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AGRICULTURE AND FOOD PRODUCTION IN POST-WAR AFGHANISTAN

A REPORT ON THE WINTER AGRICULTURAL SURVEY 2002-2003

Hector Maletta - Raphy Favre

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Executive summary

Four fifths of the Afghan population live in rural areas, and most are farmers or farm labourers. The Winter Survey provides an account of the structure of the farming sector and the rural farming population in Afghanistan, with an emphasis on food security.

The 2002-2003 crop season in Afghanistan was the first one planted and harvested in relative peace, after the end of a long period of domestic and international strife and political instability, and also the first one after the long drought that afflicted the country since 1999, a plight that in many parts of the country ended only with the Autumn rains in late 2002. After staging a healthy recovery in 2002, but still with many areas under the effects of the drought, agriculture in Afghanistan continued its recovery in the 2002-2003 crop year with a significant increase in areas planted, and an very good harvest.

This report is mainly based on a nationwide survey, the Winter Survey (December 2002-January 2003), which covered all the agro-ecological zones and relevant watersheds, interviewing nearly 5000 farmers in more than 500 rural communities. It was part of the seasonal monitoring of food production, assessing results of 2001-2002 year and autumn planting for 2002-2003. It also intended to collect structural data on land tenure, livestock, livelihoods and other matters. Data were expanded by factors based in the FAO Afghanistan Land Cover Atlas, published in 1999 on images from 1990 and 1993, with adequate adjustments reflecting modifications in land use during the last 10-13 years. This report uses also information coming from direct field crop measurements taken close to the time of harvest in 2003, meteorological information from the ground and from satellite data, and other sources.

The Winter Survey estimated a total farming population of 12.1 million people, plus a non-farming rural population of about 2.5 million. This agrees with official nationwide estimates of rural settled population. Since the official estimates distribute population by districts and zones based on the 1978 distribution, the Survey population estimates (based on actual distribution now) do not agree with official estimates at province or region level, as may be expected since the official province and district population estimates are based on the uniform application of a common growth rate to the 1978 figures, ignoring internal migration. The farmer population lives in about 1.06 million farmer households with a mean size of 11.4 people.

It is estimated than about 790,000 refugees and internally displaced persons have returned to the farming sector, including some 325,000 in resettled households and the remaining 465,000 as individuals returning to resident households. Another 200,000 people are estimated to have relocated in rural areas in non-farming households. These groups represent about 6% of all rural population.

Access to land and irrigation shows many constraints. Farm sizes are usually very small. Farms cover nearly 3 million hectares of irrigated land and about 3.5 million Ha of cultivable rain-fed land. Only two thirds of these lands are actually cultivated in a very good rainfall year. After the drought, rain-fed lands have been cultivated in larger measure than usual, but they are normally rotated, planting only part of them every year (reportedly some 20-30 percent per year even in the presence of good rains). On the other hand, one third of irrigated land is not currently planted, and

indeed it is presently not possible to irrigate it, due to constraints in irrigation infrastructure, water supply and water management.

In particular, weak law enforcement and the emergence of local (big and small) warlords and "commanders" has led to water rights infringement in various areas, notoriously in the intermittently irrigated lands of the delta-like irrigation systems in the Turkistan Plains, where too much water is appropriated at the head of the system, leaving the wide fan of land at the tail of the system waterless, and causing many farmers there to abandon their lands and villages. Another similar phenomenon is widespread encroaching of rain-fed cultivation on public grazing lands. While some of this is a piecemeal cultivation of small grazing fields by individual farmers, there are many cases of wholesale encroachment, usually by some local "commander" reclaiming grazing land as his private domain, and putting sharecroppers to grow crops on them. All in all, it is estimated that rain-fed cultivated land has been increased by about 15% in 2002-03 due to this encroachment factor.

Mechanised cultivation covers about one half of crop-planted land, though no mechanisation of harvest exists as yet. Fertilizer application covers about 80% of irrigated cereals, and about one half of the seeds planted are improved varieties.

Regarding the 2001-2002 agricultural year, the Winter Survey by and large confirms findings by the 2002 Crop and Food Supply Assessment Mission, but suggests some adjustments both in area and production. A differentiation between area planted and area harvested is introduced, and total cereal output is estimated to have been some 18% larger than previous estimates. Corrected figures for cereal production include 3.17 million MT of wheat (instead of 2.69m MT estimated by the 2002 CFSAM) and 4.19 million MT for all cereals (instead of 3.59m MT). These corrected estimates derive only from new **harvested area** estimates, leaving CFSAM 2002 **yield** estimates untouched. However, it is felt that the CFSAM was extremely conservative about wheat yields (though not so much about yields for other cereals).

Regarding the 2002-2003 agricultural year the Survey estimated total areas planted (or intended to plant) by farmers as of December-January. Some 1.29 million hectares of irrigated wheat and a similar amount (1.24 million hectares) for rain-fed wheat were envisaged at that time. Cereal crops were intended to cover 3.25 million hectares, and major crops (including potato and pulses) would occupy 3.4 million hectares. Later field visits have ascertained that total area planted actually went beyond these initial intentions, as rainfall continued all the season and farmers went on planting on usually fallow land, or even on lands used normally for grazing. However, this extra planting concerns mainly non cereal crops planted on rain-fed land, such as melons, watermelons, pulses and oilseeds. Areas planted for autumn/winter cereal crops (especially wheat and barley) as assessed in the Winter Survey were in line with those assessed at harvest time by the National Crop Output Assessment (NCOA) carried out by FAO and MAAH in May-June 2003, and the 2003 CFSAM report. In fact, total cereal area appears to have been somewhat lower than originally expected, especially for irrigated wheat. The 2003 CFSAM estimated a total cereal area of 2.8 million hectares, including 1.06 million hectares of irrigated wheat and 1.235 million hectares of rain-fed wheat (it does not provide an estimate for non-cereal major crops). The rain-fed figure is almost exactly the same reported at the Winter Survey, but the irrigated wheat figure is somewhat lower, probably due to water management problems in some irrigated areas, and the failure of water tables to feed the *karez* system in other areas.

In 2002-03 the amount of land put into rain-fed cultivation, including some grazing land, is well over the historical average for good-rainfall years. Of a total 3.5 million hectares available, some 2.5 million hectares were cultivated according to the 2003 NCOA. The extra area was not devoted mostly to cereals but to other crops, mainly for sale, such as melons, watermelons, and oilseeds like sesame or flax. This regime of extensive cultivation of almost all available rain-fed land could not be sustained over time, since such lands (especially the encroached-upon) grasslands, need rotation. Gradual livestock recovery would also impose greater demand for pasture. Therefore, it is expected that rain-fed cultivated land would decrease back to normal levels in subsequent years. However, this may not cause a significant decrease in wheat and barley rain-fed cultivation, since the areas planted in 2002-03 were not quite different from those of previous good years (though in 2001-02 a quarter of the planted area failed to yield any output).

Livestock is still greatly diminished by the drought. Some signs of recovery are detected in cattle (mainly through a relatively high breeding rate) and sheep (signs of increase in average size of flocks after bottom level by mid 2002). The apparent breeding rate in sheep was relatively low on average during 2002, as reported in the survey, though it may be improving since field observations in the spring of 2003 showed relatively many sheep offspring, especially in the North of the country. However, complete livestock recovery is expected to take several years.

Livestock estimates from the Winter Survey have, however, some shortcomings. First, they do not cover the nomadic Kuchis. Second, some landless settled herders, especially in the North, may have been regarded as “non-farmers” and ignored in the survey. Third, sample expansion factors for the Winter Survey were based on arable land, meaning that (for instance) farms with little arable land and much livestock were given less weight than farms with more arable land and possibly less livestock, thus leading probably to an underestimation of some kinds of livestock. More complete and accurate estimates of livestock holdings will be obtained with the definitive figures from the 2003 Livestock Census.

Many farmers remain food insecure and with very restricted and risky livelihoods. Consumption of meat, vegetables and fruit is very limited and infrequent, most Afghan farmers are not self-sufficient in cereals and only a minority of them are able to sell any cereal surplus. A very large proportion of farmers have some off-farm income, mainly wages (61%), and there are extensive (and probably understated) reports of remittances received by about 20% of farmers.

Nearly half the farmers took on some new debt in 2002, and about 60% were in debt by the time of the survey. However, this debt is limited in size (about $480 per debtor), and lent mostly by relatives and other village members in what works as a community and family based mutual help system (the so-called *qawm* networks). Independent reports gathered during the 2003 Nationwide Crop Output Assessment (NCOA) indicate, however, the existence of interest rates of about 50%, which is in line with similar rates prevailing before the war in the 1970s, and lower than rates as high as 100% reported at the beginning of 2002. Reports of impending financial crisis and destruction of livelihoods on account of widespread indebtedness are not sustained.

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1. Overview

1.1. Introduction

This report, mainly based on the Afghanistan 2002-2003 Winter Agricultural Survey, is part of an ongoing effort by the Government of Afghanistan, actively supported by FAO, WFP and other agencies, to develop a capacity for monitoring food security in the country. Information about the agricultural sector and the rural economy of Afghanistan is mostly anecdotal, since the country has never performed an agricultural census, and the only population census in 1979 was never completed and its partial and preliminary figures (the only available) are by now quite outdated. The last useful nationwide agricultural sample survey before 2002 was done by the Swedish Committee for Afghanistan in 1992-93. Obtaining reliable information with nationwide coverage is extremely important for understanding the structural features of agriculture in Afghanistan and for assessing the current status of agricultural production. FAO has been active in this regard, performing one such survey by mid 2002 and another during the 2002-03 winter.

The 2002-2003 crop season in Afghanistan was the first one planted and harvested in relative peace, after the end of a long period of domestic and international strife and political instability, and also the first one after the long drought that afflicted the country since 1999, a plight that in many parts of the country ended only with the Autumn rains in late 2002, and whose effects are still affecting agriculture in several ways. After staging a healthy recovery in 2002, but still with many areas under the effects of the drought, agriculture in Afghanistan continued its recovery in the 2002-2003 crop year with a significant increase in areas planted, mostly in rain-fed land, and the expectation of a very good harvest.

FAO has been conducting crop assessments in Afghanistan on an annual basis since 1996, mainly for purposes of food security surveillance. Up to 2001 such assessment were only based on field observations at harvest season, and satellite information, since no capability existed for producing ground based meteorological data nor for conducting rigorous sample surveys.

In 2002, in the framework of the Transitional Government established in the country after the removal of the Taliban regime, an inter-agency effort was put in place to create a comprehensive food security surveillance system. Food security was recognized as a crosscutting issue, and several government ministries and cooperation agencies were involved in developing such a system. An inter-ministerial commission on Social Protection, coordinated by the Ministry of Rural Rehabilitation and Dement, is in charge of all policies related to food security improvement, and a Steering Committee has been working since May 2001 to develop a comprehensive National Food Security and Nutrition Surveillance System. FAO, WFP, UNICEF and other UN agencies, as well as bilateral cooperation agencies, donors and NGOs have been involved in developing methodological instruments to monitor the food security situation in the country.

FAO has been actively involved in these developments from the beginning. In particular, since 2002 a working agreement of FAO with WFP allowed for a fruitful collaboration of the two agencies in conducting field assessments related to food

availability, access to food, vulnerability and nutrition. As the Transitional Government gradually established its capacity to perform the various functions related to this matter, a gradual transfer of these activities to the government itself was started. As regards food security this has involved mostly the Ministry of Agriculture and Animal Husbandry (MAAH) and the Ministry of Rural Rehabilitation and Development (MRRD), but other ministries have also actively participated such as the Ministry of Health in matters concerning nutrition surveillance. A Steering Committee was formed in May 2002 to organize a comprehensive, inter-ministerial, multi-agency Food Security and Nutrition Surveillance System, in which both MAAH and FAO are active members.

In May-June 2002, FAO and WFP conducted a first Crop and Food Supply Assessment Survey covering all the country and interviewing nearly 5000 farmers. That survey signalled, for large sectors of the country, the end of the long spell of drought afflicting the whole country since 1999. However, at that time several zones in the country, especially in the South, were still suffering from lack of rainfall and were still facing a deep reduction in crop output as compared with their historical record.

The survey's findings of a strong recovery in the North and Centre of the country were confirmed by the joint FAO/WFP Crop and Food Supply Assessment Mission that visited the country in June-July 2002. Staple crop production for the agricultural year 2001-2002 was an astonishing 82% higher than the year before, thanks to increased precipitation permitting an expansion of cropped areas, and also an increased diffusion of improved seeds and fertilizer use which led to higher yields throughout the country as compared with yields observed before the drought. On average, and in spite of having harvested 20% less land due to persisting drought conditions, cereal production in 2002 was nearly the same amount achieved in 1998, the last good year before the drought, due to an increase of 20-25% in cereal yields per hectare. It was therefore expected that with a good and well distributed rainfall those yields could be maintained an even increased, leading to a further increase in production in subsequent years. This expectation seems to have come true in 2003, as areas have expanded even more, and yields are even better than the past year.

The crop and food security monitoring system that the MAAH is establishing with FAO assistance comprises the following elements:

- A network of crop development monitors at the provincial agricultural offices, reporting on a permanent basis along the crop season about ploughing and planting, germination and phenological development of crops, as well as on pests, diseases, frost or other adverse or favourable events possibly affecting the crops.
- An agro-meteorological service comprising a network of meteorological instruments across the country, covering all agro-ecological zones, as well as a capability for satellite imagery interpretation and for crop forecasts based on agro-meteorological models.
- National Annual Crop Output Assessment – NCOA - to estimate crop yields and area planted in all parts of the country. It is done in several phases to cover agricultural calendars in various regions.
- Periodic sample surveys to assess areas planted and production, as well as other matters relevant for agricultural production and rural livelihoods
- A capacity to monitor the livestock sector including stocks, herd dynamics, production, diseases, prices, and trade, and covering both settled and nomadic sectors.

- Establishment of a technical unit at the MAAH (the Food, Agriculture and Animal Husbandry Information Management and Policy Unit, or FAAHM), to develop a capacity for providing accurate information and policy advice on matters concerning agricultural production and food security
- Developing a full fledged capacity to monitor food markets, including both foreign trade in food and also domestic markets
- Maintaining close relationship with the MRRD and other ministries involved in the crosscutting issue of food security, and providing technical inputs for surveillance of other related issues such as livelihoods vulnerability, access to food, food consumption patterns and nutritional status.
- Establishing an Early Warning System able to anticipate crop failures and other events possibly causing an increase in food insecurity.
- Improving the capabilities of the Government, especially the MAAH, for active intervention at community level to improve food security and nutrition status and awareness, and to integrate food security and nutrition into agricultural and rural development policies.

The 2002-2003 Winter Survey was conducted after the 2002 Autumn planting season, in the months of December 2002 and January 2003, with the immediate goal of assessing areas planted and intentions to plant during the winter and spring, and also to enlarge the amount of available data about other aspects of rural livelihoods and agricultural production such as land tenure, farmer indebtedness, livestock, and other related matters.

The schedule for fieldwork was originally planned for November-December, but the start was somewhat delayed by several factors connected with the selection and training of surveyors, and then the implementation process was also delayed by poor weather, including snowstorms and floods, hindering fieldwork in various areas, especially the Highlands but also the Northern foothills and lowlands. However, the delay in starting was not necessarily a problem, since more areas were planted or being planted by the time the survey actually took place.

Processing the information took longer than expected, mainly due to limited capacity in Afghanistan for speedy and efficient data entry. More than 5000 extensive questionnaires were filled by village assemblies and individual farmers, and a complex database was prepared for the survey data. Data entry was started in late January and finished in March 2003, but a long period of data cleaning was necessary since many errors were detected and had to be corrected manually. Anyway, a preliminary report was prepared in February 2003 with an account of the survey implementation and key findings.[1] Some mistakes originated in the field, as interviewers entered some wrong or conflicting information into the questionnaires. Some additional mistakes were committed during data entry. However, as data entry lasted longer than expected, it gave time to review carefully one by one all the questionnaires in Kabul before after they were entered into computer format, comparing the computer database records with actual questionnaires. Two MAAH professionals were recruited for that purpose and one WFP/VAM staff also assisted. Most of the errors/odd numbers were due to relatively poor data entry. The database achieved a reasonable level of cleanliness during April 2003, and then statistical analysis and reporting was undertaken during May and June, to arrive finally at a

[1] Raphy Favre, **Winter Survey Implementation Report**, Kabul, FAO/MAAH, February 2003.

complete report in June 2003. Comments and technical clearance from technical divisions at FAO headquarters led to a revised report now presented.

As the autumn-winter crops are planted in November-January, and the harvests are starting in late May or early June, it is easily seen that carrying out and processing the survey has taken almost as long as the whole crop cycle for autumn-planted crops, which is undoubtedly too long. Something similar happened with the previous Crop and Food Supply Assessment Survey: the field work was carried out in May-June 2002, but the report came out only the following October 2002. This poor performance should be improved in the future by providing adequate data entry capabilities, and also reducing to a minimum all problems connected with translation and transliteration between the local languages (Dari and Pashtu) and English, both at the fieldwork and data entry phases.

This report provides an overview of the survey's methodology and results. Section 2 concerns the survey objectives, methodology and implementation (further details on these matters are given in an Annex). Sections 3 to 11 describe the main findings of the survey in several aspects covered in the questionnaires. Main conclusions are summarized in Section 12. The main text includes a number of charts and tables, but an extensive Statistical Appendix comprises the full tabular results that are discussed in the text. Several annexes are also included at the end of the report, including those regarding sampling model, agro-ecological zoning, questionnaires used, personnel involved, and survey implementation details.

FAO was the leading agency and MAAH the leading Ministry for this survey. MRRD was a collaborating Ministry, as WFP was also a collaborating agency. Both ministries lent institutional support and staff for the survey, and both agencies provided technical advice and financial support.

