PALESTINE:

COUNTRY REPORT TO THE FAO INTERNATIONAL TECHNICAL CONFERENCE ON PLANT GENETIC RESOURCES

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Note by FAO

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CHAPTER 1
Palestine - Basic Background

1.1 THE LAND

The Palestinian territories (West Bank and Gaza, or Northern Palestinian Districts and Southern Palestinian Districts) are situated between the Mediterranean Sea and the Jordan River and Dead Sea at between 29° and 33° North Latitude and 35° and 39° Longitude. Comprising a total area of 6,065 Km2 (6,065,000 dunums), this area is divided into two distinct land masses. The larger of these two areas is the West Bank (covering 5,700 Km^2), with the Gaza Strip covering only 365 Km^2. (Figure 1) The West Bank (Northern Palestinian Districts) runs along the mountain range that makes up the spine of geographic Palestine, and down to the Jordan Valley and Dead Sea. The Gaza Strip runs along the Mediterranean Sea on the edge of the Sinai and Negev deserts. Rainfall in Israel / the Palestinian territories is highest in the north-west mountains and decreases as one moves to the south and east.

1.1.1 West Bank by Region

The West Bank is administratively divided into 7 sub-districts. The southern most, and most populated district in the West Bank is Hebron (with approximately 400,000 residents and an area of around 1,000,000 dunams). It is known for the production of grapes and fruit trees, for the large areas of range land (see below), and for the commercial savey of its inhabitants (especially those who come from inside of the city of Hebron itself). Bethlehem is a smaller sub-district, known for the production of olives, and other fruit trees and for range area and the tourist industry.

Jerusalem is of course the city which is heralded for its importance to all three religion. The sub- district which encompasses the eastern part of the city itself as well as its surrounding area is not known for its agricultural production (in large part because of its high population density), but does contain agricultural areas in its western part and range area in the eastern part of the sub-district which are not occupied by settlers or military areas. The sub-districts of Ramallah and Nablus are north of Jerusalem and are known for their olive and fruit tree production, with some field crop production in the plains of Nablus and range area in the eastern part of the regions. Nablus's administrative boundaries also extend

east to the Jordan Valley, where irrigated agriculture is practiced near springs and other water sources in these areas. Tulkarem, Jenin and Qalqilya are known as irrigated agricultural areas and Jenin represents some of the most important agricultural land in the West Bank, as soil quality is better and rainfall higher than more southern locations. (See Below) The Jericho region is located just north of the Dead Sea and west of the Jordan River between 200 and 250 meters below sea level. Although warm throughout the year, it is fed with four major springs which supply the water for significant irrigated fruits and vegetables.

1.1.2 Gaza

The Gaza Strip is divided into four sub-districts: Rafah, Khan Younis, Deir Al-Balah and Gaza city. It is one of the most populated stretches of land on earth, inhabited by more than 1,000,000 souls. Rainfall ranges from 200 mm in the south at Rafah to 400 mm in Gaza, the northern part of the Strip. Most agriculture in the area is irrigated (approximately 60%), and the crops produced are mostly vegetables and citrus. However, non-irrigated field crops are also produced, specifically in the Khan Younis and Rafah sub-districts.

It is worth noting that while Palestine has a high population density per square kilometer, there are only three major urban centers in the West Bank; Jerusalem, Nablus, and Hebron. The Gaza Strip is a smaller area, and generally standards of living are significantly lower than the West Bank, but it contains a larger population, mostly of refugees from the 1948 War and their families. There are three major urban areas in the Gaza Strip (not counting areas classified as refugee camps); Gaza, Khan Younis and Rafah. The rest of the Palestinian population lives in the 440 villages and 27 refugee camps. (Figure 2)

1.1.3 Physical Features and Important Statistics in Palestine

1 The Agroclimatical Zones

Topographically, the Occupied Territories can be divided into the following agroclimatical zones (SAAR 1992):

2 The Coastal Zone (The Gaza Strip)

This zone is located along the eastern coastal plain of the Mediterranean, in close vicinity to the Negev. Sinai desert to its south and west determines its semi-arid Mediterranean climate of long, hot summers and mild winters with fluctuating rainfall. Average rainfall ranges between 200 mm in the south and reaches 400 mm in the far north. The total area of the Gaza Strip is about 365 square kilometers

of which nearly 190 square kilometers are currently cultivated by Arab farmers and Israeli settlers. The Gaza Strip can be divided according to climatological conditions into three distinct regions:

a) The Northern Region: This region is characterized by its relatively high average annual rainfall, acceptable quality of its ground water, and high fertile soil which make it the most important part of the Gaza Strip for intensive agricultural production. Vegetables, citrus, and strawberries are the main crops produced in this region.

b) The Middle Region: This region is characterized by the high salinity of ground water and the fluctuations in precipitation. Vegetables, citrus, and dates are the main crops produced in the region, but with less intensive patterns.

c) The Southern Region: This region is characterized by its low level of rainfall and low water quality. Major crops produced in this area include field crops, vegetables, guave and almonds.

3 The Semi-coastal and Mountains Zone

It extends in the north and northwestern comer of the West Bank and it has a relatively high average yearly rainfall of about 600 mm. This zone comprises very narrow area of the edge of the coastal plain, the western foothills, hills and fertile valleys, the gently western slopes towards the Mediterranean sea, the bulk and peak of the mountain series of the West Bank from north to south with its plateaus and the narrow edge of the eastern slopes. It represents the last extension of the Palestinian Mediterranean coastal in-land.

This zone is elevated from about 200 meters in the north-west, up to 1000 meters in the south east. Many fertile valleys and plateaus are found in this zone. It nearly represents all soil types. Soils in semi coastal plain and valleys are mostly Alluvial Soil series as silt or loam. It differs in properties according to parent materials and ways of forming. Terra Rosa soil series with all its varieties may be considered dominant on tops of mountain and slopes.

This zone (approximately 400,000 dunums) represents more than 60 per cent of total are of the West Bank. All rainfed and nearly half of irrigated land are within this zone.

About 1,050,000 dunums of fruit trees, namely olives, grapes, almonds, and other deciduous fruit trees are planted in this zone. Most of the winter crops, all summer crops and rainfed vegetables are grown in this zone. Also, most sheep and goats flocks, cows herds and nearly all poultry farms are located in this zone.

4 The Eastern Slopes Zone

This zone represents the semi-desert climate as transitional zone between the true Mediterranean and desert climate. It is located between the Jordan Valley and the Central Highland Regions. It extends from the eastern parts of Jenin to the Dead Sea in the south. The steep mountains with little rainfall that predominate in this region make it an almost semi-arid to desert zone. It is suitable for grazing and, to a certain extent, is utilized for field crops varieties that survive with the average yearly rainfall of 150-300 mm such as barley and wheat. Recently some olive groves began to thrive on gentle slopes and in valleys where soil moisture can be retained.

The soils of this zone are mostly from Gray Calcareous Steppe Series. While Rendzina Soil series with all varieties especially the gray color are well represented. In the valleys, Alluvial Soil Series are dominant. Terra Rosa may be found also in some patches. The total area of this zone is approximately 1,500,000 dunums, with altitudes varying from 800 meters above sea level to 50 meters below sea level.

5 The Jordan Valley Zone (Ghors Zone)

This zone has unique topographic and climatic conditions. The approximately 400,000 dunums that comprise this region lie 90-390 meters below the sea level, surrounded by two high series of mountains from both eastern and western sides, and characterized by hot summers and warm winters. Most of the soil contains high ratio of sodium and brackish.

Due to the hot and dry climate, the rainfall is not truly effective to agriculture. So, all kinds of agriculture are entirely irrigated. Uncultivated areas are used as natural grazing lands. The availability of both springs and ground water makes this region most suitable for off-season vegetables cropping and for semi-tropical tree plantations. All strains and varieties of dates palm trees and still in existence. Citrus orchards with special taste and early season are remarkable in the Jordan Valley.

Recently, early grapes strains began to take place as an economical crop. Without access to water this region would be a desert.

The West Bank includes three governorates, names Nablus, Jerusalem, and Hebron. These governorate are further sub-divided into six districts: Jenin, Tulkarem, Nablus, Hebron, Ramallah, Jericho (Jordan Valley).

1.2 CLIMATE

In general, the climate of the Occupied Territories is Mediterranean, with a long, hot, dry summer, a rainy winter and a drier-than-spring autumn season. Accordingly, the climate of the Palestinian Territories is classified as an eastern Mediterranean climate.

The temperature increases towards the south and towards the Ghors, with rainfall ranging from 100 to 700 millimeters annually, depending on the location.

1.3 POPULATION

According to the Palestinian Statistics Bureau, the population of this combined area is about 2.5 million. Approximately 27 percent of the West Bank Palestinian population live in urban centers, 17 percent live in refugee camps and the remaining 55 percent live in rural areas. While it was chiefly rural before the creation of the State of Israel and the resulting influx of refugees in 1948, the population in Gaza is much more urban, averaging 2,330 persons per kilometer in the Strip, with the large majority of the population living either in cities or refugee camps. In recent years, the estimated natural population growth rate for Palestinians has been between 3 and 5 percent. More than twice this number of Palestinians live outside, for the most part having fled the wars that established the State of Israel and the Israeli occupation of the West Bank and Gaza. About two thirds of these live in refugee camps in neighboring countries.

1.4 ECONOMIC INDICATORS

According to World Bank and United Nations Commission on Trade and Development (UNCTAD) figures, the Palestinian per capita GDP averages around US $1,500 annually, mostly coming from a service and day labor sector, with agriculture making up between 18 and 30 percent and industry making up very little. This means that Palestinian environmentalists must worry about sustainable development, not just nature conservation (especially when living next to Israel, which has a per capita GDP of between US $10,000 and US $15,000 per year).

CHAPTER 2
Agriculture

2.1 BACKGROUND

Palestine was basically an agricultural nation until 1967. During the Ottoman and British periods, agricultural production was responsible for the vast majority of the GDP of the West Bank and Gaza. During the Jordanian period (1948-1967) there were some efforts at industrialization, particularly in Nablus and Hebron, but the West Bank was mostly viewed as the largest agricultural (and thus food) producer for the Hashemite Kingdom of Jordan.

Agriculture continues to make up a large part of both the Palestinian economy and land use, representing 40% of the Palestinian gross domestic product (GDP) (44% in the West Bank and 26% in the Gaza Strip), with more than 50 percent of the population benefiting directly from agricultural production. In terms of land use, only 32% of the land in the Palestinian territories is cultivated, with another 25-30% classified as grazing land. Less than 5% of the agricultural land in the is under irrigated production (although agriculture is by far the largest water use in the country).

It is worth noting that the cultivated area for field crops in the West Bank dropped from 955,000 dunums (95,500 hectares) in 1968 to 588,000 dunums in 1990 (a rise from 439,000 dunams in 1986), while the area for vegetables rose from 107,000 dunams in 1968 to 150,000 dunams in 1990, and fruit trees rose from 670,000 dunains in 1968 to 1,055,000 dunams in 1990. The figures for the Gaza Strip follow a similar pattern. These figures are probably at least in part due to land tenure laws by which the Israeli occupation authorities would confiscate land which was not cultivated, thus making it more secure to plant tree crops, as field crops often require a period of fallowing. (FAO, 1995) In the last 5 years that total cultivated area has fallen about 6%.

Table 1 Cultivated Area for Selected Years in the West Bank. (Area in thousand Dunums)

Crop	Year			
	1968-70	1978-80	1984-86	1990
Field crops	955	530	439	588
Vegetables	107	101	170	150
Fruit trees	670	983	1034	1055
Total	**1732**	**1614**	**1640**	**1793**

Source: United Nations Conference on Trade and Development, 1993. "The Agriculture Sector of the West Bank and the Gaza Strip". UNCTAD/DSD/SEU/Misc.5. (p. 105).

