cereal oriented plains and the irrigated vegetable part³⁶. Both have medium and better-off households, which are in both cases different in scale. Between cereal and irrigated vegetable producers there is a difference in production orientation. Investors in agriculture, which play such an important role in the plains farming system are mostly engaged in horticultural crops under irrigation and engage in share-cropping arrangements for doing so.

³⁶ Feek Mantika falls into this zone, but the corresponding figures are not included in the total area under crops in the system. Due to its inclusion in the system because of its similarities, the general cropping pattern information, based on percentages, is nevertheless valid.

Investors are less likely to engage in cereal production, where large land ownership therefore is the major distinguishing factor.

This Horan Plain is located in the western part of the broad farming system, stretches from the western slope of the Mountain and covers part of Sweida Governorate, all Daraa Governorate, and Quneitra Governorate to the Palestinian border in the west. It is characterized by a long agricultural tradition. The relatively fertile soils and flat terrain make it suitable for cereal cultivation using the winter rains of 300-600 mm (from east to west of the system). Specialized commercial agriculture has evolved in the Plain farming system and is highly diversified as well as mechanized: wheat dominates the rainfed areas, complemented by chickpea and other minor crops. In the irrigated part, a commercially oriented farming community grows field vegetables (most importantly tomato, cucumber and eggplant).

Modern irrigation technique is relatively prevalent in the zone. Within the western part of the farming system, i.e. under intensive agricultural production, there is a noticeable process of differentiation between the villages, where some increasingly commercialize farming and the community is actively seeking investment opportunities in neighbouring villages. This includes the purchase of land in neighbouring villages with a high importance of returnees.

Non-agricultural households in villages focussing on agricultural production are very rare, while due to the differentiation of commercial activities within the region, other villages contain a high percentage of non-agricultural population, where families sell their land. Examples of selling villages are Sheikh Meskin and Dael, while Tafas and Ebta are investing villages, which were visited during the field study.

Household types

This farming system and particularly its irrigated part present an extreme case of commercialisation of farming, but also of differentiation at the transition of an agricultural towards a diversified economy. Returnees play an important role, insofar, as in some village, farming is considered unattractive and the land sold, while other have a strong mentality to invest in agriculture, backed by the savings to do so.

Capital ownership was stressed more than asset ownership as a criterion for the household typology. During the field study, the group discussions with farmers resulted in the household classification using “owner” compared to “investor” as labels and to characterize farming attitudes and status. However, the term “investor” for the farmer applies likewise to farmers without own land property as to farmers expanding their cultivated land through renting additional land. A special feature in the irrigated part is the phenomenon of renting wells for intensifying land use on own and on rented land.

Investors or their family may traditionally own small holdings and seek new investment opportunities or they may be sons of large families seeking to expand their holdings. This group mostly invests in vegetable and crop cultivation except in tree orchards. Where holdings exceed the management capacity of the owner, partly if children found other employment, all or part of the land is rented to these investors. Alternatively, holders who lack labour often engage in sharecropping arrangements, which reduces supervision costs. Owners provide capital and inputs for either the fourth or the third of the output at the end of the season. These farmers plant trees (grapes and olives) and crops in the smaller areas.

The owners (only) do not exceed 30% of the households, while the investors are the majority (70%). The average holding of large owners (10% of farmers) is 4-7 ha, but frequently considerably exceeds this range. 60% of their land is allocated for trees (olives and grapes), 30% of their land is for wheat, and 10% is under tobacco and intensive vegetables on wheat land. A wheat-legumes-fallow rotation (rainfed parts) or a double rotation without fallow is applied. Farm income stems mostly from vegetable production. Drip irrigation has reached 90% in the study villages (which is probably above the average of the system).

Even though the preferred classification offered by the farmers during the field assessment, the traditional, asset based classification was attempted. Under these circumstances, large owners were said to include 10% of farmers. The average holding size within the group was given at 40-70 dunums, but frequently considerably exceeds this number. Interestingly, investors are not seen as belonging into this group, as for large owners expansion of farm size is an unnecessary strategy. Large owners cultivate approximately 60% of their holdings with trees (olives and grapes), 30% wheat, 10% tobacco and vegetables on wheat land in summer.