1.2. Objectives

Under the general purposes of the food security monitoring system detailed above, this particular survey was undertaken with the following specific purposes:

- Re-assess and confirm the outcome of major crops for the 2001-2002 crop season that was already covered by the latest Crop and Food Supply Assessment Survey in mid-2002 (Crop and Food Supply Assessment Survey - CFSAS) and the contemporaneous Crop and Food Supply Assessment Mission.
- Assess the areas planted (or planned to be planted next spring) with major staple crops for the 2002-2003 crop season, and farmers' expectations about yields and output (a key input for the crop forecasting system).
- Assess nationwide farming practices that include farming calendar, land preparation practices and crop rotation, and other technical aspects of production such as seeds used, fertilizer application, presence of pests and diseases, use of irrigation systems, use of animal or mechanical traction, etc.
- Assess other sources of income (free agricultural input and food aid, horticulture, livestock, sources of off-farm money income), and the financial situation of farmers afflicted by widespread indebtedness after three or four years of drought and many years of violence and turmoil.
- Assess the situation of livestock as compared with the previous year, after the great reduction in numbers caused by the drought

- Assess farm gate prices for agriculture products and input costs at market places close to farmers
- Assess the degree of food self-sufficiency of farmers as regards producing their own food, and also regarding the sufficiency of farm income to provide for household needs.
- Investigate land tenure arrangements, farming and non-farming population in rural villages, and inequality in the distribution of agricultural land among farms of different sizes.
- Provide training and capacity building for MAAH and MRRD professional staff in agricultural survey methods and practices.
- These objectives were pursued through a survey that covered more than five hundred villages and nearly five thousand households across the country. Its findings have a value in themselves, as an illuminating glimpse into the rural society and economy of Afghanistan, and were also useful in the short term as an information input for estimating food production in the country in 2003.

1.3. Methodology

The survey was carried out nationwide, covering all significant agro-ecological zones and watersheds. It may be taken as representative also of major regions, such as the major planning regions that have been used in recent years by United Nations organizations, but it is not representative of individual provinces or districts.

A selection of more than 500 villages was carried out, representing every agro-ecological zones and watersheds with any agricultural significance, and about 8-12 individual households were interviewed within each selected village. A total of 4761 usable household questionnaires were completed, and 516 usable village questionnaires. At each village, a collective interview of village elders or *shura* was followed by interviews with individual farmers. These farmers, in turn, were selected from groups of large, medium and small farmers identified during the village meeting.

Annex I (Methodological issues) details the various aspects involved in the design, implementation and analysis of the survey. One of the most important issues concerned the weighting of sample cases and the expansion of survey results to the national or regional total. This was done based on the amount of arable land in each zone, according to the FAO Land Cover Atlas of Afghanistan, with some corrections detailed in the Annex. A proper sampling frame, either an area frame or one based on listings, is not available at the moment. The sampling frame for this survey was therefore a provisional one, based on the existing information on Land Cover, with adjustments based on field observations, and calculated to give adequate information about agriculture at the level of major agro-ecological zones. FAO is working on updating the Land Cover Atlas (published in 1999 but based on information from 1990-93) and creating a new sampling frame for future agricultural surveys in Afghanistan. The expansion factors used in this report are believed to be the best available at the moment, especially for agricultural activities, and mainly for crops.

1.4. Zoning

Results from the Winter Survey are not reported at province or district level since the sample is not designed to be representative of those administrative units. It is reported mainly by agro-ecological zone and secondarily by region.

1.4.1. Agro-ecological zones

Agro-ecological zones and watersheds are the most significant criteria for zoning if the purpose is surveying agriculture. However, the identification and delimitation of agro-ecological zones in Afghanistan is rather difficult. The country has a very varied geography, with literally thousands of microclimates and micro-watersheds, and frequently conditions change from one valley to the next, within a fairly short distance. The main instrument for analyzing agro-ecological zones is the Afghanistan Land Cover Atlas, prepared by FAO, published in 1999 but based on satellite and ground information dating from 1990-93. As land use has somewhat changed over the intervening years, and normally varies from one year to the next according to rainfall and climatic conditions, even that very significant work has some drawbacks. FAO is now preparing to update the Land Cover Atlas, using recent satellite imagery and ground data, but no such update is available at the moment on a general basis.

However, in certain areas of the country there is some information about current land use patterns, and this was used complementarily to the Land Cover Atlas in those particular locations. Changes concern several factors: encroachment of rain-fed cultivation unto grassland, changes in water rights denying access to water to farmers at the tail of certain irrigation systems, destruction or deterioration of some irrigation systems during the wars of the 1990s, changes caused by population displacement or because of changing cropping patterns. For instance, some areas had been classified in the Atlas as “irrigated areas with one crop per year” because at the time they were devoted to cotton (one crop per year) but now they are devoted to other crops that allow for two crops per year, such as wheat followed by maize, rice or pulses. Also, some areas near Kabul (e.g. Wardak) have seen an important expansion of fruit and vegetable production, whereas other traditional areas for vineyards (as in Parwan) have seen their orchards devastated by war.

The most usual classification of agro-ecological zones for Afghanistan is the one proposed by Humlum (1959) and revived by Louis Duprée (1980) under the shape of “geographic zones”. They have been used by Berding (1996), Maletta (2002) and others for the purpose of FAO-assisted analyses and planning in Afghanistan. This classification includes a total of eleven zones, of which only nine have any agricultural significance (the other two are the deserts in the South West and the Wakhan Corridor leading to the Pamir Knot in the Northeast).

The zones as defined by Humlum and Duprée cover large stretches of contiguous territory, but in fact only parts of each are usable (or actually used) for agriculture. One agro-ecological zone like the Turkistan Plains along the Northern border appears as a contiguous belt, but in fact it comprises succession of river flood irrigation systems opening up into the deserts up North, with barren or grazing land in between. Other regions may comprise both high mountain areas with perpetual snow cover besides other areas where agriculture is practicable. It is also worth noting that the actual delimitation of the zones, especially by Duprée, took other factors into account such as road accessibility or ethnic identity, which in theory should not be considered when defining agro-ecological zones. These factors also may have changed greatly during the latest thirty years.

For the purpose of the present analysis, the geographical subdivision of the Afghan agricultural sector into eleven agro-ecological zones was adopted. These zones reflect basic ecological properties of land and climate, plus some supplementary criteria about accessibility and prevailing agricultural activity. The map at Figure 1 shows

these zones in the form of whole districts aggregations. This shows which districts have been assigned to each zone in the present report, not the actual extent of the agro-ecological conditions relevant to each zone, In fact, arable land is only a fraction of each zone's territory.

Figure 1 shows main classes of land cover in each agro-ecological zone. For the purpose of this report, only agricultural land uses were relevant, including irrigated crops, rain-fed crops, orchards and vineyards. Rangelands or forests were not investigated.

The zones indeed have designations that allude to a broad stretch of territory, such as "Northern Mountains and Foothills". However, given the mountainous geography of Afghanistan, agricultural activity does not occupy a contiguous and homogeneous stretch of the country. Agriculture is possible only in specific patches or strips of land in the numerous mountain valleys and the thousands of micro-watersheds created by numberless streams coming down from the mountain ranges. More or less contiguous and relatively extensive agricultural areas only exist in some parts of the territory (such as the Turkistan Plains or the Northern Foothills) where flat or gently undulating land prevails, but even there the actual conditions of the terrain and the capricious nature of water supply impose at the best of times only a patchwork of cultivable and uncultivable land rather than a continuous pattern of cultivation. In this survey some estimates are given about the actual extent of the cultivable land within some of the land cover types, especially within the rain-fed crop land.

It is possible and convenient to establish also finer agro-ecological differences within each broad agro-ecological zone. For instance, within the wide belt of rain-fed land in the Northern Mountains and Foothills there are recognizable differences between conditions in the Western or Eastern parts of that belt, not so much in the soils (that are generally homogeneous, mostly of the Loess type) but in rainfall, slope, and elevation. In the massive Highlands that make much of the Central Mountains Agro-ecological Zone there are also internal differences based on altitude, precipitation or watershed. Thus the zones may be considered to break down into a number of specific agricultural areas located in different provinces and districts, belonging to different watersheds and existing at different elevations. These local variants of the zones have their own agricultural specificity, and thus conclusions about one of the broad agro-ecological zones are not meant as an exact description of every local variant, but as an average for a certain type of terrain on which certain kinds of agriculture prevail.

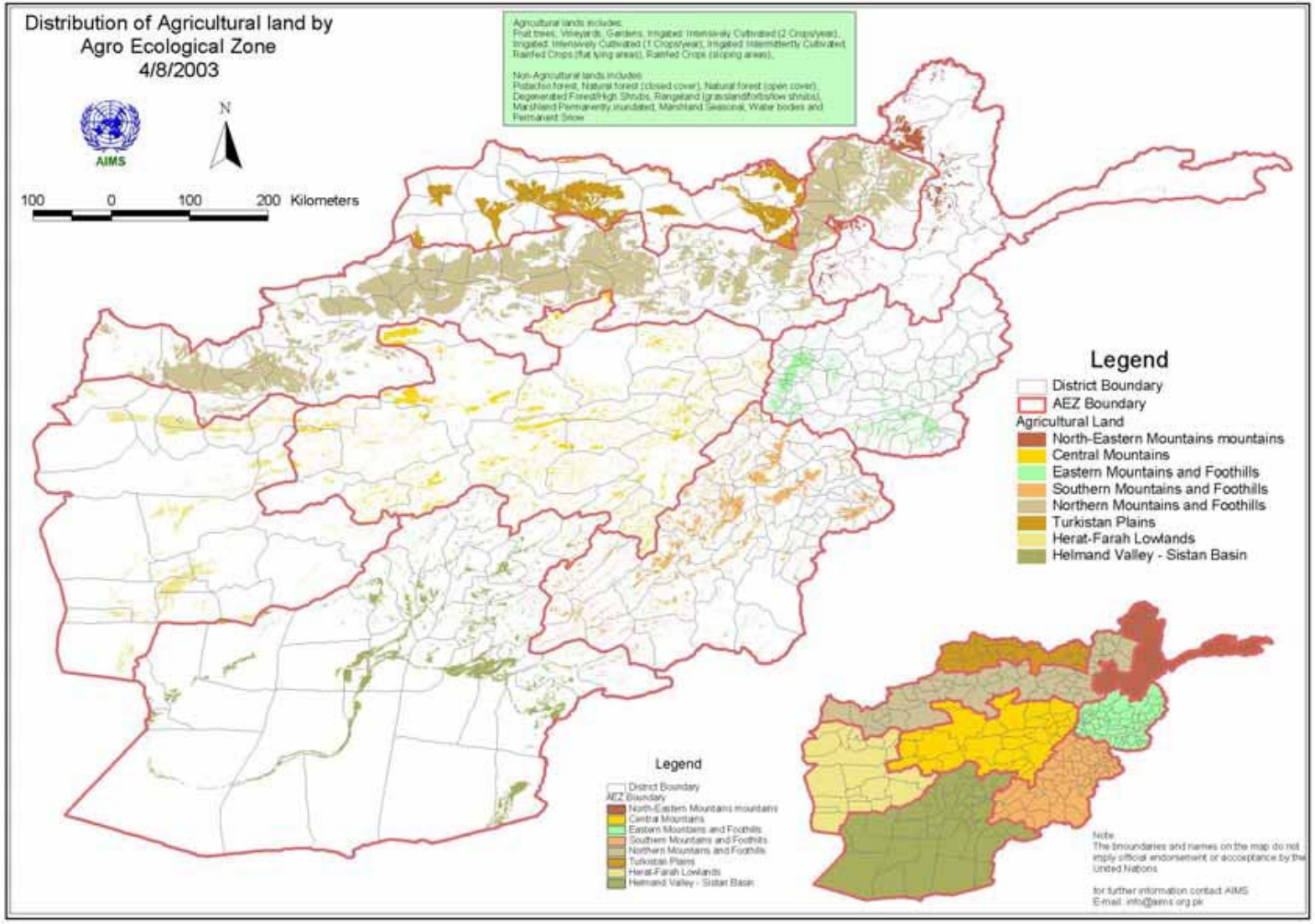

Figure 1 Agro-Ecological Zones in Afghanistan

1.4.2. Watersheds

Since rivers play such an important role in determining land use, another important criterion to classify the territory from the point of view of agriculture is watersheds. The thousands of streams coming down from the Hindu Kush define a large number of watersheds comprising five major basins or (more correctly) river systems. Only one of the river systems (the so-called Indus basin dominated by the Kabul River) goes ultimately to the Indian Ocean by way of the Indus River. All the other systems drain into the deserts and arid plains around Afghanistan, with no sea outlet.

Each major river system is further composed of several specific watersheds. A total of 27 meso-watersheds where identified within the five major river systems. No map is provided here of these watersheds because existing maps have only approximate boundaries. Work is ongoing to refine and update them. However, the approximate boundaries were used for the selection of the sample. Villages were selected at the upper, middle and lower sections of each relevant watershed.

1.4.3. Planning regions

Along this report, data are reported for agro-ecological zones and also for the UN planning regions. These are groupings of provinces that make no agro-ecological sense, but as they are commonly used it was thought convenient to present the results also in this fashion. The composition of the regions is as follows:

Table 1
UN Planning Regions in Afghanistan

Region	Provinces
NORTH	Balkh , Faryab, Jauzjan, Samangan , Sar-i-Pul
NORTHEAST	Badakhshan, Baghlan, Kunduz, Takhar
WEST	Herat, Farah, Baghdis
WEST-CENTRAL	Ghor, Bamyan
CENTRAL	Kabul, Parwan, Kapisa, Logar, Wardak
SOUTH	Paktika, Paktya, Khost, Ghazni
EAST	Nangarhar, Laghman, Kunar, Nuristan
SOUTHWEST	Nimroz, Helmand, Kandahar, Zabul, Uruzgan

Since these regions have no official sanction, their composition has varied somewhat along time and across organizations using them. For instance, in some reports from the 1990s the Southwest Region sometimes is taken to exclude Nimroz (which is then appended to the West) and when this change is adopted (or even without it) the region may be renamed as Southeast, which is not quite illuminating: it is in fact the East of the South, but by no means the Southeast. In some occasions, specific districts (rather than entire provinces) are assigned to each region. However, for the purpose of this report the above regions, formed by entire provinces, have been adopted. They have been used by different official and international reports, including the joint FAO/WFP Crop and Food Supply Assessment Mission Reports.

There are other proposals for territorial zoning in Afghanistan related to food security and agricultural production, like **food economy** zones, **livelihood** zones, **farming system** zones (quite insufficient at the moment), and **agro-economic** zones. Some of them are briefly reviewed at Section 4 of Annex I.

2. People and farms

2.1. Rural population

When the sample of this survey is expanded in such a way that total arable farmland corresponds to the amount of arable land in the Land Cover Atlas (with some adjustments, as explained in Annex 1), an estimate of Afghanistan rural farming population is obtained. It refers in principle to the total settled rural population in households practicing agriculture (growing crops or raising livestock), regardless of land ownership (i.e. including landowner farmers, sharecroppers and fixed-rent tenants). The number of such households was thus estimated at nearly 1.06 million, and their total population at about 12.1 million people. The actual figures obtained in the tables, however, being sample expansions, are not meant to be precise (see Table 2 below, and for more details Table A.3 in the Statistical Appendix).

Table 2
Rural farming households and population

	Farm households	% farm households	Farm population	% farm population
TOTAL	1,065,523	100.0	12,103,964	100.0
Agro-ecological zone				
Badakhshan mountains	35,346	3.3	416,274	3.4
Central mountains	167,168	15.7	1,940,369	16.0
Eastern mountains	177,322	16.6	2,024,525	16.7
Southern mountains	79,426	7.5	1,070,254	8.8
Northern mountains	281,308	26.4	3,006,333	24.8
Turkistan plains	74,857	7.0	1,055,560	8.7
Herat-Farah lowlands	146,759	13.8	1,693,406	14.0
Helmand River valley	103,338	9.7	897,243	7.4
Region				
North	177,764	16.7	2,078,376	17.2
Northeast	164,134	15.4	1,894,579	15.7
West	196,371	18.4	2,198,617	18.2
West Central	75,463	7.1	848,023	7.0
Central	104,796	9.8	1,391,899	11.5
South	72,871	6.8	1,077,180	8.9
East	127,941	12.0	1,336,686	11.0
Southwest	146,183	13.7	1,278,603	10.6

The Winter Survey investigated also the number of rural **non farming** households existing in the sample villages, coming up with 20% non-farming village households in the country. According to this result, total rural settled population should be about 1.33 million households, comprising about 15.1 million people (assuming non-farming households are of the same average size as those practicing farming).

These results can be compared with official population estimates. The Central Statistical Office estimates (projected to December 2003) give a total (urban and rural) settled population of 20.6 million, or 22.1 million including an (officially) estimated 1.5 million nomads. As the population of Afghanistan is supposed to be about 78-80% rural, the rural population should be about 17 million including the official estimate for the Kuchis, or about 15.6 million if the nomads are excluded, and this is very close to the numbers resulting from this survey. This close correspondence of two independent estimates of rural population is a strong argument supporting the reasonableness

of using the Land Cover Atlas as a basis for sample expansion. Official estimates would be soon improved with the completion of the new Population Census.

A government report from 1978 ("Afghan Agriculture in Figures", Table 23) reports a "farm population" of 10.84 million with 1,307,170 "land and livestock owners" (CSO 1978, P.28). The estimate of 1.3 million rural land and livestock owners reported for 1978 (for which neither source nor methodology are indicated) is not in principle to be identified with the number of households. On the one hand, there might be households not possessing any land or livestock. On the other hand, one single landowner may own two or more land holdings, some livestock owners may not own any land, and there may be several livestock (and even land) owners within the same household. The actual number of landowners may have been substantially less. If the 1978 households had the same average size observed in 2002-03, i.e. about 11 members, the rural settled population of 10.38 million would translate into about 940,000 households, which is compatible with the existence of 1.3 million "land and livestock owners".Those figures from 1978, account taken of population increase, are therefore roughly compatible with the figures for population, households and land-owners resulting from the present survey, but tell little about land tenure arrangements or non farming population.