Table 2 Cultivated Area for Selected Years in the Gaza Strip. (Area in thousand Dunums)

Crop	Year			
	1968-70	1978-80	1984-86	1990
Field crops	53	23	35	37
Vegetables	20	39	40	48
Fruit trees	69	93	108	103
Total	**142**	**155**	**183**	**188**

Source: United Nations Conference on Trade and Development, 1993. "The Agriculture Sector of the West Bank and the Gaza Strip". UNCTAD/DSD/SEU/Misc.5. (p. 105).

2.2 LAND TENURE AND AGRICULTURAL TECHNIQUES

Land holdings in Palestine tend to be small, and land-holding size per farmer has decreased. significantly since 1967 mostly because of population growth and traditional tenure arrangements. The result is that now the more than 50 percent of the holdings in the West Bank are I hectare or less. Less than a quarter of the Palestinian farms are more than 2 hectares and less than 10 percent are more than 5 hectares. (ARIJ, 1994)

A recent study on farming systems in the West Bank and the Gaza Strip has concluded the following (Agricultural Database, 1995)

1 The farming systems in the West Bank can be classified into:

a) private ownership 54.6 per cent;

b) family sharing 21.2 per cent;

c) sharing 10.9 per cent;

d) fixed rent 4.8 per cent;

e) rent 4.5 per cent; and

f) hired labor 4.0 per cent,

2 And in the Gaza Strip:

a) private ownership 77.0 per cent;

b) sharing 14.0 per cent;

c) rent 5.5 per cent;

d) family labor 2.2 per cent; and

e) hired labor 1.3 per cent.

Studies have also shown that while traditional farming technics are still widely used, mechanized farming increasingly implemented, especially in land preparation (where more than 50% of farmers cultivating field crops, 80% in greenhouse vegetables and 40% in horticultural crops use this technique). Animal traction is generally used where mechanization is not in this activity. Seeding and harvesting is still largely done manually. (Agricultural Database, 1995, Vol 2 (8))

In large part because of Israeli restrictions on water usage, over 90 percent of Palestinian agricultural land is rain-fed, mostly in the West Bank. Gaza, Tulkarem, Jenin and Jericho have major irrigated areas - largely using well or spring water. About 70 percent of agriculture on Israeli settlements in the both the West Bank and Gaza is irrigated.

2.3 IRRIGATED FARMING

Irrigated farming is the most productive sector in Palestinian agriculture, though it is produced on only 21,000 hectares. The vast majority of this land is used to produce vegetables, citrus and bananas, though attempts are now being made to diversify the crops grown, especially in Gaza, where farmers have been badly hit by marketing crises and closures of the territory in recent years. While productive, this type of farming contains inherent risks, including:

- Dependence on scarce and politically sensitive water resources. This makes efficiency essential. Fifty-nine percent of the land devoted to vegetable production in the West Bank and almost all land in Gaza are grown using water-efficient micro-irrigation systems. However, only 18 percent of the irrigation for citrus in the West Bank is modem, wasting a great deal of

water through seepage, leakage and overflow. Added to the natural water pressures caused by population increases, Israel has severely limited the amount of water available to Palestinians during the occupation. While this must change, the resources will remain severely taxed unless Israel is willing to dramatically alter its consumption. Furthermore, some estimates are that fresh water will only suffice for domestic and industrial needs by early in the next century. To maintain irrigated agriculture in Palestine advances in the use of wastewater and runoff water will need to be made.

- Irrigated agriculture tends to be much more input intensive, including the use of chemical fertilizers and plastic mulches. The Israeli ministry of environment has already stated that the Israeli coastal aquifer is saline due to nitrates from the large amounts of fertilizer used. This is certainly also a risk in Palestine. Likewise with plastics. There are 963 hectares of greenhouses in Palestine, and many of the 21,000 hectares of irrigated areas are mulched with plastics. While European researchers have developed means of disposing of the plastic once used (specifically through high temperature incineration), these methods have not yet been introduced here and an estimated 30 percent is lost into the soil - undoubtedly upsetting the soil ecology and texture.

- Intensive agriculture often also carries with it more intensive pesticide use. A total of 123 pesticides are currently being used in Palestine, mostly on irrigated agriculture and all either manufactured by or shipped through Israeli companies. Among them, fourteen pesticides are internationally suspended, canceled or banned and seven are members of the "dirty dozen", namely Aldicarb, Chlordan, DDT, Lindane, Paraquate, Parathion and Pentachlorophenol. There is frighteningly little knowledge by farmers about the best practices, storage or disposal, and labels which exist are almost always in Hebrew, a language most farmers do not read. Clearly, the implications for the health of farmers and the consumer are serious, not to mention the implications for export. An added problem is the effect of these chemicals on plant genotypes, specifically with the growing use of herbicides, fungicides and soil fumigators. Serious work will be needed to provide both integrated pest management training to farmers and extension agents and alternatives to the toxic pesticides now available for use.

- The intensive nature of irrigated market horticulture has the other drawback that farmers tend to use a relatively small gene pool of the varieties planted, preferring to use particular varieties that have certain marketable characteristics rather than the wider range of less predictable local varieties. In 1994 it became evident that this problem exists in Palestine when the failure of the stock of seeds and seedlings from one company caused a severe shortage in the tomato market throughout Palestine and Israel. (Gasteyer, Isaac-Biodiversity, February 1994).

2.4 RAINFED FARMING

The total rainfed area is around 198,000 hectares, made up of field crops and forages (particularly wheat, barley, chickpeas, lentils, sorghum, vetch, and vegetables), fruit trees (olives, almonds, other nuts, plums, apricots, peaches, pears and cherries), and grapes. (See Annex 4).

The field crops and forages are grown in the winter (rainy season), and many farmers follow with vegetables grown on residual water in the spring. The area planted tends to be small by western standards, measured in dunums (one tenth of a hectare) with often as little as 1 hectare per farmer. Methods used are relatively traditional, including animal traction and few inputs other than manure, although mechanization, chemical fertilization and herbicides are all being introduced.

Rainfed fruit orchards span much of the West Bank. Most prominent are olives and almonds, which tend, ironically to have low per hectare yields because of how they are maintained. Of smaller area, but larger economic importance are various stone fruits, including plums, peaches and apricots, which are better maintained and therefore produce better. Throughout Palestine, especially in the Hebron district, grapes are an important rainfed crop as well.

Experiments have shown that there is good potential yield improvement with the introduction of high yielding varieties, fertilization, and improvement of agricultural technics such as crop rotation and pruning (of trees). Certainly, practices such as terracing for hillside agriculture, which have been carried out for millennia by Palestinian farmers, should be encouraged as they prevent erosion.

It is important to note that as a neglected sector, rainfed farming may well harbor some of the most important cultivated genetic resources. It is now clear that the large majority of the field crops planted are “Baladi”, or local varieties, the characteristics of which may well vary from village to village, or even farmer to farmer. Likewise with tree or vine crops (grapes), the local varieties may vary significantly, and may well contain characteristics that are of genetic importance. There is better knowledge of the range of gene-stock and chorology in grapes, plums, peaches and citrus, but serious work is needed to identify the range of these resources in olives, almonds and other field crops.

2.5 LIVESTOCK

Poultry, small ruminants and small numbers of beef and dairy cattle all exist in Palestine, making up about 40 percent of the agricultural GNP, according to the Rural Research Center at An-Najah. Of most importance to plant genetic resources are small ruminants, which are very important to the lifestyle, culture and agricultural economy of the Palestinian territories. However, restriction of the grazing area (mostly in the Eastern Slopes eco-region as "Israeli military areas"), to just 15 percent of what it was in 1967, has caused production to diminish in the last almost three decades. While the numbers of range-produced livestock were unsustainable in the West Bank in 1967, with such limited grazing areas available to shepherds, there is now both an unsustainable ratio of livestock per dunum, and thus overgrazing, and higher production costs in the livestock sector, due to the need to purchase supplemental feed. More recently there has been a decline altogether in the number of livestock in Palestine because of reduced marginal returns.

Since the beginning of this century, areas and patterns of grazing have been increasingly restricted, first due to restrictions imposed by the British Mandate Authorities, later by the State of Israel which, when they had established the state in the late 1940s, were determined to settle Israelis in the Negev Desert, which had been a large rangeland area. At this time many herders which had been located in the Negev either migrated, or were transferred to the West Bank and Gaza. (Anglo- American Survey of Palestine, 1944) This increased markedly the numbers of animals on the land and led to significant desertification of the largest grazing area in the West Bank (the Eastern Slopes eco-region) between 1948 and 1967. (Abed Rabboh, 1995) With the Israeli occupation following the June War of 1967, large tracts of this same area (approximately 85%) were restricted, mostly as military or security zones. (Citation) This further restricted the grazing area, leading to an animal-to-land ratio that far overwhelmed the grazing capacity, with there being 580,000 animals grazing approximately 225,000 dunums.

With over 2500 plant species, a number of which are known to be indigenous, and with the within species divetypical of arid areas, the Eastern Slopes could well be a gold mine in biological diversity and possibly provide the gene stock for future agricultural and medical advances in the Middle East region. The area is also an important crossing point for migratory birds and is the home of wildlife native to geographic Palestine.

2.5.1 Current Status of Rangeland and Pastures

About one third of the West Bank and 12% of Gaza can be considered as pastural rangeland, suitable for the production of grazed livestock (specifically small ruminants such as sheep and goats). In the West Bank, Palestinians however, have access to only about 15-20% of the rangeland area in the Eastern Slopes (the largest parcel of this land), as much of it remains closed as either military areas, natural reserves or settlements, classified as "area c" under the "Oslo 2" agreement. This means that they remain under Israel's control., with the possibility that they will be yielded to Palestinian control over time. (ARIJ 1994, Gaza Profile 1994, Oslo 2 Agreement)

Most of the 580,000 thousand animals grazed by Palestinians in the West Bank, follow generally a grazing pattern that involves moving animals to the lower and less abundant pastures of the Jordan valley during the rainy season, and driving them back to the relatively more fertile highlands (usually in the upper Eastern Slopes) for the spring and summer. Most herders now feed their animals on purchased barley or forage concentrates during a certain part of the year (usually summer), due to the degraded nature of the range area.

Little is known about the actual capacity of the Eastern Slopes area because of the dramatic changes in numbers of animals and people in the area in the last one hundred years. Only a few pilot projects are currently under way to attempt to determine the capacity of the area if not grazed, both for natural regeneration and for reforestation. Other small areas do exist, that provide a measure of the potential productivity of the land. In areas which are now prohibited to Palestinians for "security reasons," it is possible to see the difference in biomass production, although there have also been reports from botanists in Israel about mortality in acacia and other desert species, very possibly because a small amount of grazing is needed to spur growth.

The level to which degradation of arid lands has taken place here is evidenced in comparisons between areas which have been protected from grazing and areas which have not over the last 20 years. Just southeast of Yatta is one such location. Next to the small Israeli settlement of Sussya is a reserve which was initially cordoned off by the agricultural department of Hebron, at that time under the Israeli military administration of the area, more than twenty years ago. Numerous species of flora are now seen in the area, including *Atriplex*, *Juniper*, and *Acacia* species.

Much more study is needed to determine both the current and past grazing patterns in far greater specificity, as well as ownership and land holding divisions now and in the past, and to determine the actual capacity and potential of the land. It is estimated that pasture land in the southern part of the West Bank produces currently about 50 kilograms (kg) of biomass per dunum on average

throughout the year, with variation, of course, depending on the climate and topography (i.e. water availability). The average small ruminant head eats approximately 7 kg per day of biomass and thus each animal would need about 10 dunums (I hectare) to sustain it throughout the year. Given this, it is clear that there are grave risks of overgrazing and unsustainable pastural management, as the number of animals far exceed the land's carrying capacity.