The second group includes medium and small owners as well as investors. 90% of farmers are considered in this group. They cultivate below 40 dunum of land, being either owned or rented. Approximately one third of their land is rainfed, however not due to any strategy but as a result of the lack of water in some years. Wherever possible, the irrigated area is expanded and can reach 100% on some farms, especially in good years. A rotation pattern is applied on rainfed parts (wheat, legumes, fallow) and dual rotation without fallow. The income of this groups stems mostly from vegetable cultivation, whereby the dominant irrigation type was drip irrigation, which reached 90% in the study village (probably above average in the system). Owners who own less than 40 dunums are 20% of holders, while 70% are owners and investors.

Landless residents are not considered a problem in the area, due to the high education levels and the active emigration to non-agricultural employment. Sharecropping is part of the systems structure, as they cultivate the land for which the investors provide the capital, in order to reduce supervision costs for seasonally employed labour. Most sharecropping arrangements are sought for by seasonally immigrating labourers, which are therefore important contributors to sustaining the agricultural production. The latter also includes seasonal sharecroppers, who would be considered among the poor if they were included in the local household typology. They are taking part of the production risk, but according to the local arrangements they do not provide capital inputs into the field vegetable cultivation. Working in the south is known to be attractive to landless from e.g. FS 2 compared to alternative areas.

The Plain farming system changed in the last 20 years with a rapid expansion of well drilling, creating the basis for the now dominant irrigated cultivation. The originally formally illegal practice was not sanctioned at the time and the wells are becoming licensed in recent years. New crops entered the system due to new irrigation technologies, especially drip irrigation, more productive varieties and new experiences of the farmers.

In conclusion, the southern plains farming system is at present amongst the most dynamic ones in Syria and attracts considerable private investment, which includes land purchases and the renting of wells for the irrigation of intensive crops. These processes are at the same time highly diverse, as in some villages returning workers from abroad exit the agricultural sector and sell their land, while in other villages available capital is heavily invested in land expansion.

Wheat is the most profitable crop for large holdings, particularly as it offers a calculable return due to fixed prices and the relatively good climatic conditions in the farming system. At the same time, wheat also generates the highest returns to irrigation water compared to vegetables. The main disadvantage of the latter is the price risk. Tomato and other vegetables are less profitable due to the unstable prices and the absence of storage possibilities. Livestock is kept for its return to family labour and price stability. Land expansion is permanently present as a strategy among investors, as they consider it a profitable investment for the future, even if they need to engage in sharecropping arrangements to reduce supervision costs.

The plain farming system is a recipient of seasonal agricultural immigration. The outside workers come from the northern governorates of Syria in the summer for the high wage rates. Sharecroppers are part of the system structure, as they are the ones who cultivate the land for which the investors provide the capital. A particular social component of these sharecropping arrangements compared to the alternative employment in the construction sector in Lebanon is that the entire family can stay united and is employed in vegetable cultivation.

Particular development concerns of the plain farming system are the high volume of water extraction from deep aquifers, which contributes to declining water tables. Larger local involvement in water use management could increase the awareness and acceptance of water conservation measures. Legal and institutional constraints associated with attempts to reduce the average crop-water demand needs further study. Market-related problems due to saturation of the local market with the varieties of some kind vegetables add insecurity to the development of the farming system. Further differentiation of market demand in terms of new vegetable varieties and species could reduce the risks associated with excessive degrees of specialization in the system on a small number of vegetables.

Crop-Livestock integrated farming system in Duma Mantika:

Douma Mantika is famous for its combination of small-scale dairy farming integrated into the crop production system and is at the same time an important trading post as well as equipped with a canning industry. Its development in the present form is partly due to the vicinity to the markets of Damascus and availability of processing possibilities.