In general, the areas with the largest proportion of non-farming population are located in densely populated lowlands and particularly in northern Afghanistan (i.e. Kunduz, Balkh, Faryab, Herat, Kandahar). Provinces with lower proportion of non-farming population are mainly in higher elevations (i.e. Badakhshan, Bamyan, Nuristan, Uruzgan) characterised by small landholdings, subsistence agriculture, scarce opportunities for rural wage employment and little development of rural non-farm activities; and also in some provinces of Southern or South Eastern Afghanistan (i.e. Khost, Paktya, Paktika, Wardak, Zabul, Kandahar) where many people find a livelihood by taking temporary jobs in neighbouring Pakistan or Kabul, rather than non-farm occupations in their home region.

Livelihood studies in Afghanistan tend to show that variation in livelihoods is higher than generally appreciated. Adam Pain (2001), for instance, concluded from his livelihood studies in Faryab province (one of those with a higher proportion of non-farming households in this survey) that "just because people live in rural areas it does not mean that they are farmers, let alone small farmers, or landless [agricultural] labourers. Beware the myth of the small farmer –poor people may be poor and have little or no land but they have complex livelihoods and may derive a significant portion of their livelihood from non-agricultural activities". There is also great variation in livelihoods within each zone, and even within each village, tending to suggest that the whole idea of a "livelihood zone" may be misleading.

The distribution of farms and rural people among the different zones and regions, shown in Table 2, indicates a concentration in the North: the two main agro-ecological zones in that part of the country, the Northern Mountains and Foothills and the Turkistan Plains, comprise 33.43% of farms/households and 35.58% of farm population. The southern belt, i.e. the traditional pashtun homeland areas from Nimroz to Nangarhar, including the Helmand River Valley and Sistan Basin zone, plus the Southern and Eastern Mountains and Foothills, comprise 33.79% of farms/households and 31.98% of the farm population. The remaining third of farms and population is about equally split between the central highlands and the western lowlands, plus some 3% in the Badakhshan Mountains.

2.2. Household sizes

Households in rural Afghanistan often consist of an extended family where several generations share the same dwelling. Besides, fertility is high and parents usually have a relatively large number of children. The average size of village households is consequently rather large: 11.4 persons per household is the national mean (as shown at Table 2 above and Table A.3.5 in the Statistical Appendix), ranging from 8.7 in the Helmand Valley zone to 14.1 in the Turkistan Plains.

Such large households imply that a livelihood based on agriculture as the main source of food/income should be endowed with a sufficient area of cropland to produce the food needed by such a large number of people. If the cereal requirement per capita in Afghanistan is accepted to be, as usually estimated, at around 180 kg per person/year, then about two metric tons are needed for a typical household (which requires producing about three tons to make up for losses, seed reserve, animal feed and other non-food uses).

Table 3
Farm households and population by household size

	Households	% households	Population	% population
TOTAL	1,065,523	100.0	12,103,964	100.0
Household size (persons)				
2 to 5	59,017	5.5	258,086	2.1
6 to 9	424,333	39.8	3,300,295	27.3
10 to 14	369,362	34.7	4,172,089	34.5
15 to 19	117,773	11.1	1,901,258	15.7
20 to 29	70,470	6.6	1,555,428	12.9
30 +	24,569	2.3	916,807	7.6

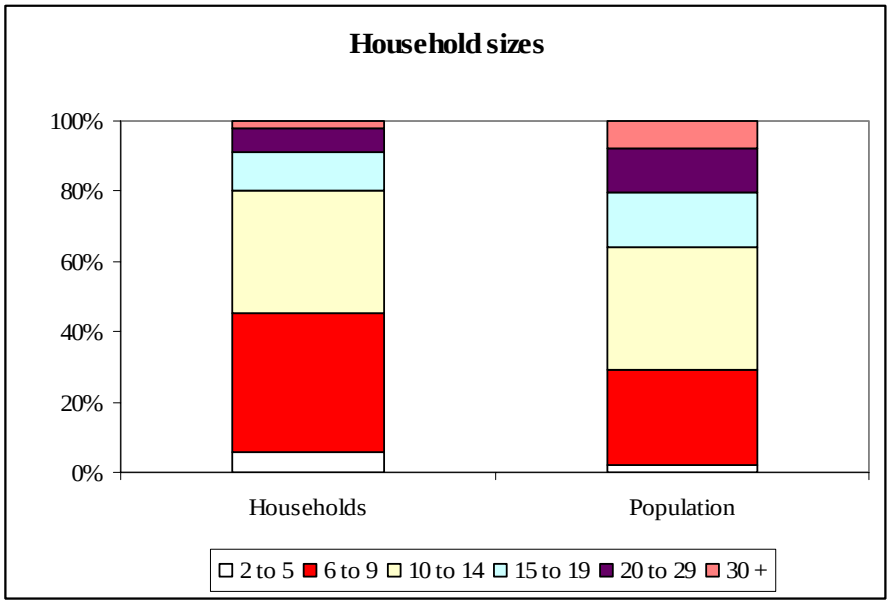

Figure 2 Household size: Percent of households and population

Households with fifteen or more persons represent nearly 20% of the households and 36% of the population (Table 3 above and Table A.3.3 and A.3.4 at the Statistical

Appendix). Only the Helmand River Valley agro-ecological zone, comprising mainly Helmand and Kandahar, shows a significantly lower average size.

On the other hand, households in the Turkistan Plains and the Southern Mountains zones include respectively 24-27% of households above 15 members, and these large households comprise 47-49% of the population. These varying patterns are related to ethnic groups and their various traditional ways. Households of up to 50 people were found during the survey. Even in the zone without very large households (Helmand River Valley), the average was nearly 9 persons per household.

The fact that rural households are this large (average between 11 and 12 people) has not been universally acknowledged, mostly for lack of direct data. Thus, the 2001 FAO/WFP joint Crop and Food Supply Assessment Mission reckoned a rural population of 17.78 million (a figure that has been subsequently lowered by the CSO to about 16.5 million if nomadic pastoralists are excluded). That rural population of 17.78 million was understood to comprise 2.96 million rural households or even as many "farm families", assuming an average size of 6 people per household and further assuming that all rural families manage a farm. Also the WFP VAM reports for 2001 and 2002 assume an average size of 6 people for rural households. There was at the time no direct evidence to the contrary on a nationwide basis, though some specific surveys had shown similar results, with household having between 10 and 12 members on average (e.g. for beneficiaries of the FAO Emergency Input Distribution Programme, as shown in the Evaluation Report for the 2001-2002 crop year, confirmed in 2002-2003: see Mollet 2003).

The 2003 Livestock Census preliminary report (still unpublished at the time of writing) also estimated a total of 3.04 million "families", of which one million had no livestock. There is no available estimate of family size or total population in those families at the present stage of analysis of the Livestock Census. If the definition of "family" were the same as in this survey, this figure actually would be impossible as an estimate of rural households because it would imply an impossibly large rural population of about 34 million. It probably refers to a narrower definition of "family", possibly related to the number of livestock owners, which would correspond more closely to the number of **nuclear** families, or (more likely still) to the number of adult (married or widowed) **men** (plus **widows**). Previous livestock estimates in 1995 and 1998 quoted in the Livestock Census preliminary report sheet had estimated respectively 0.57 million and 1.14 million "families", showing again evident inconsistencies in the underlying definition of the family unit since they could not possibly all correspond to the same definition. The lower figure (0.57 million in 1995) probably reflects **larger kinship groups**, as usual with some ethnic groups most devoted to livestock (chiefly Hazara and Kuchis) while 1.14 million (1998) probably reflects the number of residential (albeit extended) households defined in a manner similar to the Winter Survey, and finally the higher figure (3.04 million in the 2003 Census) probably refers to nuclear families or adult married (or widowed) men, plus widows. These uncertainties suggest once again the need for a more comprehensive study and typology of Afghan living arrangements and livelihoods, and a better (and hopefully standardized) specification of enumeration units for censuses and surveys.

What the 2002 Crop Assessment Survey and now this Winter Survey show is that the average rural household in Afghanistan (or more precisely, the average **farm household**) comprises about 11-12 persons. The 2002 Survey showed an average of 11.22 people (Maletta 2002a) and the 2002-2003 Winter Survey an average of 11.4,

varying by region or agro-ecological zone, in both surveys, within a range extending from more than 8 people to about 14. The following table shows the averages found in the two samples at the time of the surveys, and the recall of household size one year before the 2002 survey.

Table 4
Changes in the average size of farm households from 2001 to 2003

		May-June 2001	May-June 2002	Winter 2002-03
TOTAL		10.86	11.22	11.41
Agro-ecological zone				
	Badakhshan Mountains	8.62	9.00	11.8
	Central Mountains	9.69	10.08	10.6
	Eastern Mountains	12.34	12.77	11.4
	Southern Mountains and Foothills	10.49	10.79	13.5
	Northern Mountains and Foothills	10.64	10.82	10.7
	Turkistan Plains	10.32	10.6	14.1
	Herat-Farah Lowlands	10.37	11.12	11.5
	Helmand Valley-Sistan Basin	11.07	11.6	8.7
Region				
	North	10.84	11.1	11.7
	Northeast	9.73	10.0	11.5
	West	10.46	11.0	11.2
	West Central	9.08	9.4	11.2
	Central	13.09	13.2	13.3
	South	11.22	11.5	14.8
	East	12.02	12.6	10.4
	Southwest	9.67	10.2	8.7

Data for May-June 2002 in Maletta 2002a (Statistical Appendix, Table A.46). Excludes Nimroz province, surveyed in 2002 but not in the Winter Survey. Data for mid 2001 as reported by households interviewed in mid 2002.

2.3. Exile, displacement and resettlement

The survey investigated whether the head of each household was a returnee of an internally displaced person (IDP). A small but significant proportion of farmers actually were. This information, along with the evolution of household size, shows the impact on the farming population of resettlement after the end of the war and the demise of the former regime.

The general tendency between mid 2001 and the beginning of 2003, as shown in Table 4, is to the **increase in household size**, going from 10.86 in mid 2001 to 11.41 at the beginning of 2003, with a mark of 11.22 by mid 2002. This increase alone reveals demographic changes that go beyond the mere increase in population. Even if rural population was increasing, the average size of households should **not** increase in any significant measure in so short a period. The increase in household size may reflect a process of re-population as some returnees resettle with their relatives in the farm sector, and as fertility probably also increased (and mortality decreased) during the first year of peace, thus adding a larger number of newborns to the households than were found there shortly after the end of hostilities. The average size of households shows a total increase of 5% from mid 2001 to the start of 2003, with an initial increase of 3.3% between mid 2001 and mid 2002, and a further increase of 1.7% in the half year or so between the two surveys, representing an average growth

rate of 3.17% along the total period of about 19 months considered.[2] The rate of increase between mid 2001 and mid 2002 is 3.31%, and the annualized rate between mid 2002 and the winter survey is 3.16%.

This section attempts to make a preliminary estimate of the size of resettlement in the farming sector, based on these pieces of information.

To ascertain the impact of resettlement it is necessary to separate various factors in the increased size of households. Natural demographic growth has nothing to do with the size of households in principle, if it is accepted that the size of households in Afghanistan is not experiencing some rapid trend of change over time.

On the other hand, resettling returnees and IDPs that enter into the farming sector may be separated in two groups: entire families returning and settling down in a farm, and individual persons that join existing farmer households (thus enlarging their size).

The factors that should be separated are:

- **New returnee and IDP households.** This would imply an increase in the **number of households** due to **returnees and IDPs** who resettle in independent households of their own. This factor has been directly assessed in the Winter Survey, by asking a question whether the household was in the category of Returnee or IDP.
- **Upsurge in natural growth.** This factor would lead to an increase in the size of **previously existing** households due to **increased fertility and decreased mortality** (especially infant mortality and war victims), as a consequence of the end of war, increased agricultural production since June 2002, and increased foreign aid.
- Increase in the size of **previously existing** households due to **returnees and IDPs** who resettle in previously existing households.

If total increase in the size of households is known, and some hypothesis is adopted regarding the possible increase in natural growth, an estimate of the third component may be obtained. However, survey data are not a reliable source for making these distinctions, since the differences involved are small, and may be affected by sampling error. In particular, comparisons between mid 2001 and mid 2002 belong to same sample, and refer to the same households, while comparison between the former and the winter survey refer to different samples. For this reason, estimates presented here are only shown for illustrative purposes, and need to be confirmed independently. Only the first of the three components can be assessed reliably with survey data.

Newly resettled households. According to the Winter Survey (see table 5), a number of farmer households (representing a total of about 31,926) declared to be returnees of IDP themselves, presumably indicating that the entire household had resettled recently (see Table 5). These resettled households have an average size (10.18 people per household) slightly below that of the resident population. This involves a population of 324,871 people in resettled households, of which the great majority (276,726) are

[2] The first survey was taken from mid May to late June 2002 (average date around the first week of June), and the second from early December 2002 to late January 2003 (average date around the first week of January). The average separation of the two surveys was about 7 months. The date of recall about the household size one year before (beginning of June 2001 on average) was therefore 19 months before the average date of interviews for the Winter Survey.

returnees (former refugees in other countries), and the rest internally displaced persons. Practically all of them must have returned since the demise of the Taliban regime in November 2002.

Table 5
Farmer households and population
by household category regarding exile and displacement

	Total	Resident	Returnee	IDP	Ret.+IDP	% Ret+IDP
Households	1,065,524	1,033,598	27,236	4,690	31,926	3.00%
Total population	12,103,963	11,779,092	276,726	48,145	324,871	2.68%
Average household size	11.36	11.40	10.16	10.27	10.18	

See regional breakdown at Table A.8. Category of household as declared by the farmer (head of family). A resident household (i.e. a household where the head of family has not being exiled or displaced) may still include some returnee or IDP members.

As said before, these estimates refer to the return of **entire households**, and do not take into account any individuals who may have returned to become members of pre-existing households. They only consider households where the household head (and presumably all other members) have returned. Estimating the other category is difficult and the methods available less reliable, but some illustrative indication is given.

Returnees to pre-existing households. The 1,033,598 households headed by residents had at the time of the winter survey an average size of 11.40 people. The size of this class of households could be compared to the size in 2001 of households surveyed by mid 2002, which had 10.86 people per household, an increase of 5%. If the possibility of sampling error is disregarded, and 5% is accepted therefore as the rate of increase in the size of resident households between the two surveys, net of resettled (returnee or IDP) households, it is clear that this increase in the size of pre-existing households, in turn, may be due to (1) an increase in their natural growth (more births and less deaths in proportion to population), or (2) an influx of absent relatives that returned to the household, or most likely (3) a combination of the two.

Mortality may indeed have diminished in 2002 as a result of the end of war, and also fertility may have increased slightly. However, the increase cannot be very large. Long-term natural growth in Afghanistan is about 2%, and its increase in 2002, if any, would hardly have been higher than 1.0%. Assuming an augmentation in 2002 of one percentage point in the annual rate of natural growth, due to increased fertility and/or decreased mortality (caused by the end of war, larger food production and increased foreign aid), there remains another 4% increase in the size of households not explained by increased demographic growth. The rest of the increase in the size of households should be attributable to the addition of returnees and IDPs to existing households. This remaining growth is equivalent to 4% of the rural **farming** population, estimated at 12.1 million at the end of 2002. This boils down to about 465,000 people who would have returned **to existing farmer households** since mid 2001 (or rather, probably, since the demise of the Taliban near the end of that year) up to the end of 2002. Along with the (approximately) 325,000 people in returnee and IDP households, this adds up to a total inflow of about 790,000 resettled people in rural farming households.

Some additional increase may have happened among the non-farming population, estimated at 20% of total rural population. If the resettled population was proportionally distributed among farming and non-farming, the returnees and IDPs resettling in rural areas but not in farmer households might another 200,000. The total resettlement in

rural areas would have been about 990,000. On a rural settled population (excluding Kuchis) estimated at 15.6 million, this would represent a growth of roughly 6%, mostly along the year 2002, due to returnees and IDPs. There is no corresponding information on Kuchis.

From UNHCR data it can be has estimated a total resettlement of about 1.7 million people between returnees from neighbouring countries and IDPs, not counting those that remain in camps. Taking these approximate figures at face value, these 1.7 million people would therefore have resettled as follows: 790,000 in the farming sector, 200,000 in non-farming rural households (including possibly some labourers employed as sharecroppers), and the remainder of about 710,000 in urban areas. Kabul city, according to UNHCR, has received an inflow of nearly 400,000 returnees and IDPs. whilst the other (approximately) 310,000 among those that resettled in urban areas may have gone to other cities.

Table 6
Estimated distribution of the population resettled during 2002 (returnees and IDPs)

	Thousand people
Total returned and resettled	1,700
In farm households	790
In non-farm rural households	200
In Kabul city	400
In other cities	310

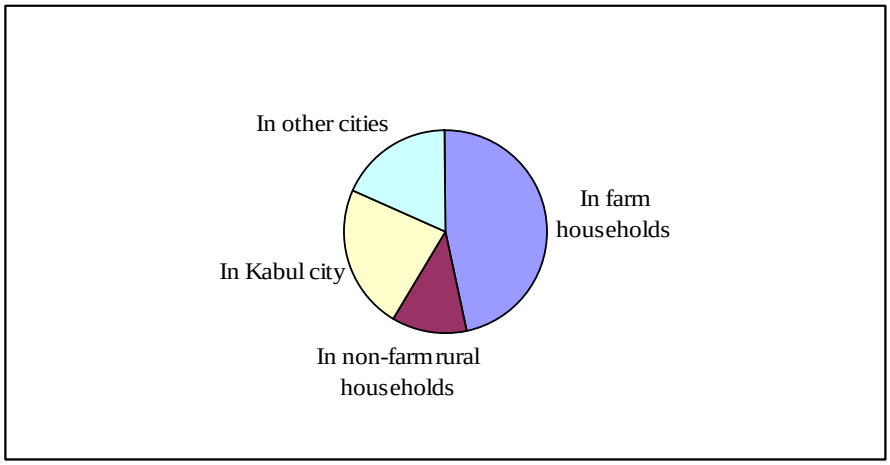

Figure 3 Estimated distribution of returned refugees and IDPs

This estimate, of course, is only a rough approximation, dependent not only on the evidence provided by the Winter Survey, but also (regarding urban resettlement) on the assumption of a total 1.7 million resettled returnees and IDPs, and the estimated number resettling in Kabul. Uncertainties about the total number of resettled returnees and IDP are reflected in the figures for resettlement in urban areas in Table 6 (Kabul or other cities), but would not affect the estimated absolute numbers for rural areas in the same table. Estimates are also affected by possible sampling error in the average size of households in 2002 and 2002-03. Therefore the above estimate is only indicative of the order of magnitude and should not be taken literally.

