AGRICULTURE AND FOOD PRODUCTION IN POST-WAR AFGHANISTAN

A REPORT ON THE WINTER AGRICULTURAL SURVEY 2002-2003

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ANNEXES

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ANNEX I: METHODOLOGICAL ISSUES

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1. General methodological framework

The Winter Survey was implemented chiefly to provide information on the farming sector, and most importantly on crops. The sample was based on selecting above 500 villages in the various parts of the country, and interviewing not only a meeting of village elders, but also from 8 to 12 individual farmers within the village.

This approach raises the question of how the villages and households were selected, and the additional question of how the results obtained were expanded to yield estimates of the total farming sector of the country. This Annex addresses these questions.

1.1. Rural population and communities in Afghanistan

The Winter Survey results, expanded by agricultural land, estimate a settled farm population of 12.1 million, or about 15.2 million if rural non-farming settled population is included. The Central Statistical Office estimates of population for all Afghanistan (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 million if the nomads are excluded, and this is very close to the numbers for settled rural population 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.

The figures are somewhat imprecise as no complete census enumeration has **ever** taken place in Afghanistan, and the last incomplete population survey was taken in 1978. Even the number and average size of villages is uncertain. There are listings of about 30,000 villages in the country, but this certainly involves omissions.[1] This boils down to an average 500 people per village (the average would be somewhat lower if the number of villages turns out to be larger, possibly between 35,000 and 40,000). Since the average household in rural villages is about 11-12 people, a figure confirmed in both farm household surveys conducted nationwide with FAO assistance in 2002 and 2003, as well as in other recent surveys, the average village would comprise about 40 households, or somewhat less. There is, however, considerable variation in village size: some large villages have more than a thousand households, whilst a large number of small settlements have no more than one or two dozen households.

1.2. Sampling principles in the Winter Survey

Since there is a wide (though neither complete nor unequivocal) listing of villages is available, the situation may lead easily to the conclusion that, since the rural population lives in villages, any sample of that population must have the village as one of the fundamental

[1] The Afghanistan Information Management System (AIMS) has a mapping and listing of about 30,000 villages with their geographical coordinates, but many villages have been found in various provinces that are not yet included in the map and list. Also, there has been some splitting of larger villages into smaller ones, the split taking place mostly around individual mosques. The actual number of rural settlements that could be considered as villages is in itself debatable, since no legal definition of a village exists. The recent livestock census carried out by FAO completed about 53,000 community-level records, but this includes many that are very small hamlets, and also many are simply defined by a mosque, or are sections of larger villages seeking to become independent. An estimate of 32,000 villages in the traditional sense of the word is a rather conservative one, but can be taken as a fair approximation.

units of selection. However, in certain parts of the country this may also create confusion since there is no agreement, officially or unofficially, on the exact number and delimitation of villages, or even about what constitutes a village. A particular group of households around a mosque may be considered by the population either as an independent village or as part of a larger village. An event like the emergence of a new commander in a neighbourhood, or the arrival of a new *mullah* to a mosque within a village, may result in the neighbourhood or the congregation around the mosque to be declared an independent village or (if it is already a village) may prompt a change of its name. In the Vulnerability and Risk Assessment survey programmed for 2003 by MRRD and MAAH (with FAO and WFP assistance) the fundamental sampling unit will not be the village but the mosque, but even this choice leaves still room to uncertainty about the precise meaning and territory of each settlement.

The actually meaningful territorial areas within a district are not so much the villages but the *manteqas*, a broad group of settlements occupying a certain zone within a district (and sometimes straddling two districts) which may respond to ethnic or clannish relations, or simply to proximity or tradition. For instance, studies conducted in Jaghori district (Ghor) by some NGOs like Avicenne were able to identify and map the territories of 25 *manteqas* in that district. At the moment, however, there is no nationwide study or mapping of *manteqas*. By the same token, there is no comprehensive survey of the solidarity networks (*qawm*) that facilitate communication, money transfers and other relationships for Afghan living in different parts of the country or abroad. The shape and scope of these informal traditional networks remains to be studied.

The Winter Survey, for lack of better information, had the **village** as the key sampling unit, selecting from existing village listings and complementing it with local information. At a higher level, the country was divided into a number of **agro-ecological zones** and **watersheds.** A selection of villages was effected within each combination of agro-ecological zone and watershed, taking also care in selecting from the **head, middle and tail** zones of each watershed; and then a number of specific **households** were chosen to be interviewed within the selected village.

This general principle was further complicated by the necessity to proceed along administrative lines, thus imposing the need to choose some specific **districts** within each agro-ecological zone. As a result of the uneven distribution of population and agriculture in the country, the survey covered a total of 101 districts, or almost one third of the districts in the country. Many districts were excluded because of lacking any agricultural activity, or having very little, such as the Western or South Western Deserts or the high mountain areas of the Wakhan corridor and the Pamirs in the Northeast. Other districts were excluded for cost or time considerations where the corresponding watershed or agro-ecological zone was well represented by other nearby districts. Two districts originally selected were not visited because of bad weather in one case, and lack of security in the other. The areas covered by the survey represent nearly all the agricultural production conditions prevailing in the country, though some local variability may be lost just because the survey is based on a sample and not on a complete enumeration of farms.

The survey was designed to represent all the significant **agro-ecological zones**, but not necessarily every **administrative subdivision** of the country. The survey was thus not designed to provide estimates for every district, or even for every province in the country. The survey covered villages in 31 of the 32 provinces, excluding only Nimroz in the South West (an almost totally desert area with very little agricultural activity that may however be well represented by other areas in nearby provinces such as Helmand or Farah that were included in the sample). Moreover, the areas actually covered within each province do not necessarily represent all the various parts of the province, as some residual nooks and corners

were not studied. Nonetheless, estimates for most provinces can be obtained, that are fairly reliable representations of the provincial rural sector. However, this utilisation of the survey data must be done with caution and is not possible for all provinces, and not for all variables. For that reason, most tables in this report are broken down only by major agro-ecological zones, or by the large "planning regions" that have been in use for UN purposes. The latter, however (being aggregations of entire provinces), do not have necessarily an agricultural identity of their own.

1.3. Agro-ecological zones

The identification and delimitation of agro-ecological zones in Afghanistan is also 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 this purpose 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 an update to 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 some 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 mainly the 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 have seen an important expansion of fruit and vegetable production, whereas other traditional areas for fruit trees 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 defined by Humlum and Duprée cover large stretches of contiguous territory, but in fact only part of each are usable (or actually used) for agriculture. One agro-ecological zone like the Turkistan Plains along Northern border appear as a contiguous belt, but in fact they are a 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.

For the purpose of the present analysis, the geographical subdivision of the Afghan agricultural sector into eleven broad **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 in the main text shows these zones, not as contiguous subdivisions of the territory, but in combination with the agricultural land cover taken from the Afghanistan Land Cover Atlas based on imagery taken in 1990-93

(FAO, Rome, 1999). This means the zones are not pictured as purely geographical areas, but as a combination of geographical features and agricultural land use. Blank areas in the map do not contain significant agricultural activity.

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 in the agro-ecological zones 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 Hindu Kush mountain ranges. More or less contiguous and relatively extensive agricultural areas only exist in some parts of the territory (such as the Turkistan Plains along the Northern border) where flat 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 cultivated and uncultivated 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.

There are also finer agro-ecological differences within each broad agro-ecological zone. For instance, within the wide belt of rain-fed rand in the Northern Mountains and Foothills there recognizable differences between conditions in the Western or Eastern parts of that belt, so that agriculture on the rain-fed lands of, say, Faryab are not exactly the same as in Kunduz. In the massive Highlands that make much of the Central Mountains agro-ecological zone there are recognizable differences based on altitude or watershed. Thus the eleven zones 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 often have their own 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.

Most of the areas are indeed narrow filaments along rivers, and few are contiguous areas. The most visible nearly contiguous areas are found along the Northern belt of agricultural land, comprising large amounts of rain-fed land and some intermittent flood irrigation systems. Such is the shape of agriculture in Afghanistan. All in all, arable land represents only a 10% of the territory (6.5 million hectares, i.e. 65,000 sq km, in a country of about 653,000 square kilometres). That amount of arable land comprises about three million hectares irrigated and nearly 3.5 million hectares of rain-fed land.[2]

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. These major river systems in turn comprise many smaller watersheds as rivers flow down from the mountains into each of the major basins.

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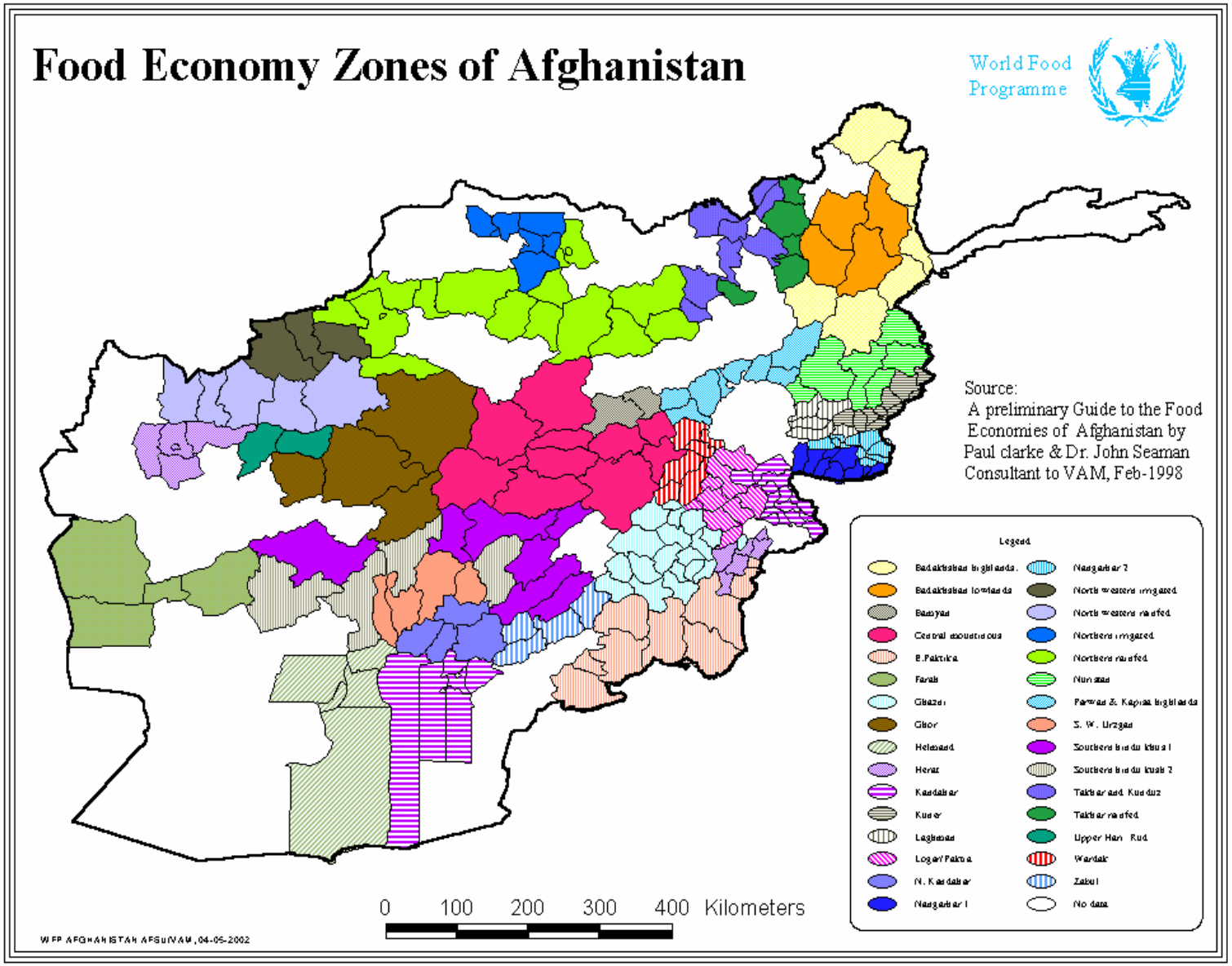
[2] This is our estimate based on all irrigated and rain-fed land identified in the Land Cover Atlas, minus areas identified as rain-fed that are not actually cultivable because they are actually public grassland not used for cultivation or because they are unsuitable for cultivation (for instance gullies, rock outcrops or steep slopes). Total rain-fed land in the Atlas is 4.46 million hectares, but the revised figure is about one million hectares less. In the irrigated land total at the Land Cover Atlas, some land is included that is not currently irrigated due to scarce water in the system or poor enforcement of irrigation rights.


Food Economy Zones of Afghanistan
World Food Programme
Source:
A preliminary Guide to the Food Economies of Afghanistan by Paul clarke & Dr. John Seaman Consultant to VAM, Feb-1998
Legend
Badakhshan highlands
Badakhshan lowlands
Bamyan
Central mountainous
E.Paktika
Farah
Ghazni
Ghor
Helmand
Herat
Kandahar
Kunar
Laghman
Logar/Paktia
N. Kandahar
Nangarhar 1
Nangarhar 2
North western irrigated
North western rainfed
Northern irrigated
Northern rainfed
Nuristan
Parwan & Kapisa highlands
S. W. Uruzgan
Southern hindu kush 1
Southern hindu kush 2
Takhtar and Kunduz
Takhtar rainfed
Upper Hari Rud
Wardak
Zabul
No data
0 100 200 300 400 Kilometers
WFP AFGHANISTAN AFG/VAM, 04-05-2002

1.4. Other zoning schemes

Agro-ecological zones and watersheds are the most significant criteria for zoning if the purpose is surveying agriculture. However, some other related ways of dividing and classifying the territory of Afghanistan for purposes related to agriculture and food security also exist. WFP for instance has been using, for food-aid planning and vulnerability assessment purposes, a set of **34 food-economy zones** devised for WFP by Clarke and Seaman (1998), shown in the following map. Each food-economy zone (indicated by a distinct colour) takes one or more entire districts (shown in the precedent map), though some gaps remain as some districts were not classified in any food economy zone.