The Duma Niche-System is located in the northern part of Rural Damascus and commercial intensive cattle rearing and dairy production are its special features. The system has evolved under the market conditions of available specialized public and private milk processing factories and the vicinity of the urban market. It is an example of a close crop-livestock integrated system, including forage production, which is otherwise still rare in Syria.

Trends and development options

Commercialisation of agriculture and increasing rural livelihoods differentiation is among the dominant features of the ongoing trends in the commercial farming area of the irrigated and to a somewhat lesser degree the rainfed plains. The land market is very active, including between villages, as the interest in agriculture is low in some of them (with high degrees of residents returning from international migration). Agricultural investment in this system is relatively independent from formal credit markets, as even small farmers do not rely on credit to finance their activities. The highly capitalized agricultural production reflects the very dynamic rural economy with differentiated consumer markets even at the village level, which also testifies to the high average income levels.

In the rainfed part of the plains farming system, large owners are investing in addition in sheep production, for which they employ shepherds from the Bedouin community.

In the mountain orchard system, there is a high dependence on Government employment which complements agricultural production income. Orchards intensified and shifted over time from a primarily grape based system into an apple based system for a large share of producers. Overall, the mountain orchard system represents a successful technical innovation by the Southern Regional Development Project. This statement does not imply an overall economic evaluation of this investment and expansion of such public expenditure should in any case be preceded by a thorough economic analysis.

Poverty profiling has a clear geographical dimension on the mountain. The zone of marginal cereal cultivation on the southern and eastern part of the slope of the mountain is characterized by such poor production conditions, that only the few individuals who succeeded in investing in perennials on pockets of better soil stand out of the poor cereal producers. The younger generation, where available, sought opportunities outside the system and transfer income into the community are an important source of annual income.

The development options in the plains farming systems operate presently with relatively little Government interventions, as industrial crops play a marginal role and the farming community is strongly oriented towards crops under private production conditions and marketing arrangements. Investment capital is available to rapidly adjust to arising market opportunities and even population growth appears not to affect the agricultural sector negatively, as part of

the producers withdraw from agriculture and sell their land. Given the high prevalence of modern irrigation systems, the chance for improved water use efficiency appears favourable. However, the high importance of field vegetables is nevertheless based on water intensive crops. The potential to further regulate water consumption and the willingness of the population to accept changes in the water pricing policy, if it is focussing on sustaining long-term resource sustainability, should be assessed.

In the mountains farming system, the production orientation on perennial crops will determine the farming systems, but in recent years, farmers claim to face the negative impact of asset fixity when their apples must be sold at depressed prices due to a lack of storage facilities. This claim deserves substantiation and investigation, but considering the high availability of investment capital within the farming system suggests that storage facilities could possibly also be build through private funding. In the marginal production areas of the mountain farming system, social policies and support to exit from agriculture might be only viable long-term option, should investment in expanded land-reclamation prove to be uneconomic.

FS 6: Pastoral and agro-pastoral farming systems of the semi-arid and arid east

Description of the system

The pastoral and agro-pastoral systems represent slightly over half (ca 10 Mio ha, i.e. 55%) of the total area in Syria, which makes it its largest farming system in terms of size. According to estimates from Al Badia directorate, the system includes slightly above 1 Million inhabitants, who jointly raise the far majority of the 12 Million sheep. Of the broad farming systems, 1 Mio hectares or roughly 10% are cultivable land. 30% of cultivated land was fallow in 2002 (a high rainfall year) and 46% of cultivated land (432000 hectares) is cropped with barley.

The farming systems cover most of the area located in the so-called Stabilization Zone 5, marked by land unsuitable for rainfed cultivation, an average annual rainfall below 200 mm (after exclusion of the parts under irrigation schemes, mostly along the Euphrates River), high rainfall variability and the associated sparse natural vegetation. Furthermore, these farming systems include most of the Stabilization Zone 4, defined as rainfall of up to 250 mm, characterized by cereal cultivation under high risk of failure of the grain harvest. Given the high to exclusive reliance of the population on sheep (and occasionally camel) raising, the frequently absence of barley grain is not perceived as a failure but part of the natural cultivation conditions in the system. Pockets of irrigated farming from oasis and wells have a long tradition and often are located in small areas.

