Assessment of Water Availability and Access in the Areas Vulnerable to Drought in the Jordan Valley

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List of Abbreviations

ARIJ	Applied Research Institute – Jerusalem
HWE	House of Water and Environment
GIS	Geographical Information System
GPS	Geographical Positioning System
GVC	Gruppo Di Volontariato Civile
JICA	Japan International Cooperation Agency
LRC	Land Research Center
LSU	Livestock unit
MoA	Ministry of Agriculture
NIS	New Israeli Shekel
OCHA	Office for the Coordination of Humanitarian Affairs
oPt	occupied Palestinian territory
PARC	Agricultural Development Association
PCBS	Palestinian Central Bureau of Statistics
PHG	Palestinian Hydrology Group
PWA	Palestinian Water Authority
SPSS	Statistical Package for Social Sciences
TLU	Tropical Livestock Unit
UAWC	Union of Agricultural Work Committees
UNICEF	United Nations Children's Fund
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
WFP	World Food Programme

Summary

The Jordan Valley has always been considered one of the most important strategic, economic and cultural areas in the Palestinian territories, affected by drought as well as by Israeli restrictions. It has been studied by several actors during the last years and data rationalization is extremely important to share information.

The aim of the project is to define the gaps in knowledge on the availability of and access to water for 28,246 people living in 65 communities identified in the target area, and integrate it with new information in order to provide basic tools for defining domestic water needs and critical vulnerabilities in the Jordan Valley.

Following the experience carried out by GVC and their partners UAWC, PHG and LRC in a similar study in the southern part of the West Bank, bibliographic data and field assessment have been collected and analyzed to provide a literature review, an analytical data base based on collection sheets used in the field visits, 18 thematic maps and a synthetic analysis about the present status of the water availability for human and animal consumption in the area.

Human water consumption varies significantly between villages (103 l/c/d) and Bedouin communities (34 l/c/d). The water source highly influences consumption rates, as the 15 communities served by networks present an average consumption of more than 100 l/c/d while others consume around 30 l/c/d.

65% of the population, living in 15 villages, are covered by networks with an average price of 4 NIS/m³. The remaining population is supplied by private and PWA wells, filling points and springs with prices rising to 15.6 NIS/CM for the springs, from 15 to 40 NIS/CM for the wells and from 15 to 30 NIS/CM for filling point, influenced by transport costs for water trucking. Irrigation system, agriculture wells and mixed network represent other sources of water with very varying price.

17,747 of TLU animals assessed in the area are consuming an average amount of 70 l/LSU/d.

1. Introduction

1.1 Background

The Jordan Valley is one of the most important agricultural areas in occupied Palestinian territory. It is considered the 'food basket' for Palestinians, having unique climate conditions that allow the production of food throughout the year. This unique condition has attracted many communities to the area. They are mostly farmers or herders who work in agriculture or animal husbandry.

Water for irrigation is a crucial resource for food production, thus its availability and accessibility is imperative for the local population. The Jordan Valley is classified as arid, with rainfall not exceeding 300 mm per year in the northern part and less than 150 mm in the southern part of the study area. The change in rainfall quantity and consecutive drought events witnessed over the past five years in the area have affected the livelihoods of the communities living across the Valley. However, the magnitude of impact varies from one place to another, especially among the marginal and Bedouin communities in the area. The region's political sensitivity and Israeli restrictions on movement and access play a major role in limiting residents' possibilities for improving their livelihoods.

With over 81%[1] of its area classified as Area C (under full Israeli control), residents of the Jordan Valley face difficult living conditions: limited access to water resources; movement restrictions (residence, farming and grazing activities); limits in the expansion of the agricultural sector; policies that destroy agricultural activity; confiscation of fertile land and control of Palestinian access to local and Arab markets.

For these reasons, the proposed project addresses the baseline conditions of availability and accessibility to water and will shed light on the major challenges to residents' livelihoods in the area.

1.2 Objectives

Define the number of communities and the gaps in knowledge on the availability of and access to water in the target area, and integrate it with new information in order to provide basic tools for defining domestic water needs and critical vulnerabilities in the Jordan Valley.

1.3 Outputs

The proposed outputs can be summarized as follows:

1. Collection of existing databases

[1] Japan International Cooperation Agency (JICA. *The Feasibility Study on Water Resources Development and Management in the Jordan Ricer Rift Valley: Final Report*, 2008.

Define the various projects and activities that have been implemented in the area by various actors and collect all the available information, maps and data regarding the study area.

2. Updated map of communities with basic data on GIS support
   Map the communities and their location with GPS coordinates and collect basic data such as population per community, related number of animals, domestic water consumption and main income sources.