Experts suspect that plant biodiversity and biomass in the Eastern Slopes has decreased substantially in the open areas since 1967. These estimates are based on the number and frequency of rangeland species present in the area. Slightly more than 200 species are rare or endangered in the West Bank. Some of the these include important rangeland forages such as *Coleutea*, *Artemisia herba-alba*, *Spinaristia*, *Haloxylon pesicum*, *Acacia albida*. The vegetative potential of these plants as forage as well as green cover is high. It is necessary that a management system be put into place that will allow flowering and seeding, and thus regeneration to occur in the rangeland.

CHAPTER 3
Forestland

The West Bank contains about 260,000 dunams (26,000 hectares) of forested area, according to the forestry department of the Ministry of Agriculture. Of this, more than 195,000 dunams are natural forests and just over 37,100 dunams are man-made forest areas. An additional 28,400 dunams are unplanted area with forest potential. (Abed Rabboh, 1995) Native forest species are listed in the annexes.

In the southern most areas (Hebron, Bethlehem, Jerusalem, Ramallah) the majority of the forested areas (about 20,000 of the 21,300 dunams) are introduced and mostly coniferous (made up mostly of pine) and planted either by the British, Jordanian or Israeli authorities. While not native, in many cases they often harbor significant wildlife and plant genetic resources. Historical and recent natural data indicate that these areas were probably naturally planted with tree species such as juniper, caroub, and oak, as well as cultivated species such as olives and fruit trees. (Robinson 1838, Guerin 1852, Tristram 1892). In many cases, there has now been a mixing of the various species in these areas, so that forested areas are often made up of both introduced coniferous and other species. While most these forested areas are in the district of Hebron, Ramallah does contain several important forested areas including Im Safa, the oldest planted forest in the West Bank.

Very little forested area exists in Nablus, with most apparent on the outskirts of the city of Nablus itself. For the most part this area is introduced, though it is clear that climatically potential exists for development of forestry in the sub-district.

The Tulkarem and Jenin sub-districts make up the largest forested areas in the West Bank, making up more than 235,000 of the total 260,000 dunams of forest. Because the sub-districts are relatively less populated than the rest of the West Bank and receive relatively more rainfall, they tend to be more suited for naturally occuring forested area (and indeed the large majority of forests in the north are natural). The forests tend to be diverse, composed of *Pinus halapensis*, *Pistachea* spp., *Ceratonia siliqua*, *Cuppressus sempverence*, and *Quercus* spp., among others.

Gaza is renowned for the severity of the population crisis (see below). As a large percentage of the population is involved in agriculture for their livelihood, much of the land that is not directly inhabited is under cultivation. However, unoccu-

pied and uncultivated land does exist (113,000 hectares, or 42% of the total land area) and is in need of revitalization, or at least stabilization. Much of this area is in fact of restricted access for security reasons. There is effectively no land which can be considered forest area in Gaza, in large part because of the climate and soil.

CHAPTER 4
Indigenous Plant Genetic Resources

Indigenous plant genetic resources have been identified through work by PIALES, using available literature. The literature search of flora and fauna in Palestine revealed that the study of floristic biodiversity here is least developed in the West Bank and Gaza. While *Flora Palaestina* (Zohary 1966), indicates that approximately 2500 species occur in the West Bank and Gaza, representing a high degree of biological diversity, little is known about the documentation of species chorology and distribution pattern.

In the last 30 years great economical, industrial, urban, and political changes have taken place in the Palestinian territories. The influence of these on the status of biological diversity is imagined to have been destructive, especially in the sense that their geographical and habitat range have narrowed and in the sense that local populations are small, as many as 40 plant species are reported endangered and about 150 are known to be rare (see annex). Some of these plants are listed now as protected species by the Israeli Nature Reserve Authority (NRA).

In terms of the scope of literature available on flora in Palestine, there are records on this topic dating back to the late 19th century, when Tristram (1892) wrote the Natural History of Palestine, which drew on the work done by the Palestine Exploration Fund to produce Flora of Palestine in the late 1880s. While useful as an historical record, the work, and even the updates done through the 1940s by the Palestine Exploration Fund, have at this point been surpassed by more recent publications.

Aaronsohn (1934) in his Trans-Jordan Flora gave a general description of plants in Hebrew but provided little information on plant geography. Zohary (1966) and Feinbrun-Dothan (1978) assumed the West Bank to comprise of four phytogeographical districts, known as Samarian, Judean mountains, Judean desert and the lower Jordan Valley, while Pitmann *et al.* (1983), has added another district to eastern side of Samaria named as the Eastern Samaria. This comes as a result of its unique, rather different climatological and topographical characteristics which ultimately affect the type of the native flora and the richness of its biota. Most of the available plant collections are deposited at the herbarium of the Hebrew University in Jerusalem. Although Pitmann *et al.* (1983) and Feinbrun-Dothan and Danin (1991) present their taxa on grid-shaded maps, it is

unfortunate that the documentation of taxa abundance and distribution in the literature is rather general and only refers to the botanical district mentioned above.

Attempts from the Palestinian side to study the plant biodiversity and to evaluate in particular species composition and distribution in Palestine have been somewhat limited, making the identification of ecologically sensitive areas and the justification for these decisions challenging. Abu-Irmeileh (1988) highlighted the existence of poisonous plants in the region and evaluated important rangeland and garden plant species in the Palestinian-Jordanian environment. However, nothing is found in his account about chorological and distributional patterns. A significant portion of the available literature on plants in the region has been mainly devoted to the medicinal, agricultural and cultural attributes, rather than viewing them from the ecological or scientific perspective (Najim 1992; and Juneidi 1973, 1994).

Among the most important indigenous plant groups adapted for the arid land environment here are *acacia*, *artimisia*, *prosopis*, *Ziziphus, populus* and *platanus* species. While some literature exists about the phyto-sociological and ecological importance of these species, little is known about their distribution in Palestinian habitat (*Daninn, 1988*) and thus the available knowledge on these taxa is still general, and accurate figures and maps are still required (*Ashkenzi 1995*); (*Ben-David and Shik 1994*).

According to Waisel (1982) and Shmida (1992), the pool of genetic resources and vegetation biomass in Israel and the West Bank is declining. Therefore, it is now of the utmost importance to undertake investigations on the ecological status of these species and figure out the appropriate means of conservation and management.

The situation in wildlife diversity is not entirely different from botanical diversity, though, obviously, animals have less endenousity than plants, due to continuous movement from one place to another. In the end this means that information of Fauna and its biodiversity, is more difficult to obtain. The first studies on fauna in Palestine were also made by the Palestine Exploration Fund in the late 19th century (Tristram, 1892), but lacked precision and reliability. Even in more modern studies, while numbers of wildlife in Palestine are estimated, their monitoring and evaluation is sketchy due to their continuous movement and the changes in their population (Abbadi, 1988; Andrews, 1995). The available literature, as well, regarding animal biodiversity and wild life movement does not entirely cover Palestinian territories Approximate figures about wild life numbers have been obtained from NRA, IUCN and literature by Isaac, *et al.* (1992, 1993). It is estimated that there are approximately 500 bird species; 100 mammal species, 120 reptiles; and 5-10 thousand insects.

Annexes 1, 2, 3 give details from this literature review on three specific areas of importance:

- Forestry Resources: These range significantly depending on the climate and environment. Certainly, there are a range of types of trees. In the annex below are listed the native species, their general location, notes on their usefulness to humans and a record of their availability.
- Agricultural landraces and pasture plants: These are made up mostly of legumes and cereals, which are either wild relatives of cultivated crops or are useful as wild forage for goats, sheep, and other range animals. They are listed in the table below with notes about their location, usefulness to humans and their availability.

CHAPTER 5
Reserves and Protected Areas

In its 27 years of controlling the West Bank and Gaza, the Israeli occupation authorities have declared and implemented 73 natural reserves, all in the West Bank. These have tended to be around forested areas and water sources, though not always, and often coincide with closed military areas. Negotiations are still underway between the Palestinian Authority and the Nature Reserves Authority regarding the transfer of information about these reserves. Under the "Oslo 2" agreement between Israel and the Palestinian Authority, control of the nature reserves within the area over which the PA has been given control are to be transferred to the PA's Ministry of Agriculture.

CHAPTER 6
Causes of Degradation of PGR and Biodiversity

The danger of degradation of Plant Genetic Resources is significant in the Palestinian territories. The reasons for this are numerous and predictable, related to a recently established authority and lack of proper pollution control laws and facilities. These include:

1. Poisoning the environment through solid waste. There are no registered waste dumps or land fills in the West Bank and very little room for the disposal of waste in Gaza. The result of this and the lack of public awareness about the dangers of solid waste, is that unmonitored land fills exist throughout the West Bank, often next to or on top of ecologically important sites. In an attempt to dispose of this problem, waste is often burned, resulting in toxins being released into the air from plastics and other materials mixed in with the waste. In Gaza Strip, some attempts have been made to address the solid waste problem, which had reached crisis proportions by the time the Strip was given over to the control of the Palestinian Authority. However, given the high population and small area, the problem of the disposal of solid waste remains a major difficulty. It is worth noting that an estimated 65% of waste in the PT is organic, meaning that significant potential exists for recycling and composting.

2. Industrial pollution. Likewise no system exists for the disposal of industrial and medical waste, which is often simply dumped with solid waste, releasing toxic substances and gasses. Included in this category, and a particularly visible example of the damaging effects of industrial pollution, are the effects of runoff from stone cutting and crushing facilities, the lime-rich runnoff from which runs down wadis in the West Bank, damaging vegetation and soil quality.

3. Waste-water (Sewage). While wastewater treatment facilities have been installed in Ramallah and Jenin in the West Bank and Jabalia and Gaza City in Gaza, and efforts are currently underway to develop a system of wastewater collection and treatment in Bethlehem/Beit Jala, none of these facilities are yet running at optimal capacity. Most wastewater is currently dumped into wadis, flowing generally toward the Jordan Valley (from the West Bank) or the Mediterranean Sea from Gaza, and risks not only contaminating the wadis, but also possibly contaminating groundwater. No hamlets or villages in the West Bank and Gaza are served by wastewater collection net-

works. These communities tend to use cesspits or septic tanks, which either contaminate the ecosystem through faulty bottoms or after overflow, or are pumped into trucks, which generally dispose of their wastewater into wadis.

4. The intensification of agriculture, with the increasing usage of agricultural chemicals and the increasing tendency toward exotic higher yielding varieties presents serious risks for PGR in the West Bank and Gaza, particularity in vegetable and horticulture crops, but also increasingly in grain crops.

5. The expansion of housing, roads and other infrastructure to meet the growing population also presents risks to PGR, from resulting erosion of soil texture and biomass and loss of crop land. This problem is exagerated by the continued presence and expansion of Israeli military and civilian settlement installations in the West Bank and Gaza Strip and the declared need for "security roads" for their safety.

6. Lastly, but of great importance, is the low level of awareness from the Palestinian population as a whole about the importance of preservation of the environment generally, and biodiversity and PGR in particular, and the effects of pollution on these things. Programs are newly under way to try to change this, but this process will be long and complicated by the prevailing uncertain political and economic situation.

CHAPTER 7
Ongoing Activities for the Preservation of Biodiversity and PGR

Despite the problems regarding the degradation of Plant Genetic Resources caused by pollution and other human processes, and the problems in developing programs in the implementation of national level programs to handle this problem, there have been a number of activitites already launched, or in the process of being launched that should be noted and supported.

1. Recognizing the importance of the issues of desertification and degradation of and land resources, Palestinian Authority President Yasser Arafat ordered in 1994 the establishment of the Palestine Institute for Arid Land and Environmental Studies (PIALES), with a mandate to act as the lead institution in the carrying out research and implementation of activities to combat desertification, including the preservation and development of PGR and biodiversity.