The main point these estimates reveal is that a substantial resettlement has taken place in rural areas. In spite of the difficult conditions in the countryside, and the persisting drought problems during 2002, a large number of people have resettled as farmers (and presumably also as non-farmers) in the rural areas of Afghanistan. However, the return and resettlement flow is indeed biased towards urban areas: in a country that is nearly 80% rural, resettlement in rural areas makes only 57% of total resettlement. But even with this urban bias, the process of return and resettlement has directed nearly a million people towards the countryside.

This must have also caused an increase in the rural labour force, over and above the natural growth of population. Assuming a natural growth of about 2%, and also assuming that the labour force is distributed proportionally among households, a growth of 6% in the rural farming population due to resettlement, plus 2% natural growth, implies that the labour force available for agriculture would have increased by 8% in 2002. This significant increase in the availability of rural labour may have been an important factor in the recovery of agriculture during the year.

At the same time, demand for agricultural labour must have increased strongly due to the end of the drought and the resumption and expansion of agricultural activity in 2002-03. Many landless re-settlers may have become sharecroppers, especially in the poppy sector, and many in the cultivation of other crops. In particular, there have been reports of labour shortages in 2003 in areas were hired labourers play a major role during the harvest. This and other factors (chiefly the higher salaries paid in poppy production, which also expanded in 2002) explain the fact that an increased supply of farm labour appears not to have caused any perceptible decrease in farm wages either in nominal or real terms.

The estimated size of the resettled rural population is somewhat surprising in view of widespread opinions to the contrary. A UNHCR survey of people about to return from Pakistan in 2002 reported that 74% declared they did not have any land in Afghanistan, though this in many cases was probably a deliberate attempt to pass as landless peasants and thus receive perhaps more benefits (Alden Wily, 2003, p.63, who also cites an anonymous informant reporting that direct experience in the refugee camps suggest almost all refugees own some land). Several sources have suggested that many previously rural refugees and IDPs were flocking to cities instead of going back to their areas of origin. This may be true, and in fact the figures show that urban areas, representing only 20% of total population, receive about 40% of returnees, but it is still compatible with large numbers resettling in rural areas.

2.4. Age of farmers

The average age of Afghan farmers is nearly 47 years (see Table A.4 in the Appendix), with little variation (from 44 to 50 years in the various regions and agro-ecological zones). A mere 7.5% are below 30, whilst a similar amount (6.5% are over 70, a relatively high proportion of elderly farmers in a country with a short life expectancy like Afghanistan. Various reasons may contribute to this. First and foremost, farmer households are usually an **extended family**, and they may be headed by a middle-aged or even old farmer but several adult sons (single or married) may be living within the same household. As the survey did not investigate the ages of all the population in the households, a complete age-sex distribution cannot be estimated. There could also possibly be some demographic imbalance caused by war, exile and

migration (whereby younger able-bodied people are frequently elsewhere, or dead, whilst older people remain in the countryside), as observed in many other countries.

Another factor, reported by different practitioners acquainted with Afghanistan rural society, is a relatively late emancipation of men. The frequent late emancipation of men is reportedly due chiefly to the payment of dowry for marriage. The price is so high that it is only in late years that men can marry (exception made of course for richer farmers or commanders, and men in their families, who can afford not only one but often several wives). This social factor may affect the population growth. There are figures on marrying ages existing from the 70s, consistent with this data, but we are not aware of more recent and reliable figures on marriage age to judge which combination of causes lies behind the present age-distribution of farmers.

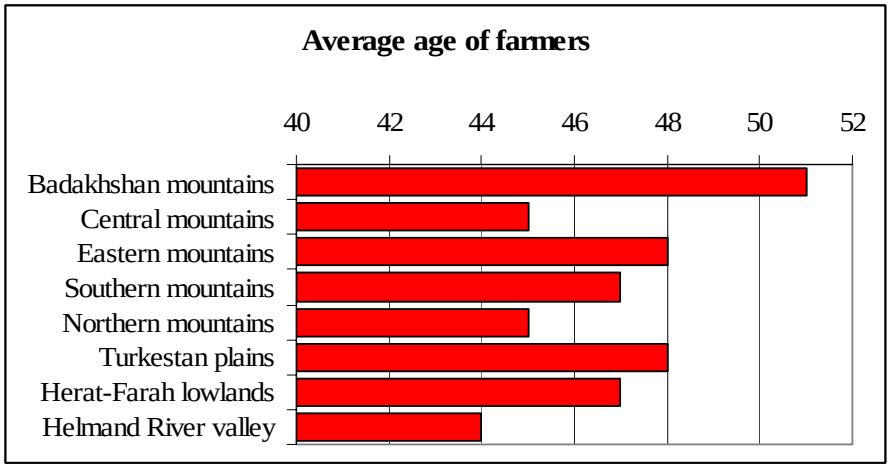

Figure 4 Average age of farmers by agro-ecological zone

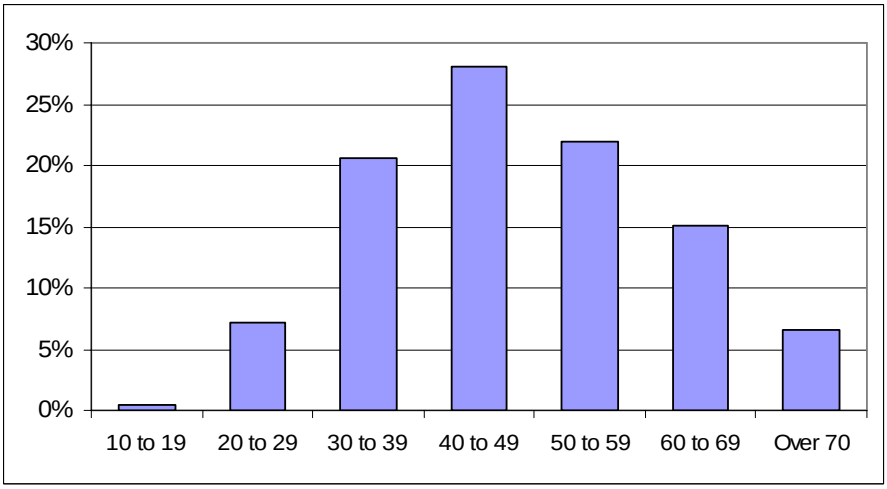

Figure 5 Percentage farmers by age group

The lowest average age of farmers was found in the Helmand River Valley (44 years) and the Central Mountains (45). The highest was in the Badakhshan Mountains (51). The proportion of young farmers (below 30) was lowest in Badakhshan Mountains (2.5%) and highest in the Helmand River zone (14%, including some teenagers). Badakhshan has also the highest proportion of old farmers over 70 years of age (11.8%) while the lowest is in the Southern Mountains (2.2%). The age of farmers is

of great interest for any attempt to introduce innovations, as younger farmers are probably keener to adopt them. According to this survey the most unfavourable age structure in this regard is in Badakhshan, and the most favourable in Helmand.

3. Farms and land

3.1. Agricultural land

The survey investigated the total amount of arable land, either irrigated or rain-fed, existing in the farms. Farmers were asked about the total area under their control, including land owned or taken from others under some tenancy arrangement (sharecropping or fixed rent). They were also asked about any land that they may have given others on rent. The total area reported by farmers in the sample has been expanded (as explained in Annex I) by means of the Land Cover Atlas published by FAO in 1999 (based on satellite images from 1990 and 1993), with some suitable adjustments. Table 7 shows the total amount of agricultural land **resulting from the adjustment of the Land Cover Atlas** in the various regions and zones.[3]

Table 7
Total arable land (irrigated or rain-fed):
Afghanistan Land Cover Atlas (1990-93) with adjustments (2003)

	Total arable	Irrigated	Rain-fed
Total	6,536,971	3,145,373	3,391,597
Agro ecological zone			
2.Badakshan mountains	374,900	78,154	296,746
3. Central Mountains	522,797	274,135	248,662
4. Eastern Mountains and Foothills	245,571	226,458	19,112
5. Southern Mountains and Foothills	607,309	532,078	75,231
6. Northern Mountains and Foothills	2,823,010	368,667	2,454,343
7. Turkistan Plains	789,777	589,958	199,819
8. Herat-Farah Lowlands	445,957	392,716	53,240
9. Helmand Valley - Sistan Basin	727,650	683,206	44,444
Region			
North	2,683,606	713,159	1,970,447
Northeast	1,644,215	387,141	1,257,074
West	1,311,017	465,110	845,908
West-Central	258,314	106,491	151,823
Central	265205	190985	74221
South	487726	413626	74101
East	154496	148482	6014
Southwest	951,242	831,015	120,227

Source: Estimated from FAO **Land Cover Atlas**, with corrections and adjustments (Annex I).

[3] The amounts of irrigated and rain-fed land in the sample at national level stand to each other in almost exactly the same proportion resulting from adjusting the Land Cover Atlas. However, the sample expansion, even if it reproduces the total amount of arable land in each zone or region, does not give exactly the same amounts of irrigated and rain-fed land, possibly because of changes in land use since 1990-93, and also because of the intrinsic lack of precision in the estimates. However, the nationwide expanded sample results for irrigated land (3,048,801 hectares) and for rain-fed (3,488,170) are close enough to the estimates from the adjustments made on the Land Cover Atlas, shown in Table 7, and therefore no correction was applied. Likewise, differences in the irrigated/rain-fed proportion at the level of specific zones were also left without correction.

A total arable land area of 6.5 million hectares shows in itself the paucity of agricultural resources in Afghanistan: arable land is a mere 10% of the country's territory (comprising 653,000 square kilometres). With 22.5 million people, Afghanistan has about 0.3 hectares of arable land per capita, low by international standards. When account is taken also of the scant precipitation and difficult climate conditions in many parts of the country, these figures make clear the hardship and resource poverty endured by Afghan farmers trying to make a living out of their country's land.

3.2. Farms

With a complex system of traditional rights over land, disrupted by a quarter century of war and instability, determining the size of farms is not easy in Afghanistan. Rights over crop land, both rain-fed and irrigated, are more or less clearly established (even if the irrigation water itself may not be available at the moment), and every farmer would know the precise location of the dividing line between his land and his neighbours'. However, in many cases the **size** of the property cannot be reported easily, because it has not consistently been measured. Farmers report the size of their land in only an approximate fashion.

The amount of land reported for the farms refers only to arable land, including rain-fed and irrigated arable land plus orchards. The latter includes land covered with fruit trees, vineyards and gardens. Types of land other than arable land were not reported. Grassland is usually public, and no data were collected on other types of land (with no agricultural use) that may be included in the property.

Table 8
Farms with irrigated or rain-fed land

	Farms	With irrigated land	With rain-fed land
TOTAL	1,063,269	944,561	444,169
Agro-ecological zone			
Badakhshan mountains	35,346	26,006	30,218
Central mountains	167,168	151,940	97,797
Eastern mountains	175,327	172,583	14,964
Southern mountains	79,426	79,426	18,021
Northern mountains	281,048	202,864	233,774
Turkistan plains	74,857	67,520	24,417
Herat-Farah lowlands	146,759	143,815	14,718
Helmand River valley	103,338	100,406	10,260
Region			
North	177,504	129,862	134,809
Northeast	164,134	132,761	105,027
West	196,371	177,583	63,291
West Central	75,463	60,235	60,911
Central	104,796	104,546	18,193
South	72,871	72,871	24,711
East	125,946	123,452	10,724
Southwest	146,183	143,252	26,504

Farms may have both irrigated and rain-fed land.

Table 8 indicates the number of farms with access to rain-fed and irrigated land. Out of the total 1,065,523 farms, 944,561 have some access to irrigated land, and 444,169 have access to rain-fed land (this implies that 323,207 farms have both types of land).

Thus **a majority of those farms with rain-fed land have also access to some irrigation,** albeit minimal or very limited.

Land in the farm may be owned or rented from others. Land owned by farmers but presently rented to others was investigated, but it was not included in the farm's size. Some farmers that have no cropland but raise livestock, and also some sharecroppers and fixed-rent tenants who do not own any land, were to be included in the sample, and many actually were. Others, however, were apparently not interviewed in some communities, because community members considered them as "non farmer" households. However, this is not uniform. Many sharecroppers and other tenants were included in the sample, though probably others were not. So there is possibly some underestimation of the extent of sharecropping and settled pastoralism. Some attempt is made later to estimate the size of this possibly omitted group of farms and farmers.

3.3. Farm sizes

Most of the farms in Afghanistan are very small. As shown at Table 9, only a small fraction of the farms (16%) have an area over 10 hectares of arable land, either irrigated or rain-fed. About 69% of the farms have an area below 5 hectares. However, even if large latifundia are not common in Afghanistan, there is a significant concentration of land in the larger farm-size groups. A mere 6.5% of farms, with area over 20 hectares of arable land, concentrate about 33% of the irrigated land and 50% of the rain-fed, as shown in Tables 9 and 10. In total, three quarters of all farmers, with total holdings below 5 hectares, control only 13% of the land (19% of the irrigated, and 8.7% of the rain-fed).

Table 9
Farms with irrigated and rain-fed land by farm size
Estimated number of farms

	Total farms		Farms with irrigated land		Farms with rain-fed land	
	Farms	**Arable land (Ha)**	**Farms**	**Irrigated land (Ha)**	**Farms**	**Rain-fed land (Ha)**
TOTAL	1,063,269	6,536,971	944,561	3,048,801	444,169	3,488,170
Farm size						
Below 0.50 Ha	142,835	52,583	134,635	48,647	14,258	3,935
0.50-0.99 Ha	122,445	84,384	114,137	72,580	25,130	11,803
1.00-1.99 Ha	187,815	254,858	175,883	207,088	54,993	47,770
2.00-4.99 Ha	277,481	880,542	243,897	588,104	127,191	292,438
5.00-9.99 Ha	158,770	1,087,828	130,446	553,714	97,055	534,114
10.0-19.9 Ha	98,737	1,290,979	81,920	559,789	69,315	731,190
20.0-49.9 Ha	58,760	1,695,166	50,578	574,148	44,581	1,121,018
50+ Ha	16,426	1,190,632	13,065	444,731	11,646	745,901

Total irrigated and rain-fed land in this table, resulting from expansion of sample results, is very close but does not agree exactly with areas estimated from the Land Cover Atlas, given in Table 7, due to changes in land use since the date of the Atlas data (1990-93) plus sampling variability. The total number of farms in this table does not coincide exactly with the number of farms in Table 8 because a few farms did not report their size or do not have arable land. Farm size refers to the total amount of arable land managed by the farm, owned or rented, including irrigated and rain-fed land. A farm may have both irrigated and rain-fed land.

Average arable land per farm is 6 Ha. The largest category, over 50 Ha of arable land, has an average of 69 Ha per farm. Farms with irrigated land manage an average of 3.24 Ha under irrigation, while farms with rain-fed land control (on average) 7.36 Ha of rain-fed land. However, a large majority of farmers have quite small farms. The typical or average farmer with less than 5 hectares of arable land controls 1.14 hectares

of irrigated land and 0.5 hectares of rain-fed land, of which only a portion can be cultivated at any given time. This land area is not enough to feed a family of 11 people, and this situation afflicts more than 730,000 farms, nearly 70% of all farms.

Table 10
Farms with irrigated and rain-fed land by farm size:
Percent of farms and percent of areas

	Total farms		Farms with irrigated land		Farms with rain-fed land	
	Farms	Arable land (Ha)	Farms	Irrigated land (Ha)	Farms	Rain-fed land (Ha)
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00
Below 0.50 Ha	13.43	0.80	14.25	1.60	3.21	0.11
0.50-0.99 Ha	11.52	1.29	12.08	2.38	5.66	0.34
1.00-1.99 Ha	17.66	3.90	18.62	6.79	12.38	1.37
2.00-4.99 Ha	26.10	13.47	25.82	19.29	28.64	8.38
5.00-9.99 Ha	14.93	16.64	13.81	18.16	21.85	15.31
10.0-19.9 Ha	9.29	19.75	8.67	18.36	15.61	20.96
20.0-49.9 Ha	5.53	25.93	5.35	18.83	10.04	32.14
50+ Ha	1.54	18.21	1.38	14.59	2.62	21.38

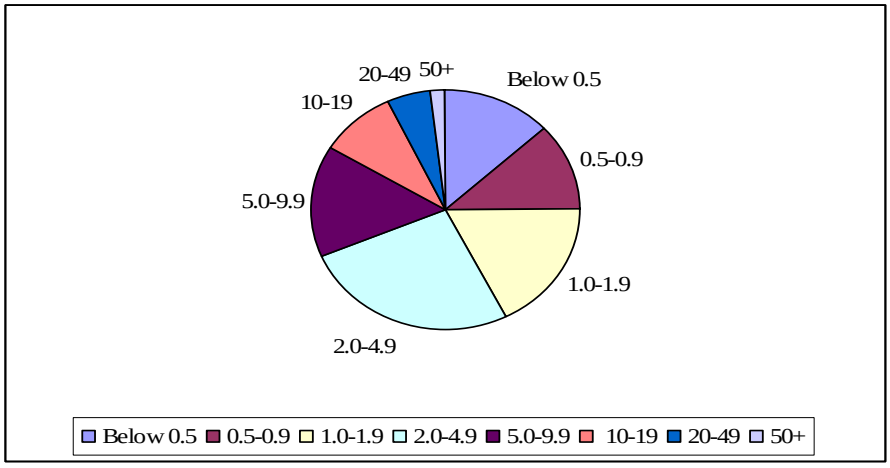

Figure 6 Number of farms by farm size in hectares of arable land

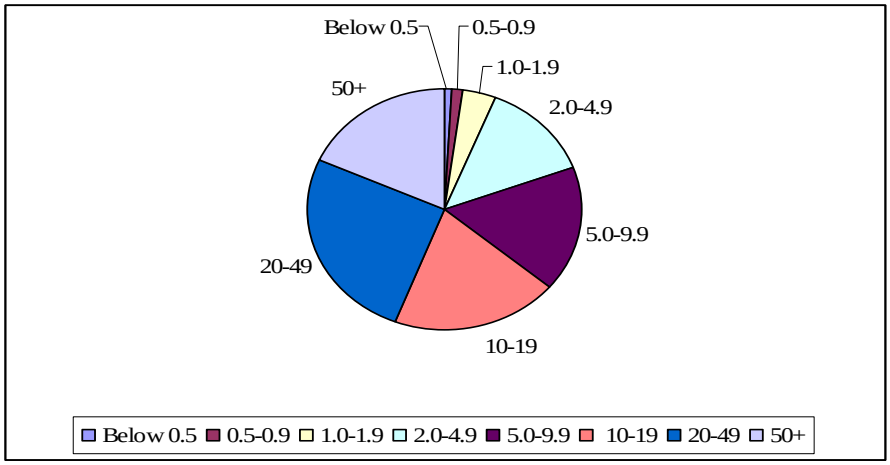

Figure 7 Arable land by farm size (in hectares)

These land holdings should not be taken as indicating the amount of land that can be actually cultivated in a given year, especially as regards rain-fed land. Land without irrigation is normally used on a rotation pattern, cultivating only about a third or less even in a good year, and much less if a drought occurs. Besides, part of the land formally under irrigation may not be actually irrigated or planted, due to water scarcity, water rights problems, or damaged infrastructure.