3. Updated map of water sources per community on GIS support
   Define the current water sources of each community and map them with GPS coordinates in order to define those communities that are unserved and set priorities of intervention for water consumption.

2. Methodology

Based on previous experience and driven by the need for shared information among the various stakeholders in the area, the activities were designed to produce a set of informational materials (literature review, Maps, Database) able to support future needs assessments and interventions in the area. As a result, description of the methodologies, information sources and metadata in general acquires paramount importance. All the explanations on the methodology used during the study are listed in the following sub-paragraphs.

2.1 Literature Review

In order to compile a solid information database, all the material produced by previous assessments, studies and researches concerning the project's scope has been collected. This knowledge is crucial to avoid duplication of work and overlapping. Organizations as well as authorities (the PWA in particular) were contacted and visited for the collection of the material and several interviews were conducted with their representatives to analyze the work done and discuss future plans and studies for the area.

Twenty-three publications were collected, including reports, fact sheets and spreadsheets, and read (See Annex 8 Literature review material). Short summaries of each have been prepared and assembled into a narrative description (See Annex 1 Literature review summary). A user-friendly database, that can easily be updated in the future, was also created that includes the title of the publication, the publishing organization(s), three keywords, its type (report, scientific paper, fact sheet, etc.), the year of publication, and a hyperlink to the soft copy, if available, and the location and extension of the related study area (See Annex 2 Literature review grid).

2.2 Community Profiling and Data Collection

In order to compile a preliminary list of the communities to be surveyed in the target area, a mapping campaign was organized at the start of the project. These communities were mapped using their GPS coordinates, noting that these were their locations at the time of the survey. The final selection of target communities to include in the framework of the study was then made. The selection was mainly based on two criteria:

- Communities located in the Jordan Valley (or very close to its boundaries);
- Communities located in Area C or relying for herding and agriculture activities on land in Area C.

Before the list of target communities was finalized, a series of meetings with counterparts from OCHA (also surveying the area) were organized in order to produce a unique set that would be useful to all, avoiding duplications and work overlap. A total number of 65 communities have been listed (See Annex 5 Database). The communities are shared among three governorates including: Jericho & Al Aghwar, Nablus and Tubas.

In order to collect information about each community, two data collection sheets were designed (See Annex 3 Data collection sheets). The first includes general information about the community, socio-economic details such as main income sources and typologies of house construction, flock size according to animal type and the quantity of water consumed by the livestock. The second collection sheet includes information about main water sources used by the communities, whether being springs, cisterns for rainwater harvesting, groundwater wells and/or filling points, the presence of water network and the related percentage of coverage in the community, the distance to these water sources and the costs of water. The data collection tools used by OCHA and the GVC-PHG-UAWC team (PHG and UWAC are GVC partners for all the activities of the project) were also discussed, clarifying the purposes of both surveys. While OCHA's survey would be an instrument for flagging problematic areas, GVC-PHG-UAWC survey would be used to map the communities by collecting general data about the main water sources and some basic data about the livestock flocks. Common data between the Community Profile form developed by OCHA and the data collection sheets developed by the Project team were collected by the GVC-PHG-UAWC survey, in addition to some addition data that were later agreed on in order to save time and effort.

The data collection process extended between March 1 and May 11 of 2010. To compile the most accurate data possible within the context of the project, a water specialist and a agronomist specialist, both residents of the study area, collected the relevant information from the communities. The specialists interviewed representatives (mukhtars and village council heads) from each community, who were believed to best be able to provide the needed information. It is important to mention that the data collected should be considered rough due to the methodology, short time available and sources of information used. Previous information gathered through the literature review were cross-checked with the data coming from the field in order to increase the reliability of the database.

The water resources used by these communities for domestic purposes were also mapped. This was followed by a detailed tracking campaign where the routes between each community and the water sources were sketched, distances estimated and the conditions of the roads assessed.

Other sources were also employed, and some assumptions made. The complete list of the data collected with description of methodologies, sources of information and assumptions, units and code used in the database is contained in Annex 4 Database description.

2.3 Database and Map production

All the data collected has been processed and organized in Excel tables to facilitate its consultation and analysis (See Annex 5 Database). All the communities, routes for water tankering and water sources were marked with GPS devices. Merging geographical data with data grids from the field, it was possible to represent in a series of maps the information gathered. All the maps produced in this process are contained in Annex 6 Maps.