In general, the Clarke-Seaman food economy zones can be fitted onto the agro-ecological and watershed zones: typically in Clarke and Seaman's map one agro-ecological zone (such as the Northern rain-fed belt included in the Northern Mountains and Foothills Agro-ecological Zone) is broken down into several smaller food-economy zones according to conditions of living and other factors prevailing in each (cf. the various food economy zones depicted in green along that zone in Northern Afghanistan), which in general correspond to the various watersheds. However, the fit is not perfect. Moreover, there are areas in the country that pertain to some agro-ecological zone (and contain agricultural activity) but are not explicitly included in any food economy zone; the food-economy map is a preliminary work that has in fact at the moment several wide "blank" areas, as shown also in the attached map. Also, the food economy zones, unlike the agro-ecological zones, are made of entire districts, whereas agro-ecological conditions usually occupy only portions of districts.

A recent work by Semple (2001) has attempted to reconcile both classifications (FAO agro-ecological zones and WFP food economy zones) by proposing a set of 36 "agro-economic zones". However, the exact delimitation of Semple's zones still needs to be worked out. This interesting contribution may be taken as a basis for future work linking farm production and vulnerability analysis.

There are also other classifications, such as one designed by USAID in the ProMIS project, based on Afghan pre-war zoning efforts started back in 1970s, dividing the country into 31 zones based mainly in agro-ecological conditions.

Since the crop survey is based on a sample, it is convenient for statistical reasons to use a limited number of zones. A large number of zones (as well as an analysis at province level) would lead to statistically non-significant results for many of the smaller subdivisions. Mainly for this reason, the present report uses the 11 agro-ecological zones (of which only 9 have any significant agricultural activity) and also the 8 UN Planning Regions in which the 32 provinces are usually grouped. Results are occasionally provided at finer levels of aggregation, but they should be regarded with caution in view of the limited sample sizes in many smaller subdivisions. Tables A.1 and A.2 (see Statistical Appendix) show the distribution of the sample across provinces, regions and agro-ecological zones. The main text of this report presents only basic and aggregate results in tabular or graphic form. More detailed and extensive tables are found in the Statistical Appendix. Combining agro-ecological zones, land cover (rain-fed and irrigated agriculture) and watersheds, this survey covered all significant agro-ecological zones, and most of the zones in which agriculture is actually practiced,

The major agro-ecological zones considered (Table A.1 at the Statistical Appendix) show also the districts selected as representative of each zone. In several cases, some parts of a district belong to different major agro-ecological zones, but usually there is a **dominant** agro-ecological zone occupying most areas in the district. In a few cases a **residual** participation of the district in other major agro-ecological zones may exist. In those cases, normally only those parts of the district were covered by the survey that represent the dominant major agro-ecological zone. The residual parts were usually excluded, unless they were important enough to be represented by some villages in the sample. Thus the actual delimitation of major agro-ecological zones for the purpose of sample expansion in this survey, made of entire districts, may marginally differ from a true delimitation based on agro-ecological conditions, because some of the borderline areas, representing a borderline or residual part of some districts, usually small in comparison with the rest, were included in the dominant agro-ecological zone to which the majority of that district belongs. This may not introduce a significant bias, since the delimitation of agro-ecological zones is itself approximate, and in most cases a borderline "grey area" exists as a transition between two neighbouring agro-ecological zones. Agro-ecological conditions do not indeed change sharply when some precise border is crossed, but normally change gradually over a certain stretch of territory, and intermediate situations usually prevail in those transition areas.

A distinction must be made between **major** agro-ecological zones and **local** agro-ecological conditions. Within a major zone (such as the Northern Mountains and Foothills), and even within a single watershed or a single district included in it, there might be some variability in agro-ecological conditions. This variability is associated with different **farming systems**. Some specific areas of a district, for instance, may have access to irrigation while other specific areas in the same district allow only rain-fed crops, or have only intermittent or poorer irrigation. Within each district, the selection of villages for this survey was made to cover all or most of the locally significant agro-ecological conditions and farming systems. However, the entire district was counted within only one **major agro-ecological zone** for tabulation purposes. This may explain the fact that within certain agro-ecological zones different farming systems appear; thus, some regions where irrigation is the dominant system may include some rain-fed areas, and vice versa.

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 as commonly used is as follows:

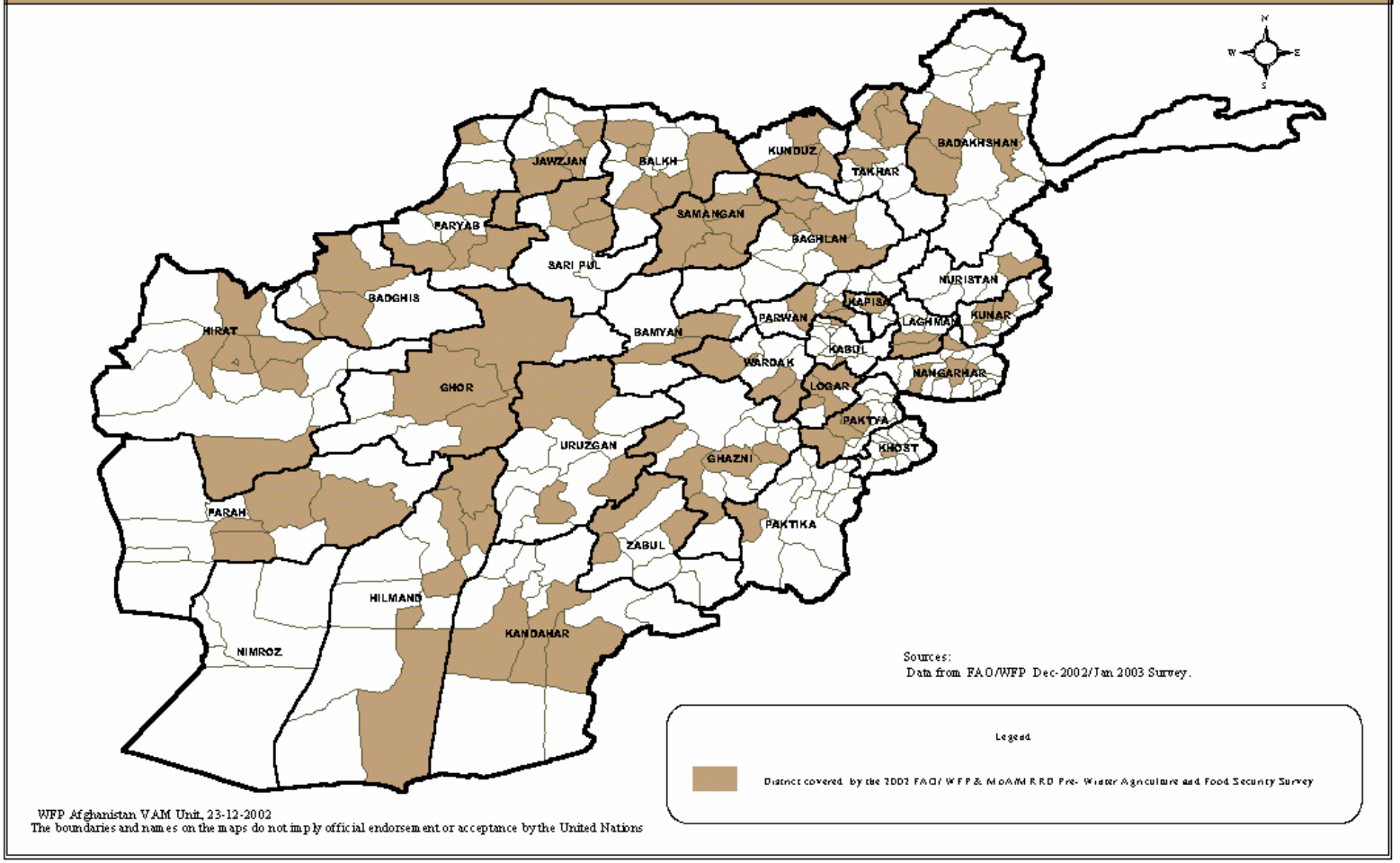
UN Planning Regions in Afghanistan	
Region	**Provinces**
NORTH	Balkh , Faryab, Jauzjan, Samangan , Sar-i-Pul
NORTHEAST	Badakhshan, Baghlan, Kunduz, Takhar
WEST	Herat, Farah, Baghdis
WEST-CENTRAL	Ghor, Bamyan
CENTRAL	Kabul, Parwan, Kapisa, Logar, Wardak
SOUTH	Paktika, Paktya, Khost, Ghazni
EAST	Nangarhar,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

AFGHANISTAN

FAO/WFP &MoA/MRRD pre-Winter Agriculture and Food Security Survey

December 2002- January 2003

World Food Programme



WFP Afghanistan VAM Unit, 23-12-2002
The boundaries and names on the maps do not imply official endorsement or acceptance by the United Nations

2. The survey sample

The precedent map shows the districts included in the survey. The colouring refers to the entire selected districts, though of course only the significant agricultural areas of each district were actually covered by the survey.

2.1. Sample selection

After choosing the districts that would represent the various agro-ecological zones and watersheds, a number of villages were chosen inside each selected district, covering the various micro-zones of the district and therefore (presumably) the various farming systems existing in the district. Based on cost considerations, a total of 526 villages were selected, including some for eventual replacements, with about 10 farm households to be interviewed in each on average. As a matter of fact, 516 villages were actually studied, but usable household interviews were obtained only for 514 of them. Surveyors had instructions to interview from 8 to 12 households per village. A total of 4761 usable interviews at household level were actually obtained (i.e. 9.31 households per village, ranging from 3 to 20 in the various villages).

The starting point for village selection was the list of villages included in the 2002 VAM survey for the selected districts. Most of these villages came originally from the AIMS listing of villages, though some of them did not. In some areas a few additional villages were included in order to get a better coverage of the various parts of the district. Those additional villages were selected, when possible, from the list of villages visited during the 2002 Crop Assessment survey, and residually some completely "new" villages selected from the AIMS village listing.

The villages in the sample were not chosen strictly at random, because no complete listing exists. The VAM sample of villages was based on previous discussions with local monitors and district authorities, and the selection was based on the following criteria: (1) the villages to be selected had to be neither very large nor very small, with sizes ranging between 50 and 150 households; thus they are not supposed to represent the actual average size of villages in the district or zone; however, these size limits were not universally observed; (2) they should be "typical" or "average" villages in terms of poverty or vulnerability, representing neither the worst nor the best situations existing in the district. This latter criterion may tend to exclude from the sample the poorer or more marginal villages, which does not mean the poorer villages would be excluded from the food aid program: the VAM is supposed to be a tool for geographical targeting of **districts**, leaving actual allocation of food aid to **villages** and **households** to be decided locally within each district. From the point of view of a crop survey, the idea of having selected "average" or "middle-of-the-way" villages is not a bad criterion *per se*, but it is of course debatable whether these villages actually reflect the average conditions in each zone, since their selection is based on subjective criteria that are hard to control.

Within each village, the survey started with a meeting at village level with the elders or *shura*, gathering information on the village as a whole. During this collective interview, the *shura* were asked about the number of big, medium-sized and small farmers in the village. Afterwards, surveyors identified some farmers considered by the *shura* in each

size category, for individual household interviews, performing typically 1-4 interviews among farmers of each category for a total of 8-12 interviews per village. Since no complete listing of households exists in many villages, a random selection of households was not a realistic option. Rather, surveyors were instructed to choose farmers in each category from different parts of the village (various cardinal points, or various points along the river, depending on the village's shape). These procedures aimed at covering the presumed variability between households, but by no means ensure complete and rigorous randomness.

2.2. Alternatives for sample expansion

The survey sample was not selected in a rigorous random way, for lack of an adequate sampling frame. However, it is considered a reasonably representative sample for all farming households within areas defined by agro-ecological zone and watershed. However, even admitting the reasonability of the sample selection procedure, the question remains of how the sample data can be weighted and expanded to yield totals and unbiased averages for the whole country.

Three different possibilities were explored to expand the results obtained in the sample. One was based on **population**, and would consist on going from population in the sample households and villages up to total population in each area. The second possibility explored was using the **number of villages** as the basis for expansion, roughly using the ratio of the total number of villages in an area to the number of villages in the sample. The third possibility was based on **agricultural land**, and would involve passing from agricultural land in the sample to total agricultural land in the area.

2.2.1. Expansion based on population

Population in selected villages and households might be possibly used to expand sample results to the entire reference population, i.e. the entire rural population living in villages. For this, accurate figures for rural population are needed, disaggregated possibly at village, district or province level.

Afghanistan is among the very few countries in the world that never had a scientific reporting of its population and, as a result, suffers from all the uncertainties that might be expected from such a constraint in information. Population data in Afghanistan are anything else but "guesstimates" and recent such estimates have varied, according to various sources, between 18 million and 30 million.

2.2.2. The 1979 Census

Afghanistan carried out in 1979 its first and as yet only national population census.[3] The times were extremely unfavourable for such an undertaking. A revolution has occurred the year before, and a foreign (Soviet) invasion of the country occurred the very year of the census. Anti-government rebellions were raging in several parts of the country, which prevented the census takers from counting the entire population. Out of 10,000 census takers, all of them teachers specially trained for the project, about eighty were killed by

[3] Data in this section are mostly extracted from Daniel Balland, "Census in Afghanistan", in : Encyclopaedia Iranica. See http://www.iranica.com.

rebels. In several instances, filled questionnaires were destroyed before reaching Kabul (e.g. those from the entire Badghis province). The census was almost complete in urban areas, but covered only 40% of the settled rural population and 15% of the nomadic population. The census covered well the Northern provinces and those areas of the south inhabited by the Durrani tribes, which remained still loyal to the central authority. The census coverage was, on the other hand, mediocre in Western, Central and Eastern Afghanistan.

Only preliminary results of the census have been so-far published (CSO, 1981). They are based on a sample of 5 percent of the rural population and 10 percent of the urban population covered in the enumerated districts. For districts that were not enumerated, data collected during the preparatory phase were extrapolated and increased by estimated population growth.

The 1979 census, thus, by no means eliminated previous uncertainties related to the lack of a population census, but at least marked the beginning of scientific reporting in Afghanistan. The political and military situation during the two and half decades that followed the 1979 census resulted in a chaotic and unstable situation that would not allow for any new scientific analysis of population issues.