3.4. Land tenure and ownership

Land ownership and land access rights in Afghanistan are very complex, and the long period of war and political instability has further complicated the land tenure system. A recent study of land rights in Afghanistan suggests that "At any given time, a single farmer may be owner, tenant, sharecropper and mortgagor – and may be in transition from one status to another with respect to one or more of his plots" (Alden Wily, 2003, p. 62). The Winter Survey allows for only a glimpse into the complex tenure arrangements used by Afghan farmers to manage their land. However, the information is not detailed or exhaustive since land tenure was not the central goal of the survey. In particular, no attempt was done to investigate in detail the scope, legal ground or definition of "ownership" used by farmers when they describe land as their own. As remarked by Liz Alden Wily (2003, p.20), "the distinction between owning land and holding land (occupying and using it) [should] be made clear here".

Data from the 1960s and 1970s suggest that sharecropping and not ownership is the dominant land tenure arrangement. A 1968 report from the Government of Afghanistan based on the 1967 "Survey of Progress", according to which "only 27% fully owned their land. Most were crop share tenants (47%), renters (8%) or part-owner operators (17%)" (cited in Alden Wily, 2003, p.85). Data from the late 1980s, however, depict a different situation. The 1988-89 Agricultural Survey showed that 18% of those who were farming owned no land at all, whilst sharecroppers and tenants (in either pure or mixed tenancy) made another 21% of farmers. Those who owned land and only farmed their own land (albeit renting out some land to others) represented 78% of farmers interviewed (cited in Alden Wily, 2003, p.87). These data from the 1980s and some fragmentary information from the 1990s seem to agree with the pattern of widespread ownership (or reported ownership) found by the Winter Survey. Three decades of disruption may have profoundly affected land tenure, but probably most alleged land owners today do not have formal ownership title, and are legally just occupiers squatting on land not legally theirs. Long term occupancy may derive in formal ownership, though probably very few have actually obtained the title. The origin of the contrast between the views prevailing in the 1960s and 1970s on the one side, and the late 1980s on the other, has probably much to do with the collapse of the monarchy in 1973 and the establishment of a communist-led regime in 1978-92. Both processes encouraged widespread changes in land tenure, and profound transformations in rural class relations. The chaotic political scenarios of the 1990s under the *mujaheddin* and Taliban regimes did probably little to settle the issues or to restore pre-existing status quo.

The investigation of these issues in this survey was not in depth. Land under fixed rent or sharecropping arrangements was investigated, but other aspects of land tenure, such as mortgaging, were not. Reported tenancy or ownership was not further investigated to better ascertain the legal tenure status of the land. Therefore "ownership" in this report represents reported ownership, which may reflect only *de facto* occupancy, and does not imply legal title or absence of mortgages on the land.

Farmers were asked how much land (if any) they have rented to others (under sharecropping or fixed-rent arrangements), and how much land (if any) they have taken from other under similar kinds of arrangements. As expected, the number of farmers that have rented land to others is lower than the number of farmers taking land from others. This is because (1) some landowners in the village rent land to several tenants; and (2) some tenants have rented land from people not in the village. Tables 11 and 12 specify the number of landlords and tenants elicited in the survey.

Table 11
The landlords: Farmers who have rented irrigated or rain-fed land to others, by farms size

	Irrigated	Rain-fed	Total
TOTAL	27,867	7,402	33,525
Farm size			
Below 0.50 Ha	2,696	1,290	3,626
0.50-0.99 Ha	249	421	670
1.00-1.99 Ha	4,029	260	4,288
2.00-4.99 Ha	8,931	962	9,634
5.00-9.99 Ha	5,310	894	6,204
10.0-19.9 Ha	4,888	2,277	6,041
20.0-49.9 Ha	1,214	1,299	2,513
50+ Ha	550	0	550

Table 12
The tenants: Farmers renting land from others

	Irrigated	Rain-fed	Total
TOTAL	84,771	44,383	116,713
Farm size			
Below 0.50 Ha	4,520	111	4,631
0.50-0.99 Ha	6,525	249	6,525
1.00-1.99 Ha	15,907	1,754	17,129
2.00-4.99 Ha	31,631	20,250	47,679
5.00-9.99 Ha	14,166	13,170	23,560
10.0-19.9 Ha	6,902	6,812	11,206
20.0-49.9 Ha	3,687	1,517	4,031
50+ Ha	1,433	519	1,952

The same farmer may be renting both irrigated and rain-fed land to/from others, therefore the rows do not necessarily add up. The landlords' farm sizes in this table refer to total arable land actually operated by the landlord, not including any land rented to others, but possibly including land rented from others. The tenants' farm size in this table refers to total arable land area actually operated by the tenant, which may include rented and owned land.

The data show in fact an excess of land rented from others, relative to land rented out by other farmers in the village, as can be seen at Table 13. Regarding irrigated land, for instance, farmers in the villages rented out 120,401 hectares, but (other) farmers in the villages took much more (229,566 hectares) under rent arrangements. The excess land has been evidently rented from people who are not active farmers living in the villages. They may be landowners living in the village who are not cultivating any land (the old, the infirm, the handicapped, the widows), and also landowners not living in the village. The latter might be some relatives still living outside the country, or some powerful people in the vicinity (e.g. commanders) offering land to farmers under sharecropping arrangements. For farmers represented in the survey all over the country, as shown in Table 13, some 7.72% of the irrigated land and 3.96% of the rain-fed land in the farms has been taken on some tenancy arrangement (mostly sharecropping, with some fixed rent cases).

Table 13 Tenant farmers renting land from others			
Farm tenure of tenants	**Renting irrigated**	**Renting rain-fed**	**Total tenants**
TOTAL	84,771	44,383	116,713
Mixed tenure	58,783	40,528	89,892
Tenancy only	25,988	3,855	26,821

"Mixed tenure" = Farms with some owned land and some land rented from others.
"Tenancy only" = Farms where all the land is rented from others

Table 14
Arable land rented from others

	Land rented from others, in Ha		
Farm tenure of tenants	**Irrigated**	**Rain-fed**	**Total**
TOTAL	235,352	138,293	373,646
Mixed tenure	163,935	113,154	277,089
Tenancy only	71,418	25,140	96,557

"Mixed tenure" = Farms with some owned land and some land rented from others.
"Tenancy only" = Farms where all the land is rented from others

Table 15
Rented land balance

	Irrigated		Rain-fed	
	Hectares	**Percent**	**Hectares**	**Percent**
Total arable land	3,048,801	100.00%	3,488,170	100.0%
Rented out by farmers	128,438	4.21%	66,555	1.91%
Rented in by farmers	235,352	7.72%	138,293	3.96%
Difference: rented from non-farmers	107,914	3.54%	71,738	2.06%

One particular feature of the survey data is the relative scarcity of tenants in general and pure tenants (without any land of their own) in particular. Only about 27,000 pure tenants (making 2.5% of all farmers) are represented in the sample, as shown in Table 13. Their farms occupy about 97,000 Ha, i.e. about 1.5% of all arable land, as shown in Table 14. Most of the land that appears in the survey as taken on rent arrangements is held by farmers with mixed tenure, i.e. tenants who also own some land. However, there are reports of more widespread and abundant sharecropping arrangements in different parts of the country that do not seem to be represented in the sample. Liz Alden Wily, without giving any figure, entitles one section of her study "Few owners, many tenants" (Alden Wily, 2003, p.20), suggesting land ownership is not the prevailing case. This hypothesis was widely held in studies and reports dating from the 1970s, but more recent data point in a different direction, as discussed previously and discussed also by Alden Wily (2003, Appendix D, p.85-87). Probably most farmers nowadays consider themselves as owners, and hold undisputed occupancy, even if many of them probably lack legal title. As remarked earlier, "ownership" in this report refers to this reported ownership which could often be mere occupancy.

The present survey results do not support the idea of widespread tenancy. However, they suggest the possibility that in this survey inadvertently some "pure" tenants may have been disregarded as "non-farmers". It is highly likely that among the 20% of village households that were considered as non-farming, some are really tenants,

mostly sharecroppers. They are reportedly regarded by other people in the countryside rather as labourers with a particular mode of payment than as independent producers.[4]

All in all, the 20% non farming households comprise some 266,000 households. A significant part of that number of "non farmers" certainly corresponds to other situations (sick or handicapped people that cannot work on the land, as well as traders or truckers, and people in other non-farm occupations, and even some settled pastoralists that also were considered (erroneously) as "non farmers". Therefore, only a fraction of the 266,000 households classified as "non farmers" can possibly be landless sharecroppers. There is no real basis for making a guess in this regard. An arbitrary estimate is as good any other, from zero to 266,000. But farmers misclassified as non farmers could not be but a fraction of the total, and almost certainly more than zero. Then it is also true that the possible scope for variation is rather narrow. Besides, the omission of some farmers may have been partly compensated by some landlords who had rented out all their land, and are not farming any land themselves, but who may have been considered anyway as a "farmer" on account of owning farmland in the village. We may assume for the sake of illustration that **one quarter** of the supposed "non farmers", i.e. some 67,000 households, are in fact landless sharecroppers, in addition to the nearly 27,000 appearing as such in the survey, for a total of about 93,000 pure tenants with no land ownership. This estimate is indeed a rather arbitrary one, but the reasonably possible range is not extremely large. It is probably between 10% and one third of the non-farmers.

If indeed about 67,000 landless sharecroppers have been excluded, they would control a significant amount of land. Those 26,821 pure tenants that were represented in the sample had an average of 3.5 hectares. In particular, those that rent irrigated land have on average 2.29 hectares, and those who rent rain-fed land have on average 8.44 hectares. Applying these figures to the total number of tenants (represented or not represented in the sample) and assuming the irrigated/rain-fed ratio is similar among the omitted, leads to a total of 316,000 hectares irrigated and 113,000 rain-fed managed respectively by 90,000 pure tenants on irrigated land, and about 13,000 on rain-fed land. Most of these tenants would be sharecroppers (fixed rent arrangements are rarer). Since the results of the survey have been expanded to the total available land, either irrigated or rain-fed, it is obvious that the land occupied by the omitted sharecroppers and tenants, if included explicitly, should be subtracted from the land occupied by owners and the rest of tenants, not altering the total.

Concerning the absentee or non-farming landlords from whom some tenants take land under sharecropping or fixed rent arrangements, the precise estimation of their number is impossible, but some range can be indicated. A plausible hypothesis is that some landlords have more than one tenant. In fact, some cases have been ascertained in which a single powerful landlord, usually a "commander", has many sharecroppers cultivating land in his possession. This may be for instance the case in the wholesale appropriation and cultivation of grassland, or also for the cultivation of poppy (a sector where sharecroppers abound). Two illustrative hypotheses are proposed, assuming an average of one (the bare minimum) or three tenants per landlord. In these cases, total non-farming landlords would be between 28,000 (if there are three tenants per landowner) and 150,000 (if each tenant has a different landowner). The former

[4] Farming and non-farming households were identified at the village level, and household interviews performed only on farming households. Instructions were that sharecroppers are indeed farmers, even if not owning any land, but this may have been ignored in some areas.

figure is far more plausible than the second, since the prevailing idea is (in Liz Alden Wily's words) that there are "few owners and many tenants" in Afghanistan. Many large landowners in fact have their lands tilled by several sharecroppers.

After the precedent discussion, the following approximate figures (Table 16) can be proposed to describe the land tenure situation in Afghanistan as a whole. The total number of farmers in this table exceeds the number in other tables, because it includes also farmers not represented in the sample. It may still exclude a few settled pastoralists with no crops, some of which were not declared as farmers, and of course the nomadic pastoralists. The total pastoralist population is officially estimated by the CSO at about 1.5 million Kuchis, based on estimates from the 1970s, but recent estimates by WFP (DeWeijer 2002) reduce their numbers to about 1,000,000, of which about 25% are in IDP camps and some more may be living in towns after losing all their livestock. The remaining actively nomadic or transhumant Kuchis (possibly about 700,000 people) would involve about 60,000 households (if the average size of their households is also about 11 people).

Table 16
Land tenure in Afghanistan:
A rough estimate of households involved in various land tenure situations (in thousand households)

	Irrigated land	Rain-fed land	Total (a)	Only irrigated	Mixed land	Only rain-fed
A. Landowner farmers who till only their own land=B+C	860	400	949	549	311	89
B. Landowner farmers who do not rent land to others	832	392	915	523	309	83
C. Farmer landlords who rent land to others	28	7	34	26	2	6
D. Farmers who rent from others	85	44	117	72	12	32
E. Non-farmer landowners renting land to farmers: (b)						
E.1. Assuming one tenant per landlord	121	47	150	103	18	28
E.2. Assuming three tenants per landlord	22	11	28	17	5	6
F. Total farmers with mixed tenure (owner and tenant)	59	41	90	49	9	31
G. Landless tenant farmers represented in the sample	26	4	27	23	3	1
H. Landless tenant farmers not represented in the sample (c)	64	10	67	57	7	2
I. Total landless tenant farmers = G+H	90	13	93	80	11	3
J. Total tenants = F+I	149	54	183	129	20	34
K. Total farmers represented in the sample	945	444	1,066	621	323	121
L. Total farmers = K+H	1,009	454	1,132	678	331	123
M. Total landowners (farming themselves or not)						
M.1. Assuming one tenant per landlord	981	446	1,098	652	329	117
M.2. Assuming three tenants per landlord	882	410	976	566	316	95

(a) Farms can have irrigated and rain-fed land at the same time. A few farms have no information. Some rows do not add up exactly due to rounding.
(b) It is not possible at the moment to determine the number of non-farmer landowners who rent land to farmers. Two estimates are given depending on the assumed average tenant/landlord ratio (which is not known). One tenant per landowner is the bare minimum and highly unlikely. Three tenants per landowner is more plausible. The real figure is likely to be in between these two hypotheses.
(c) Estimated assuming that one quarter (25%) of the total rural "non farmer" population were in fact landless tenants, renting land in an equal amount per tenant as found for those tenants represented in the sample. Most of them would be sharecroppers. The estimate that tenants mistakenly regarded as non-farmers are 25% of the non-farmer population is arbitrary, and given only for illustrative purposes.

3.5. Access to irrigation

The Land Cover Atlas classifies irrigated land into intensively or intermittently irrigated, and the former into those yielding one or two crops per year. However, this latter classification is not dependent only on the land and its irrigation, but also on

crops grown and land use patterns. At the time the Land Cover Atlas observations were made (1990-93), for instance, cotton was still grown extensively in several parts of the country, yielding one crop per year. Now cotton crops have been greatly reduced and replaced by other shorter-cycle crops, thus allowing two crops per year. The shift towards shorter-cycle varieties appear to be general. The land and its quality have not changed, not even the irrigation systems has been improved (on the contrary, they may have deteriorated under war and neglect) but changes in cropping patterns have determined the shift. However, in 2001-2002 many irrigation systems had scarce water after years of drought, and thus the water available was not enough for planting all the area, and less so for obtaining a second crop. Table 17 shows only part of irrigated land was planted, and most with only one crop.

Table 17
Land availability, and use of irrigated land

	Arable land in the farms			Irrigated land cropped 2001-2002		
	Total	**Rain-fed**	**Irrigated**	**Total**	**One crop**	**Two crops**
TOTAL	6,536,971	3,488,170	3,048,801	1,731,784	1,292,025	439,759
Agro-ecological zone						
Badakhshan mountains	374,900	272,437	102,463	84,683	62,926	21,757
Central mountains	522,797	208,148	314,649	198,368	197,895	474
Eastern mountains	245,571	25,139	220,431	144,975	30,885	114,089
Southern mountains	607,309	199,434	407,875	155,538	151,911	3,626
Northern mountains	2,823,010	2,345,843	477,167	394,896	249,541	145,355
Turkistan plains	789,777	276,752	513,025	217,600	207,432	10,168
Herat-Farah lowlands	445,957	23,549	422,408	261,475	256,765	4,710
Helmand River valley	727,650	136,868	590,783	274,248	134,669	139,579
Region						
North	2,384,953	1,815,686	569,267	245,143	224,198	20,945
Northeast	1,226,192	739,439	486,753	419,438	271,337	148,101
West	822,499	363,456	459,043	294,073	281,130	12,944
West Central	241,448	162,735	78,713	79,862	79,388	474
Central	158,130	22,203	135,927	70,187	58,141	12,046
South	653,309	216,850	436,459	108,158	104,531	3,626
East	162,671	15,163	147,508	112,144	10,101	102,044
Southwest	887,768	152,637	735,131	402,779	263,200	139,579

Of a total 3.05 million hectares under irrigation schemes, only 1.73 million (some 57%) were cultivated in 2001-2002. The rest remained uncultivated for various reasons. In turn about 25% of the irrigated land actually cultivated yielded two crops in that agricultural year, while the majority (75%) yielded only one. This means that total irrigated crop area was 2,171,543 hectares, over 1,731,784 hectares of irrigated land, with an intensity of cultivation of 125% relative to irrigated land actually used for cultivation, or 71% relative to total irrigated land (see Table 17). Better conditions in 2002-2003 have permitted to plant more irrigated land, and to obtain two crops on a larger portion of it, as will be seen later.