This entire zone is marked by considerable Government intervention in terms of settlement policy of its population, social organization (promotion of co-operative organization of Bedouins), provision of social services and subsidized feed and intervention in the grazing rights of the traditional social groups. Definition of boundaries for the legal cultivation of the fragile environment and the permit system for the establishment of wells are important policy decisions influencing the development of the systems.

Within the above area, the composition of livelihoods, development options and policy interventions suggest the definition of three farming systems, of which two are defined geographically, while the pockets of irrigated farming are subject to special regulations and disperse in nature. Presenting the distribution of population and sheep between the farming systems is not feasible due to the migratory nature and the fact that the registration of residence provides little information on the source of livelihoods.

Agro-pastoral farming system

The agro-pastoral farming system is characterized by the combination of livestock husbandry combined with marginal cereal cultivation, predominantly of barley. Given the cultivation ban within the formal Badia boundaries (demarcated along the border between stabilization zones four and five), the farming system covers approximately 1.56 Million hectares. In reality, the band of agro-pastoral land use is much broader, based on the above defined characteristics of the system and of natural conditions of the system. The latter refers to a gradual transition between the pastoral and agro-pastoral farming systems, with a strong tendency to encroach on the Badia with barley cultivation. Despite considerable success by the agricultural administration to impose the legal provisions, they do not succeed against the strong conviction of part of the farmers that cultivation is the best way to use the Badia, a lack of clearly definable boundaries and lack of practical capabilities of the administration to monitor compliance.

The agro-pastoral farming system is a transition between the traditional grazing areas of the pastoral farming system and the crop-based farming systems in the north and the west of the country. The agro-pastoral system is mostly located in the so-called stabilization zone four (200 – 250 mm average annual rainfall), as rainfed farming is permitted, but rainfall is too low and insecure for crop-based livelihood strategies. The system is characterized by the close sheep-

barley integration, but faces high risks to produce a grain harvest due to the rainfall variation, for not only the wheat, but also even the dominant barley. The frequent use of the crops for grazing instead of grain production is an inherent part of the system and is not perceived a failure by the herd owners as it is by agronomists. Off-farm income and casual employment is a frequent element of the livelihood strategy in the farming system. The agro-pastoral farming system is relatively free of large-scale policy interventions and exposed to climatic risks as well as private marketing of its produce.

The socio-economic reason for the inability to define a clear boundary for the agro-pastoral farming system is the transhumant nature of part of the livelihood system of its inhabitants. This implies a partial (seasonal) reliance on feeding resources within the pastoral zone as well as the feeding on by-products in the agricultural zones.

The criteria for developing household types include herd size, but also the size of cultivated land, off-farm income and asset ownership. Poor households depend mainly on agricultural or non-agricultural casual labour (50%). The preferred employment is often as a herdsman, as skills can be directly applied against a fixed wage without changing the lifestyle. Many households lost the majority of their sheep during the drought and they have found no possibility to recover the loss. Consequently, sheep income contributes at present only 20% of family income, compared to half before the drought. The capital loss and lack of credit partly reaches levels that they rent their land to investors, who provide the capital as they are able to face the production risk. After each consecutive crop failure, the investor enters a new agreement based on the condition that for the new attempt to cultivate, the share of output is adjusted in his favour. The better educated members of these households pursue an exit strategy from the system, while people with lower education seek possibilities to re-invest in sheep. Medium households were not defined in this system, as the number of combinations of the different income sources did not result in a clear picture. The share of households according to the local population not belonging into either the poor or the better-off category was very small, i.e. the effect of the drought years had led to a rather clear polarization of the rural population and left only two household types.