2.2.3. CSO Population estimates

The CSO (Central Statistics Office) population has produced annual estimates of population by province and district. These estimates are based on extrapolation of the population census conducted in 1979 with an annual uniform increase of 2.2% for population growth. However, dramatic changes have occurred in the country between the 1979 population census and today. Besides possible changes in the rate of demographic growth (currently estimated at 1.92%), massive migration between rural and urban areas and between Afghanistan and foreign countries occurred during more than two decades of war. The ratio of rural/urban population at district level is unknown and the unknown degree of inaccuracy of the population figures seems not to permit their use for statistical extrapolation of agricultural survey data. Even under the best circumstances, and even in more stable countries, it is highly unlikely that all districts and provinces grow at exactly the same rate during a quarter century. Even if the estimated updates of total population figures were correct, distribution of that population among provinces and districts, and its urban/rural breakdown, remains highly uncertain.

CSO is undertaking (with UNFPA support) pre-census activities in preparation for the next population census in Afghanistan. Pre-census data will be available on a rolling basis. Preliminary figures for some completed provinces show the encouraging result that actual **provincial** population figures estimated from the pre-census exercise are within a reasonable margin relative to the official CSO figures, which were based on the 1979 census and a fixed growth rate of growth for all provinces. This may suggest that the official figures may be roughly right, at least for large tracts of territory such as entire provinces, though not necessarily for smaller areas such as districts. CSO and UNFPA are projecting to finish this data collection activity for the whole country by mid 2004. Hopefully, by 2004 or 2005, scientific reporting of population in Afghanistan would have been resumed, and the resulting figures could be used to build a population-based sampling frame, usable also (to some extent) for rural or even agricultural surveys. However, even if the official CSO population figures were accepted for district popula-

tion, they do not provide indications about the population of villages, nor even allow for an estimate of the **rural** population in each district.

2.2.4. WHO NID Population Data

One possibility for estimating district level rural population in 2002 comes from the comprehensive children vaccination campaign led by the Ministry of Health with WHO assistance. The WHO child population survey and NID (National Immunization Day) polio eradication campaign may provide valuable information on geographical distribution of population in Afghanistan. WHO conducted a population survey in 2000 throughout Afghanistan in order to plan their NID polio eradication campaign. WHO teams went out in (reportedly) all Afghan villages and assessed the number of households per village through community/village elders/leaders. In each village, the number of (reported) households was multiplied by 7 to calculate the total population.[4] The data collected where compared against other population data available in the country (CSO, UN data) for each territorial subdivision, and for each of these **the highest figures were retained** as a planning tool, to be on the safe side in regard to targets. The total population for Afghanistan resulting from this exercise, if all the maximum figures are added up, was about **30 million** people, certainly an exaggeration. WHO considers these figures to be **certainly an overestimation** of the actual population of the country, now generally considered to be about 22-23 million with some high-end estimates of about 25 million.

In 2002, WHO vaccinated children against polio throughout Afghanistan, reportedly covering about 70% of the target group.[5] The number of children under 5 covered by the polio vaccination gives an indication of the total population in each village. The under 5 population may represent between 17% and 20% of the total population. Therefore, multiplying the under 5 population by 5 or 5.8 would give a fair geographical estimate of the total population, perhaps the best estimate for Afghanistan today at least for small disaggregated areas such as districts, villages or sub-district zones. In any case, it would give an indication of the **proportional distribution** of population, even if the absolute figures are considered doubtful.

However, the WHO survey and NID data were generated for WHO planning and not for statistical use in sample surveys. The NID database has limitations that at present make it **unusable for agriculture sample surveys**. The main limitations are the following:

1. WHO used the older subdivision of the country in 29 provinces (involving a lower number of districts than currently exist) and not all the districts have data available. However, for the NID campaigns in 2003, WHO will use the current 32-province subdivision.

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[4] This may lead to underestimating total population, since actual household surveys in rural areas, such as this and precedent crop surveys, suggest the mean size of village households is about 11 people. The actual number of people per household was not assessed in the WHO survey, and differences across regions were not considered. Moreover, what is considered as a "household" may vary in the various ethnic groups existing in the country, and this factor may also influence the results.

[5] The reported percentage coverage of the vaccination campaign probably reflects the overestimation of population in the WHO survey data (30 million) rather than low coverage of children (70% of 30 million is 21 million, and this is about 95% of the estimated population in the country). It is arguable that the vaccineation campaign did have a coverage close to 100%.

2. The NID data have not been entered into computer files in all WHO area offices. Not all the NID forms were collected and many forms still are in the Ministry of Health offices at provincial level.
3. Even if aggregate data were prepared at district and province levels, and even adjusting for the use of the 29-province scheme instead of the current 32 provinces, those WHO aggregate results at present do not provide a breakdown on rural and urban populations. Therefore, if data should be expanded an artificial and highly doubtful ratio would have to be applied in each district to estimate its rural (village) population. The fact that significant variations of urban/rural ratio exist at district level makes the exercise difficult if not impossible to carry out from a Kabul office, without undertaking extensive survey work. Future WHO NID exercises should be planned in a more sensible way in order that NID data can be used for agriculture and other sample surveys. Provided some improvements are made, a WHO village list could be used as a random sampling base for selecting villages, and NID under-5 population figures could be used to expand survey results.[6] Before this happens, however, better population figures should be available from CSO.

A couple of trial applications of population figures to expand the survey results, based in CSO and WHO data, were carried out in the process of analyzing the present survey, but they both led to somewhat inconsistent results, with implausibly large or implausibly small figures for crops or livestock in different parts of the country.

As a result of these considerations, the possibility of using population figures (from CSO or WHO) as a basis for expanding sample results in this survey was finally discarded.

2.2.5. Expansion based on a list of villages

Another possibility for sample expansion would be based on villages. The number of villages selected in each zone could be expanded to the total number of villages in that zone. This alternative would be based in the most comprehensive listing available at the moment, the village listing prepared by AIMS, the Afghanistan Information Management System supported by the United Nations. This option, however, was also discarded in the end. AIMS village list is an evolving database that is continuously being updated with GPS data collected in the field by various organizations working in Afghanistan. It is the responsibility of various actors in Afghanistan to collect GPS coordinates in the field and give a feedback to AIMS. At present, the database comprises some 32,000 settlements of several kinds, of which about 30,000 are described as "villages" (other categories include for instance district centres, towns and large cities). The list includes only those villages having been assigned a geocode, i.e. with known geographical coordinates. The coordinates have been in many cases taken directly with GPS devices in the field, but some come from approximate locations derived from maps, especially from Russian-made maps dating from the 1970s. Some of these coordinates taken from printed maps are highly inaccurate. The main defect of the AIMS list, however, is not the erroneous coordinates of some villages, but the fact that it is apparently **incomplete**.

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[6] WHO NID data are presented by villages, cluster (smallest management unit for polio vaccination campaign which consists of several villages or sections of towns), districts and province. However, the village breakdown is not available at the moment because of the difficulties referred to in the text.

GOAL, a British NGO, conducted a GPS village survey in the provinces of Jawzjan and Samangan in 2002. In Jawzjan province, GOAL recorded 451 villages, while only 256 villages were listed by AIMS. This would mean that in Jawzjan AIMS is missing 43% of the total villages recorded by GOAL. Moreover, table I.1 below shows that the missing villages are not equally distributed between districts, or across zones within districts. Indeed, the variation in the number of villages actually visited by GOAL, relative to villages listed by AIMS, ranges from 80% missing in Khamyab district to an **over**-estimation of 25% in Mardyan district. This overestimation probably means that some old villages have been in fact abandoned, since at some time in the past they actually existed and were put into a map or a list. In Samangan province, the missing villages are also not equally distributed across districts. Most of the missing villages appear to be located in **remote rain-fed** areas of Darzab district, away from rivers or main roads. Also a number of villages are misplaced on the current AIMS village map of Darzab district. This suggests the AIMS listing covers the irrigated areas along rivers better than the scattered settlements based on rain-fed agriculture away from the rivers.

Table I.1 : Differences in villages listed between current AIMS village data and GOAL GPS village survey in various districts of Jawzjan and Samangan provinces.

Province	District	AIMS list villages	GOAL survey villages	% GOAL/AIMS villages
Jawzjan	Aqcha	42	65	+ 35%
	Darzab	30	119	+ 75%
	Fayzabad	31	69	+ 55%
	Khamyab	1	5	+ 80%
	Khawaja du Koh	11	29	+ 62%
	Mardyan	25	20	- 25%
	Mingajik	28	26	- 8%
	Qarqin	8	14	+ 43%
	Shibergan	80	104	+ 23%
	TOTAL	***256***	***451***	***+ 43%***
Samangan	Aybak	44	136	+ 68%
	Hazrat-e Sultan	28	66	+ 58%
	Khuram wa Sarbagh	53	37	- 43%

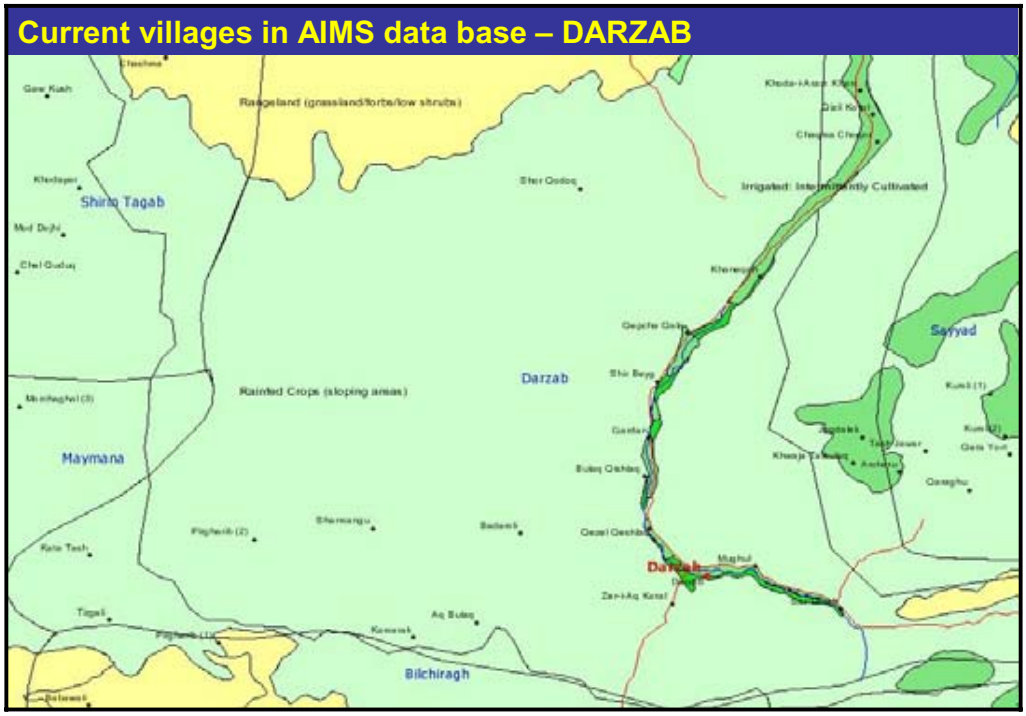

Figure 1 : AIMS village list for Darzab district of Jawzjan province. Extracted from A. Pinney, 2003[7].

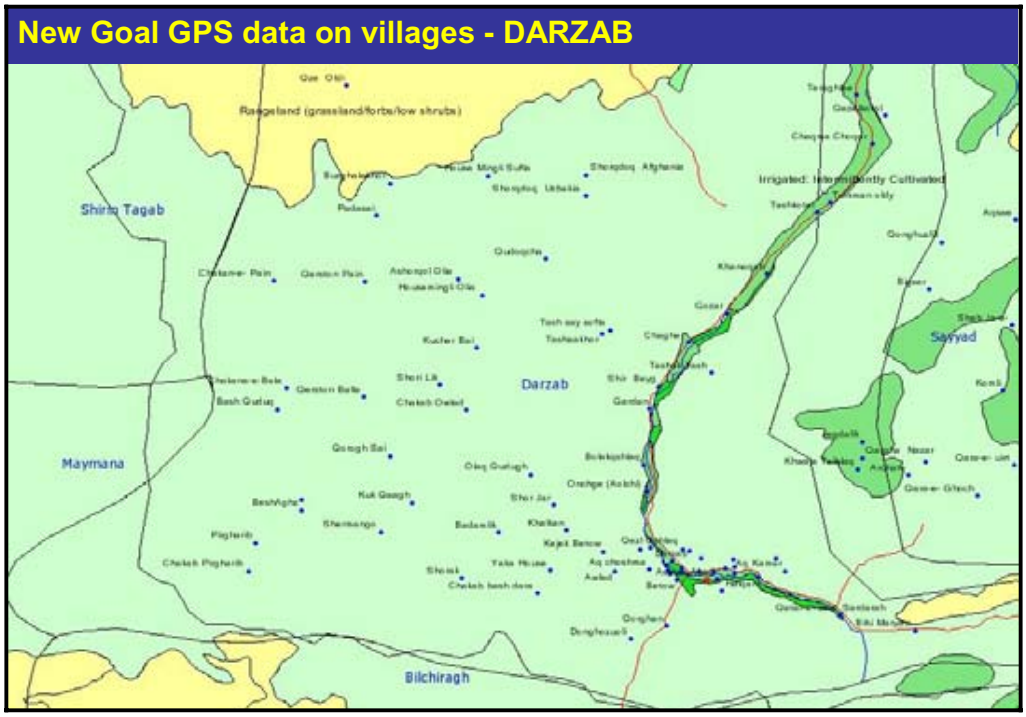

Figure 2 : New GOAL GPS data on villages for Darzab district of Jawzjan province. Extracted from A. Pinney, 2003.

[7] A. Pinney, "Implementing the Surveillance System. Lessons from the Field", Powerpoint Presentation, Steering Committee for the National Food Security and Nutrition Surveillance System, Kabul, 2003.

As a consequence of the incompleteness and apparent bias in the AIMS village listing, any selection of villages based on the AIMS listing may run the risk of over-sampling irrigated areas and under-sampling the rain-fed areas, besides underestimating the total number of villages in the country. This factor has had an echo in the present survey, as will be shown below.

Field observations in general confirm the GOAL village survey results also in other provinces and districts in the country. The recent Livestock Census undertaken by MAAH and FAO has visited more than 40,000 settlements (though allowance should be made for the fact that some large villages were divided into several sections, and thus considered as separate settlements or "villages", for the purposes of the Livestock Census). The actual number of villages must be somewhere between the 30,000 or so in the AIMS list and the 40,000 or so listed by the Livestock Survey. If the larger number of villages is adopted, the average size of the villages should be correspondingly reduced, for otherwise the resulting population figure would grossly exceed the currently estimated rural population in the country.