2. An ad hoc committee has been formed under the auspices of PIALES and the Palestinian Ministry of Agriculture, which includes representatives from these and other ministries or departments, Universities, and NGOs. This committee's purpose is to discuss the formation of a strategy for the conservation of plant biodiversity, and to identify the areas to be targeted for the protection of PGR and plant biodiversity more generally. This will hopefully lead to further in depth research as part of a regional program for the conservation of agricultural biodiversity.

3. The Palestinian Ministry of Planning and International Cooperation has organized an emergency program for the identification of ecologically sensitive areas, which should be protected throughout the West Bank, in cooperation with PIALES, universities, and other NGOs and governmental organizations. In each of the sub-districts, relatively large areas of high ecological sensitivity, agricultural areas of high sensitivity, areas for which EIAs should be done prior to building, and major pollution sites have all been identified. The report from this project will lead to the establishment of a strategy for natural resources protection to carried out through inter-ministerial and inter-organizational coordination.

4. Efforts are underway by the Ministry of Agriculture, PIALES, NARC and Palestinian NGOs to identify PGR, specifically those resources of use for agriculture and range management. Basic efforts have also been made to screen varieties for important characteristics.

5. Basic, small scale herbariums and nurseries have been started and maintained (with more or less success depending on the location and the personnel in charge of the maintenance) at Birzeit University, University of Bethlehem and An'Najah University in Nablus. While representing a start, all of these could use significant improvement. Likewise, a national herbarium, separate from the University structures, is needed at this time to provide a central location and clearinghouse.

6. PIALES, the Palestine Geographic Center (PALGRIC), and ARIJ have all begun looking at how to use remote sensing and GIS technologies in the identification of plant genetic resources in Palestine. PALGRIC and PIALES have specifically been looking at the application of satellite images in identifying general plant cover, and ARIJ has been using digitized aerial photographs in demonstrating land use in the West Bank. Environmental department of the Ministry of Planning has been involved in similar activities in the both Gaza and the West Bank.

7. Several initiatives have recently been started to increase awareness of environmental issues, including preservation of plant biodiversity. Among the leaders of this are Hand by Hand for the Protection of the Environment, Education for Awareness and Involvement, Children for the Protection of Nature in cooperation with the Palestinian National Commission for Education, Culture and Science/PLO.

ANNEX 1

List of Native Legumes Plants in Palestine

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Name	District	Locality	M	R	T	Com	Rare	End.	Notes
Acacia albida	5	Hot zone = tropical	X	X	X		X		timber for building, gum for industry, bark
A. laeta	5	arid region		X			X		for tanning and for grazing- الاكاسيا
A. tortilis	4,5			X			X		
A. raddiana	1,2,3,4,5			X		X			
Prosopis farcta	1,2,3,4,5	Alluvial soil and among crops	X			X			Pods eaten by cattle - ينبوت
Cercis siliquastrum	1,2	Maquis/mountains			X		X		Ornamental, buds are pickled, timber used in carpentry - كليل عروس الغابة شيرق
Ceratonia siliqua	1,2,3,4,5	Maquis + mountains but not high altitude	X	X	X	X			Food, juice - خروب
Caesia (Senna)	5	Wadi in hot regions	X				X		
Parkinsonia aculeata	1,2,3,4	Wadis				X			
Anagyris foetida	1,2,3,4	Open vegetation	X	X			X		
Lotononis platycarpa	5			X			X		
Crotalaria aegyptiaca	5	Wadis in hot deserts		X			X		Browsed by camels
Argyrolobium uniflorum	3,4,5			X		X			
A. crotalarioides	2	Batha + fields		X					
Lupinus angustifolius	5	Batha + fields	X	X			X		Protected by law
L. micranthus	2		X	X			X	X	
L. pilosus	2		X	X			X		
Calycotome villosa	1,2,3,4,5	Maquis + batha		X	X	X			
Spartium junceum	1,2,3,4	Batha, mountains	X	X	X		X		
Retama raetam	1,2,3,4,5	Sandy + desert soil	X	X		X			Home use eye wash
Indigofera articulata	5 dead sea	Oasis Tropical	X	X			X		Dye plant
I. obliongifolia	5			X			X		
Bituminaria bituminosa	5					X			Not palatable
Colutea istria	2			X			X		
Astragalus spiosus	1,2,3,4,5	Fields + batha		X		X	X		Some spp. are common others are rare
A. dactylocarpus	2,3,5	vegitation		X			X		
A. sieberi	5			X		X			
A. dienacanthus	2,4			X		X			
A. bethlehemiticus	2,4			X		X			
A. cretaceus	2,4			X		X			
A. dactylocarpus	2,3,4			X			X		
A. caprinus	4			X			X		
A. brachystachys	4	Fields + batha		X			X		

Name	District	Locality	M	R	T	Com	Rare	End.	Notes
A.palaestinus	1,2,3,4,5	vegitation		X		X			
A. oocephalus	3			X			X		
A. sanctus	1,2,3,4,5			X		X			
A. marcocarpus	1,2,3,4			X		X			
A. aleppicus	1,2,3,4			X		X			
A. epiglottis	1,2,4			X		X			
A. compy lorrhynchus	2			X			X		
A. asterias	1,2,3,4,5			X		X			
A. tribuliodes	1,2,3,4,5			X		X			
A. boeticus	2,4			X			X		
A. corrugatus	4			X			X		
A. guttatus	2			X			X		
A. bombycinus	2			X			X		
A. palaestinaus	1,2,3,4,5			X		X			
A. intercedinus	2,4			X			X		
A. hamosus	1,2,3,4,5			X		X			
A. intercedens	2,4			X			X		
A. callicurus	1,2,3,4,5			X		X			
A. hipidulus	2,3,4			X		X			
Biserrula pelecinus	1,2,3,4,5			X		X			
Glycyrrhiza glabra	5		X				X		Economic plant
Tripodion tetraphyllum	1,2,3,4					X			
Hymenocarpos circinnatus	1,2,3,4,5	Fallow fields		X		X			
Lotus edulus	1,2,3,4,5	Among fields	X	X		X			الاصيبعه – السيسه
L conimbricensis	1			X			X		
L. ornithopodioides	2			X			X		
L. peregrinus	1,2,3,4,5			X		X			
L. palustis	1,5			X			X		
L. glaber	2,5			X			X		
L. collinus	1,2			X			X		
Tetragonololous plaestinus	1,2,3,4,5	Among fields		X		X			food - اصيبعه
T. requienii	1,2			X			X		
Dorycnium hisutum	1			X			X		
D. rectum	1			X			X		
Securigera securidaca	1,2	Among wintre ccrop		X			X		
scorpiurus muricatus	1,2,3,4,5			X		X			
Ornithopus compressus	2			X			X		
O. pinnatus	1						X		
Coronilla scorpioides	1,2,3,4,5	Fields		X		X			
C. Ccretica	1,2,3			X		X			

Name	District	Locality	M	R	T	Com	Rare	End.	Notes
C. rostrata	1,2,3			X		X			
Hippcrepis unisiliquasa	1,2,3,4,5	Fields		X		X			
H. costricta	5			X			X		
H. multisiliqosa	2,5			X			X		
hedysarum spinosissimum	2		X	X			X		
Onobrychis caput-galli	1,2,3,4,5			X		X			
O. squarrosa	1,2,3,4,5			X		X			
O. crista-galli	1,2,3,4,5			X		X			
Alhagi graecorum	1,2,3,4,5			X		X			
Ononis spinosa	1,2,3,4,5					X			(Compared with other legumes, it is less palatable by animals.)
O. pubescens	1,2,3,4,5					X			
O. alopecuroides	1,2						X		
O. reclinata	1,2,3,4,5					X			
O. mitissima	2,5						X		
O. phylosephala	2						X		
O. hirta	1,2						X		
O. serrata	3,4						X		
O. natrix	1,2,3,4,5					X			
O. orithopodioides	1,2,3,4,5					X			
O. biflora	1,2,3,4,5					X			
O. viscosa	1,2,3,4,5					X			
O. sicula	1,2,3,4,5					X			
Algagi maurorum	1,2,3,4,5	Among fields + on hills	X	X			X		Eaten by camels
Trigonella shlumbergeri	2,3,4,5	Mountain, E.slope,	X	X		X			Important forage plants
T. arabica	1,2,3,4,5	among fields	X	X		X			
T. foenum-graecum	2		X	X			X		حلبة
T. berythea	1,2,3,4,5		X	X		X			
T. lilacina	1		X	X			X		
T. spicata	2		X	X			X		
T. astroites	2		X	X			X		
T. caelesyriaca	1,2,3,4		X	X		X			
T. sibthorpii	4		X	X			X		
T. cylindracea	2		X	X			X		
T. kotschyi	1,2,3,4		X	X		X			
T. hamosa	5		X	X			X		
T. corniculata	2		X	X			X		
T. spionsa	1,2,3,4,5		X	X		X			
T. stellata	1,2,3,4,5		X	X		X			
T. monospeliaca.	1,2,3,4,5		X	X		X			
Factorovskya aschersoniana	2,3,4,5					X			

Name	District	Locality	M	R	T	Com	Rare	End.	Notes
Medicago lupulina	1,2,3	Fields		X		X			Important group of plants for grazing. some are common, some are not. القرطه
M.sativa	1,2			X			X		
M. radiata	2,4			X			X		
M. scutellata	1,2			X			X		
M. blancheana	2,3,4			X		X			
M. orbicularis	1,2,3,4,5			X		X			
M. rugosa	1,2,4			X		X			
M. coronata	1,2,3,4,5			X		X			
M. ciliaris	1,2			X			X		
M. granadenisis	2			X			X		
M. murex	2			X			X		
M. polymorpha	1,2,3,4,5			X		X			
M. laciniata	3,4			X			X		
M. minima	2,3,4,5			X		X			
M. rotata	1,2,3,4,5			X		X			
M. tuberculata	1,2,5			X		X			
M. italisa	2			X			X		
M. rigidula	2,3,4,5			X		X			
M. tuncatula	1,2,3,5			X		X			
M. constricta	2			X			X		
Melilotus	2,5	Fields	X	X			X		Fodder + pasture plants also good honey plants البرسيم
M albus	1,2,3,5			X		X			
M meassanensis	1,2,3,5			X		X			
M. sulcatus	1,2,3,4,5			X		X			
M. indicus	1,2,3,4,5			X		X			
M. italicuc	1,2			X			X		
M. elegans	2			X			X		
Trifolium repens	2	Fields, batha – Rdsides		X		X	X		Basic fodder + pasture plants
T. fragiferum	1,2,4			X		X			
T. phisodes	2,4			X			X		
T. pilulare	1,2,3,4			X		X			
T. eriosphaerum	1,2,3,4,5			X		X			
Tsubterraneum	1,2			X			X		
T. israelliticum	1			X			X		
T. campestre	1,2,3,4,5			X		X			
T. boissieri	2			X			X		
T. erubescenc	2,4			X			X		
T. spumosim	2,4			X			X		
T. argutum	1,2,3,4,5			X		X			
T. resupinatum	1,2,3,4,5			X		X			
T. clusii	1,2,3,5			X		X			