The better-off households are characterized by high (30-50%) off-farm income from agricultural or non-agricultural sources, while sheep provide only 10-20% of income. Cultivation provides only approximately 10% of income. A special development occurs in the western part of the system, where experiences from the green belt project have been transferred into the agro-pastoral farming system and farmers invest in establishing olive orchards. In addition, capital is invested in poultry farms, which permit a quicker recovery of capital than crops. The latter strategy is only available to those with access to credit or capital available from other income sources. These new strategies document a considerable shift in livelihood strategy, as in the study villages, half of the income in that group was said to be obtained from sheep a decade ago.

The agro-climatic conditions in the agro-pastoral farming system lead to a very simple cropping pattern. Rainfed barley is the lead crop, even though with low average grain yield and a large yield variation. Wheat plays a relatively minor role due to its higher susceptibility to low rainfall. In the western part of the farming system, specifically in the areas around Aleppo and on the western, north-south rim of the farming system, perennials gained increasing importance in the last decade. Particularly olive orchards expanded dramatically, partly driven by the incentives given in neighbouring farming system by the Green Belt Project.

This agro-pastoral strategy represents a combination of a risk reduction strategy, where cultivation allows in dry years at least to produce fodder for the sheep and offers a possibility for additional cash income from barley sales in particularly good years. Low grain yields are in most cases used for winter-feeding of the sheep, where crop production and sheep ownership are in the same hands.

The drought of the late 1990s resulted in a serious blow for the population of the agro-pastoral zone, as its extent exceeded the tolerance for acceptance of failing crop farming (which in

principle is an inherent part of the strategy). Many of the poorer households in the system lost the capital and therefore their capability to re-invest in their traditional livelihood system. It was observed that in some villages, many and particularly the small landowners started to rent out their land in a share cropping arrangement to urban businessmen who possessed sufficient capital to accept the risk of barley cultivation. As this sharecropping refers to low-input, mechanized crop, the contribution of the landowner consists exclusively in the provision of land, while the investor organizes for tractor ploughing, seeding and harvesting. The agreements follow an intricate arrangement, whereby the share the landowner in the yield is stepwise increase with each failed crop. In other words, should the investor obtain a harvest in the first year of the arrangement, the landowner receives 30% of the harvest. Should the harvest fail in that initial year, the investor may plant a second time in the subsequent year and in case of a grain harvest receives a share of output of 75%, i.e. the landowners share is decreased to 25%. Fails the second season as well, and the investor decides to plant again, his output share in the third attempt increases to 80%³⁷ and the landowner receives only 20% of the output.

New strategies were implemented in response to different external influences: The Green Belt Project, even though primarily focussing on the more humid agro-climatic zones, introduced the strategy to start olive cultivation further in the east. Farmers with sufficient funds to engage in new investments after losing their sheep launched small poultry units and an increasing number of farms copied their initial success. However, given the capital requirements or credit worthiness, only established and farmers that are more successful are able to pursue this new development and market access is an important determinant of the possibilities for the poultry component. For that reason, this dual approach to modernization was found in the western part of the agro-pastoral farming system, with relative good market access to Homs and Hama, but not in its less densely populated northern part. The replicability and expansion of this strategy has clear limitations and market risks for the poultry strategy will increase with the number of replicants. This example is nevertheless a clear indication of the willingness of the farmers to pursue new opportunities.

The present study did not focus to assess the degree to which overstocking from earlier stages has contributed to resource degradation and the seriousness of the present problem. The ban on barley cultivation in the drier parts of this formerly broader band of marginal barley cultivation is clearly necessary for environmental conservation.

The development options within the present resource based livelihood system are quite limited. Livelihood production within the farming system is threatened by drought years, which entail for farmers a high risk of losing their accumulated livestock assets, which goes much deeper than income loss in crop production under similar events. Reducing the risk of livestock loss or spreading the drought consequences over longer periods might be important entry points to improve livelihood security and promoting a higher return to productivity-increasing complementary measures, such a stronger selection, mineral and salt feeding as well as selective complementary feeding. Credit for re-stocking or (area based) insurance-based systems are feasible options, but the long record in grant provision and direct support under such circumstances imply that long term relationships between public institutions for credit repayment or the development of functioning insurance mechanisms will take time to evolve. Marginal producers will depend on income support, if they should remain within the farming system, as casual income or the occasionally available share cropping arrangements in the neighbouring irrigated farming system will not allow them to accumulate capital to invest in their future.