The current status of the AIMS village list, as a result of these considerations, does not allow statistical use for sampling villages for a survey, until further GPS surveys are conducted in all provinces of Afghanistan. The incompleteness of the AIMS village list, and the varying degree of its coverage in different districts, precludes its use for systematic sampling of villages.

The relative coverage of the AIMS villages listing, as suggested before, appears also to be not equally distributed. This also precludes the use of the listing as a basis for the **proportional** allocation of the sample. The listing, besides, gives only the village name and geographical coordinates, with no indication of the absolute or relative size of each village's population, or the extent of arable land controlled by each village.

Even if a complete listing of villages were available, the villages selected for the winter survey (coming mostly from the sample of villages for the 2002 VAM survey) were not representative of the average village in the list, since VAM selected villages mostly in a range of sizes from 50 to 100 households, and therefore the average number of households per village in the VAM (or the present) survey could not be taken as representative of the average size of all villages in the country or in one particular area.

The very idea of a village is also of a doubtful, variable and unreliable nature. There is a tendency for sections of larger villages to become independent as separate villages, and the really significant territorial unit is not the village but the *manteqa*. The very definition of a village is imprecise. Several settlements located in close vicinity can be alternatively classified as one or several villages. The situation can change over time, as some problem in the villages moves some villagers to become independent. When a village has more than one mosque, there is a perceptible tendency for each mosque to become the centre of an independent village. This process is also perceptible at the level of districts, when parts of one or more districts aspire to become an independent district and are unofficially regarded as such by the inhabitants.

For these reasons, (1) the selection of villages for this survey was not obtained as a random sample of villages (since no complete listing existed) and (2) the expansion of results cannot be based on the ratio of total to selected villages.

2.2.6. Expansion based on agricultural land

A different approach for expanding sample results from the present (or similar) surveys, aiming at estimating crops, is using the ratio of agricultural land in the sample to total agricultural land in each area. For this purpose, the main source available is the Land Cover Atlas published by FAO in 1999.

2.2.7. FAO Land Cover Atlas for 1990-93

The FAO Land Cover Atlas is based on Landsat Thematic Mapper (TM) satellite data from 1990 (25 images) and 1993 (14 images). According to AIMS (Afghanistan Information Management System) the resolution of the Landsat images in 1990-1993 were 30 meters.[8] The satellite data were geometrically corrected, radiometrically enhanced and finally produced in a one degree by one degree photomap format, comprising 82 photomap sheets covering the whole territory of Afghanistan. The interpretation of the data was assisted through the use of other data, such as aerial photographs and KFA-1000 space images. The interpretation was validated by ground-truth operations carried out in Afghanistan in 1993, using an NGO arrangement. According to AIMS the Swedish Committee for Afghanistan (SCA) and Acted (French NGO) were contracted for ground-truthing work. According to AIMS, GPS equipment was expensive and rather inaccurate at that time.

In 1993, the political and military situation in the country was the worst for decades and certainly resulted in severe difficulties to access several parts of the country. The communist regime in Kabul fell to the *mujaheddin* forces on April 27 and the following day the leaders of seven exiled political parties arrived in Kabul from Pakistan. Two months later these political factions started fighting each other, which destroyed most of the urban and part of the rural infrastructures in the country. The year 1993 was one of the worst years of war and chaos ever experienced in Afghanistan. Nonetheless, the Land Cover Atlas data remain the reference today for Afghanistan and perhaps the best source of data to expand sample agricultural surveys.

2.2.8. Changes in land use patterns since 1990-93

The main possible objection against using the Land Cover Atlas is that land cover patterns have certainly changed over the past years, and certainly in a dramatic way for natural resources such as forestry (see UNEP 2003). The UN agency for the environment reports that changes between 1977 and 2002 in wood land cover have dramatically modified the landscape. In Takhar, the total wood land cover in 1977 (including very low density woods) represented 37% of the province in 1977, while in 2002 they represented practically zero. In Badghis, wood land cover represented 55% of the province, while in 2002 it represented just one percent. In both provinces the original wood land was covered with pistachio (*Pistacia vera*) and Juniperus (*Juniperus seravtschanica*).

The shift in land cover is not however as dramatic when it comes to farming land. Few comparative analyses have been done on agricultural land cover, apart from the poppy survey conducted in 2002. The alleged large reduction in arable land emerging from that survey may be considered, *prima facie*, as evidence of significant changes between 1993

[8] Today, Landsat produces similar maps but more accurate, with 15 meters resolution.

and the present. Based on FAO 1993 land cover and the 2002 Opium Poppy Survey, UNODC estimates that in total there is a reduction in arable land of 37% between 1993 and 2002 in six provinces analyzed (see UNODC 2002). However, these estimates compare 1993 land potential use classification with 2002 land effective cultivation. Rain-fed land in the sense used in the Land Cover Atlas does not imply that all of it is actually used for rain-fed crops in a particular year. The same goes for irrigated land. Looking at several provinces where irrigated land is dominant, the UNODC reports the following differences.

Table I.2 : Differences between available arable land (Land Cover Atlas, 1993) and land cultivated with crops (2002) in six provinces, according to UNODC (in hectares)

Province	1993	2002	Difference	Changes %
Southern Afghanistan				
Helmand	238,000	181,000	- 57,000	-24%
Uruzgan	59,000	29,000	- 30,000	-51%
Kandahar	202,000	137,000	- 65,000	-32%
Central-Eastern Afghanistan				
Nangahar	96,000	89,000	- 7,000	-7%
Kunar	22,000	16,000	- 6,000	-27%
Laghman	21,000	21,000	0	0%
Source: UNODC (2002). Includes rain-fed and irrigated land (but mostly irrigated). Data from 1993 taken from FAO Land Cover Atlas, and for 2002 from UNODC Opium Poppy Survey.				

The major differences among these provinces occur in Uruzgan and Kandahar, where the drought continued into 2002 and many irrigation systems were dry. Of course, with a drought in place there would be no possibility of having much cultivation, as a large proportion of the irrigation system had no water; there are few rain-fed lands in the area, but the little there is would also be without rain.

In Helmand province the reduction is somewhat lower (24%), but there the situation was different. The Helmand River is collecting water from the central highlands mountains. It is the largest river in Afghanistan and drains water from various sources, from the Band-e Baian on the Passarband district of Ghor province up to the Parwan mountains of Behsud II (Wardak province) located about 50 Km West of Kabul, via the whole Koh-e Baba range in the Central Highlands. The changes in Helmand are lower that in the other two provinces, in spite of the drought being present in both, as the Helmand irrigation scheme could be cultivated with water from the far-away central Highlands.

In the central and Eastern part, the changes have been minimal in Nangarhar and Laghman. In Kunar the changes are more important, probably related to the failure of the limited rain-fed land in the province but also because there are karez irrigated fields which in 2002 were dry because the water table had descended with the drought.

For provinces where rain-fed cultivation is important, UNODC only reported about Badakhshan (the only province with significant rain-fed land and extended poppy

cultivation). The difference there was -67%, but this is easily explained. In rain-fed areas, land rotation is practiced after one year cultivation (leaving it on fallow for two, three or four years afterwards). It is generally estimated that **in a normal year**, only 25 to 35% of the rain-fed land is cultivated. The difference of 67% would mean that 33% was cultivated, which is of course normal. The lack of inputs and losses of animal traction in 2002, following several years of drought, may also partly explain the difference.

It appears therefore that the difference between arable land availability in the Land Cover Atlas and effective land use in 2002 can be explained and that no significant changes in available arable land (rain-fed or irrigated) have occurred, especially for rain-fed areas, with the only possible exception of grassland encroachment. Moreover, many such tracts of grassland were already included in the "rain-fed" category in the Land Cover Atlas, since they are interspersed amidst rain-fed areas subject to rotational cultivation. However, part of the irrigated land was not planted in recent years due to the drought or its consequences, or the deterioration of canals and other infrastructure. This affects the actual **use** of that land, but not the extent of potentially irrigated land, even if some may need rehabilitation. Farmers would declare the whole irrigated land as part of their farms, even if declaring, at the same time, that some of it could not be cultivated.

The main explanation for the differences lies in the very distinction between the Land Cover Atlas land classification and effective land use investigated by the Opium Poppy Survey. The Land Cover Atlas has assigned entire stretches of territory to a specific type of land, such as "irrigated agriculture", when in fact the actual use of the land for irrigated crops in a particular year may be less than uniform. This is particularly true of rain-fed areas, which normally show a patchwork pattern of cultivated and unused land due to rotation practices and other reasons (such as the fact that the areas designated as "rain-fed" in the Atlas contain portions of unusable land, mainly gullies or steep slopes that farmers do not consider as "rain-fed land" when they declare their holdings). For any particular area, the total acreage under a particular land cover category is expected to be larger than the actual use of the land in a given year, and the total amount of rain-fed land in the Atlas is expected to be larger than the actual amount of potentially cultivable rain-fed land in the area.

Also, as will be seen below, some irrigated areas are so badly affected by infrastructure destruction and water management problems that entire villages (which were active in 1990-93) are now abandoned. The irrigated areas controlled by those villages were included in the Atlas but **were not represented in the sample**, since of course only inhabited villages were visited. It would be wrong to expand data on irrigated cultivation obtained from the sample to the entire irrigated areas in the country. In every sample village, a certain percentage of available irrigated land would be actually cultivated, but the average percentage of cultivation would be under-estimated if abandoned villages (with zero percent cultivation) are excluded.

For all these considerations, it was decided (1) to use arable land as the basis for expanding the Winter Survey sample data to the total amount of arable land in the country (2) to estimate arable land (rain-fed and irrigated) based on the Land Cover Atlas, with suitable adjustments in specific areas.

2.2.9. Assigning land to agro-ecological zones

Agricultural land reported in the FAO Land Cover Atlas has been assigned to the various agro-ecological zones in the most precise way available. Since the smaller subdivision in the Land Cover Atlas tables is the district, the allocation was done by assigning entire districts to each agro-ecological zone, even in cases when the same district comprises land pertaining to different agro-ecological zones. This may cause some imprecision but is unavoidable with the available data. Table A.1 shows districts assigned to each agro-ecological zone, and the corresponding rain-fed and irrigated areas. A few remarks are in order.

A few districts have significant areas in two different agro-ecological zones, but in all cases agricultural production from one zone is dominant, and thus the entire district was assigned to the dominant zone. The distribution of districts among agro-ecological zones does not mean that every corner of the district has the same agro-ecological conditions, but it is to be interpreted as a description of predominant characteristics of agricultural activity in the district.

Areas classified under "orchards" (comprising fruit trees, vineyards and gardens) were added to land classified under "irrigated agricultural land" (comprising intensively irrigated land with one or two crops per year, and intermittently irrigated land), to make a single category of "irrigated land". This was because the winter survey did not distinguish between irrigated land devoted to crops or devoted to orchards. Also, land considered fit for one crop per year or for two has also been merged because the two categories are not fixed and may have changed since the date of the Land Cover Atlas (the crop assessment in 2003 found many cases of double cropping on land classified in the Atlas as irrigated with one crop per year).

Nimroz province as a whole is classified by Duprée in the Western Stony Desert agro-ecological zone. It is not, however, entirely a desert. It has some cultivated areas (all irrigated) that were not included in the Winter Survey sample. Based on similarities between the farming systems, and their relation to the general Helmand river system, cultivated areas in Nimroz were merged with the Helmand River Valley and Sistan Basin agro-ecological zone for the purpose of expanding the Winter Survey sample results. Arable land in the South Eastern corner of Kandahar province, technically located in the Sandy Desert zone, was also included in the Helmand-Sistan zone.

A few discrepancies were found in the Land Cover Atlas between the national table (giving provincial totals) and the provincial tables (showing district totals). When all the districts in the provincial tables had been allocated to the various agro-ecological zones, the total did not agree with the national table, and the discrepancy (involving some 55,000 hectares, mostly rain-fed) was concentrated in a few provinces. As a general rule, the national table was taken as reference, and the discrepancy was assigned to the relevant agro-ecological zones in the best possible manner. There are significant differences only in Baghlan, and a very small one in Paktya. In the case of Baghlan, the difference was clearly derived from the fact that the provincial table assigned no area at all for the Baghlan Centre district. Fortunately the entire Baghlan province belongs to a single agro-ecological zone, thus creating no problem: the areas in the national table were taken as valid. The same is the case for Paktya, all of which belongs to the Southern Mountains agro-ecological zone.

2.3. Expansion of sample results

The **expansion** of sample results up to the scale of entire zones, regions or the country total was mainly based on the ratio of **total arable land** (as given by the Land Cover Atlas) and **arable land surveyed in the sample**. Many of the villages selected for this survey, as said before, had been previously included in the Vulnerability Assessment carried out by WFP during 2002, thus allowing for combining village-level information collected by the VAM with village level and especially household level information collected by this survey. A thorough exploitation of this possibility is not attempted in this report, however, but will be addressed in a separate analysis.