Name	District	Locality	M	R	T	Com	Rare	End.	Notes
T. tomentosum	1,2,3,4			X		X			
T. ballatum	1,2,3,4			X		X			
Tglanduliferum	1,2			X			X		
T. stellatum	1,2,3,4			X		X			
T. cherleri	1,2,3			X		X			
T. scaburm	1,2,3,4			X		X			
T. nigrescens	1,2			X			X		
T. lappaceum	1,2,3			X		X			
Tclypeatum	1,2,3,4			X		X			
T.scutatum	1,2			X			X		
T. plebeium	2,4			X			X		
Techinatum	1,2			X			X		
T. vavilovii	1,2			X			X		
T. berytheum	2			X			X		
T. echinatum	1,2			X			X		
T. dasyurum	1,2,3,4,5			X		X			
T. prophetarum	2,4,3,5			X		X			
T. puroureum	1,2,3,4,5			X		X			
Cicer pinatifidum	1,2,4	Among fields	X	X		X			Cultivated stable and well known in the middle eastern food
Vicia ervilia	1,2,3,4,5	Fields		X		X			Forage plants
V. narbonensis	1,2,3,4,5			X		X			
V. galilaea	1			X			X		
V. hybrida	1,2,3,4,5			X		X			
V. sericocarpa	1,2			X			X		
V. galeata	1,2,4			X		X			
V. sativa	1,2,3,4,5			X		X			
V. peregrina	1,2,3,4,5			X		X			
V. monantha	2,3,4,5			X		X			
V. galeata	1,2,4			X		X			
V villosa	2			X			X		
V. benghalensis	2			X			X		
V . palaestina	1,2,3,4,5			X		X			
V. tetrasperma	1			X			X		
Lens ervoides	2			X			X		Food crop
L. orientalis	1,2,3		X	X		X			
Lathyrus aphaca	1,2,3,4,5	Fields		X	X	X			Forage plants
L. ochrus	1,2,4			X		X			
L. belipharicarpus	1,2,3,4,5			X		X			
L. ciliolatus	2,4			X			X		

Name	District	Locality	M	R	T	Com	Rare	End.	Notes
L. shaericus	2			X			X		
L. inconspicuus	1,2,3			X		X			
L. pseudocicera	1,2,3,4,5			X		X			
L. grogonei	2,3,4,5			X		X			
L. hierosolymitanus	1,2,3,5			X		X			
L. hirtcarpus	2			X			X		
L. marmoratus	2,4			X			X		
Pisium fulvum	1,2,3	Fields		X		X			Cultivated forages for food البازيلاء
P. elatius	1,2,3,4			X		X			
P. sativum	1,2,3,4,5			X		X			
Oxalis corniculata	1,23,5	Damp places + among		X			X		
O. pes-caprar	2	fields		X					

ANNEX 2

List of Native Grasses in Palestine

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Name	District	Locality	M	R	T	Com	Rare	End.	Notes
Leersia distachyon	1,2,3,4,5			X		X			
Heteranthelium piliferum	2,4			X			X		
Aegilops kotschyi	2,3,4,5	Fields		X		X			
A. peregrina	1,2,3,4,5			X		X			مراعي
A. biuciali	2			X			X		
A. geniculata	1,2,3,4			X		X			
A. speltoides	1			X			X		
A. crassa	2			X			X		
A. searsii	1,2,3			X		X			
A. peregrina	1,2,3,4,5			X		X			
Triicum dicoccoides	1,2,3			X		X			
Hordeum spontaneum	1,2,3,4,5			X		X			
H. bulbosum	1,2,3,4,5			X		X			
H. glacum	1,2,3,4,5			X		X			
H. marinum	1,2			X			X		
H. histrix	2			X			X		
Taeniatherum crinitum	2,4			X X			X		
Bromus catharticus	1,2, 5	Batha		X		X			Some other species are common
B. syriacus	1,2			X			X		
B. brachystachys	1,2,5			X		X			
B. scopariu	1,2,3,4,5			X		X			
B. japonicus	1,2,3			X		X			
B. alopecuros	1,2,3,4,5			X		X			
B. lancelatus	1,2,3,4,5			X		X			
B. tectorum	1,2,3,4,5			X		X			
B. diandrus	1,2,3			X		X			
B. sterilis	1,2,3,4,5			X		X			
B. madritensis	1,2,3,4			X		X			
B. rubens	2,3,4,5			X		X			
B. fasciculatus	1,2,3,4,5			X		X			
Boissiera squarrosa	2,5			X X			X		
Averia	1,2,3,4,5	Batha		X		X			الشوفان
Avena clauda	1,2,3,4			X		X			
A. eriantha	2			X			X		

Name	District	Locality	M	R	T	Com	Rare	End.	Notes
A. eriantha	2			X			X		
A. sterillis	1,2,3,4,5			X		X			
A. longiglumis	2,4,5			X		X			
A. wiestii	3,4,5			X		X			
A. barbata	1,2			X			X		
Arrhenatherum palastinum	1,2,4			X		X			
Gaudinia fragilis	1,2			X			X		
Rostraria pumila	5			X			X		
R. obtusiflora	2			X			X		
R. smyrnacea	1,2,3,4,5			X		X			
R. cristata	1,2,5			X		X			
Trisetaria marcochaeta	2,4,5			X		X			
T. linearis	3,5			X			X		
Mililum pedicellare	1,2			X			X		
Lagurus ovatus	1,2	Hillsides		X	X		X		شعر زينب In Hebron
Polypogon viridis	1,2,3,4,5	Moist habitat		X	X	X			ذيل الثعلب
P. maritimus	3,5			X			X		
P. monspeliensis	1,2,3,4,5			X		X			
Phalaris pradoxa	1,2,3,4,5	Moist habitat		X		X			Reed grass - ذيل القط
P. tuberosa	1,2,3,4,5			X		X			
P. minor	1,2,3,4,5			X		X			
P. barachystachys	1,2,3,4,5			X		X			
P. canariensis	2,3			X			X		
Phleum subulatum	1,2,3			X		X			
Alopecurus mysuroides	1,2,5			X		X			
A. utriculatus	1,2,3,4			X		X			
Cornucopiae cucullatum	2,5			X			X		
Festuca arundinacea	1,2			X			X		
Lolium pernne	1	Fields		X			X		Rye grass - fodder plant
L. temulentum	1,2,3,4,5			X		X			
L. subluatum	1,2,3			X		X			
L. rigidum	1,2,3,4,5			X		X			
vulpia ciliata	1,2,3,4,5			X		X			
V. unilatralis	2,3,4			X		X			
V. mularis	2			X			X		
V. myros	1,2,3,5			X		X			
Loliolum subulatum	4,5			X			X		
catapodum rigidum	1,2,3,4,5			X		X			

Name	District	Locality	M	R	T	Com	Rare	End.	Notes
Cutandia memphitica	3,4,5			X		X			
sphenopus divaricatus	4,3,5			X		X			
psilurus incurvus	1,2,3,4,5			X		X			
Poa bullosa	1,2,4,5	Fields		X		X			
P. eigii	3,4,5			X		X			
P. bulbosa	2			X			X		
P. trivialis	1,2,3,4,5			X		X			
P. infirma	1,2,3,4,5			X		X			
Catabrosa aquatica	2,3,4			X		X			
Sclerochloa dura	2			X			X		
Dctylis golmerata	1,2,3,4,5			X		X			
Cynosurus elegans	2			X		\	X		
C. callitrichus	1,2,4			X		X			
C. echinatus	1,2			X			X		
Lamarckia aurea	1,2,3,4,5			X		X			
Brica mazima	1,2,3,4,5			X		X			
B. minor	1,2			X			X		
parapholis incurva	1,2,3,4,5			X		X			
Monerma Cylindrica	1,2,3,4,5	Fields		X		X			
Echinaria capitata	2,3,4			X		X			
Melica copani	1,2	Fields		X			X		
M. minuta	1,2			X			X		
Stipa barbata	2,4			X			X		
S. hohenackeriana	2			X			X		
S. parviflora	2,3,4			X		X			
S. bromoides	1,2			X			X		
S. capensis	1,2,3,4,5			X		X			
S. lagascae	1,2,4			X		X			
piptatherum miliaceum				X					
P. thomassi	2,5			X			X		
P. blancheanum	1,2,4			X		X			
P. holciforme	1,2			X			X		
Phragmites austalis	1,2,3,4,5	River banks		X		X			Reed - القنة
Schismus arabicus	2,3,4,5			X		X			
S. brabatus	4,5			X			X		
Aristida coerulescens				X		X			
A. adiscensionis	3,5			X			X		
Aluropus lagopoides	3,4	Saline marshes		X			X		Fodder plant
A. litoralis	3,4,5			X		X			

Name	District	Locality	M	R	T	Com	Rare	End.	Notes
Enneapogon persicus	5			X		X			
Eragrostis pilosa	2,5			X		X			
Eleusine indica	1,2	Saline soil		X		X	X		
Dactyloctenium aegypitum	1,5			X		X			
D. bipinnata	3,5			X		X			
D. retoflexa	1			X		X			
D. fusca	1,3			X		X			
D. villosuss	3,4,5			X	X				
Chloris gayana	1,5			X		X			
Panicum	1,2,3,4,5	Irrigated fields		X	X				Millet - ذرة
Cynodon dactylon	1,2,3,4,5	irrigated land		X	X				Lawn grass - نجيل
Crypsis schoenoides	2,3,5			X	X				
C. factorovskyi	2			X		X			
Panicum repens	1,2,3,5			X	X				
P. miliaceum	2			X		X			
P. capillar	1,2			X		X			
Echinochloa crus-galli	1,2,3,4	River banks		X					Fodder plant
E. colonum	1,2,3,4,5			X					
Branchiria eruciformis	1,2			X		X			
B. mutica	3			X		X			
Paspalum dilatatum	1,2,3,4			X	X				
P. paspalodes	1,3,4			X	X				
Digitaria sunguinalis	1,2,3,4,5			X	X				
Setaria glauca	2	Irrigated land		X		X	X		
S. viridis	2			X		X			
S. verticillata	1,2,4,5			X	X				
Pennisetum asperifolum	1,2,3,4,5			X	X				
P. divisum	4,5			X		X			
P. ciliare	4,3,5			X	X				
Tricholaena tenerifae	3,4,5			X	X				
Imperata cylindrica	1,2,3,4,5			X	X				
Saccharum ravennae	1,5			X		X			
S. strictum	5			X		X			
Sorghum halipenase		Irrigated land		X	X				ذرة القانس
S. virgatum	2,3,4,5			X	X				
Phoenix dactylifera	3,4,5	Cultivated		X	X				Food - النخيل
Arum spp.	1,2,3,4,5	Wet land		X			X		Food - لوف

Name	District	Locality	M	R	T	Com	Rare	End.	Notes
Typha spp.	1,2,3,4,5	River banks		X			X		نبات مخزز
Epipactis helleborim	3,4,5	Maquis		X			X		Protected by law
Cephalanthera	1,2	Maquis shade			X		X		Protected by law
Limodorum abortirum	1,2	Pine forest			X			X	Protected by law
Neotinea maculato	1,2	Batha			X			X	Protected by law
Orchis spp.	1,2	Batha			X			X	Protected by law
Anacumptis pyramidialis	1,2	Batha			X			X	Protected by law
Serapias vomeracea	1,2	Batha			X			X	Protected by law
Ophrys spp.	1,2	Batha			X			X	

ANNEX 3
List of Indigenous Forest Trees in Palestine

Acacia spp., albida Delile,
Acacia laeta Bentham,
Acacia tortilis (Forsk) Hayne,
Acacia radiana Savi,
Arbutus andrachne L.,
Cupressus sempervirens L.,
Ceratonia siliqua L.,
Laurus nobilis L.,
Pinus halepensis - Miller,
Pinus pinea L.,
Pistacia lentiscus L.,
Pistacia atlantica Desf.,
Pistacia saportae Burnat,
Pistacia palaestina Boiss.,
Populus euphrantica - Oliver,
Quercus spp.,
Tamarix spp.,
Tamarix aphylla (L.) Karsten,
Tamarix arvensis Zohary,
Tamarix amplexicaulis Ehrenb,
Tamarix tetragyna Ehrenb,
Tamarix parviflora DC. etc.,
Ziziphus spina-christi (L) Desf.,
Ziziphus lotus (L.) Lam.