Irrigation systems are very varied in Afghanistan. They include relatively modern irrigation systems based on dams, such as in Helmand, or ancient systems like the karez shallow tunnels (getting water from the water table at slightly higher elevation and conveying it to the crop fields), micro-irrigation systems based on canals getting water from a mountain river or spring, some systems based on deep wells, flood irrigation, or oasis systems with intermittent irrigation. According to the Land Cover Atlas, one half of irrigated land is intensively irrigated land, and the other half is intermittently irrigated. Within the intensively irrigated class, only 12% was considered fit for two crops a year in the Land Cover Atlas, but this in part depended

on cropping patterns prevailing at the time: for instance there is a shift from long-cycle crops like cotton to crops combinations like wheat followed by maize, rice, pulses or melons, which can be grown in succession within a single agricultural year. Diffusion of short-cycle varieties has also helped in that process.

About 93% of the villages in the sample had some kind of irrigation. This means that most of the villages in the rain-fed areas, also, had some complementary means of irrigation. Even in areas where rain-fed cultivation is dominant, as in the Northern Mountains and Foothills or the Badakhshan Mountains, more than 70% of the villages have some kind of irrigation.

Most of the irrigated villages take irrigation water directly from rivers (Table 18). Only in the Helmand River Valley big reservoirs are important. Small reservoirs are also in use in other regions. The ancient karez system is dominant in the South, and has an important incidence in the southern side of the Central Mountains, the Herat-Farah Lowlands, the Helmand Valley, and the Eastern Mountains. Wells are important in the same areas than the karez, being both adapted to dry lowland areas. Springs, instead, are more frequent in the mountainous zones of the Central and Southern Mountains. Three quarters of the villages use wells in the Helmand River Valley agro-ecological zone, in addition to the reservoir-based irrigation system. Many systems based on karez and wells were affected by the long-term effects of the drought in 2001-2002 and even in 2002-03, as the aquifers take longer to recover their usual level.

Table 18
Access to sources of irrigation
18.1. Villages with access to the various sources of irrigation, by agro-ecological zone and region

			Irrigation in village		Source of irrigation				
		Total	No irri-gation	With irri-gation	River	Reser-voir	Spring	Karez	Well
TOTAL		100.0%	6.8%	93.2%	55.3%	5.8%	20.8%	22.7%	19.0%
Agro-ecological zone									
	Badakhshan mountains	100.0%	27.8%	72.2%	61.1%	0.0%	27.8%	0.0%	0.0%
	Central mountains	100.0%	1.8%	98.2%	53.6%	0.0%	60.7%	25.0%	10.7%
	Eastern mountains	100.0%	3.9%	96.1%	63.2%	3.9%	19.7%	6.6%	15.8%
	Southern mountains	100.0%	0.0%	100.0%	36.3%	1.3%	22.5%	66.3%	47.5%
	Northern mountains	100.0%	13.7%	86.3%	54.7%	1.7%	16.2%	6.0%	0.0%
	Turkistan plains	100.0%	8.5%	91.5%	78.9%	7.0%	7.0%	1.4%	4.2%
	Herat-Farah lowlands	100.0%	2.6%	97.4%	71.8%	0.0%	0.0%	43.6%	15.4%
	Helmand River valley	100.0%	5.2%	94.8%	32.8%	32.8%	19.0%	34.5%	56.9%
Region									
	North	100.0%	11.4%	88.6%	69.5%	3.8%	10.5%	1.0%	1.9%
	Northeast	100.0%	14.3%	85.7%	66.2%	3.9%	13.0%	1.3%	1.3%
	West	100.0%	7.9%	92.1%	55.6%	0.0%	12.7%	36.5%	9.5%
	West Central	100.0%	4.0%	96.0%	52.0%	0.0%	44.0%	20.0%	8.0%
	Central	100.0%	0.0%	100.0%	66.2%	1.5%	29.2%	36.9%	20.0%
	South	100.0%	0.0%	100.0%	34.7%	2.0%	28.6%	59.2%	57.1%
	East	100.0%	5.8%	94.2%	53.8%	3.8%	21.2%	3.8%	17.3%
	Southwest	100.0%	3.8%	96.2%	31.6%	24.1%	29.1%	40.5%	46.8%

It is interesting to note that underground water through wells has originated a market for access to water. Some 40,000 farms with 129,000 hectares of irrigated land access use water from some neighbour's well, for a payment, as shown in tables 18.2 and 18.3. The system prevails mostly in the South, where most of 100,000 hectares are

irrigated in this way. In the Eastern Mountains there are numerous farms renting a well, but the acreage is far lower.

Table 18 (cont.)
Access to sources of irrigation

18.2. Farms using irrigation from wells

	Farms with irrigation	Using own well	Neighbour well for free	Neighbour well for payment
TOTAL	944,561	77,186	8,690	39,516
Agro-ecological zone				
Badakhshan mountains	26,006	183		
Central mountains	151,940	8,460	3,384	1,015
Eastern mountains	172,583	6,484	249	10,724
Southern mountains	79,426	8,788	1,780	20,135
Northern mountains	202,864	1,818		519
Turkistan plains	67,520	573		115
Hirat-Farah lowlands	143,815	18,082	1,262	4,626
Helmand River valley	100,406	32,797	2,015	2,382
Region				
North	129,862	459		115
Northeast	132,761	1,597		
West	177,583	18,602	1,262	5,145
West Central	60,235	5,076	1,015	1,015
Central	104,546	4,558	667	6,438
South	72,871	6,452	1,112	17,576
East	123,452	4,489	249	6,734
Southwest	143,252	35,954	4,384	2,493

Table 18 (cont.)
Access to sources of irrigation

18.3. Irrigated area (in hectares), total and in farms using wells

	Total area with irrigation	Irrigated area in farms using wells		
		Using own well	Neighbour well for free	Neighbour well for payment
TOTAL	3,048,801	525,092	35,550	129,452
Agro-ecological zone				
Badakhshan mountains	102,463	916	.	.
Central mountains	314,649	15,702	4,196	744
Eastern mountains	220,431	12,320	349	9,278
Southern mountains	407,875	169,237	9,022	102,164
Northern mountains	477,167	7,589	.	675
Turkistan plains	513,025	8,712	.	229
Hirat-Farah lowlands	422,408	83,512	6,812	14,346
Helmand River valley	590,783	227,104	15,171	2,015
Region				
North	569,267	4,127	.	229
Northeast	486,753	12,519	.	.
West	459,043	84,084	6,812	15,021
West Central	78,713	7,783	1,421	744
Central	135,927	7,437	467	7,436
South	436,459	159,067	8,554	97,982
East	147,508	9,627	349	5,936
Southwest	735,131	240,449	17,946	2,104

4. Agricultural technology

Cultivation in Afghanistan is presently a mixture of ancient tradition and recent innovations. Nearly one half of the farmers use tractors for ploughing the land, but the harvest is done by hand, and several ancient systems are in use such as the karez irrigation systems, traditional implements such as wooden ploughs, or the practice of levelling the ploughed land with a heavy wooden board drawn by oxen (the mala). Threshing is also done by hand, but there is an ongoing process of rapid adoption of imported static threshers. The survey gives some important information about the present state of production technology in Afghan farms.

4.1. Land preparation and planting

At the level of villages this survey investigated the number of operations performed before and after planting, and the implements used in each case, both for irrigated and rain-fed fields. Detailed results are shown at Tables A.8 to A.11 in the Statistical Appendix. Out of 481 villages reporting, 274 used an **iron plough** for land preparation. This kind of implement is used chiefly with tractors, and the information agrees with other data in the survey regarding the use of tractors. The most frequent implement, however, was the **wooden plough** used by 337 of the 481 villages reporting on this issue. The use of iron plough is often followed by a second pass with a wooden plough. It is mostly used with animal power,. The "**mala**", a heavy wooden beam that is passed for levelling and pressing the top soil after sowing, was used also by 274 villages, whilst a **harrow** was used by a minority (125).

Most farmers in the lowlands plough their land first with tractors (iron plough) and then make a second pass to level the land with a wooden plough pulled by animals. The second pass is much quicker as the land is already softened by the tractor/iron plough pass. If a harrow is available, farmers may also level their land with a tractor-driven harrow. However, this case is not a majority. The seeds are generally broadcast by hand after levelling the land. After broadcasting the seeds, farmers would normally do another pass with the wooden plough and/or simply use the "mala" to cover the seeds with soil. In more rare cases a harrow is used. Regarding the use of iron and wooden ploughs, some farmers use one or the other for land preparation, but many use the two, as shown in the following table 19.

Table 19
Use of iron and wooden ploughs before planting

		19.1. Irrigated crops		
		Wooden plough		
		Not used	Used	Total
Iron plough	Not used	51	162	213
	Used	176	126	302
	Total	227	288	515

		19.2. Rain-fed crops		
		Wooden plough		
		Not used	Used	Total
Iron plough	Not used	321	120	441
	Used	43	31	74
	Total	364	151	515

In irrigated fields, use of the iron plough is more frequent (274 cases) than in the rain-fed (63 cases only). Also in irrigated fields the use of the two ploughs is more

frequent (131 cases) than in the rain-fed (27 cases). However, it is evident that the use of wooden ploughs is more widespread.

The number of operations before planting is larger in the case of irrigated fields (Table A.10, Statistical Appendix). Of the 443 villages reporting the number of operations in irrigated fields, more than 15% make 4-5 passes, while in rain-fed fields, where 195 villages report, only 15 make four passes, and none makes five. The 15 cases with four pre-planting passes are all in the Northern Mountains rain-fed belt.[5]

4.2. Cultivation techniques

After sowing (Table A.12) irrigated fields receive one or two passes, and some receive even three. In rain-fed fields, most cases receive only one pass after planting. Some villages reported four or five operations done after planting, but it is unlikely that all of them are carried out on the same crop.

The implements used for irrigated fields are mainly the **mala** (reported by almost all) and the **wooden plough** (reported by nearly one half). The plough is usually passed after overcastting, to mix soil and seed. The **mala** is passed afterwards. The use of the plough after overcastting the seed obtains certainly the better results. The use of the **harrow** is quite in the minority.

4.3. Farm power

In 2002-2003 about 46% of farmers, controlling also 46% of the area with major crops, used a tractor for ploughing the land. The percentage of farms is nearly the same as the percentage of crop area because the use of tractors is diffused in all farm sizes. Otherwise, the percentage of land covered by tractors would have been much larger than the percentage of farms. The percentage of farms using tractors had been 39% the year before, indicating a clear tendency to increased use of mechanical power (see Table 19 and Table A.13 in the Appendix).

The percentage of farms using tractors was highest in the Helmand Valley zone, where more than 92% of farmers use it to plough 98% of the land. It was also very high in the Southern Mountains zone to which Kabul pertains with all the surrounding provinces. The diffusion of tractors is lowest in Badakhshan and the Central Mountains, and in the sloppier rain-fed fields, the main reason probably being the ragged nature of the terrain.

Between the agricultural years 2001-2002 and 2002-2003, nearly one hundred thousand farmers adopted the tractor, whilst only a small minority abandoned its use, as shown in Table 20 below. More precisely, about 12,000 farmers ceased to use tractor this year, whilst nearly 89,000 started using it. There are still 567,000 farmers, slightly more than half, who have not used mechanical power for ploughing in either of these years.

[5] Since these are village-level responses, it is not sure that farmers make usually all these passes, one after the other. It might have been intended to mean that all those implements are used, though not necessarily all in succession on the same field for a single crop. That may explain the cases with allegedly up to five passes, which is not indeed so frequent according to field observations.

Table 20
Changes in use of tractors for land preparation, 2001-2002 and 2002-2003
20.1. Number of farms

		Farms using tractor 2001-02		
		No	**Yes**	**Total**
Using tractor 2002-03	**No**	567,020	12,083	579,103
	Yes	89,310	397,110	486,420
	Total	656,330	409,193	1,065,523

20.2. Percent of farms

		Using tractor 2001-02		
		No	**Yes**	**Total**
Using tractor 2002-03	**No**	53.2%	1.1%	54.3%
	Yes	8.4%	37.3%	45.7%
	Total	61.6%	38.4%	100.0%

The strong presence of tractors, and their increase, has been possibly prompted by a large decrease in the number of oxen due to the prolonged drought. The existence of significant sources of income for many farmers in the poppy sector (clearly in Helmand) is also a factor influencing an increase of investment in tractors.

In addition to or instead of tractors, many farmers used draught animals to plough the land, overwhelmingly cattle (cows and oxen) plus a limited number using donkeys, mules and horses. Farmers do not necessarily use only one source of farm power: many use both, as shown in Table 21. After ploughing with tractor, a pass of other implements with oxen is quite frequent.

Table 21
Use of tractors and draught animals in 2001-2002
21.1. Number of farms involved

		Used draught animals		
		TOTAL	**No**	**Yes**
Used tractor	**TOTAL**	1,065,523	420,875	644,648
	No	656,330	103,585	552,745
	Yes	409,193	317,290	91,903

21.2. Area with crops (Ha)

		Used draught animals		
		TOTAL	**No**	**Yes**
Used tractor	**TOTAL**	3,444,276	1,249,429	2,194,847
	No	1,835,823	155,396	1,680,427
	Yes	1,608,453	1,094,033	514,420

The use of tractors in 2001-02 by more than 400,000 farmers, to plough more than 1.6 million hectares of land, necessitates indeed a large number of tractors, further increased in 2002-03 by an even wider diffusion of the machines.

Prices for renting a tractor or for renting a pair of oxen, collected in the survey, suggest that the price of rented oxen **per unit of land** follows the cost of renting a tractor, the latter being in turn determined by the investment involved in the machine plus the cost of fuel, both tradable goods whose price can be considered as exogenously determined. In most regions, the cost per unit of area (the cost of ploughing a hectare) by oxen or tractor tend to coincide. This is due to the price of oxen having gone up to follow the rental cost of tractors. This fact implies strong competition and substitution between the two, especially at a time in which the supply of oxen has significantly diminished due to the prolonged drought of recent years (in

spite of importation of oxen from Pakistan up to Northern Afghanistan where they have been trained to pull from ploughs in the hilly terrain there) whilst the supply of tractors has probably increased. The tractor is more efficient for ploughing the land, but perhaps becomes more expensive for lighter operations such as passing the mala or the wooden plough for top soil levelling before and after planning. Oxen are also less damaging to the soil structure.

The opening up of the economy after the fall of the Taliban, plus the increased availability of income (due to economic recovery and the expansion of poppy areas, with the illegal product selling at a very high price since 2001), have allowed a rapid substitution of tractors for oxen, which could possibly continue if those conditions do not change. However, the full recovery of livestock may still take some more years.

4.4. Fertiliser

The use of fertiliser has become almost universal, at least for irrigated cereals. Table 22 shows the extent of fertiliser use for irrigated wheat in 2001-2002. All in all, 78% of all farms with irrigated wheat reported to have applied fertiliser to that crop. Practically all those that used fertiliser used both urea and DAP (the latter in autumn and urea in spring).

Table 22
Farms planting irrigated wheat and applying fertiliser, 2001-02

	Total farms	Farms with irrigated wheat	Farms using fertilizer for irrigated wheat			
			Total	Urea	DAP	Other
TOTAL	1,065,523	848,795	673,118	624,180	611,809	8,050
Agro-ecological zone						
Badakhshan mountains	35,346	25,090	24,541	24,541	24,174	0
Central mountains	167,168	129,268	83,584	81,215	81,554	0
Eastern mountains	177,322	156,622	145,648	137,418	135,423	1,025
Southern mountains	79,426	65,744	54,620	52,061	50,170	290
Northern mountains	281,308	173,772	148,576	138,446	123,640	4,616
Turkistan plains	74,857	62,476	20,864	19,717	18,112	132
Herat-Farah lowlands	146,759	138,349	108,072	94,195	93,354	1,564
Helmand River valley	103,338	97,475	87,214	76,587	85,382	424
Region						
North	177,764	104,298	58,233	52,411	41,310	1,938
Northeast	164,134	129,507	117,565	116,786	109,552	0
West	196,371	165,882	126,254	107,702	108,419	4,373
West Central	75,463	58,881	19,627	19,627	19,289	0
Central	104,796	95,595	82,998	81,881	71,667	145
South	72,871	44,494	37,819	37,374	36,364	0
East	127,941	116,219	112,229	103,999	108,987	1,025
Southwest	146,183	133,919	118,392	104,400	116,222	569

Use of fertiliser for other crops has not been investigated in detail in this survey. It is commonly used for fruit, vegetables, potatoes and several other crops. Fertiliser is not quite effective on rain-fed wheat, but even so it has been found applied in a number of cases (representing however only 1.5% of all farms with rain-fed wheat, a rather negligible number).

The doses applied in 2001-2002 were in general quite high. The national average was 179 Kg per fertilised hectare of irrigated wheat. The highest average rates were observed in the Central Mountains (255 kg/Ha) and the Eastern Mountains and Foothills (246 kg/Ha). In terms of regions, the Kabul or Central region was the one

with the highest rate (346 kg/Ha). Far below was the Helmand River basin (mostly Helmand and Kandahar) with only 64 kg/Ha), possibly because of fertiliser access constraints in the autumn of 2001 where the war was raging in that region, and lack of water in the *karez* and spring irrigated parts of that zone.