The expansion factors used in this report to represent the total amount of land, crops, livestock or farming population in a zone or in the entire country are essentially a ratio of total arable land in a zone to total arable land in the farms included in the sample. Some remarks are necessary in this regard.

a. Expansion factors were computed **at the level of major agro-ecological zones**. Within each major zone, therefore, no differential weight was applied to districts, households or villages. This has some advantages and some drawbacks. The main drawback is that some under- or over-weighting of some areas **within each zone** may be present (and not corrected) if the sample was biased or not proportionally selected from the various sub-zones existing within each zone. Therefore, for instance, provincial totals may be not accurate. The advantages of having expansion factors computed at major zone level are that (1) averages obtained for each agro-ecological zone are simple averages of sample units, not dependent on the weights used for expansion; and (2) random errors occurring in the selection of individual villages or households are likely to be compensated by contrary errors within the same major zone, whereas such compensation should be more doubtful if expansion factors were defined for a narrow local zone. This reduces de impact of possible outlier cases in one particular province or district.

b. Using arable land as the expansion criterion is surely an adequate basis for estimating crop totals, but it is debatable whether it is justifiable to use these expansion factors to estimate total human or animal populations in the farming sector, or other variables that are not expected to be highly correlated with arable land acreage. Farm livestock holdings, especially, may not be proportional to arable land holdings, and thus the averages and totals could be biased. Therefore, estimates for animal stock should be regarded with caution. However, the results obtained seem to match other sources, and thus are considered credible.

c. Total arable land in the Land Cover Atlas comprises all land suitable for rain-fed or irrigated agriculture, and is not equivalent to actual land use for cropping in a particular year. Some land is left on fallow, and some may not be planted due to insufficient water supply, malfunctioning of the irrigation system, or other reasons. Thus the expansion factor is calculated on the farms' total holding of arable land irrespective of their actually being planted this year.

d. Total arable land in the sample farms is not equivalent to total land ownership by farmers. Some farmers have rented some of their land to other farmers, through

sharecropping or fixed rent agreements. Some farmers, on the other hand, are using land taken from others on some fixed rent or sharecropping arrangement. Therefore the expansion factors' denominator is the actual farm size in terms of arable land, i.e. the total amount of arable land **controlled** by farms in the sample, irrespective of land ownership.

e. Many Afghan farmers do not actually know how much land they have in terms of area. They know the physical boundaries of their land, and the amount of seed they can plant, but they may have never measured the area. Thus the statements of farmers about the total amount of rain-fed land they own or manage are to be considered with caution, as they are only approximate.

f. The total amount of irrigated and rain-fed land estimated in the Land Cover Atlas needs some adjustments, as explained in the next section. The expansion factors used for this survey reflect these necessary adjustments.

Expansion factors used in this report, then, are essentially based on the ratio of arable land in each zone to arable land in the sample for that zone. This implies ascertaining beforehand the amount of arable land in each agro-ecological zone. The matter is discussed in the following section.

3. Availability and use of arable land

3.1. Rain-fed land

The amount of rain-fed land estimated in the Land Cover Atlas (4.46 million hectares) has been adjusted in order to apply it for this sample expansion purpose. The Land Cover Atlas frequently designates as "rain-fed crop land" a blanket area but, in reality, not all that area is actually cultivable, especially in stretches of steeply sloping land, gullies, crevices, eroded land, and other terrain features that make cultivation difficult or impossible. In fact, actual farm ownership usually does not extend to those unusable patches, and when asked about the rain-fed arable land they own or control, farmers declare land actually considered fit for rain-fed crops. Even if all the potentially usable rain-fed land were cultivated, it would look rather as a patchwork of cultivated and uncultivated land, and it would not possibly represent the total amount of land estimated in the Land Cover Atlas.

On the other hand, significant parts of the lands classified as fit for rain-fed cultivation are actually public grassland. Besides the extensive stretches of Afghanistan classified as "rangelands", which lay mostly in the Hazarajat region at the Central Mountains, these grasslands incrusted in rain-fed territory are among the most important feeding grounds for animals. Whilst the rain-fed lands are all under private ownership, these grasslands are public, and are thus not mentioned in the farmers' land holdings. They are excluded for reasons both physical (those lands are frequently marginal by rain-fed cultivation standards, and for that reason they were traditionally being used for pasture only) and social (the grassland is not under private ownership, and can only be used for grazing by people with specific grazing rights).

Between unusable land and grassland, about 30 percent of the land classified as "rain-fed" in the Land Cover Atlas is not really fit for rain-fed cultivation.[9] As the Land Cover Atlas reckons there are about 4.46 million hectares of rain-fed land, this means the actual availability of land for private rain-fed cultivation within those areas is about 3.15 million hectares only. According to field observations during the crop assessment carried out in May-June 2003, about 2.5 million hectares of rain-fed land have been actually cultivated in the 2002-2003 agricultural year. This represents probably the maximum level of cultivation of rain-fed land in a single year, and was made possible by a particular combination of circumstances: first, the land had been mostly at rest in precedent years due to the drought; second, there was good and sustained rainfall during the 2002-03 agricultural year.

However, two kinds of **encroachment** have been taking place recently whereby rain-fed cultivation has been gradually **expanding over grassland**. On the one hand, rainfall in 2002-03 has been good and extended over all the crop cycle; after planting traditional rain-fed crops such as wheat and barley at the beginning of the season, when rains continued many farmers decided to plant additional land, occupying more of their private rain-fed land that would otherwise have been left on fallow, and eventually planting also in some grassland nearby. On the other hand, farmers and nomadic pastoralists are now holding far less animals than before the drought, thus reducing the demand for pastureland. As a consequence, in 2002 and 2003 many farmers have expanded their rain-fed cultivation in a small way over the borders of the grassland in the vicinity of their villages. In many areas this expansion by encroachment has increased rain-fed land by a substantial amount. These newly cultivated areas in the grasslands have been represented in the survey, since farmers were asked about all the land they have and all the cultivation they have been doing without reference to land ownership. Even if there is no assurance that farmers actually declared the lands upon which they had encroached, those lands were included in the expansion, on the assumption that cropping patterns for those lands would be adequately represented by cropping patterns reported in the survey.

On the other hand, in some areas powerful individuals have been encroaching in a more massive and aggressive way over nearby grasslands. This, as observed in the field during the winter survey and also during the crop assessment mission conducted in May 2003, is done in two fashions. In the first modality, these powerful individuals (frequently local commanders) may proceed by themselves to occupy relatively large stretches of grassland, and plough them directly (mostly with tractors), a move mainly intended to claim ownership as a result of having "developed" new land for cultivation. Crops may or may not be planted on the newly ploughed fields (in a case study at Dasht-e-Laili pastureland in Jazwjan and Faryab only half these ploughed fields were planted with wheat or barley). In a second modality used in other cases, the new occupants and aspiring owners of the land engage poor or near-landless local farmers as sharecroppers, enable them with a provision of inputs, and have them ploughing and cultivating the grasslands with oxen or rented tractors.

[9] Estimates based on measurements and other results from the Crop Assessment Field Mission organized by FAO and the Ministry of Agriculture with WFP and MRRD participation, in May-June 2003.

The modality of wholesale encroachment through direct tilling is not represented in this survey, since no such powerful individuals live or were interviewed in the selected villages. This modality, however, is considered to be on the minority, since for operational reasons it is far easier for them to apply the second modality, i.e. claiming possession of the grasslands and engaging poor sharecroppers to cultivate them for a share of the proceeds. Sharecroppers cultivating the occupied grassland may or may not have been interviewed. In principle they should have been, but apparently there was an under-enumeration of sharecroppers in the survey because of them not being considered as "farmers" at the shura meetings (a confusion resulting from identifying a farmer as somebody that actually owns the land).

On average it is estimated that in 2002-2003 these two forms of expansion of rain-fed cultivation represents an increase of about 10% over actually cultivated rain-fed land derived from the Land Cover Atlas. Since the latter has been estimated above at 2.5 million hectares, the encroachment over grassland would represent an expansion of some 250,000 hectares.

Net rain-fed land availability (i.e. the Land Cover Atlas total minus 30% to account for grassland and unsuitable land) has been estimated above at 3.15 million hectares. In 2002-03 total rain-fed land available for cultivation, including rain-fed land estimated in the Land Cover Atlas minus the unusable parts, plus the various forms of encroachment on grassland, is now estimated at approximately 3.4 million hectares (3.15 million + 250,000). This is about 25% less than the amount in the Land Cover Atlas (4.46 million hectares). Of this total amount of about 3.4 million hectares, probably 3.3 million hectares or more have been represented in the survey, leaving only a small fraction uncovered (wholesale encroachment by commanders not recurring to sharecroppers, plus some rain-fed sharecroppers not represented in the survey, including here also other omitted sharecroppers besides those associated with wholesale encroachment by commanders). However, for expansion purposes a total of 3.4 million hectares has been considered for rain-fed land, assuming implicitly that information reported in the survey adequately reflects the situation of those areas not directly represented in the survey. Since there is no detailed account of the incidence of encroachment or non-usable rain-fed land by district or province, a uniform reduction of 25% has been applied throughout.

As a result of this analysis combining the survey itself with other sources of information it has been concluded that, nationwide, the actual availability of rain-fed land in 2002-03 was about 25 percent less than the figure in the Land Cover Atlas. This applies mostly to the rain-fed lands in the Northern Mountains and Foothills agro-ecological zone, and also to other similar terrain in the Central Highlands and Badakhshan. For practical purposes, in this report the numerator of the expansion factor for rain-fed lands was reduced by 25% from the amount in the Land Cover Atlas at each agro-ecological zone, bringing the total rain-fed land in the expanded survey from 4.5 million down to 3.4 million hectares.

Actual cultivation of available rain-fed land has been higher in 2002-2003 than in other years. Some of this expansion may be a temporary phenomenon associated with the rare combination of good and prolonged rainfall right after the forced fallow imposed by a long drought, or it may become a permanent feature. The permanent or transient character of the rain-fed encroachment over grassland would probably depend on the recovery of livestock and thus increased demand for grazing land, and the evolution of the local socio-political situation associated to the rain-fed/grassland encroachment. A

careful update of the Land Cover Atlas should address this question in order to produce more precise and updated figures.

3.2. Irrigated land

The availability of irrigated land does not depend on the actual availability of water in the irrigation system. Many irrigation schemes in the country are still waiting for rehabilitation, and some are still under the protracted effects of the drought (especially the karez systems in the South, where the water table is still too low even after a season of good rains). Even for those systems in non-working conditions, the land is considered as irrigated land, and declared as such in the land holdings of farmers, except in areas where the land has been abandoned and farmers are no longer in the vicinity as explained below. In principle, then, farmers in the survey should be considered to represent the entire extent of irrigated land existing in the country, but some correction is needed for abandoned irrigated land that is not represented in the survey.

Since no new systems have been developed during the latest ten years, the Land Cover Atlas is considered as a good representation of the irrigated lands in the country. However, some irrigated lands have not been adequately represented in the survey. This happened mostly at the outer reaches of the "oases" irrigation systems (or "intermittently irrigated land" systems) in the Turkistan Plains along the Northern border of the country. The rivers descending from the Northern Mountains into the plains open up into a desert delta, which is the basis of the irrigation system. Traditionally, the entire land in the delta is under rotation. This land is called "zamin-e Paikali" or "zamin-e Bawri" in the local language. Customary practices and the enforcement of irrigation rights ensured that people at the head of the system, where the rivers are still rather narrow, do not divert too much water into their lands, thus allowing people in the middle and especially at the tail or outer reaches of the delta to have enough water.

As it happens, however, farmers near the head section of some irrigation systems (frequently involving land under control of local commanders) have been using more water than their traditional share, to irrigate more abundantly and on a permanent basis what used to be intermittently irrigated and rotationally cultivated land. Therefore, villages at the tail section of the system are left with water insecurity as to when and how much water is flowing in their irrigation canals. Without irrigation water security, those marginal lands are largely not cultivated and become simply part of the surrounding desert, with no possibility of cultivation. The land, theoretically under irrigation, becomes barren land in the desert or in some instances intermittently flooded land that produces grasses for livestock. As a consequence, many farmers (sometimes entire villages) have deserted the area, and were not found around at the time of the survey. These absentee farmers actually own land in the irrigation system, but they and their land were not adequately represented in the survey. Even in this very good year for agriculture, at the tail of some of the systems in the Turkistan Plains not more than 10% of the irrigated land was cultivated, but this fact was not reflected in the survey. A similar situation occurred in several irrigation systems within the Northern Mountains and Foothills zone.

It would be wrong, therefore, to expand the existing sample of irrigated land up to the entire amount of irrigated land in the country. The main effect of this procedure would be to over-estimate irrigated land and irrigated crops in the country and in particular in the Turkistan plains and the irrigated systems of the Northern Mountains and Foothills. The

extent of this under-representation of non-cultivated land in those irrigation systems is difficult to ascertain. The tail of the systems is the less fertile, but it is also the most extensive part of the system just because the system is a delta stretching out into the desert. Some of the farmers in those parts were actually included in the sample, some were not, but their relative proportions are not really known. How much land the omitted farmers represent is also difficult to estimate (in the outer reaches of the system the average farm seems to be larger than in the middle and upper sections, though it receives normally less water per hectare).

After carefully analyzing information about the situation at the various districts along the border according to the Crop Assessment Field Mission findings, plus detailed examination of the cases sampled in those districts, and the location of the villages covered, irrigated area was reduced in a certain proportion in several provinces. Specifically, the irrigated area reported in the Land Cover Atlas was reduced by 25% in Jawjzan, 12.5% in Faryab, and 20% in Balkh. This applies both to the parts of those provinces in the Northern Mountains and Foothills zone, and in the Turkistan Plains.

In fact, a similar situation exists in the Southwest, but for different reasons. There, sand dunes encroachment after four years of drought have damaged the irrigation structures as observed in the Lash wa Joweyn district of Farah province during the 2003 crop assessment. None of these districts have been sampled in the winter survey (i.e. the lowest part of Helmand, the whole of Nimroz and the Lash was Joweyn district of Farah). Most of the irrigated land is intermittently irrigated and in Lash was Joweyn it was found in June 2003 that only a small percentage of it has been cultivated (5-10%) As a consequence, the expansion factor for irrigated land these South-western districts may have been slightly overestimated. Given the small amount of land involved, and lack of precise data, no correction was made for this area.

3.3. Sample expansion estimates

The ratio of total arable land in one agro-ecological zone to total arable land in the sample is the basic expansion factor used for the Winter Survey. A total of nine expansion factors were computed for the nine agro-ecological zones considered. The expansion factors used throughout the analysis, calculated as shown in Table A.1.2 of the Statistical Appendix, were as shown in Table I.3.

Expansion factors used in this report reproduce total arable land at each agro-ecological zone, but they cannot be used for much finer estimations. As the expansion factors are applied by agro-ecological zone, they do not necessarily reproduce the amount of land available at province or district level, since land in the sample for a particular district or province is not necessarily proportional to total land in that province or district, and in fact many districts were simply not included in the sample.