ANNEX 4
List of 1995 Agricultural Crops Reserves for the West Bank & Gaza (in dunums)

Table 1 List of orchards - genetic resources (fruit trees) Crop Land Area

Crop	Land Area
Almond	75,690
Apple	10,000
Apricot	5,320
Avocado	43
Banana	5,802
Date Palms	2,820
Fig	22,750
Grapefruit	3,760
Guava	4,535
Jajoba	83
Java	4,198
Juava	683
Kaki	13
Land grape	69,150
Lemon	3,054
Loquate	88
Mandalina	6,034
Mandrin	1,173
Mango	5
Olives (non prod.)	35,300
Olives (prod)	769,250
Citruses	80,000
Orange (Blood)	
Orange (Farshawi)	
Orange (Joint)	
Orange (Local)	
Orange (Shamuti)	
Orange (Valencia)	
Other fruits	53,407
Palm	750

Crop	Land Area
Peach & Nectarine	938
Pear	285
Pecan	45
Pistachio	116
Plum	30,450
Pogmond	260
Pomegranate	70
Quince	140
Trellise Grape 12340	
Valencia	2,860
Vines	88,000
Walnut	320w
Washingtonia	1,955w

Source: Department of Agricolture, Jericho, 1995

Table 2 List of cultivated field crops

Crop	Land Area
Anise	725
Barley	133,965
Bitter vetch	27,293
Broad bean	6,354
Broom sorghum	6,763
Chick peas	26,121
Coriandor	265
Dill	580
Dry onion	20,028
Dry peas	339
Dry vetch	16,540
Fenugreek	570
Garlic	2,166
Green forage	804
Lentils 29387	
Local tobaco	1,094
Nigella	820
Onion seeds	448
Onion-sets	510

Crop	Land Area
Peanut	380
Roman camomile	1,895
Seasame	16,919
Sunflower	75
Tobaco	1,465
Vetch / seeds	10,269
Wheat	153,091
White sorghum	1,693

Source: Department of Agriculture, Jericho, 1995.

Table 1.3 List of vegetable crops

Crop	Land area
Artichoke	4
Beans (Dry)	7,000
Beans (green)	9,850
Broad Beans (Green)	14,370
Pumpkin	100
Cabbage	1,202
Carrot	454
Cauliflower	6,821
Cucumber	78,196
Eggplant	5,080
Fresh broi bean	2,535
Garlic	97
Giant melon	2,979
Green	92
Green bean	3,327
Green onion	439
Green peas	921
Hot pepper	10,014
Jewsmallow	2,293
Lettuce	164
Maize	4,300
Melon	1,780
Okra	15,697
Onion	15,000

Crop	Land area
Parsley	161
Potato	7,097
Radish	390
Silvia	20
Spinach	668
Squash	23,785
Sweet com	3,609
Sweet pepper	462
Thyme	434
Tomato	26,151
Turnip	612
Watermelon	1,917
Yellow bean	500
Yellow melon	2,000

Source: Department of Agriculture, Jericho, 1995.

ANNEX 5
List of Ecological and Agricultural Sensitive Areas in Palestine

CRITERIA FOR SITE SELECTION

At this stage land will be classified into the following three categories as a means of determining the level of restrictions on human activities needed on the land: highly sensitive areas (HSA), such as natural reserves and valuable ecosystems which need to be protected for the common good; agriculturally sensitive areas (ASA), which includes important agricultural areas which should be protected from development; or moderately sensitive areas (MSA) land of some ecological importance on which development should require an environmental impact assessment; and areas with no particular sensitivity (NS), where the current situation should remain in tact whereby building is permitted as long as it follows common standards of laws and regulations. As mentioned above, the criteria used for making decisions about the extent to which areas are ecologically Highly Sensitive Areas are as follows

1. the habitats or biological communities are considered exceptional;
2. the area contains an ecosystem with limited representation;
3. the area has an unusually high diversity of biological communities or species;
4. the area provides natural habitat for indigenous species (plants and/or animals) that are rare or endangered;
5. the area is a key lynchpin or a watershed with ramifications for adjacent areas.

Agriculturally Sensitive Areas have been chosen according to their suitability for:

1. grazing
2. field crops
3. vineyards
4. orchards
5. vegetables

Moderately Sensitive Areas have been marked as such on the following criteria:

1. The area is of potential ecological value but characteristics such as rare flora or fauna, provision of habitat, or placing that would make the area key ecologically have not been spotted;
2. Even if the area may contain important flora or fauna, it is a large enough area that it is possible that human activities will not necessarily disrupt nature, if proper measures are taken;
3. It is not necessarily agriculturally important area, but human activities are key to the ecology;
4. The area would be either agriculturally important or highly sensitive but is degraded and needs rehabilitation.

Hebron Region

Highly Sensitive Areas

1. Beit Cahal Natural Reserve (Wadi Al-Qof) - Forest containing *Rhamnus palaestinus*, (buck thorn) *Quericus calliprines* (oak), Cyclemen persicum (protocol, a well known protected plant), and *Populus euphrantica* Olivier (Hour tree). Terracing exists which is said to date back to Byzantine and Roman times. There are two varieties of *Cuppressus*, *C. sempervirens* L. *C horizontalis* (Mill) (Gordon), *Phlomis pungens* Willdr. & *P. brachyodon* Boiss. (Zohary) and many trees of the *Eucalyptus* family. In terms of wildlife, while none were sighted by the research team, discussion with local people revealed that some mountain gazelles, Husaini (fox) and many rabbits are known to live in and/or pass by the area. The protected area encompasses both sides of Wadi Qof (west of Beit Cahal).
2. Between the villages of Tarqoumia and Nuba an ecological site of natural forest that includes *Quericus calliprinos*, a few *Ceratonia siliqua* L., many *Pinus halapensis* (Miller), *Olea europaea* L., *Eucalyptus sp.*, and *Opuntia ficus-indica*. According to locals, animal life includes gazelle, wild rabbits. The protected area should runs along the top of the mountain to the immediate east between Tarqoumia and Nuba.
3. South-east of the town of Idna, near the village of Suba-forest containing *Quericus calliprinos*, *Rhamnus alternus*, *Rhamnus palaestinus*, *Pinus halapensis*, in addition to some annual-biennial plants that have not been identified at this stage (date January 15th, 1996).

4. Just to the south-west of Al-Fawwar Refugee Camp - forest containing *Quericus caliprinos*, *Pinus halapensis*, *Cupressus sempervirens* and *Eucalyptus spp*. Moreover, while currently a sewage stream drains from Hebron and settlements to the west, the area is a natural water drainage basin and wadi, thus increasing the importance of the surrounding area.

5. Just to the west of the village of Karma is a forested area, planted in Jordanian times, which appears to provide an important natural habitat. The forest is dominated by the tree species of *Quericus*, and *Pinus*, and harbors *Cupressus spp*. and other vegetation. Rodents, gazelles and wolfs have all been sighted in the area.

6. East of Deir Rizah near Dura-here is a large forested area-no specific species have yet been identified.

7. North of the road leading into Dura is a forested area providing habitat to flora including *Quericus* and *Pinus*, and fauna including wolves, gazelles, rabbits.

8. In the Southern-Eastern Slopes, the region surrounding the Israeli settlements of Karmel and Maoun, is degraded rangelands with some scattered *Pinus* and *Cuppressus* trees and a *Thymelaea hirsuta* that form a batha sort of vegetation. The area is a habitat to important wild-life including birds, such as Dwairi-Draiji (dunlin), Hassoun, Bulbul, Hodhod (Hoopoe), Abu Sa'ad, as well as wild pigeons, and mammals, such as mountain gazelle, rabbits, fox, Huseini, and wolves.

9. South-west of the town of Beit Ommar is a forested area, probably important in the maintenance of the mountain ecosystem. It includes many forest trees, and is famous for orchards of cultivated species such as malus, plum, peach and *Nactarina* (Nectarine). To the West of the town, important terraces of watershed and mountain landscaping.

10. While mostly pine, the forests surrounding Kufr Ascion should be protected as well (although most are under the protection of Gush Etzion settlement). Little is known about the type of wildlife existent in the area.

11. There is a forest between Beit Ommar and Arroub which contains *Pinus* spp., *Quericus*, *caliprinus*, *Q. boisseri*, *Pistacea*, and a few *cupressus*. It covers a hilltop just southwest of the Arroub refugee camp, and is thought to be an important habitat for fauna.

12. The forest just prior to Beit Fajjar (from Arroub to Beit Fajjar) is urgently in need of both protection and rehabilitation. It has important habitat, and covers a mountainous area which overshadows agriculturally important areas. Surface water drains off the mountain into wadis, spring sand water catchments. It is also biologically important as a habitat for not only *Pinus* spp., but also for other species of flora and fauna. The entire hilltop to be reforested is to be protected.

Agriculturally Sensitive Areas

These are areas which are used for agriculture production. Often the agricultural practices (such as terracing) are important for the maintenance of ecosystems.

1. To the East of Beni Na'im are rangelands and cultivated areas. Orchards of olive and some other fruit trees (specifically almond) and dry land field crops have been planted in the area. It is suitable for grazing of livestock as the potential biomass production of forage plants is quite high, including legumes and short grasses that appear especially when rainfall is adequate. However the present pressure of grazing of herders in the region affect the biomass and decreases the rangeland potential of the region. Our observations in last December showed only few forms *Iris Palestina*, *many Asphodelus ramosus* Miller (a poisonous plant when green) and *Sarcopoterium spinosum* (L.) Spach (unpalatable species). The area extends down to the Jordan Valley and is ideal for water harvesting all the way through. A double check visit to the area in April showed the following native species: *Paronychia argentea, Majorana syriacum, Gundelia tournefortii, Aruma palestinum* and *Chamomile*.
2. East of Hebron is a terraced agricultural area where grapes, fruit trees, and field crops are produced.
3. The valley between Beit Omar, Arroub, Kafr Ascion and Beit Fajjar is agriculturally valuable land, farmed with grapes, figs and stone fruits. It is also the site of the Arroub Agricultural Research Station and agricultural school, where stone fruits, field crops and livestock are all produced and tested.
4. The wadi leading from Sa'ir and Arroub east is agriculturally important land used currently for vegetables, fruit trees, and field crops.
5. In the area leading from Halhul to Sa'ir is an important terraced agricultural area, especially for the production of grapes, fruit trees and some field crops. The southern most *Quericus boisseri* in the world is existent in this area as well.
6. Between Halhul and Hebron are important terraced grape vineyards and some orchards. Not only is their production important, but the terracing is important in the biological maintenance of the area.
7. The plain west of Surif and northeast of Nuba, including the area known as Beir El-Qous, is both valuable for irrigated and rainfed agricultural production - includes some orchards, *Pinus halapensis* on small hills, and quite often, many annual plants that are good for grazing of herders.
8. Along the road to Beit Awwa, Idna, Tarqumia and Nuba, west to the green line, has dry and irrigated agriculture including orchards, field crops and grapes.
9. The area around Ein el-Fawwar, between Fawwar, Yatta and Samoa is a site for irrigated agriculture including vegetables.

10. On either side of the main road from Idna to Hebron are valley agriculture including olives and stone fruit. Villages such as Taffuh have planted in these wadis.

11. West of Dhahiriya toward the hamlets of Khirbet Mamara and Khirbet al-Jabri are important areas for field crop production and grazing. Some grapes, olives and stone fruits are also produced in the area. It includes the area near by Dharya-Arab Al-Rabaddin and Al-Beirih agricultural station which was famous for cultivation of orchards and represents an ecological gradient shown by its different climate and native flora. The most abundant wild plants are Thymalia hirsuta, Carlia coromposa and many crucifers.

12. The area behind (east of) Dhahiriya, is important grazing and agricultural area. Within the wadis and watersheds, agricultural areas (rainfed fruit trees and field crops) are prominent. On hill tops and east of the cultivated areas, grazing is important.

13. South-east of Dura to Dhahiryeh the area is planted with field crops and some orchards.

Moderately Sensitive Areas

1. The mountain just below the village of Beit Cahal includes few olives and grapes as well as fruit trees and naturally occuring wood species (a few *Rhamnus palaestinus* and probably *pistiacea*).