The potential of improved crop production through improved crop water availability should be carefully assessed. Under similar agro-climatic conditions in the equivalent farming systems in

³⁷ The specific percentage is subject to negotiation and might differ within the farming system on the number of investors and land owners willing to rent their land.

North and sub-Saharan Africa, water harvesting has proved feasible to reduce yield variability and increase average yields considerably. Proper design of such systems and their potential for mechanisation should be carefully determined in order to address the otherwise potentially low initial labour productivity in the establishment years. The so-called Vallerani plough might be suitable to improve natural re-vegetation by increasing initial growth of forage plants.

The carrying capacity of this farming system is mostly exhausted, so the system has very little potential to accommodate a growing population and emigration will be unavoidable. Small niches in livelihood development might be feasible, such as nature friendly tourism, particularly near historic sites.

Pastoral farming system

The pastoral farming system represents the traditional land use type in Al-Badia, based on a livelihood system adjusted to the fragile and highly variable environmental conditions. Taking the stabilization zone 5 as indication, this farming system covers approximately 8.6 Million hectares (including the cultivated niches). Migratory cycles to provide the sheep, goats and camels with their feeding requirements were established on negotiated grazing areas with other tribes and detailed movements are adjusted at the lower levels of social organization, i.e. the clans and families.

The annual movement cycle involves grazing in the Badia in spring and early summer, followed by migration to cultivated areas where sheep feed on crop residues, starting with cereal stubbles (or dry plants) followed by cotton residues. In irrigated areas, other crops such as maize and vegetable fields or legumes are grazed. In the winter, the families return to Al-Badia and feed their animals on concentrated feed, part of which is provided at subsidized rates through the co-operative system. Hence, the migrations traditionally include moving beyond the farming system into the cultivated areas to graze crop residues, particularly in the irrigated and rainfed crops in the north and the west of Syria. The length of these migration cycles depends on the quality of forage within the system, while their general direction is more a function of family ties. Apart from the income derived from sheep products (milk and meat), off-farm income and self-employment are the only available livelihood sources. Most of the sheep milk is processed, partly by the family or traditional processors (*Jaban*), while wool processing is increasingly limited to the family needs.

The Badia has been subject to cycles of expanding and contracting cultivation encroachment, with noticeable damage to the natural habitat. Cultivation in SZ 5 has been banned for that reason. Over the last decade, the Government established a large number of forage reserves on land under the jurisdiction of the Badia Department and partly on co-operative land. These grazing reserves proved the technical feasibility of range improvement through regulated access. The local and decentralized management responsibility of the local communities has so far not been sustainable and been hampered by events of the past drought years. The provision of subsidized feed was established to buffer feed shortages in drought years and their provision support the winter feeding by reducing feeding costs. Co-operatives as a social organization, including management of designated grazing areas, have been tested, but the exclusive use of co-operative land was granted only in exceptional cases. Grazing boundaries for most co-operatives were abolished during the recent drought and open access is the standard situation.

The differentiation of household types in the pastoral population depends only on the combination of livestock with off-farm income sources. Poor households make up about 60% of holders, who have small ruminant herds below 200 heads (typically up to 100), many of which are village-based. They rely heavily on off-farm or transfer income and partly seek employment as herdsmen. The capital loss in drought years affects them very seriously, as they have no access to credit to re-stock. Some minimum livelihoods are guaranteed by local and state transfers at a low level, which do not permit exit of the situation. Access to employment possibilities even in the irrigated farming system (cotton harvesting) are limited for this

household type, as contracts for cotton picking are partly given with preference to families from within that system, who have experience in cotton farming.

About 30% of holders are classified as medium households, who typically own 200 to 500 heads of sheep and partly complement their income through casual labour. The larger owners in the group may employ a herdsman, but these cases are unusual for the household type.