Table I.3
Factors used for expanding sample results

Agro-ecological zone	Expansion factor
2. Badakshan mountains	**183**
3. Central Mountains	**338**
4. Eastern Mountains and Foothills	**249**
5. Southern Mountains and Foothills	**111**
6.Northern Mountains and Foothills	**260**
7.Turkistan Plains	**115**
8. Herat-Farah Lowlands	**421**
9. Helmand Valley - Sistan Basin	**183**

These expansion factors are simply the ratio of total available arable land in an agro-ecological zone, to total available arable land in the farms included in the sample for that zone. Estimates of total arable land in the zone are based on the FAO Afghanistan Land Cover Atlas (1999) with some adjustments described in the text. See Table A.1.1 and A.1.2 at the Statistical Appendix.

4. Household sample imbalances

4.1. Rain-fed and irrigated land

As the proportion of rain-fed and irrigated land in the sample is close but not exactly the same as in the corrected figures from the Land Cover Atlas, the totals resulting from the sample expansion are slightly different, but the difference was well within sampling error, and also within the margin allowable for the very rough approximations used in correcting the Land Cover Atlas. They were therefore left untouched (see Table A.1.2 in the Statistical Appendix). For the country's total, irrigated land as estimated from the adjusted Land Cover Atlas was 3,145,373 hectares, while the estimate from the sample was 3,048,801, some 3% less. For rain-fed, on the contrary, the estimate from the adjusted Land Cover Atlas was 3,391,587 hectares, whereas expanding the sample gives 3,488,170 hectares, some 2.8% more. As a consequence of this slight sample imbalance, everything related to rain-fed cultivation is slightly over-estimated, and everything related to irrigated land is slightly under-estimated at the national level. As the very calculations underlying the adjusted Land Cover Atlas totals are themselves only roughly approximate, we decided not to correct for this. It could perfectly be that the difference is due to actual differences in the field, because the situation may have changed since the time the Land Cover Atlas was compiled, and anyway at the national level the difference is very small.

This problem is somewhat more important at the level of individual agro-ecological zones. Expansion factors reproduce the amount of **total** arable land existing in each agro-ecological zone, but not necessarily the proportions of that land which are irrigated or rain-fed. The sample had, in each zone, proportions of irrigated and rain-fed land that did not exactly match the proportions in the Land Cover Atlas, even with adjustments. In some areas the differences are noticeable. For instance, the amount of rain-fed land in the

Herat-Farah agro-ecological zone (located mostly in the eastern and relatively higher parts of the Herat province) appears to be lower than suggested by the Land Cover Atlas. On the contrary, the extent of rain-fed land in the Helmand-Valley and Sistan Basin agro-ecological zone appears to be larger than suggested by the Land Cover Atlas (see Table A.1.2 at the Statistical Appendix). This may be simply an error due to the rough nature of the adjustments, or it may reflect actual changes in the availability of irrigation and rain-fed land since the time the Land Cover Atlas was compiled. We have introduced no correction for this issue in this report, because no actual information exists outside the Land Cover Atlas for any such correction; the impact of this problem in the results is not large, and the solution will have to wait for an update of the Land Cover Atlas.

These estimates extrapolate from areas reported by farmers in the sample to estimated areas existing in the country. Of course, besides errors in estimating total area in the country or zone, **areas reported by farmers may be misreported**. Besides simple error due to farmers not having a precise measurement of their land, there is also a lingering doubt regarding what farmers interpret as "their land", especially in areas where rotation is practiced, which may happen on rain-fed land and in intermittently irrigated land. If a farmer uses to plant one jerib per year, rotating every year among five different jerib, he may declare to have one jerib, not five, because he does not think in terms of area, but in terms of seed to be planted. Therefore when he mentions one jerib he is actually representing five hectares in the Land Cover Atlas estimates. This would introduce an error for which no correction is at the moment available. However, there is no way of discovering whether such an error actually existed. Perhaps in future surveys the wording concerning land ownership, tenancy arrangements and related matters should be carefully revised to make sure all these aspects are properly taken care of, and no confusion is allowed to persist.

There is also some concern that some land may have been not represented in the survey if the corresponding farmers do not live in the villages. For the sake of this report, it was assumed that any such case is adequately represented by farmers in the sample.

4.2. Farmers big and small

There was a slight imbalance in the household sample because of not necessarily proportional selection of larger and smaller farmers within villages, leaving some classes of farmers somewhat under-represented and others over-represented. The village meeting was asked (1) to estimate the number of farmer households and non-farmer households in the village; (2) to estimate the number of big, medium and small farmers within the total number of farmer households; and (3) to help identify some farmers within each class of farm sizes, for household interviews. On the one hand, as mentioned before, there might have been an under-identification of farmers, as some sharecroppers and some pastoralists may have been considered not to be farmers.

On the other hand, and quite independently, there was apparently some over- and under-sampling of farmers of different sizes. The number of big, medium and small farmers in the sample was not on the whole exactly proportional to the number of big, medium and small farmers in the villages (as estimated at the elders or *shura* meeting and registered in the village questionnaires). Usually, surveyors took a sample of two or three farmers from each group, for a total of about ten per village. Typically they may take two large, two or three medium-sized, and three or four small farmers. They were instructed to

maintain the proportion between the three groups, but this was not always possible. As a result, the sampling ratio for the three groups might be slightly different. In other words, the proportions in the sample do not necessarily coincide exactly with the proportions in the village.

Globally, as a consequence of this, it turned out there was a moderate degree of **over-representation of bigger farmers** and **under-representation of medium and smaller farmers** in the sample. Since all are village dwellers, the differences are not extremely large between a small and a large farmer, but anyway the difference exists. At the moment we have not applied a correction for this factor. The main reason is that the very definition of these classes differs from one village to the next, and is sometimes quite inconsistent even within the same village. For instance, the land holdings and livestock of the actual farmers interviewed as representative of each class do not agree with the supposedly average holdings for those same classes, declared at the village meeting. Introducing a differential weight for large and small farmers in the sample creates also some technical problems, and the whole matter requires further analysis. Another reason for not making the correction is that some larger farmers, who actually manage their farms, do not reside in villages but in some nearby town, and were therefore not represented in the sample; a moderate over-sampling of bigger farmers in the village may compensate for the omission of non-resident bigger farmers. Smaller farmers are more likely to be village residents.

However, correcting for this imbalance would have the effect of reducing the total acreage **in the sample**, but would not have any impact on estimates of **total acreage in the country**, or in the agro-ecological zone, since whatever is observed in the villages is ultimately expanded to the whole arable land in the zones and the country as estimated in the Land Cover Atlas (with the corrections already discussed). Even the average cropping pattern (the distribution of land across different crops) would be mostly unaltered, since cropping patterns do not vary much by farm size **within villages.** Correcting for this aspect may have some impact, however, on the **average size** of farms in terms of acreage or livestock, or the **size distribution** of farms, and therefore the possible implications of this survey for household vulnerability would be slightly altered. The impact, however, would not be large, and would not alter the main conclusions of the analysis.

4.3. Sharecroppers and landlords

Land tenure arrangements also may have led to mistakenly taking some sharecroppers as non-farmers, since apparently in some quarters they are regarded as a kind of "labourers", especially when they farm on land owned by some powerful landlord. The land rented by these omitted sharecroppers may be owned by other farmers in the village (therefore represented in the sample), or it may be owned by non-farmers in the village (themselves represented in the sample through the non-farming population, but not their land) or may be owned by outside landlords who reside elsewhere, and therefore were not represented in the sample. **Total area is not under-estimated**, because we have expanded the survey sample results to the entire arable land, implicitly including land tilled by those omitted sharecroppers. We do not know exactly the number of the allegedly omitted sharecroppers, nor the amount of land they till. Implicitly, it has been assumed that they are represented by other farmers in the sample, but they may have special characteristics that were not investigated nor represented in the sample. Also, we do not know the

number or importance of landowners that have rented out their land and do not work as farmers themselves; part of them may reside in the village, others may be absent.

The only indication in this regard comes from the land tenure data in the survey itself. Land declared by farmers as having being taken from others on rent or sharecropping arrangements is far more extensive than land declared by other farmers as having been rented out. These data, and also data on non-farming rural population, allow for some estimate of the amount of land rented out by rentier landowners who are not farmers themselves (including emigrated neighbours or relatives, as well as land rented out by old, infirm or handicapped owners who cannot till the land themselves, plus some cases in which big landowners operate their property through sharecroppers). Also, the same set of data may be used to estimate the number and proportion of pure sharecroppers or tenants not represented in the sample, as will be shown in the section devoted to land tenure, below. Also in this case, this factor does not imply any error in estimates of the total amount of land available or cropped, though also here some impact on estimates of farm sizes would be expected.

Some approximate estimates are given in the main report, however, about land tenure structure, including estimates of these non-observed groups, such as absentee landlords. But no information has been collected directly on the omitted sharecroppers.

5. Survey content and questionnaires

Two kinds of questionnaire were applied, respectively at village and farm/household level. A copy of both is included in the Annexes to this report. The village questionnaire included estimates of population and its subdivision into classes (non farming, big farmers, medium farmers and small farmers), availability of arable land and irrigation in the village, prevailing land and livestock holdings in each farming class, prevailing cropping patterns, agricultural calendar, common or habitual agricultural practices in the village, crop rotation patterns, market prices for agricultural inputs and outputs, and a few more questions of general interest.

The farm/household questionnaire investigated household size; land tenure; access to water, and adequacy of water supply during the past season; areas planted with various crops and volume of output for the past (2001-02) season; pests and diseases experienced; areas planted with major crops and expected yields for the ongoing 2002-03 season; livestock holdings; use of various farm inputs (animal or mechanical traction, fertilizer, etc.); total food production supply and utilisation (sales, family consumption, etc); level of indebtedness; and some few other related questions.

Even if the questionnaire were given a pilot test before starting actual fieldwork, some problems and limitations of the questionnaires were discovered during the course of the survey. The main ones include the following:

a. Rain-fed arable land area controlled by farms is not easy to quantify. There are frequently no formal property rights or deeds with explicit reference to a certain amount of land. Farmers tend to be not aware of a specific area at their disposal: in rain-fed zones, the amount of land a farmer may plant depends on rainfall, soil quality and the availability of seed. They tend to be aware of the amount of seed they would plant, but their awareness of a certain amount of rain-fed land can be doubtful, tentative or even non-existent.

b. Double cropping and intercropping were probably not well reflected in the survey, because the questions in this respect were less detailed than would have been desirable. Surveys should be more specific about the way every crop is planted, asking explicitly whether each crop was the first or the second (or the only) crop of the season on that specific piece of land, and also asking which specific crops were the first and second one, and also about any mixture of two crops on the same land. Certain local systems such as planting wheat among fruit trees, common in certain areas, were not captured at all in the survey.

c. Use and source of farm labour (family labour or hired labourers) was almost completely neglected. Quantifying the amount of labour used for each specific crop in terms of man-hours or some similar unit is quite difficult for farmers, and this was the primary reason for skipping the question in the first place, but at least some question should have been included to investigate for instance the use of non-family labour, the number of family members (male and female, children and adults) participating, the duration of the harvest, and other related matters.

d. The use of static threshers existing in many villages, or more generally the technique used for threshing, was not investigated. Also, grain milling services at village level (availability, sufficiency, cost, etc.) were insufficiently studied, as were also other post harvest processing and marketing issues. However, the rate charged for milling, as a fraction of the grain milled, was asked for in the questionnaire.

e. Food consumption issues were only marginally addressed through a question concerning the frequency of consumption for some food items such as meat or vegetables. The integration of the crop survey with the VAM, and the inclusion of a dietary diversity scale in the 2003 National Vulnerability and Risk Assessment will greatly improve this situation, allowing for a better integration of agricultural and vulnerability information.

Many of these limitations simply arose as a consequence of time and cost constraints. Scarcity of qualified field staff and the necessity of finishing fieldwork as early as possible (to avoid as far as possible the harshest weather during the dead of winter, a purpose not always achieved) imposed a tight schedule for completing the survey as soon as possible. Only one day was allowed for each team to complete their work at each selected village, and this necessitated to keep the questionnaires short. Indeed, the farming section of the questionnaires to be used in the 2003 Vulnerability Assessment will be even shorter. It is impossible to adequately cover all the aspects of a complex rural economy in one single survey. Specific formerly neglected issues should be included in future surveys, possibly one at a time, to get gradually a more complete picture of the agricultural sector in Afghanistan. In this matter, the general idea is that annual surveys or assessment should aim only to measure changes in short-term issues such as areas planted or yields, while special surveys (or special modules in annual surveys) should measure more structural aspects such as land tenure, technology, family structure and other matters that change more slowly over time.

Annex 2

Afghanistan		Questionnaire Number			(Leave number blank)
United Nations	**Government of Afghanistan**	**V**			
FAO – Food and Agriculture Organization **WFP – World Food Programme**	**Ministry of Agriculture and Animal Husbandry**				

Agriculture and Food Security Survey, December 2002 – January 2003

VILLAGE QUESTIONNAIRE

1. IDENTIFICATION		**Name**	**Code (blank)**
1.1	Province:		
1.2	District:		
1.3	Village:		**AF**
	SURVEYORS		
1.4	Surveyor 1 name:		
1.5	Surveyor 2 name:		
1.6	Surveyor 3 name		

1.7	Date of survey	**Day**		**Month**	
2. GEOGRAPHICAL COORDINATES					
	Measure village coordinates (take three GPS measurements)				
	LATITUDE	**LONGITUDE**	**ELEVATION**		
2.1					
2.2					
2.3					

3. FARMING GROUPS: Could you classify the population in the village in 4 groups: Non-farming, Big farmers, Middle farmers and Small farmers. Farmers could be owners or sharecroppers. Then define how much land and livestock a typical member of each group would have.