2. The area between Karma, Dhahiryeh and Samoa is an important natural watershed site. In the region there are sites of water wells and natural water resources.

3. Between Zif, the settlement of Carmel, and the hamlet of Al Carmel is important for rangelands, and includes *Olea europaea* and *Amygdalus communis* (almond) trees, natural water catchments (now dug as wells or cisterns), and *wildlife*- gazelles, shinnar birds, many wild pigeon.

4. To the north-east of Sa'ir, Wadi Sa'ir and to the west is an area with good landscaping potential, suitable watershed as well as agricultural field crops and orchards. It also has rich diversity of native plants biota, of which *Tamarix* is the most common.

5. West of the mountainous forested area at Karma is a mountainous area with significant biological potential.

6. Just west of Duma is a valley of potential importance, but more study is needed and possibly revitalization of the area might well be necessary.

7. West of Halhoul, south of Al-Baqar, is a valley with significant potential agricultural and ecological importance.

8. West of Um Alas to the "Green Line", is a hill of significant potential, directly abutting an area of agricultural and environmental potential.

Bethlehem Region

Highly Sensitive Areas

1. Valley between Takoa Settlement and Herodian is a forested wadi-important both as erosion control and watershed, but also probably as flora and fauna habitat. More research is needed to determine the species type existent in the wadi, though oak and *Pinus* spp. have been spotted. Presumably wildlife would be prevalent in the area, though more study is needed.
2. The area directly around Mar Saba-specifically both sides of the Qidron Valley, where wild *caperis* (*Capparis spinosa* L.) have been sighted-should be considered of high importance. In terms of wildlife, gazelles, and various bird species have been spotted in the area.
3. The north side of the valley behind Beit Jala contains important ecological resources including *sarcopoterium spinosum*, *Thymus bovei*,, *Asphodelus ramosus*, Oak, *Phlomis*, some *Trifloium* and *medicag*o species, and some frequent *Olea europaea*. Various types of rodents and birds, as well as important insect varieties are known to exist in this area (Shmida Pers. Comm.).
4. The controversial Jabal Ghneim (Har Homa-between Beit Sahour and East Talpiot) is a mountain covered with old forest (mostly *Pinus*) which acts as a habitat for flora and fauna. The area is said to be inhabited by rodents and mammal predators as well as bird species.
5. The area around King Soloman's Pools is well known as a religious and archeological site. It also contains old trees, as well as important aquatic vegetation, including *Potamogeton filliformis*, *Ornithogalum*, *Narscissus* spp. According to the literature some protected plant species have been recorded there as well including *Narscissus*, *Tulipa*, and some Irises. Animal species are not terribly prevalent because of the site's proximity to neighboring towns and villages. However, there are rodents, birds and other wildlife which inhabit the areas.
6. The area behind Husan and Wadi Foqeen is terraced and forested (mostly with pine) providing important habitat for animals and plant life. It is also an irrigated agriculture site in the area.

Agriculturally Sensitive Areas

1. The agricultural area just above to the west of the village of Taqoa is planted with orchards of stone fruit, olives and vineyards.

2. The village of Taqoa is planted with olives.
3. Just below the settlement of Efrat is a valley planted with orchards and field crops.
4. The area immediately south-west of Al-Khadir village is terraced agricultural land mostly cropped with grapes, fruit trees and field crops.
5. The area immediately around Wadi Foqeen is one of the most important irrigated agricultural sites in the Bethlehem district.
6. The area to the west of Husan is cropped with olives and other fruit trees.
7. Most of the area around Beit Jala to the west is important agriculturally terraced land.
8. The same is true of both immediately north and south of Beit Sahour and Bethlehem. Significant agricultural and grazing areas exist throughout the district.
9. The area southeast of Obediyeh and east of Beit Sahour (Ta'amara and Za'atara) are ecologically important as agricultural and grazing areas as well. (See Map)
10. Extending from east of Abu-Ghneim mountain to Wadi Qidron is an agricultural area planted with fruit trees, field crops and orchards.
11. The area around wadi Al-Khadir, village of Artas, has a high potential for irrigated agriculture, specifically fruit trees and vegetables.

Moderately Sensitive Area

1. The far eastern part of the district, including the area from Obediyeh southeast and from Herodian east contains greatly more unused, not terribly valuable land than the west and central parts of the districts. However, the value of the pasture in this area is important as wild varieties of medics, grasses and legumes have been spotted here.
2. The north side of the Batir / Husan mountain facing Beit Jala and Walaja is terraced and interspersed with low level agriculture and green area. While no evidence of important flora or fauna have yet been revealed, it is very possible that the area is of ecological importance.

Jerusalem Region

Highly Sensitive Areas

There are few truly expansive forests in the Jerusalem area. However, there are several sites which should be protected from the overwhelming pace of development around East Jerusalem. Obviously protection of some of these sites is provisional on a change in the current control of east Jerusalem. From east to west:

1. On the land of Mar Elias, next to East Talpiot, is a forest which also serves as an important habitat for flora and fauna.
2. By the College of Abu-Deis grounds is an old forest which not only provides a habitat for flora and fauna but is also an important check against soil and biodiversity degradation in the area.
3. In the valley leading from Wadi Nar is biologically relatively fertile and contains plantation of varieties ranging from olive to acacia.
4. The area just behind the Mount of Olives and Mount Scopus on the land of the Luthern Augusta Victoria Hospital is an area wooded with relatively old forest which should be preserved.
5. The area between the Mount of Olives, El-Eizaryieh and the settlement of Ma'aleh Adumim is the center of origin of the species Nicotiana glucua and contains several older *Pinus* and *cuppressus* forests-apparently good habitat providers for flora and fauna.
6. The area around the village of Anata is forested and there is rare habitat for flora and fauna (pinus, oak and cuppressus).
7. The water source and recharge area for Wadi Qelt exists in the district of Jerusalem and should be protected both as an important water source and as a habitat for a variety of tree, shrub, plant and animal species. (Marked from the top of Israeli natural reserves marked area).

Agriculturally -Sensitive Areas

Much of the land in and around Jerusalem is already being used for construction, industry or housing (either for Palestinians or Israeli settlers). However, some land does exist which is used for agricultural production.

1. Around the village of Sur el-Baher, the valleys both to the north and south have been planted with fruit trees and field crops.
2. The valley to the east of Jabal Makabr is planted with fruit trees and field crops and terraced.
3. Some agricultural area exists in Hizma and Anata which should be protected as well.

4. South of El-Jib is agricultural area planted with field crops, vegetables, fruit trees and olives.

5. West of Beit Hanina is land that is planted mostly with olives and fruit trees.

Moderately Sensitive Areas

1. The north-west of the Mount of Olives between Getsemene and Mount Scopus is forested with fruit and wood trees.
2. The area east of Abu Deis going toward Wadi Nar. The land is used for grazing and low level agriculture. Trees are important in hold the hillsides and construction should only take place if an alternative strategy for preventing erosion can be implemented.
3. Land east of El-Eizaryieh stretching toward the Jordan valley is valuable as pasture and may well provide a habitat for desert vegetation and animal life, but is badly degraded and needs reclamation.

Jericho Region

Highly Sensitive Areas

In Jericho most of the important areas (until more time exists for in-depth study of flora and fauna) corresponds either with water sources or important archeological sites which have been identified. These are from south to north:

1. Nabi Musa is located to the south-west of Jericho itself, and would be prime grazing area where it open to herders. It has more or less been closed as a military practice range however, since 1967. Existing there are classic Eastern Slopes vegetation including *sarcopeterium spinosa*, *acacia spp.*, and wild grasses and legumes including vetch. Gazelles, Ibex and other creatures of the Jordan Valley are known to frequent the area.
2. Wadi Hajla and the adjacent wadi, 2 km to the north, is a rich oasis to the east of Jericho with a high abundance of *Ziziphus spini-christe*, *Eucolaptus*, and *Pinus halapensis*. Although the wadi is closed to the Jordan Valley border, it appears as a good path for the passing of the wild life west-east or vice versa allowing Gazelle, wild rabbits to cross. Crows have also been seen in the area.
3. Wadi Al-Auja: has a beautiful landscape, and a wide space of land suitable for both irrigated and rainfed agriculture. A representation of its biota included Date palms, *Ziziphus*, *Cuppressus*, *Rhamnus alternus*, *Echium Palaestinum*, *Podonsoma*, *Onosoma giggentea*, *Notobasis syriaca*, *Centurea.*, *Ballota undollata*, in addition to many composites and crucifer species. Gazelle, porcupine (Neis), fox (Husaini) are among the wild animals which were usually abundant in the wadi. The local herders say that the wadi

represents another passing path of wild animals that normally pass by for drinking and might well be for shelter. The area has been frequented for generations by herders. They are probably an important part of the ecosystem, and should be incorporated into protection schemes in the area.

4. Within Ein El-Sultan and its surrounding area is tremendous biomass in comparison to the prevailing landscape of Jericho. Grass and bush species are of particular prominence. This is due to the high water availability.

Agriculturally Sensitive Areas

1. Immediately surrounding most built-up areas and along the road to the north in the Jericho District are irrigated agricultural lands. Generally these areas should be classified as sensitive, requiring EIA for major construction. It is some of the most valuable agricultural land (hectare per hectare) in Palestine. Also sporadic native trees were found in Jericho area such as *Calotropis procera*, *Ziziphus spini-cristi*, and *Acacia albida* and *A. tortilis*. There are some *Artimisa sieberi* Besser, *Haloxylon persicum* Bunge, *Hammada negevensis* Iljin et Zohary and very few *Balanitis aegyptiaca* (L.) Delili further north.
2. The area surrounding Ein el-Dyouk is agriculturally important with bananas and vegetable plantations fed by the waters of the spring.
3. The area surrounding Ein el-Nuweima is agriculturally important with bananas and vegetable plantations fed by the waters of the spring.

Moderately Sensitive Areas

1. The area south of Jericho toward the Dead Sea contains savannah-like vegetation including grass species as well as, *Zizaphus, Calatropis, Acacia*.
2. The wadi to the north of Wadi el-Qelt also feeds Jericho and may well contain relatively important species diversity, especially in winter.

Ramallah Region

Highly Sensitive Areas

The highly sensitive areas are less prevalent in the Ramallah district, as much of the land in the area is agricultural or built up. In this preliminary investigation four sites of importance have been identified

1. On the road between Ramallah and Birzeit, the land on Star Mountain school for the handicapped is forested, containing species of *Pinus* spp., *Quericus* spp. and fruit trees. Wildlife spotted there by local residents includes gazelles and rodents.

2. The land on the campus of Birzeit University is relatively newly planted forested, including *Qericus* spp., *Acacia* spp., *Pastacia* spp. and other species.

3. The area directly across from the refugee camp of Jalazone includes many native plants (*Leguminus such as, Calicotomi villosa* Link, *Sarcopoterium spinosum*, olives, almond, *Ficas caria*, *Asphodilus*, many liliaceae, several *Capparis spinosa*, *Urtica sp.*, and few *Crataegous aronia* (L.), plants from the Decandle family.

4. There is a significant wooded area north of the village of Turmus Aya (between Turmus Aya and Sinjil) which is important as habitat for both flora, including *Inula* viscosa, *Quericus* spp., *Ficus* spp., *Lorenthus* spp., and several composite species, and fauna.

5. The areas of Ein Qiniya is an important watershed and has tremendous biological production. It is an important habitat for both flora and fauna.

6. Between Um Al-Safa and Nabi Saleh is one of the oldest wooded forests in Palestine, constituting some of the most important habitat for flora and fauna.

Agriculturally Sensitive Areas

Aside from those areas mentioned above as highly sensitive areas, land outside of villages in the Ramallah district is important as agricultural land. In particular:

1. The area between Jifna and Turmus Aya is marked by old terraces and olive groves which are important in maintaining healthy soil and preventing erosion, thus preventing degradation of biodiversity.