The better-off households own large herds (above 500, but herds above 1000 are exceptional) and derive all their livelihoods from it if they are not absentee herd owners. Capital access and connections to urban relatives for transfer make them less vulnerable as they can more easily buy feed in case of drought and can recover more easily than the poor can. Off-farm employment is unimportant for the better off, who more regularly employ herdsmen. Their good access to the social network provides them with information on market opportunities, improved feed access and considerable economies of scale. Camel Bedouins are relatively few in number, but are generally considered part of the better-off households.

The structure of the system allows only two strategies within the system. The first one is to expand herd sizes to build capital and be prepared for crises or to rebuild herd sizes after it. Timely information and proper knowledge of market constellations provide the means to reduce losses. Alternatively, employment can be sought, which is available as herdsmen, in casual employment or outside the farming system. The possibilities for income generation through processing are largely limited to milk processing and they are largely exploited. The household possibilities to explore the different strategies are obvious when considering the asset and skills available in each household type.

NGOs and Government programmes often focus on traditional weaving and Bedouin handicrafts in promoting opportunities for increased self-employment. Marketing these items is frequently a constraint and the opportunities for higher sales margins by the Bedouin families are related to the general development of tourism in the country. Additional income generation could stem from the involvement of Bedouins in the tourism sector, either through provision of accommodation, guided tours to explore the natural scenery or wildlife sights. At present, some initial developments are observable, but they are confined to the Palmyra area and mostly organized by Hotels. Additional and largely unexplored potential exists near other historic sites (such as Resafah), but their development requires careful development and possibly international assistance.

The co-evolution of the farming system with its' harsh ecologic environment resulted in livelihood strategies, which have shown high resilience to stress conditions. Policy change is one factor, which could add stress to the system. It cannot be expected that the acceptance of policy signals intended to guide the development of the farming system (e.g. on grazing management regulations or water access regulations) is a rapid process. Too frequent and sporadic policy change leads to mistrust in the institutions identified with these measures. In case the confidence to institutions is lost, a second driving force derived from a harsh ecological system might otherwise be applied, which is the rapid exploitation of new opportunities without entering long-term commitments.

Such behaviour is not backwards or reminiscence to the past, but an asset: once range management strategies become engrained in the society, they have the chance to become resilient - if sufficient flexibility for local range management decisions is permitted. The pastoral farming system can only then contribute to valorisation of the steppe areas, if its livelihood system can survive the stress from the natural and the institutional framework. Locally managed and socially acceptable range management strategies are a key to its success, such as are stable and predictable policies influencing the pastoral farming system. Range policies have not always provided incentives, which encouraged social groups (co-operatives or traditional forms of social organization) to reap the benefits from improved management of the range.

The trends and development options within the pastoral farming system are relatively limited, as long as water resources do not allow the sustainable complementation of livestock production activities with crop production (e.g. near oasis or special permits for well-based sustainable crop production). Nevertheless, the almost total reliance on sheep grazing within the farming system and the high risk associated with the rainfall variability can be reduced to some degree. The earlier expansion of crop farming into the dry season grazing areas of this farming system, which partly belong to the agro-pastoral farming system but also the some areas now under intensified land use based on irrigation expansion, should be recognized as one of the factors increasing the pressure on this farming system. From the perspective of analysis of the land use profitability of these areas these land use changes are possibly beneficial, but the sustainability of some of these areas might have been overestimated in the past.

However, even within the remaining areas, not all the development potential is presently being realized: There is still considerable scope to promote the improved local management of natural resources. Pasture rehabilitation has been attempted and often failed, but the absence of consistent and transparent policies on who should reap the benefit of improved range management has contributed to the failures. The drought effect offered from a short-term perspective an understandable excuse for intervention in grazing policies, but has serious long-term impacts on the willingness to co-operatives or other forms of local organization (including the traditional tribal structure) to improve grazing management.

Under-utilized is furthermore the potential for runoff water use (surface water harvesting) for improved forage production, which could increase the survival rate of newly seeded fodder shrubs (which is more cost-effective than replanting) and improve the productivity of existing ones.