		Number of families in each class	**Typical amount of land and livestock in farms of each class**			
			Irrigated (Jerib)	**Rainfed (Jerib)**	**Number of small livestock**	**Number of large livestock**
3.1	Non-farming population					
3.2	Farming – Big farmers					
3.3	Farming – Middle farmers					
3.4	Farming – Small farmers					

. **SOURCE OF IRRIGATION:** What are the water sources for irrigation in the village? (may mark more than one)

	✓	Surface (Jerib)
4.1 No irrigation in the village		
4.2 From river		
4.3 From reservoir (dam)		
4.4 From spring		
4.5 Karez		
4.6 Well		

5. IRRIGATED LAND PLANTED IN 2001-2002: What is the proportion of irrigated land that was actually planted in 2001-2002?

		✓
5.1 No irrigated land in the village		
5.2 Irrigated land was not planted at all	0%	
5.3 Less than half was planted	<50%	
5.4 More than half, but not all	>50%	

7. WATER AVAILABILITY - IRRIGATION

If insufficient irrigation water availability, at what periods of the year the problem occurred? (may be more than one period)

	✓
7.1 Autumn/ winter 2001-2002	
7.3 Spring 2002	
7.4 Summer 2002	

8. WATER AVAILABILITY - RAINFALL

8.1 How was rainfall in 2001-2002 in this village?	✓
1. No rain at all	
2. Insufficient	
3. Sufficient	
4. Very good	
8.2 If rain was insufficient, at what periods of the year was it insufficient? (may be more than one period)	✓
1. Autumn 2001	
2. Winter 2001-2002	
3. Spring 2002	

5.5 All was planted	100%	

6. MAIN CONSTRAINTS FOR IRRIGATION IN 2001-2002:

Mark all that apply

	✓
6.1 No irrigation in the village	
6.2 Insufficient irrigation water availability	
6.3 Silting of canals	
6.4 Losses of water along the irrigation system	
6.5 Damaged infrastructures in irrigation system	
6.6 Poor water management/distribution	
6.7 Salinity of irrigation water	
6.8 Other (explain)	

8.3 What phase of the crops was affected by water shortage? (may be more than one).	✓
1. Planting	
2. Germination	
3. Stemming	
4. Flowering	
5. Grain formation	

9. CROP CALENDAR : At what period of the year the following farming operation are normally taking place? (only for major crops in the village)													
Crops	**Operations**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
9.1 Winter Irrigated Wheat	1.Land Tillage												
(Planted Nov-Feb)	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												
	6.Threshing												
		Sep	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
9.2 Spring irrigated wheat	1.Land Tillage												
(Planted March-Apr)	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												
	6.Threshing												
		Sep	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
9.3 Rainfed wheat	1.Land Tillage												
	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												
	6.Threshing												
		Sep	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
9.4 Irrigated Barley	1.Land Tillage												
	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												
	6.Threshing												

		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
9.5 Rainfed Barley	1.Land Tillage												
	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												
	6.Threshing												
		Sep	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
9.6 Rice	1.Land Tillage												
	2.Planting nursery												
	3.Transplanting												
	4.Manure												
	5.Fertilizer												
	6.Harvesting												
	7.Threshing												
		Sep	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
9.7 Maize	1.Land Tillage												
	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												
	6.Threshing												
		Sep	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
9.8 Potato	1.Land Tillage												
	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												

		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
9.9 Pulses	1.Land Tillage												
	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												
		Sep	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
9.10 Oilseeds	1.Land Tillage												
	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												
9.11 Other major crop (specify)		**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
	1.Land Tillage												
	2.Planting												
	3.Manure												
	4.Fertilizer												
	5.Harvesting												

10. LAND PREPARATION/PLANTING FOR WHEAT CROP: What is the most common practice for preparing the land for the wheat crop?

	Irrigated	**Rainfed**
10.1 How many land tillage operations do you do before planting? (indicate number)		
10.2. What implements are commonly used before planting? (mark all that are used)		
1. Iron plough ✓		
2. Wooden plough ✓		
3. Harrow ✓		
4. Hand tools ✓		
5. Mala ✓		
6. Other (specify)		
10.3 How many passes after planting? (indicate number)		
10.4.What implements are commonly used after planting? (mark all that are used)		
1. Wooden plough ✓		
2. Harrow ✓		
3. Mala ✓		
4. Other (specify)		

CROP ROTATION: What is the most common crop rotation pattern in the village? The year 1 starts with wheat crop. In case of double cropping, please mention both crops cultivated on the specific year.

11. MOST COMMON CROP ROTATION IN IRRIGATED FIELDS

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
11.01	Wheat	✓						
11.02	Rice							
11.03	Maize							
11.04	Potato							
11.05	Barley							
11.06	Pulses							
11.07	Clover							
11.08	Vegetables							
11.09	Melon /water melon							
11.10								
11.11								

12. MOST COMMON CROP ROTATION IN RAINFED FIELDS

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
12.01	Wheat	✓						
12.02	Barley							
12.03	Sesame/flax							
12.04	Pulses							
12.05	Melon							
12.06	Other							
12.07	Fallow							
12.08	In a year with normal rainfall, what percentage of rainfed land will be cultivated? (%)							

13. MARKET PRICE FOR FARM INPUTS

(At the usual place of purchase for farmers of this village)

	Items	Price	Unit	Comments
13.01	DAP Fertilizer		Bag 50 Kg	
13.02	Urea Fertilizer (made in Afghanistan)		Bag 50 Kg	
13.03	Urea Fertilizer (foreign)		Bag 50 Kg	
13.04	Seeds (most common seeds in market)*		Seer	
13.05	Rent tractor for ploughing for 1 hour		Hour	
13.06	Rent Pair of oxen for 1 day		Day	
13.09	Rent of mechanical thresher for 1 hour		Hour	
13.10	Grinding wheat grains **		Ratio	

* Mention the name of variety ** One seer of grain is paid for grinding how many seer?

14. PRICES PAID TO FARMERS WHEN THEY SELL			
		Price	**Unit**
14.01	Wheat		Seer
14.02	Potato		Seer
14.03	Pulses		Seer
14.04	Oilseeds		Seer
14.05	Live sheep (one year-old male)		Unit
14.06	Live goat (one year-old male)		Unit
14.07	Calf		Unit
14.08	Sheepskin		Unit

15. UNIT OF MEASUREMENT	
15.1 How many Kg is one seer in this area?	

16. CURRENCY AND EXCHANGE RATE		
16.1 What is the currency most commonly used here?		
		Exchange rate for 1 US dollar
1.	Kabul Afghani (old)	
2.	Kabul Afghani (new)	
3.	Northern Afghani (jumbeshi)	
4.	Pakistani rupees (kaldar)	

17. WHAT ARE THE WAGES OF LABOUR?		Pay for one day*
17.1	Agricultural labourer	
17.2	Poppy-field labourer	
17.3	Construction or other casual worker	
* If any part of the wage is paid in kind, or a meal is given to the worker, calculate the total equivalent value (money + products or meal)		

ANNEX 3

Afghanistan		Questionnaire Number (leave blank)		
United Nations	**Government of Afghanistan**	**F**		
FAO – Food and Agriculture Organization **WFP – World Food Programme**	**Ministry of Agriculture and Animal Husbandry**			

Winter 2002/03 Agriculture Survey,
December 2002 – January 2003
FARMER QUESTIONNAIRE

	1. IDENTIFICATION	Name	Code (blank)	3. **Type of household**:	✓
1.1	Province:			3.1. Resident?	
1.2	District:			3.2. Returnee?	
1.3	Village:			3.3. IDP?	
1.4	Name of farmer			3.4. Head of household is a widow?	
1.5	Age of the farmer			3.4 Other special condition? (specify)	
1.6	Number of people in the household:				
2.1	**Name of Surveyor:**			**2.2. Date of the survey**	Day / Month

4. The household is considered as:	1. Big farmer ✓		2. Middle farmer ✓		3. Small farmer ✓	

5. LAND TENURE AND LAND RENTING	A. Yes/No ✓		B. Share of crop or fixed payment for landowner	C. How many jerib now?		D. How many jerib before drought?	
	Yes	No		Irrigated	Rainfed	Irrigated	Rainfed
5.1. Land owned by household							
5.2. Land given for sharecropping							
5.3. Land given for a fixed payment							
5.4. Land received for sharecropping							
5.5. Land received for a fixed payment							

6. USE OF ARABLE LAND MANAGED BY THE HOUSEHOLD FROM NOVEMBER 2001 TO OCTOBER 2002 (Owned or rented)

	Jerib
6.1 How much irrigated land with one crop per year ? (Jerib)	
6.2 How much irrigated land with two crops per year ? (Jerib)	
	✓
6.3 Did you leave some arable land uncultivated last year ? ✓	
6.4 If yes, what are the reasons ?	
Lack of water ✓	
Lack of seed ✓	
Lack of labour ✓	
Other reason (specify)	

7. If you have access to irrigation: Irrigation system used?
(may mark more than one)

	✓
7.1 Canal	
7.2 Karez	
7.3 From your own well	
7.4 From a neighbour's well without payment	
7.5 From a neighbour's well with payment	
7.6 Other (specify)	

8. WHEAT IN 2002 (AGRICULTURAL YEAR 2001-2002)

PRODUCTION OF WHEAT		Irrigated Wheat		Rainfed Wheat
		Winter	Spring	
8.01 Total amount of seed sowed? (seer)				
8.02 Area with the crop (jerib)				
8.03 Date of planting (month)				
8.04 Date of harvest (month)				
8.05 Had losses from pests, diseases? (Y/N)				
8.06 Type of problem	8.06.1 Smut ✓			
	8.06.2 Rust ✓			
	8.06.3 Locust ✓			
	8.06.4 Other (specify) ✓			
8.08 Wheat production (seer)				
8.07 Multiplication factor				
8.09 Applied chemical fertilizer? (Y/N)				
8.10 Amount of urea (seer)				
8.11 Amount of DAP (seer)				
8.12 Amount of other fertilizer (seer)				
8.13 Total amount of manure applied (donkey loads)				

SOURCE OF SEEDS	Irrigated Wheat	Rainfed Wheat
8.14 How much seed was from your own farm? (seer)		
8.15 How much of seed received from organization? (seer)		
8.16 How much of seed purchased? (seer)		
USE OF WHEAT		
8.17 Your total wheat production this year (seer)		
8.18 How much wheat did you sell? (seer)		
8.19 How much used for payments in kind?		
8.19.1 For land and irrigation water (seer)		
8.19.2 For other obligations (seer)		
8.20 How much wheat your family need per year? (seer)		
8.21 How many months of family consumption come from your own wheat production? (months)		
	Yes	**No**
8.22 Have you purchased any wheat since last harvest? ✓		
8.23 Have you received wheat food aid since last harvest? ✓		

9. OTHER CROPS IN 2002 (AGRICULTURAL YEAR 2001-2002)

	1	2	3	4	5	6	7	8	9	10	11	12
9.1 Name of crops	Irrigated Barley	Rainfed barley	Maize	Rice	Oilseeds	Potato	Pulses	Melon / watermelon	Cotton	Opium	Alfalfa	Clover
9.2 Amount of seed planted (seer)												
9.3 Area planted with crop (jerib)												
9.4 Multiplication factor												
9.5 Total production (seer)												

9.6 Name of other crops you grow					
9.7 Area with the crop (jerib)					
9.8 Total production (seer)					

10. MAJOR CROPS FOR NEXT YEAR (2002-2003)

	1	2	3	4	5	6	7	8	9
10.1 Name of crops you will grow in 2002-2003	Irrigated winter wheat	Irrigated spring wheat	Rain fed wheat	Irrigated barley	Rain fed barley	Maize	Rice	Potato	Pulses
10.2 Date of planting - actual or planned (month)									
10.3 Total amount of seed (seer)									
10.4 Area of crop (jerib)									
10.5 Expected date of harvest (month)									
10.6 Expected multiplication factor									
10.7 Expected production (seer)									

11. USE OF FERTILIZERS	Yes	No
11.1 Have you used chemical fertilizer the past year 2001-2002? ✓		
11.2 Will you use chemical fertilizer in the year 2002-2003? ✓		

11.3 If answered Yes to <u>both</u> questions 11.1 and 11.2: How much chemical fertilizer will you use this year, compared with 2001-2002? ✓	More	Same	Less

12. LAND TILLAGE	Yes	No
12.1 Have you used a tractor for ploughing in 2001-02? ✓		
12.2 Plan to use a tractor for ploughing in 2002-03? ✓		
12.3 Did you use animals for ploughing in 2001-02? ✓		

If responded Yes to question 12.3:	A	B	C
	Cattle	Horse	Donkey
12.4 How many animals did you use?			
12.5 How many were your own animals?			
12.6 How many were from other owners?			

13. WHEAT SEED VARIETIES. Which varieties did you use in 2001-2002?

	Yes (seer)	No ✓	How much seed (seer) from		
			Saved	Purchase	Organization
13.01. Kauz/Bakhtawar 92					
13.02. Inqilab-91					
13.03. Pamir 94					
13.04. Herat 99					
13.05. Mazar 96					
13.06. Ghori 96					
13.07. Takhar 96					
13.08. Maxipak					
13.09. Indian red					
13.10. Other improved seeds: Specify					
13.11. Local varieties					

13.12Do you mix wheat seed varieties? ✓	Yes		No
13.13 Which is the wheat seed that you prefer? Write the number of the variety from the list above			

14. AGRICULTURAL INPUTS AID RECEIVED. Did you receive farming inputs from any organization?

Input received	A. For 2001-2002		B. For 2002-2003	
	Yes	No	Yes	No
14.1. Seeds ✓				
14.2. Fertilizer ✓				
14.3. Tools ✓				
14.4. Other (specify) ✓				

15. VEGETABLE GARDEN

15.1 Do you have a vegetable garden?	1.Yes ✓		
	2. No ✓		
15.2 Which vegetables do you grow?			
1. Onion ✓		6. Garlic ✓	
2. Tomato ✓		7. Leek ✓	
3. Carrot ✓		8. Other (specify)	
4. Pumpkin ✓			
5. Okra ✓			
15.3. Destination of vegetables produced			
1. Only for consumption at home ✓			

16. FRUIT TREES				Yes	No
16.1 Do you have fruit trees? ✓					
16.2 Which fruit trees do you grow?					
	Number Trees	How many Jerib		Number Trees	How many Jerib
1. Apricot			7. Plum		
2. Peach			8. Almond		
3. Vineyards			9. Pistachio		
4. Apple			10. Walnuts		
5. Mulberry			11. Citrus		
6. Pomegranate			12. Other		

16.3 Destination of fruits produced	
1. Only for consumption at home ✓	
2. Also for sale ✓	

17. FOOD CONSUMPTION	Once a Week	Once a Month	Once a Year
17.1 How often do you eat fruits? ✓			
17.2 How often do you eat vegetables? ✓			
17.3 How often do you eat meat? ✓			