2. Land to the east of Ramallah (toward and past Taibeh) is generally important grazing land, with some agricultural potential as well. More study is needed to determine its importance as a natural habitat.

3. The area between Jifna, Ein-Seinia, Sinjil and Aboueen, to the north-west of Ramallah are plentiful with fruit trees, agriculture, and with many native species of *Crataegus* aroni, *Pyrus* syriaca and many other legumes.

4. The land west of Ramallah city, between Ramallah and Ein Qinya is planted with terraced olives and fruit trees, with grazing on the uncultivated hills and some vegetable production in the valleys.

5. The valley between Deir Abziah, Ein Arik (west of Betunia) and Beit Aur Fauqa and Beit Aur Tahta is important for irrigated and dry orchard agriculture.

6. The area between Sinjil and Salfit stretching west to Biroquin is terraced olives and fruit trees with some field crops and vegetables in the valley.

7. Between Beit Rema and Abud are terraced orchards of olives and fruit trees.

8. The land to the west of the district is either hilly land, which is generally "natesh" (*Sarcopotarium* spp.) covered, lightly cropped with olive or fruit trees, and used for grazing, or the more plains land that is used as agricultural land (generally used for growing vegetables and fruit trees under irrigation). Some more pristine areas have been developed by the Israelis on the sites of destroyed villages in the northwestern corner of the district.
9. In the plains and valleys south and west of Beit Laqia are irrigated and dry land areas for the production of field crops, vegetables and fruit trees.

Moderately Sensitive Areas

1. North of Taibeh is a mountainous area which extends down toward the Jordan Valley. It is currently used as grazing area but also has significant agricultural potential.

Nablus District

Highly Sensitive Areas (HSA)

1. On the road to west Burkka passing by the south of Yaibud is another forest area of pine and cuppressus trees (HSA).
2. The angle bridge nearby the junction of Al Badan town is an area of beautiful landscaping, watershed and high plant diversity including *Ferula communis* (indigenous to the Al Badan region), *Haloxylon persicum*, *Ziziphus spina- christi*, *Euphobia spp.*, *Thymus*, *Ranunarlus*, *Pinus*, *Artimisia*, etc. (HSA)
3. Just before the town of Tallouza is a forest land of *Pinus*, cuppressus, almond trees and some ordinate perennial plants (HSA).
4. On the Al-ttour mountain (Jerseem) to the east of the mountain is a forest land of pine and cuppressus trees that allow the survival of other plant biota enhance the beauty of the landscape in the area (HSA).
5. The north mountain of the city of Nablus has also a similar forest plant of pine and cuppressus trees (HSA).
6. The mountain to the east of the city of Nablus facing Atsqar refugee camps and close to the Aloun Moraih settlements is another forest land (HSA).
7. There is also another forest land close to the District Coordination Liaison office in Nablus, where the dominant trees there is *Pinus* (HSA).
8. While the town of Sabastia is known for having valuable archeological sites, it is also famous for its native biota, olive cultivation, and some other field crops (HSA).

Agriculturally Highly Sensitive Areas (AHS)

1. On the way from Tallouza to Atseera is a large agricultural area planted with olive, almond, some citrus as well as native plant biota (AHS).
2. The junction from Atseera to Beit Imrein has also a similar capacity for cultivation of olive and other orchards as well as cereal and vegetable crops (AHS).
3. Close to the town of Ejneseniah is dense olive trees forming another agriculturally sensitive area (AHS).
4. Nearby the town of Al Nassarieh is an agricultural land cultivated for vegetables and includes some native Ziziphus and Calotropis trees (AHS).
5. Nearby the towns of Al Funduq and Jean Safut is a wide agricultural fields that is cultivated for rainfed crops such as wheat and barley (AHS).
6. Nearby the town of Tel is a wide area of agricultural land cultivated mainly for Ficus carrica and olive trees as well as field crops (AHS).
7. Close to the town of Kabalan are many olive trees and oak, pistacio are occurring (AHS).
8. Deir Sharaf junction on the way from Nablus to Anabta is well known for its agricultural potential of field crops and olive trees (AHS).

Moderately Sensitive Areas (MSA)

1. The mountain to the north of Al Badan on the east side of the way to Nablus is a moderately sensitive area (MSA) for having some potential for native biota of pine trees and some short grasses.
2. The mountains to the east of the towns of Akraba up to the town of Majdal Beni Fadel is a rangelands and include some perennial plant vegetation and short grasses (MSA).
3. Nearby the town of Salem and Deir Al Hatab is some rangelands and agricultural fields which makes the area as moderate sensitive area. (MSA).
4. Close to the town of Yetma is olive trees, almonds, as well as some plant biota (MSA).
5. Nearby Azzoweih town - acacia trees have been seen among the wheat fields and the olive orchards places (MSA).

Tulkarem District

Highly Sensitive Areas (HSA)

1. The pine and olive forest to the west side of the town of Anabta is a highly sensitive area (HSA).
2. The area between Tulkarem and Azzoun includes old forest lands as well as agricultural land cultivated for olive, almond, and citrus trees. In the area there are also many perennial and annual plants - some of them belong to the Labiatea, Compositi, Umbelleferae and Leguminosea. The area is considered as (HSA).
3. On the road from Qalqeelia to Nablus, a few kilometers before Nablus nearby the settlements of Shamron-Araiel, is an area with many Acacia trees, beautiful biodiversity of native biota including Calycotmi, Pistacio, Ceratonia, Albisia plants as well as olive fields (HSA).

Agriculturally Highly Sensitive Areas (AHS)

1. The town of Saida, especially on the hills nearby, are hundred of dunums of olive trees and orchards which makes the area agriculturally highly sensitive (AHS).
2. To the west of Tulkarem - agriculturally fields are cultivated for vegetables, cereals, citrus and other orchards; many nurseries are present in the region (AHS).

Moderately Sensitive Areas (MSA)

1. The area from Azzoun to Jaiyouse is a moderate sensitive area (MSA) where it has a few olive trees and some rangelands.

Jenin District

Highly Sensitive Areas (HSA)

1. The mountain to the north west of Tubas, known as lbzeeq, is an area of high ecological significance as it includes a rich vegetational cover of rangelands species, including many legume pulses other grass plants, in addition to forest trees of *Pinus*, *Cupressus* that were planted at the beginning of this century, and wild peagons together with many other birds are seen passing by the region (HSA).

2. To the east of Tubas is Lehif Jader mountain with some scattered *Pinus halapensis* and few olive trees on the western slope; to the north eastern side of the mountain, after the town of Tyaseer, is the West Bank best rangelands that is associated with high diversity of native flora, including *Pistacia lentiscus*, *Quericus caliprinose* and *Ceratonia ciliqua* as well as numerous *Anemone* and *Tuilpa* flowers. The presence *Cyclamen persicum*, *Podonsoma syriaca*,, some other gigantea, some other Anchusa spp., and many composites such as *Bellis silvestris*, *Notobasis syriaca*, *Selybum marianum*, *Centaurea iberica*, and *Onopordium* spp.). In the area, beautiful birds of Abu Al-A'ala, Qubbara and the short-toed Eagle, wild cat, mountain Gazelle, and the little owl. Unfortunately the mountain as a whole is too big to be declared HSA and some housing development already exists then. While some parts of the mountain are to be designated as HSA other parts are treated as MSA.

3. Few Kms to the east of Tubas-Tyaseer is location of natural water spring named as Ein Al-Malih where water represent a valuable natural source that we believe play an important role in the course of species richness and diversity. The natural biota in the place includes many plants of *Retama raetem*, *Gundelia tournefortii*, (Akkoub), *Pistacia sp.*, *Callignum comosum*, *ziziphus lotus*, *Ephedra*, *Mericuriales* (male and female species), and many *Brassica*, *Pistacia* species (HSA).

4. To the northwest of Tubas on the way to Zababdih passing through the village of Aqqaba, the area has a great potential for growing olive trees and the cultivation of many cereal crops. In the area to that there is some scattered *Pinus* trees on the hills of a beautiful rangelands. The giant fennel (Ferula communis) and probably Euphorbia sp. together with many composites and legumes have spotted during the field visit. The area is best classified as Agricultural High sensitive (AHS).

5. The forest on the myrter triangle just before the entrance to the city of Jenin is an old pine and cupressus forest. (HSA)

6. The Raba forest to the north east of Aqqaba is another highly sensitive area of pine, oak and cuppresus trees, in addition to agricultural land which fits perfectly for cereal plantation (HSA).

7. Although the top of the mountain facing the town of Sanour from the east has less vegetation, but many almonds and olive trees, some opuntias, occur on the Western slope. More importantly is the presence of Quericus sp., Pistacia, Rhmnus sp. together with a high diversity of many annual grasses and a collection of legumes, composites, umbellifera an latiate species. In addition to the biomass, the area has a beautiful archeological sites and landscaping and capacity for water harvesting (HSA).

8. A forest to the northwest of the city of Jenin has many pine, cuppresus, and oak trees as well as some olive nearby, it is a highly sensitive area (HSA).

9. About two kilometers north of the town of Aaneen is a national forest, known as Um Al Reehan forest, that include pine, cuppressus trees, Eucalyptus, oak, Pistacio, Rhmnus, and a diversity of other plant biota flowers including many Ranunculus, Euphorbia, Narcissus, labietae and composites plants. (HSA)

Agriculturally High Sensitive Areas (AHS)

1. Near the town of Seer is an agricultural land cultivated by vegetables, cereals, as well as olive trees. The area expresses an excellent topography for watershed, and in particular the Al-Fara'a spring. It has also some native biota of *pistchio* and *rhumnus* (AHS).
2. By the town of Mesileh is an agricultural area of olive, almonds trees, some acacia, pistacia trees occur naturally in the hill as well as a variety of wild flowers including calocotomy, tulip and Ridolfia. The presence of housing development in the area together with big areas put restriction in designating the area in HSA and thus it is (AHS).
3. The hill facing the town of Jab'a has many orchards including almond and olive trees. It is agriculturally sensitive area (AHS).
4. In the town of Kabatia a great portion of its land is considered agricultural which is cultivated for cereals, vegetables and olive trees and thus it is considered as an agriculturally sensitive area. Unfortunately, the town has many nearby quarries that causes much pollution hazards to all land animals, human beings and plant biota. (AHS)
5. The plain of Marj Ibn Amer to the northwest of Jenin is heavily utilized for agricultural purposes including cereals (wheat, barley, lentils, chick pea) and vegetables both irrigated and rainfed. (AHS).
6. To the southeast of Al Far'ah refugee camp is a valuable water resource called Al Far'ah spring that is heavily used for the irrigation of the agricultural land nearby, (AHS). Citrus is most common, together with wide space area of vegetables. The native biota includes Eucolyptus, Acacia, Albozia, and several native flowers.

Moderately Sensitive Areas (MSA)

1. The area from Zababdih to Imm-Etout, just before the village of Raba has a great potential for rangelands and olive trees, observed. An example of the native plants, includes Pimpinella, Ridolfia segetum, Achillea critica. (MSA)
2. To the west of Mesileh is a mountain that has a beautiful labiatae and loguminosae plants together with native oak, *Pistacia*, *lentisus*. (MSA).

3. The region after the town of Ta'anick includes natural biota of *Ficus Cycomorus*, olives, almonds, oak, pistacio, but it is sparse sort of community and not in a forest sort of shape, so it is a moderately sensitive area (MSA). While there are many types of birds are expected to inhabit the area, only the Israik bird was seen.

4. On the way between Ta'anick and Aaneen is a rangeland area. It has a sporadic olive trees, optunia, oak and carob trees, so it is a moderately sensitive area (MSA).

5. The area on the southeast of Tubas - Tamoun is a rangeland suitable for livestock herders and might have some agricultural potential (MSA).

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