However, fertiliser rates may be quite higher than the average, reaching beyond 500 kg/Ha in some cases, whilst on the other side one quarter of the fertilised wheat area receives less than 50 kg/Ha (see Table A.17 in the Statistical Appendix). DAP rates may equal the seed rate, and each urea application may also be up to the same size of the seed rate, totalling easily more than 300 kg/Ha in many cases.

Common practices for fertiliser application in irrigated crops are as follows:

- One application of DAP at planting time
- One or two applications of urea in spring, to support the growth and at the heading period. However, even if the total rate applied is relatively high, and two spring applications are done, at the end of the growing stage some shortage of nitrogen is visible in many irrigated wheat fields, due to the **spacing between the applications**.

Table 23
Fertiliser rates for irrigated wheat, 2001-02

		Irrigated wheat			
		Total area planted (Ha)	**Fertilised area (Ha)**	**Total fertiliser used (Kg)**	**Fertiliser rate (Kg/Ha)**
TOTAL		1,242,425	986,974	176,525,051	179
Agro-ecological zone					
	Badakhshan mountains	65,197	64,575	15,328,499	237
	Central mountains	107,915	62,942	16,048,061	255
	Eastern mountains	108,164	99,210	24,372,878	246
	Southern mountains	91,774	71,150	13,538,701	190
	Northern mountains	290,971	271,827	58,624,264	216
	Turkistan plains	186,993	78,238	15,962,256	204
	Herat-Farah lowlands	173,798	139,190	19,905,402	143
	Helmand River valley	217,614	199,841	12,744,990	64
Region					
	North	190,179	95,780	14,973,827	156
	Northeast	337,656	307,951	72,655,144	236
	West	189,123	150,099	22,191,451	148
	West Central	53,230	11,438	3,179,495	278
	Central	59,801	51,349	17,730,473	345
	South	80,633	63,368	10,530,398	166
	East	80,555	77,812	16,904,418	217
	Southwest	251,247	229,176	18,359,847	80

At the time of the survey the season was beginning, so no account was asked of total fertiliser use in 2002-03. However, the survey asked farmers whether they used fertiliser in 2001-02 (for any crop), if they intended to use fertiliser in 2002-03 (again for any crop), and whether they would use more, the same amount, or less than the year before. Table 24 shows the results. The main finding at Table 24.1 is the **significant number of new users, relative to the year before**. Ten percent of those who are (or would be) users in 2002-03 had not used fertiliser the year before. Secondly, among old users, **those intending to augment the quantity used are more numerous than those intending to reduce it**. Some 211,000 farmers plan to increase their use of fertiliser, while only some 53,000 intended to reduce it. These two findings at an early

date in the season (December-January) announce an increased and more widespread application of fertiliser. Since the season looked increasingly better as the year progressed, it is likely that these rather cautious intentions were surpassed by decisions taken later, and therefore the increase in the use of fertiliser (both in number of users and quantities applied) **may have been more pronounced than suggested by this table**. Indeed the yields observed in 2003 suggest heavy use and widespread of fertiliser along with improved seeds and increased supply of water. Table 24.2 shows the changes occurred as some farmers start using fertiliser while others cease to use it.

Table 24
Changes in fertiliser use
24.1. Users of fertiliser in 2002-03: Changes from 2001-02 in amount used

	Farms using fertiliser in 2002-03						
	Total	Had used in 2001-02	Amount to use compared to 2002-03				
			Less than 2001-02	Same as 2001-02	More than 2001-02	Not a user in 2001-02	Unclear
Total	712,788	640,101	52,841	367,153	211,058	72,688	9,049
Agro-ecological zone							
Badakhshan mountains	24,907	24,724	916	8,424	15,200	183	183
Central mountains	99,827	78,170	2,369	31,133	43,992	21,657	677
Eastern mountains	152,881	147,145	6,734	101,255	37,410	5,736	1,746
Southern mountains	62,740	53,396	1,335	29,701	21,358	9,344	1,001
Northern mountains	149,096	134,810	13,507	74,288	45,456	14,286	1,558
Turkistan plains	29,920	21,322	1,834	13,871	5,044	8,598	573
Herat-Farah lowlands	99,241	91,672	25,231	54,246	9,251	7,569	2,944
Helmand River valley	94,177	88,863	916	54,234	33,347	5,313	366
Region							
North	70,116	53,985	8,190	38,552	6,121	16,130	1,123
Northeast	114,325	112,064	2,093	51,798	57,242	2,261	932
West	118,722	106,478	31,205	60,480	11,589	12,245	3,203
West Central	32,486	19,289		6,430	12,859	13,197	
Central	86,165	82,265	3,392	53,723	24,589	3,900	561
South	40,911	35,682	222	17,693	17,433	5,228	334
East	115,970	112,229	6,484	74,570	29,429	3,741	1,746
Southwest	134,093	118,108	1,255	63,908	51,796	15,984	1,150

24.2. Adopting and stopping using fertiliser from 2001-02 to 2002-03
24.2.1. Total farms

		Use of fertiliser in 2002-03		
		Total	No	Yes
Use of fertiliser in 2001/02				
	Total	1,065,524	352,735	712,789
	No	388,668	315,980	72,688
	Yes	676,856	36,755	640,101

24.2.2. Farms without any irrigation

		Use of fertiliser in 2002-03		
		Total	No	Yes
Use of fertiliser in 2001/02				
	Total	120,963	113,660	7,303
	No	115,830	111,852	3,978
	Yes	5,133	1,808	3,325

Table 24
Changes in fertiliser use (cont.)
24.2.3. Farms with irrigated land

		Use of fertiliser in 2002-03		
		Total	**No**	**Yes**
Use of fertiliser in 2001/02				
	Total	944,561	239,075	705,486
	No	272,838	204,128	68,710
	Yes	671,723	34,947	636,776

24.2.4. Farms with irrigated wheat, 2002-03

		Use of fertiliser in 2002-03		
		Total	**No**	**Yes**
Use of fertiliser in 2001/02				
	Total	797,347	159,418	637,929
	No	180,786	130,394	50,392
	Yes	616,561	29,024	587,537

24.2.5. Irrigated farms without irrigated wheat

		Use of fertiliser in 2002-03		
		Total	**No**	**Yes**
Use of fertiliser in 2001/02				
	Total	147,214	79,657	67,557
	No	92,052	73,734	18,318
	Yes	55,162	5,923	49,239

24.2.6. Irrigated land area (hectares)

		Use of fertiliser in 2002-03		
		Total	**No**	**Yes**
Use of fertiliser in 2001/02				
	Total	3,048,801	751,567	2,297,234
	No	907,257	659,962	247,294
	Yes	2,141,544	91,605	2,049,939

24.2.7. Irrigated wheat area, 2002-03 (hectares)

		Use of fertiliser in 2002-03		
		Total	**No**	**Yes**
Use of fertiliser in 2001/02				
	Total	1,289,652	276,242	1,013,410
	No	324,251	238,951	85,299
	Yes	965,401	37,291	928,110

A significant number of new users of fertiliser were detected, i.e. farmers who had not used fertiliser in 2001-02 but will use it in 2002-03 (Table 24). Some farmers, certainly fewer, did the opposite change, stopping using fertiliser. The cells in the table representing the shifts are highlighted.

The total number of farmers using fertiliser would grow from 676,856 to 705,486, a net increase of about 5%, resulting from 72,688 new users, minus 36,755 dropouts (farmers who did use fertiliser in 2001-02 but were not using it, or planning not to use it, in 2002-03). The 72,688 new users involve 247,294 hectares of irrigated land, and 85,299 hectares of irrigated wheat in 2002-03. These acreages represent respectively 8.1% of irrigated land and 6.6% of the area with irrigated wheat. The shift towards using fertiliser occurs preferably among smaller farmers, because the percentage of farmers affected is larger than the percentage of land or crop. The shift involves fertilisation of other crops besides wheat, since the percentage of irrigated land involved is larger than the percentage of irrigated wheat area. This latter inference is consistent with the observation of increased crop diversification in 2002-03 relative to the precedent and previous years, and with Table 44.5, where it is shown that more than 18,000 new users (a quarter of all new users) are in farms with irrigated land but

not growing irrigated wheat. Also, farms without access to irrigation, where very few use any fertiliser (Table 44.2), there are nonetheless 7303 users, of which 3978 are new users in 2002-03.

Looking at the process of adoption from a different standpoint, the figures also indicate that in 2002-03 some 25% of previous non-users did become users, and that on 27% of previously non-fertilised irrigated land, and 26% of previously non-fertilised irrigated wheat, fertiliser would be applied in 2002-03. This shows a strong tendency towards adopting fertilisers in all irrigated land, a tendency advancing at a rapid pace in the latest two agricultural years. Clearly the use of fertilizer is expanding in Afghanistan, and the process is likely to continue.

4.5. Seeds

4.5.1. Seed rates

Along with soils, water and fertiliser, the other crucial element in the crop equation is the seeds. The following table shows the realised average seed rate for 2001-2002, and an estimation by farmers about the seed rate for 2002-2003 (many have already planted, but much remained still to be planted).

Table 25
Average seed rate for wheat, 2001-02 and 2002-03

	Wheat seed rate (Kg/Ha)			
	2001-2002		2002-2003	
	Irrigated	Rain-fed	Irrigated	Rain-fed
TOTAL	153	90	150	92
Agro-ecological zone				
Badakhshan mountains	170	115	174	119
Central mountains	181	96	185	99
Eastern mountains	160	108	163	97
Southern mountains	181	85	185	99
Northern mountains	161	85	153	87
Turkistan plains	155	101	151	105
Herat-Farah lowlands	151	99	148	104
Helmand River valley	107	84	104	68
Region				
North	146	76	140	79
Northeast	167	113	163	117
West	153	98	149	106
West Central	161	96	156	101
Central	212	83	212	70
South	194	82	188	96
East	146	106	149	105
Southwest	112	95	108	81

The figures for 2002-03 reflect, as mentioned before, part fact and part expectation. However, there is a strong degree of consistency between the ex post rates obtained from amounts planted and areas planted the year before, and the ex ante amounts planted or about to be planted at the beginning of 2003, when many farmers still had no idea of the sustained rainfall they would enjoy for the subsequent months.

According to these figures, which in general agree with the survey last year and with field observations and measurements done both in 2002 and 2003 crop assessment exercises, the average rate for irrigated wheat is 150-153 Kg/Ha, and 90-92 Kg/Ha in the case of rain-fed wheat.

Variation between the average seed rates of different zones or regions are noticeable, especially the higher rates for rain-fed wheat in the Highlands (Badakhshan and the Southern and Central Mountains) and the low rates (both irrigated and rain-fed) in Helmand Valley. Local variability within zones also exists, as verified during fieldwork for this survey and during the 2003 pre-harvest crop assessments. In some locations where very good rains had occurred, farmers planted some rain-fed fields with rates as high as is usual for irrigated land (130-150 Kg/Ha).

High seed rates in Afghanistan are explained by the fact that farmers usually sow by broadcasting the seed, and then make one or two passes with suitable implements such as a wooden plough or a mala. This causes the seeds to be positioned anywhere between the surface and 15 cm deep. Those at the bottom are more likely not to emerge, whilst those at the top may be eaten by birds. Planting in excess of recommended rates may cover these losses.

4.5.2. Improved seeds

The use of improved seeds is widely diffused. According to this survey, 53% of all wheat seeds planted was of improved varieties, and the rest (47%) local seeds of various kinds (Table 26). All in all, 288 thousand MT were planted in 2001-02.

Table 26
Use of local and improved varieties of wheat seed, 2001-2002

	Wheat seed used, 2001-02, MT			% improved
	Local	Improved	Total	
Total	135,669	152,677	288,346	52.9%
Agro-ecological zone				
Badakhshan mountains	9,669	13,241	22,910	57.8%
Central mountains	23,381	5,148	28,529	18.0%
Eastern mountains	3,513	12,624	16,136	78.2%
Southern mountains	14,535	3,332	17,867	18.6%
Northern mountains	38,107	79,160	117,267	67.5%
Turkistan plains	13,868	21,829	35,697	61.2%
Herat-Farah lowlands	16,913	9,238	26,151	35.3%
Helmand River valley	15,684	8,105	23,789	34.1%
Region				
North	31,592	41,215	72,807	56.6%
Northeast	22,189	70,154	92,343	76.0%
West	24,776	12,099	36,875	32.8%
West Central	14,883	2,312	17,195	13.4%
Central	4,992	6,440	11,431	56.3%
South	15,902	1,355	17,257	7.9%
East	698	10,871	11,569	94.0%
Southwest	20,637	8,231	28,868	28.5%

A total of 288 thousand metric tons of improved wheat seeds were used in 2001-2002. This amount increased in 2002-03 because of expanded area planted with wheat, increased seed supply and access to seeds through 2002 (relative to late 2001 and early 2002) due to the better political situation, and large seed supply programs implemented by FAO and other partner organizations, and (last but not least) the strong trend towards ever greater adoption of improved seeds. The seed rates per hectare reported for 2002-03, as seen before, closely match those of 2001-02.

The regional rates of use of improved seed, however, differ markedly. The Eastern Mountains Agro-ecological Zone as well as the East planning region had the highest rates with 78% and 94% respectively, possibly due to the vicinity of Pakistan where some of the commercial varieties come from. By the same token, the Northern Mountains and the Badakhshan Mountains agro-ecological zones, as well as the Turkistan Plains, enjoyed in general better access to improved seeds. This notwithstanding, specific areas in the North such as Faryab and some other provinces in that zone have had a much reduced access to improved seeds. The lowest rate were observed in the Southern and Central Mountains, in the Helmand Valley zone, and around Herat and Farah, possibly because of lack of access to improved varieties due to the difficult political and military situation there at the time of planting (November-December 2001). However, the 2003 Nationwide Crop Output Assessment observed yields and plant densities in that region that reveal seed rates in line with those observed in other regions, suggesting that farmers under-reported seed rates in the survey.

4.5.3. Improved varieties

Table 27 shows varieties used by farmers planting wheat in 2001-02, again showing that 52.9% of the wheat seed belongs to improved varieties.

Table 27
Varieties of wheat seeds, 2001-02

	MT	Percent
Kauz 92	14,446	5.0%
Inqilab 91	8,734	3.0%
Pamir 94	14,870	5.2%
Herat 99	753	0.3%
Mazar 96	1,933	0.7%
Ghori 96	3,951	1.4%
Takhar 96	28,826	10.0%
Gul 96	2,474	0.9%
Roshan	5,449	1.9%
Rana	32	0.0%
Dyma	85	0.0%
Amu 99	819	0.3%
Maxipak	10,855	3.8%
Indian Red	3,386	1.2%
Other improved	56,065	19.4%
Total improved	152,677	52.9%
Total local wheat seed	135,669	47.1%
Total wheat seed	288,346	100.0%

Some of the so-called local or traditional varieties may in fact be improved varieties introduced long ago.

The improved varieties used are not only those developed and distributed by FAO or the Afghan Government: commercial varieties are also included, and some NGOs, bilateral agencies and international organisations have distributed seeds of various origins. In addition to varieties distributed by FAO or the Afghan Government, a quarter of all seeds (one half of all improved seeds) were improved varieties from other origins, probably commercially imported. It is also worth noting that some seeds classified as local or traditional varieties are in fact originally improved varieties that have been introduced long ago and have been in use for more than 10 years, and many of those may have lost their original quality, as many farmers (especially during the

difficult 1990s) used their own saved seed over and over again. The much used Zardana variety, classified here as “local”, is one of these “old” improved seeds. Therefore the share of non-local or improved seeds is larger than recorded here. However, a significant proportion of the improved seeds was obtained from the saved reserves of farmers, and have undergone probably several recycling years, thus reducing their genetic potential (see Table 28 below)

Varieties sold or distributed by FAO through various partners, i.e. most of those shown at Table 26 (except Maxipak and Indian Red), account for 28.6% of all wheat seed, and 54% of all improved wheat seeds used. Other improved varieties of various origins, including many not identified, account for another 24.4% of seed use, or 46% of all improved seed. Among the identified improved seeds, Takhar 96, Pamir 94, Kauz 92 and Inqilab 91 are the most frequently used, followed by the Pakistani seed Maxipak. A special Annex at the end of this report summarizes the characteristics of the main available wheat seeds.

4.5.4. Acquisition of seed

The survey investigated the way farmers obtained seeds for wheat. Three possibilities were identified in the questionnaire: own seed saved from a previous season, seed received from some organization, and seed purchased in the market. Some minor modes of acquisition were subsumed in the above for statistical reasons (too few cases in the sample to yield a meaningful estimate). These included seeds brought by returnees from neighbouring countries, which were considered as own seed saved from previous seasons. There was also no specific question to identify the organizations delivering seeds, because there are too many NGOs and other organizations distributing seeds, and many farmers are not exactly aware of the identity of such organizations. Besides, most of the seeds distributed by organizations originate in a few donors such as the FAO emergency input distribution program, but they are delivered through implementing partners, making difficult for farmers to identify the ultimate source. As shown in Table 28, out of 840,440 farms with irrigated wheat, more than half a million (60%) used their own seed. About 95,000 farms (11%) received seeds from some organization, and 385,487 (i.e. 46% of all farms) purchased seed in the market.

Some 62.5% of all irrigated wheat seed was saved by farmers from previous seasons, while nearly 4% of the seed was received, and 35.5% was purchased. The sum of purchased and received seeds (39.4%) is less than the percentage of improved seed used by farmers for this crop, showing that some of the improved seed was saved from previous seasons and reused. Table 29 shows precisely that situation. More than sixty percent of the improved seeds are saved, and less than 40% purchased or received.