18. LIVESTOCK

	Cattle	Sheep	Goats	Donkeys	Horses	Camels
18.01 Total animals owned now						
18.02 Adult males owned now						
18.03 Adult females owned now						
18.04 Females you milked this year						
18.05 How many animals 1 year ago?						
From Jan 2002 to Dec 2002:						
18.06 Animals born						
18.07 Animals purchased						
18.08 Animals sold alive						
18.09 Animals killed by you						
18.10 Dead from disease/drought						

19. POULTRY:	
19.1 Total number of poultry animals you have now?	
19.2 How many hens have had chicks in the year?	

20. SOURCES OF MONEY. What have been your sources of money in the past year?	**Yes**	**No**
20.1 Sale of animals ✓		
20.2 Sale of crops ✓		
20.3 Sale of home made handicraft ✓		
20.4 Other sales ✓		
20.5 Labour income (wages) ✓		
20.6 Commerce (trading) ✓		
20.7 Remittances received ✓		
20.8 Money borrowed from others ✓		
20.9 Other (specify)		

21. MONEY OWED TO YOU	**Yes**	**No**
21.1 Do people owe you money? ✓		
21.2 Amounts owed to you and currency		
21.2.1 Kabul Afghani (old)		
21.2.2 Kabul Afghani (new)		
21.2.3 Northern Afghani (Jumbeshi)		
21.2.4 Pakistani kaldar		
21.2.5 US dollars		
21.2.6 Other (specify)		

22. **INDEBTEDNESS**	**Yes**	**No**
22.1 Have you in debts now? ✓		
22.2 Amounts you owe and currency		
22.2.1 Kabul Afghani (old)		
22.2.2 Kabul Afghani (new)		
22.2.3 Northern Afghani (Jumbeshi)		
22.2.4 Pakistani kaldar		
22.2.5 US dollars		
22.2.6 Other (specify)		
22.3 Interest Rate (%)		

Creditors (whom you owe money)	**Yes**	**No**
22.4 Relatives ✓		
22.5 Land owners ✓		
22.6 Traders ✓		
22.7 Other village members ✓		
22.8 Other (specify)		

22.9 Intended form of repayment of your debts	
1. In cash ✓	
2. In kind (wheat, animals, etc) ✓	
3. In labour ✓	

ANNEX 4

List of the Released Crop Cultivars in Afghanistan from 1994-2000

Source: FAO. 2001. Food Security Through Sustainable Crop Production. AFG/96/004. Annual Report.
FAO Afghanistan Seed Component Activities.

No.	Year of release	Name of cultivar	Pedigree or name	Introduced from	Area for which recommended	Salient features
Wheat						
1	1994	Pamir-94 *	7M-0M-8M-2M-0YE	CIMMYT /Turkey	Adapted in all zones but its yield is higher in cooler areas.	It is a facultative bread wheat The plant height is 97 cm, the grain color is light red and the chaff color is white. Days to maturity in cool areas such as Kabul, logar ,Wardak and Ghazni is 279.While in mild winter areas it takes 189 days to mature. The response to leaf rust is 5R and to stripe rust is MR.
2	1996	Kauz	CM7458-4y-1M-3Y-1M-3Y-08-OSY	Mexico	Wide range of Adaptability in lower elevations	Facultative early maturity, amber grain color, white chaff color, 86cm height, resistant to rusts. In Pakistan it has been named Bakhtawar-92.
3	1996	Gul-96	2WM-OWM-OSE-1YC-OYC	Mexico /Turkey	cold and mild winter locations	Facultative with more winter hardiness, and prostrate growth habit. The grain color is amber the chaff color is white, rusts resistant are 0-MR. It is 98 cm tall. Days to maturity is 287 .
4	1996	Takhar -96	VEE#7/ OPATA	CIMMYT	Low elevation and mild winter ,good for north part	Facultative earliest maturing variety. The response to rusts is R.The grain color is between red and amber. The chaff color is white and the plant height is 99 cm.
5	1996	Roshan-96	Bloundan/3/Bb/7C*2//Y50E/Kal*3	CIMMYT	Wide adaptability	Facultative medium maturity, has white grain and chaff color.It has erect to semi-erect growth habit.The response to rust is 0-R and to bunt also showed resistant.The plant height is 94 cm.

No.	Year of release	Name of cultivar	Pedigree or name	Introduced from	Area for which recommended	Salient features
6	1996	Rana-96	2AP-2AP-2AP-1AP-OAP	Mexico/Turkey	Cold and mild winter areas	Facultative bread wheat with prostrate to semi erect growth habit. The maturity in Logar and Wardak is 286 days.The response to stripe rust is (0-R)to leaf rust is MS. The plant height is 95 cm and the grain color is white.
7	1996	Ghori- 96	CM59377-3AP-1AP-3AP-2AP-1AP-0AP	Mexico /Syria	Rainfed areas (west part)	It is bread wheat, the response to stripe rust is (0-MR).It takes 175 days in Herat and 113 days in Baghlan to maturity.The grain color is amber and the protein content is 13 %.
8	1996	Diama-96	HD2206/HORK//BUC/BUL	CIMMYT	Rainfed areas(North part)	The grain color is amber. It is an early variety.The Number of days to maturity in Herat is 175 and in Baghlanand Takhar is 113 days. It is resistant to all rusts.
9	1999	Amu-99 (Bloyka)	ICW84-0008-013AP-300L-3AP-300L-0AP	ICARDAand CIMMYT	Wide adaptability	The growth habit is erect ,the chaff color is white and the grain color is amber. The maturity dates varies from place to place. In cold areas such as Ghazni it takes 267,in mild winter areas such as Takhar, Balkh and Herat it takes 204 days to mature. In warm areas such Kandahar and Nangarhar it an average of 185 days to maturity.
10	1999	Herat- 99 (MYNA/VUL//PRL)	CM97958-0M-7Y-030M-030M-84-0M.	CIMMYT and ICARDA	Wide adaptability but released from Herat.	The growth habit is erect and the average plant height is 96cm.The grain color is amber and the chaff color is white. The maturity dates varies from place to place. In cold areas such as Ghazni it takes 228,in mild winter areas such as Takhar,Balkh and Herat it takes 205 days to mature.In warm areas such Kandahar and Nangarhar it an average of 182 days to maturity. The response to rusts is (0-MR)

No.	Year of release	Name of cultivar	Pedigree or name	Introduced from	Area for which recommended	Salient features
11	1999	Mazar-99 (Pasture)	CM85295-0101TOPY-2M-0Y-0M-3Y-0M	CIMMYT and ICARDA	Wide adaptability but released in Mazar	The grain color is amber and the chaff color is white. The plant height is 94 cm. The response to yellow rust is MR-R, while the response to leaf rust is 0-MR. The maturity dates varies from place to place. In cold areas such as Ghazni it takes more days to mature,in mild winter areas such as Takhar,Balkh and Herat it takes 206 days to mature. In warm areas such Kandahar and Nangarhar it an average of 175-187 days to maturity.
12	2000	Lalmi-1 (Fow-1)	SWM11147-1AP-2AP-1AP-1AP-0AP	CIMMYT and ICARDA	Well fit for rainfed areas	It has been selected from RWYT-FA(regional bread wheat yield favorable areas.)The grain color is red and the plant height is 97cms.It takes as an average 156 days to mature. The grain size is 2M(intermediate and medium) the response to stem rust is (0) and to stripe rust is MR. The protein content is 12 %.
13	2000	Lalmi-3 (Florkwa-3)	ICW84-0074-02AP-3002-1AP-0L-0AP	CIMMYT and ICARDA	Rainfed areas	It has been selected from RWYT-SA(regional bread wheat yield semi arid areas)The grain color is amber and the plant height is 78cms.It takes as an average 153 days to mature. The grain size is small and plump and the response to stem rust is (0) and to stripe rust is R. The protein content is 12 %. and 1000 kernel weight is 38 grams.
14	2000	Lalmi-2 (Bobwhite1//Mn....)	IC88-063-1AP-0L-1AP-2AP-0TS-0AP	CIMMYT and ICARDA from Syria	Rainfed areas	It has been selected from RWYT-SA(regional bread wheat yield semi arid areas)The grain color is amber and the plant height is 83cms.It takes as an average 153 days to mature. The grain size is plump and medium in size the response to stem and stripe rust is (0).The protein content is 12 %.and 1000 kernel weight is 32 grams.

No.	Year of release	Name of cultivar	Pedigree or name	Introduced from	Area for which recommended	Salient features
Barley						
1	1998	Hewad-98 (Gloria-Bar/COMB-B//...).	CMB87-643-E11Y-1B-1M-0B-1M-0Y	From IBYT CIMMYT and ICARDA	Wide adaptability	This is a four row barley. The average number of days to maturity is 146. The growth habit is semi-erect and the grain texture is medium. The plant height is 79 cms and 1000 kernel weight is 37 grams. It is resistant to rust and bunt.
2	1998	Watan-98 (LIBRAN/UNA 8271...)	CMB89A.291-2M-1Y-1M-0Y	From IBYT CIMMYT and ICARDA	Wide adaptability	This is a four row barley. The average number of days to maturity is 150. The grain texture is hard and the size is short. It is taller about 5 cm than Hewad -98 and matures a few days later .1000 kernel weight is 38 grams. It is resistant to rust and bunt.
Rice						
1	1998	Afghan-98	PRP1670-7613-3-2	IRRI	Rice growing areas	It is a medium grain rice. It has an average height of 82 cm and matures 5-10 days earlier than Swat-2 and one week earlier than Basmati-385.Also it is 5-10 cm shorter than Basmati-385.The 3 years and 23 locations mean yield is 6127MT.
2	1998	Baghlan-98	IR62871-166-2-2	IRRI	Rice growing areas	It is a long grain rice . Tested since 1993 in long grain rice yield trials in rice growing areas. It is about 5-10 cm shorter and 3-5 days earlier in maturity and produces 0.5 MT/ha more yield than Basmati-385.

No.	Year of release	Name of cultivar	Pedigree or name	Introduced from	Area for which recommended	Salient features
3	1997	Swat-2	Introduced in Pakistan	Pakistan	Rice growing areas.	It is a short grain rice developed in Pakistan. It was tested in Afghanistan from 1990-1999 and produced the highest yield among the short grain rice in multi locations. It matures in 147 days almost one week earlier than the local and the plant height is 103 cm. It is resistant to lodging.
Maize *						
1	1994	SHAHEEN	Cross of 'Zia' and very early maturing varieties 'Nodak'and 'Mandan' from USA and 'Payette' from Canada.	Pakistan	Maize growing areas.	The grain color is white. It is an early maturing variety with cold tolerance habit, therefore it is being cultivated in the high elevation zones of Pakistan and Afghanistan.
2	1994	Azam	(Pirsabak 7930xZia)x Pirsabak 7930	Pakistan	Lower elevation maize growing areas.	White, semi-flint, mid-season variety maturing in about 90 days. It is a medium height resistant to lodging and resistant to leaf blights. It is a very good variety for irrigated plains and is moderately drought tolerant.
3	1994	Kissan 90	Pirsabak 7930x Local germplasm using a full sib family selection scheme	Pakistan	Maize growing areas.	It is a white grain short to medium duration recommended for irrigated as well as good for high rainfall areas. It short plant type with lower ear placement and can tolerate high plant densities. Matures in about 85 days. Good in low lands of Afghanistan.
4	1994	Sarhad Yellow	'Vikram'x ('B57'x 'B37')xAkbar	Pakistan	Maize growing areas	Yellow grain type variety. It takes 110-115 days to mature. The plant height ranges 230-250 cm. Ears long ,Kernels dent -flint. Also popular in the low land ,warm areas of Afghanistan.
5	1994	Sarhad White	White version of Sarhad yellow.	Pakistan	Maize growing areas	It is comparable to Sarhad yellow in yield, maturity, and adaptation but it is susceptible to leaf blights.

No.	Year of release	Name of cultivar	Pedigree or name	Introduced from	Area for which recommended	Salient features
6	1994	Ehsan	Sarhad whitexlot 81 CIMMYT	Pakistan	Maize growing areas	It is a medium-season, white flint variety matures in 100 days. Ears of medium size, compact with 14-16 kernel rows. Even after the harvest ,the plant stays green and its stalk remain sweet. It is resistant to stalk rots and leaf blight than any other varieties.
7	1994	Pahari (Ev-II)	'Shaheen'x 'Pirsabak 7930'	Pakistan	Maize growing areas	It is a short duration variety bred for production in the cool mountain environment. Developed in Kaghan for mid elevation zones from 1000-1800m above the sea level.
8	1994	Sunehri		Pakistan	Mid season areas	It is a medium season June/early July planting. Takes 110 days at low altitude and 120 days at mid altitude up to 1300 m.
9	1994	Population-31		Pakistan	Mid season areas	The same as Sunehri.
Food Legumes						
1	1999	Barakat-99	VIVA	MSU(Machigan State University) USA	Baghlan, Logar ,Wardak	The color is red or pink, and the average number of seeds per pot is 4. It is an early maturing variety and takes 90 days to mature. The plant height is 28 cm. and the growth habit is bush type.
2	1999	Salamati-99	UI 5229	MSU	Adaptable in irrigated area Introduced from Wardak.	It is a bush type kidney bean and has dark red color The plant height is 35 cm and it has 4 seeds/pot. The number of days to maturity is 97.
3	1999	Bari-99	Aparaho	MSU	Introduced for irrigated area from Wardak.	It is a climbing and pinto type bean. The number of days to maturity is 91 days and has 4 seeds/pot. The plant height is 45cm.
4	1999	Arzo-99	CO-1760	MSU	Introduced from Wardak for irrigated rea of the country.	This is a bush type bean with white color. The number of days to maturity is 96. The number of seeds/pot is 3 and the plant height is 43 cm.

No.	Year of release	Name of cultivar	Pedigree or name	Introduced from	Area for which recommended	Salient features
5	1999	Sehat-99 (Flip93-58C)	X90TH249 (ILC5342xFlip 84-78C) xILC 1272.	ICARDA/ICRISAT	North eastern North and North west.	This line matures in 103 days. The plant height is 55 cm and the plant type is semi-erect. The weight of 100 grain is 31 grams. The agronomy rating is very good and there is no lodging.
6	1999	Madad-99	Flip 93-53C	ICARDA/ICRISAT	North and North eastern Provinces	It needs 103 days to mature. The plant height is 41 cm and the growth habit is erect. The weight of 100 seed is 32 grams. It was distributed to the farmers of Takhar, Kunduz and Badakhshan.