Lamb fattening could become a viable diversification strategy within the pastoral farming system and despite the need for capital investment (minimum for complementary feedstuffs), could improve the overall resource use efficiency in terms of meat production for local or export markets. Fattening cooperatives or individual fattening attract investors in the agro-pastoral farming system, but the potential for the average population within the farming system to participate in the activity depends on their capital availability and the absence of liquidity constraints which often forces medium household to sell their animals prematurely.

Pockets of irrigated farming

Apart from marginal farming within stabilization zone four and illegal cases of continued rainfed barley cultivation within the Badia itself, a third agricultural land use type exists in small areas: irrigated farming.

The pockets of irrigated farming are based on licensed wells and are developed either in oasis or in newly licensed well areas near the Euphrates River. Cultivation restrictions for water conservation apply to these areas as well, but sheep are frequently an important component of these systems. To the extent possible, farmers cultivate regulated crops such as cotton and wheat with reportedly high yields. There are indications, though, that apart of these new permits, they may not be used by the intended beneficiaries. Where accumulated debt prevents them from cultivating the land themselves, they might rent it to investors instead.

Policies affecting the pastoral and agro-pastoral farming systems relate to the marketing conditions, input pricing and resource management. Major changes have occurred in all of these issues, which are discussed in the main report. Changes in the meat export policies in 2000 have supported income generation from exploiting the preference for Awassi meat, particularly in the Arabian countries, which could be further exploited if combined with policies on the feed provision side aimed at encouraging increased returns per head of sheep and per grazing-day in the Badia. Investors from outside the farming system presently carry out most fattening. Support to the engagement of traditional breeders in fattening of lambs should be explored, as it generates additional income while reducing pressure on the range. Furthermore, the promotion

of creating emergency feed resources would prevent particularly medium holders from losing their herds (i.e. capital stock) in drought situations. The role of traditional social organization or co-operatives (particularly where the tribal structure coincides with co-operative affiliation) in the supervision of improved rangelands deserves strengthening, but its success would depend if they can be confident to benefit from their management without external interference.

There are technical possibilities to increase forage production in the traditional run-off areas in Al-Badia (*Faydat*) instead of the barley cultivation, which occurred in these flood plains prior to 1992. Experiences for area-based insurances for breeders could be explored, but careful implementation in a socially adjusted manner and a long horizon for slow implementation would be indispensable to be accepted and sustainable. Policies allowing particularly poor and medium holders to recover from their loss of capital should be pursued, which would involve allowing careful re-stocking, but also working capital provision of rainfed producers in the agro-pastoral system to prevent the long-term resource use of these lands by external investors. The development of additional income sources besides sheep breeding will nevertheless be indispensable to raise the living standards of a growing population, but increased resource use efficiency and income generation within the farming system could considerably reduce this pressure.

Trends and development options

The recent drought seriously affected the agro-pastoral as well as the pastoral farming system through the loss of capital and subsequent credit default of livestock and crop producers. A frequent consequence is the focus on new income sources, i.e. land rented out to commercial producers and investors. Other examples on new developments include olive and chicken enterprises, as is observable east of Salamiya, or the focus on casual work and migration (partly with the hope on restocking lost sheep in the future) north of the Euphrates.

A wealth of international literature has proven that the natural vegetation is the best cover and vegetation type for the arid land of Syria, commonly known as Al Badia. Specific improvements increasing the productivity of natural grazing species have been successful. Livestock grazing, especially by sheep, are the best direct use of these areas for the benefit of humans and are sustainable if properly managed. The management of range areas may be carried out through different organizational forms, including private property, individual use rights and common property management. There is no clear superiority of one arrangement over the other and the earlier mis-interpretation of the so-called Hardin theorem has been mostly put to rest. The most tragic situation for the management of common property resources are situations of uncertainty and free access and not the common property arrangement as such. In other words, it is the clarity of use rights and management responsibility against outsiders, which is the most important success criterion for common property arrangements and not private property as one specific way of arranging it.