Table 28
Origin of seeds for irrigated wheat, 2001-2002
28.1. Farms

	Total farms reporting	Own saved	Received	Purchased
TOTAL	840,440	502,963	94,740	385,487
Agro-ecological zone				
Badakhshan mountains	25,090	19,962	10,805	13,369
Central mountains	126,899	105,918	16,243	28,425
Eastern mountains	156,622	81,802	4,489	84,047
Southern mountains	65,744	44,830	2,447	27,032
Northern mountains	173,512	90,393	39,222	91,691
Turkistan plains	61,559	25,334	8,368	38,174
Herat-Farah lowlands	133,723	103,026	12,615	35,323
Helmand River valley	97,291	31,698	550	67,426
Region				
North	103,380	25,436	18,918	70,947
Northeast	129,247	96,746	26,490	64,235
West	161,256	116,533	25,603	43,375
West Central	56,512	53,128	3,722	9,814
Central	93,350	73,085	8,175	20,154
South	44,494	38,042	7,987	8,352
East	118,464	51,376	249	80,306
Southwest	133,735	48,617	3,595	88,304

Farms may acquire seeds from more than one origin. Rows do not add up.

28.2. Metric tons

	Total seed	Own saved	Received	Purchased
TOTAL	189,921	118,692	7,450	67,354
Agro-ecological zone				
Badakhshan mountains	11,062	8,581	1,059	3,027
Central mountains	19,577	16,760	921	2,750
Eastern mountains	17,257	12,489	190	4,935
Southern mountains	16,588	13,200	337	3,331
Northern mountains	46,931	21,860	3,270	22,144
Turkistan plains	28,913	14,516	545	12,805
Herat-Farah lowlands	26,246	20,038	1,015	4,809
Helmand River valley	23,347	11,248	112	13,553
Region				
North	27,814	6,294	1,763	19,301
Northeast	56,319	37,297	2,381	17,911
West	29,019	21,404	1,746	5,572
West Central	8,566	7,955	251	761
Central	12,676	11,179	398	1,823
South	15,623	13,965	670	1,393
East	11,758	7,109	7	4,591
Southwest	28,147	13,489	235	16,001

A.28.3. Percent of farms obtaining seed from each origin

	Total seed	Own saved	Received	Purchased
TOTAL	100.0%	59.8%	11.3%	45.9%
Agro-ecological zone				
Badakhshan mountains	100.0%	79.6%	43.1%	53.3%
Central mountains	100.0%	83.5%	12.8%	22.4%
Eastern mountains	100.0%	52.2%	2.9%	53.7%
Southern mountains	100.0%	68.2%	3.7%	41.1%
Northern mountains	100.0%	52.1%	22.6%	52.8%
Turkistan plains	100.0%	41.2%	13.6%	62.0%
Herat-Farah lowlands	100.0%	77.0%	9.4%	26.4%
Helmand River valley	100.0%	32.6%	0.6%	69.3%
Region				
North	100.0%	24.6%	18.3%	68.6%
Northeast	100.0%	74.9%	20.5%	49.7%
West	100.0%	72.3%	15.9%	26.9%
West Central	100.0%	94.0%	6.6%	17.4%
Central	100.0%	78.3%	8.8%	21.6%
South	100.0%	85.5%	18.0%	18.8%
East	100.0%	43.4%	0.2%	67.8%
Southwest	100.0%	36.4%	2.7%	66.0%

Table 28
Origin of seeds for irrigated wheat, 2001-2002
28.4. Percent of seed from each origin

	Total seed	Own saved	Received	Purchased
TOTAL	100.0%	62.5%	3.9%	35.5%
Agro-ecological zone				
Badakhshan mountains	100.0%	77.6%	9.6%	27.4%
Central mountains	100.0%	85.6%	4.7%	14.0%
Eastern mountains	100.0%	72.4%	1.1%	28.6%
Southern mountains	100.0%	79.6%	2.0%	20.1%
Northern mountains	100.0%	46.6%	7.0%	47.2%
Turkistan plains	100.0%	50.2%	1.9%	44.3%
Herat-Farah lowlands	100.0%	76.3%	3.9%	18.3%
Helmand River valley	100.0%	48.2%	0.5%	58.1%
Region				
North	100.0%	22.6%	6.3%	69.4%
Northeast	100.0%	66.2%	4.2%	31.8%
West	100.0%	73.8%	6.0%	19.2%
West Central	100.0%	92.9%	2.9%	8.9%
Central	100.0%	88.2%	3.1%	14.4%
South	100.0%	89.4%	4.3%	8.9%
East	100.0%	60.5%	0.1%	39.0%
Southwest	100.0%	47.9%	0.8%	56.8%

Table 29
Origin of improved seed for irrigated wheat, 2001-02 (percent of seed)

		Total improved seed	Own saved	Received	Purchased
TOTAL		100.0%	61.5%	6.1%	33.0%
Agro-ecological zone					
	Badakhshan mountains	100.0%	75.1%	10.6%	28.1%
	Central mountains	100.0%	88.4%	10.8%	12.2%
	Eastern mountains	100.0%	63.6%	1.2%	32.3%
	Southern mountains	100.0%	63.2%	6.0%	26.8%
	Northern mountains	100.0%	48.0%	7.7%	43.4%
	Turkistan plains	100.0%	62.6%	2.8%	33.5%
	Herat-Farah lowlands	100.0%	80.0%	8.2%	13.2%
	Helmand River valley	100.0%	63.8%	1.3%	30.0%
Region					
	North	100.0%	24.8%	10.8%	61.7%
	Northeast	100.0%	65.4%	4.6%	32.1%
	West	100.0%	73.7%	12.2%	15.9%
	West Central	100.0%	73.0%	5.6%	27.8%
	Central	100.0%	81.9%	4.8%	19.0%
	South	100.0%	70.1%	16.2%	10.9%
	East	100.0%	61.3%	0.1%	36.0%
	Southwest	100.0%	64.1%	2.0%	29.1%

Actually the rate reported (40% purchased seed) is considered by experts as extremely good and much above the rates found in neighbouring countries. The replacement rate is lower than 5% in neighbouring countries (communication from FAO Chief Advisor in Seed Development for Afghanistan, N. Tunwar). The rate of 40% is in fact unexpectedly high.

The questions about use of improved seed and the mode of seed acquisition were not asked about 2002-03, because the planting season was not over and the picture would have been incomplete. However, evidence from the Crop Assessment 2003 suggests the incidence of improved seeds has increased, as has the use of fertiliser.

4.6. Agricultural input assistance

As shown before concerning seeds, some farmers in the sample had received assistance in the form of inputs from various organizations. Most of these inputs came from FAO Emergency Agricultural Assistance program, but also from other various sources. FAO inputs, in turn, as those from other sources, were distributed by various NGOs acting as “implementing partners”. FAO distributed inputs for the spring season of the 2001-02 agricultural year, and the autumn and spring seasons in 2002-03, thus the coverage of both agricultural years was different. Other organizations distributing inputs may have been also kept from doing so in the violent autumn of 2001, when war was raging over Afghanistan.

An estimated 97,706 farms declared having received seeds from some organization for the 2001-2002 agricultural year, while 83,705 declared having received seeds for the 2002-03 season, as shown in Table 30. Fertilizer was received by 49,000 and 60,000 farmers respectively in each year. However, the numbers are not strictly comparable because of the late start of the programme in the 2001-02 year, and the fact that at the time of the survey the distribution of inputs for the spring 2003 had not

yet started.[6] About one half of seed beneficiaries in 2001-02 received also fertiliser, while more than two thirds did receive both inputs in 2002-03. Smaller numbers received tools and other inputs (see detailed figures about this matter in the Statistical Appendix, Table A.24).

An ex post evaluation of the FAO autumn input distribution programme for the 2002-03 season, carried out by FAO in mid 2003, showed a significant impact in yields and income (see Mollet 2003).

Table 30
Assistance received in seed and fertilizer
30.1. Seeds in 2001-02 and 2002-03

		TOTAL	Seeds received 2002-03	
			No	Yes
TOTAL		1,065,523	981,819	83,705
Seeds received 2001/02				
	No	967,818	908,468	59,349
	Yes	97,706	73,350	24,355

30.2. Fertiliser in 2001-02 and 2002-03

		TOTAL	Fertiliser received 2002-03	
			No	Yes
TOTAL		1,065,523	1,004,948	60,576
Fertilizer received 2001/02				
	No	1,016,507	965,697	50,810
	Yes	49,016	39,251	9,766

30.3. Fertiliser and seed in 2001-02

		TOTAL	Fertilizer received 2001/02	
			No	Yes
TOTAL		1,065,523	1,016,507	49,016
Seeds received 2001/02				
	No	967,818	967,298	519
	Yes	97,706	49,209	48,497

30.4. Fertiliser and seed in 2002-03

		TOTAL	Fertiliser received 2002-03	
			No	Yes
TOTAL		1,065,523	1,004,948	60,576
Seeds received 2002-03				
	No	981,819	979,691	2,128
	Yes	83,705	25,256	58,448

30.5. Agricultural year 2001-02

Assistance for 2001-02		TOTAL	Type of wheat in the farm, 2001-02			
			No wheat	Only rain-fed	Only irrigated	Both
TOTAL		1,065,523	68,214	148,515	634,092	214,703
	None	967,298	68,099	122,988	596,112	180,099
	Total receiving inputs	98,225	115	25,527	37,980	34,604
	Only seed	49,209		20,765	13,665	14,779
	Only fertiliser	519		260		260
	Both	48,497	115	4,503	24,314	19,565

[6] Tools and other inputs (not shown in the tables) appeared to have been received by no more than 4000-6000 farmers each year, in numbers below statistical significance in the sample.

Table 30
Assistance received in seed and fertilizer
30.6. Agricultural year 2002-03

Assistance for 2002-03		TOTAL	Type of wheat in the farm, 2002-03			
			No wheat	Only rain-fed	Only irrigated	Both
TOTAL		1,065,523	117,904	150,272	615,634	181,713
	None	979,691	116,326	143,213	564,642	155,510
	Total receiving inputs	85,832	1,578	7,060	50,992	26,203
	Only seed	25,256	636	5,532	14,368	4,721
	Only fertiliser	2,128		374	1,119	634
	Both	58,448	942	1,154	35,504	20,848

As seen in Table 30, only a fraction of those receiving seeds have received also fertiliser. The main reason is that some organisations do not distribute fertiliser for rain-fed cultivation (in fact, very few farmers apply them in that case). However, as shown in Tables 30.5 and 30.6, fertiliser assistance was also given some farms having only rain-fed wheat. On the other hand, some farms with only irrigated wheat received only seeds or only fertiliser. Some of the odd cases with no wheat but receiving inputs may have received the inputs for other crops such as potatoes or vegetables.

Beneficiary farms had a total arable area of nearly a million hectares between irrigated and rain-fed land. They planted about 100,000 hectares of irrigated wheat and about 200,000 hectares of rain-fed wheat in both agricultural years considered. Table 31 shows the main characteristics of beneficiary farms at national level. Table A.24 has some breakdown by region and agro-ecological zone as well.

It seems that in 2001-02, there was a larger proportion of deficit farmers among beneficiary farms in the seed distribution program, while in 2002-03 the opposite was true It can also be noted that seeds were relatively more likely to be received by deficit households, while fertilizers were relatively more likely to be received by rich/surplus households The possible explanation is that fertilizers are probably a more demanded or scarcer input, demanded even by farmers with enough seed, and thus fertilizer ended up (in a larger proportion than seeds) in the fields of richer farmers, who are probably also more influential as well as regards discussions at local level concerning the allocation of the inputs to specific farmers.

Table 31
Main features of beneficiary farms
receiving agricultural inputs assistance

	Farms receiving:							
	Seeds 2001-02	Seeds 2002-03	Fertiliser 2001-02	Fertiliser 2002-03	Tools 2001-02	Tools 2002-03	Other inputs 2001-02	Other inputs 2002-03
Total beneficiary farms	97,706	83,705	49,016	60,576	5,851	4,039	6,462	4,088
Total arable land (hectares)	948,696	648,069	475,213	423,155	17,249	16,632	21,051	14,292
Area with irrigated wheat, 2001-02*	100,745	120,241	70,967	101,749	6,079	5,690	9,933	5,293
Area with irrigated wheat, 2002-03*	107,519	118,686	70,404	97,565	5,825	4,799	8,045	5,080
Area with rain-fed wheat, 2001-02*	207,133	114,588	75,587	75,322	5,356	3,304	5,076	2,239
Area with rain-fed wheat, 2002-03*	218,035	100,468	88,261	69,922	3,278	3,198	2,930	1,707
Farms by gross cereal balance (**)								
Deficit households	51,699	37,433	23,280	20,939	3,399	918	4,387	2,550
About self-sufficient	13,817	11,940	5,864	8,770	973	499	741	366
Surplus households	32,189	34,332	19,872	30,867	1,479	2,622	1,334	1,171

Table 31
Main features of beneficiary farms
receiving agricultural inputs assistance

	Farms receiving:							
	Seeds 2001-02	**Seeds 2002-03**	**Fertiliser 2001-02**	**Fertiliser 2002-03**	**Tools 2001-02**	**Tools 2002-03**	**Other inputs 2001-02**	**Other inputs 2002-03**
Farms by size of total arable land	97,706	83,705	49,016	60,576	5,851	4,039	6,462	4,088
Below 0.50 Ha	4,974	11,157	2,656	8,356	1,858	682	1,204	472
0.50-0.99 Ha	5,896	5,363	3,442	4,195	1,115	865	950	366
1.00-1.99 Ha	9,987	13,132	5,970	8,888	588	249	1,910	888
2.00-4.99 Ha	21,652	22,383	10,123	16,483	1,733	1,234	1,475	1,689
5.00-9.99 Ha	22,013	12,855	10,415	9,393	183	374	550	298
10.0-19.9 Ha	20,155	9,782	10,484	7,452	115	634	115	374
20.0-49.9 Ha	11,195	7,948	5,096	5,442	260	.	260	.
50+ Ha	1,835	1,085	830	366	.	.	.	.

(*) Farms may have both irrigated and rain-fed land (see Table 30).
(**) Gross cereal balance for 2002-03 = Total cereal output from 2001-02 year, minus estimated cereal needs (150-250 kg per capita). Cereal needs are supposed to include food, feed and seed requirements.
Deficit households = Output less than 150 kg per capita
About self-sufficient = Output between 150 and 249 kg per capita
Surplus households = Output at least 250 kg per capita

Farms have often used seeds of various origins: their own saved seed, purchased and received from some organization. All the possible combinations may in fact be encountered, as shown in Table 32. For that table, an estimate is given of the area planted with each kind of seed, assuming farmers distribute them proportionally (i.e. using the same seed rate for all kinds of seed on a given land). Seed assistance normally involved a donation of no more than 50 kg per household, thus the amount of land that could be planted with it was very limited.

Table 32
Farms and area by origin of seed, 2001-02
32.1. Irrigated wheat
32.1.1. Farms with irrigated wheat

	Farms planting	**Planting received seed**	**Planting own seed**	**Planting purchased seed**
TOTAL	848,795	94,297	498,643	377,846
Origin not reported	30,379	0	0	0
Received only	26,572	26,572	0	0
Purchased only	278,729	0	0	278,545
Received + Purchased	11,989	11,989	0	11,989
Own saved only	366,735	0	364,366	0
Own + received	46,965	46,965	46,965	0
Own + purchased	78,655	0	78,541	78,541
All three origins	8,771	8,771	8,771	8,771

32.1.2. Hectares with irrigated wheat

	Area planted	**Area planted with received seed**	**Area planted with own seed**	**Area planted with purchased seed**
TOTAL	1,242,425	46,852	724,810	490,702
Origin not reported	32,685	.	.	.
Received only	17,814	14,160	.	.
Purchased only	341,630	.	.	378,676
Received + Purchased	20,193	5,324	.	14,692
Own saved only	549,703	.	560,015	.
Own + received	77,702	22,179	59,772	.
Own + purchased	178,734	.	90,610	88,826
All three origins	23,965	5,189	14,412	8,507

Table 32
Farms and area by origin of seed, 2001-02
32.2. Rain-fed wheat
32.2.1. Farms with rain-fed wheat

	Farms planting	Planting received seed	Planting own seed	Planting purchased seed
TOTAL	363,218	40,525	198,327	186,627
Origin not reported	15,177	0	0	0
Received only	5,494	5,234	0	0
Purchased only	115,099	0	0	114,590
Received + Purchased	25,265	25,265	0	25,265
Own saved only	148,724	0	144,869	0
Own + received	6,687	6,687	6,687	0
Own + purchased	43,433	0	43,433	43,433
All three origins	3,338	3,338	3,338	3,338

32.2.2. Hectares with rain-fed wheat

	Area planted	Area planted with received seed	Area planted with own seed	Area planted with purchased seed
TOTAL	1,244,305	35,678	537,286	661,099
Origin not reported	33,312	.	.	.
Received only	4,099	3,902	.	.
Purchased only	456,867	.	.	467,324
Received + Purchased	89,097	18,276	.	70,198
Own saved only	418,912	.	416,761	.
Own + received	25,647	11,707	14,100	.
Own + purchased	199,865	.	100,279	114,673
All three origins	16,507	1,793	6,146	8,904

5. Crop production

The survey investigated ex post the 2001-2002 agricultural year; regarding the 2002-2003 agricultural season the survey asked about areas already planted at the time of the survey (mostly autumn-winter crops planted in November-January) and areas intended to be planted in subsequent months.

By mid 2002, while the first harvests were underway and the late harvests had not started yet (in fact, late spring crops and second crops were due to be harvested months ahead) the joint FAO/WFP Crop and Food Supply Assessment Mission visited most of the country, and based on first hand experience plus satellite imagery and other sources, made an estimate of agricultural production. The present survey provides a check on those estimates.

In the same way, the field crop assessment conducted in May-June 2003 by the Ministry of Agriculture with FAO assistance (and with also participation of WFP and MRRD) provides some additional information on the 2002-2003 agricultural year. An ex post survey of agricultural production in 2003 is conducted as part of the National Risk and Vulnerability Assessment which is conducted by MRRD, with participation from the MAAH and assistance from WFP and FAO, among other stakeholders, between July and September 2003. A second phase of the field crop assessment also takes place in August-September evaluating second crops in the lowlands and spring crops in the highlands.