The GIS file produced and annexed (See Annex 7 GIS files) to this report are the following:

- *Communities*: a point shapefile with the location of all the communities containing the grid complete with all the data collected and processed;

- *Track*: a polyline shapefile containing the routes used for the water supply from distant sources;

- *Water sources*: a point shapefile containing the location of all the water sources used by the communities with the description of the typology;

- *Study area*: a polygon shapefile that represent the study area.

All the GIS files are in WGS 1984 projection.

2.4 Data Analysis

Once processed and organized in spreadsheets the data collected were analyzed using the Statistical Package for Social Sciences (SPSS) (See paragraph 5.2 Database) to highlight particular tendencies and vulnerabilities. Once again, due to the rough nature of the data collected, the analysis was carried out using averages and ranges to minimize error.

3. Results

Data collected from the field and elaborated with the support of GIS, are analyzed sector by sector in the following sub-paragraphs, illustrating conditions of vulnerability in the study area. For the geographical distribution of the results among the communities see Annex 6 Maps.

Population (See Map 1)
The total population in the study area is 28,246, distributed in 65 communities. The population size of these communities ranges from nine people in Algerb Bedouins to about 5,000 in Jiftlik. The size of the communities is also related to the presence of water networks (all the larger communities are served) and to the type of community. Bedouin communities are usually smaller with an average size of 168 with the largest being 1,140 (in total 8,396 people are living in 50 Bedouin communities), while villages are larger with an average size of 1,323 and a minimum of 120 (in total 19,850 people are living in 15 villages).

Families (See Map 11)
The number of families is directly related to the total population with a number of family members ranging from 4 to 14 and an average of 7. Usually, in Bedouin communities the number of family members is higher.

Human water consumption (See Map 2)
Human water consumption varies significantly between villages and Bedouin communities. Its calculation derives from the total amount compared to the number of people in the communities. However the data is conditioned in some communities by the people claiming not to pay for the water that causes waste and anomalous consumption data up to more than 100 l/c/d. As a matter of fact, while the average consumption in the communities is 50 l/c/d (34 l/c/d in Bedouin communities and 103 l/c/d in villages), if one weights the different consumptions by the total population of the communities, the average rises to 91 l/c/d and an even more striking difference between Bedouins (33 l/c/d) and villagers (116 l/c/d). The water source also highly influences consumption rates, as the 15 communities served by networks present an average consumption of more than 100 l/c/d while 32 consume between 31 and 38 l/c/d and the 16 communities listed below, consume less than or equal to 30 l/c/d (Water Source Typologies are reported in Map 9).

Comm. ID	Community Name	Governorate	Population	Water consumption [l/c/d]	Type of community
17	Al Burj ('Ein al Hilwa group)	Tubas	84	24	bedouins
31	Hammamat al Malih	Tubas	100	24	bedouins
5	Al Meeta (Hammamat al Malih group)	Tubas	120	26	bedouins
60	Um Daleen	Jericho	20	26	bedouins
65	Khirbet Yarza	Tubas	60	27	bedouins
20	Lifjim	Nablus-Aqraba	168	28	bedouins
24	'Ein Samiya	Ramallah	110	28	bedouins
55	Mu'arrajat Centre (Tayameen)	Jericho	100	28	bedouins
59	Um al 'Obor	Tubas	78	28	bedouins
22	'Ein al Hilwa	Tubas	48	30	bedouins
23	Nabe' Ghazal (Al Farisiya group)	Tubas	100	30	bedouins
26	Al Jubiye (Al Farisiya group)	Tubas	80	30	bedouins
32	Hmayyer (Al Farisiya group)	Tubas	150	30	bedouins
36	Khirbet Samra Bedouins	Tubas	31	30	bedouins
39	Khallet Khader (Al Farisiya group)	Tubas	176	30	bedouins
53	Khirbet Telll al Khashaba (another name Twayyel)	Nablus-Aqraba	150	30	bedouins

Animals (See Maps 7 and 13)
The number of animals owned by the communities was analyzed both as equivalent livestock units and on the basis of singular typology. Tropical Livestock Unit (TLU) methodology has been adopted, obtaining the TLU equivalent value multiplying the number of the selected animals for their TLU parameter (See the table below for the list of parameters). One TLU is equivalent to an animal of 250 kg liveweight on maintenance that is equal to 10 sheep. The total number of TLU is 17,747 in the overall study area. In the maps the animals are also represented in sheep-equivalent units which are obtained dividing the number of TLU for 10. The table below illustrates the results related to the 4 different typologies of animals present:

Animal	TLU parameter	Total in the study area	% on total TSU	Average number per community	Minimum number per community	Maximum number per community
Sheep	0.1	145,150	82	2,233	30	12,000
Cow	0.7	2,978	12	46	0	500
Horse	0.4	1,506	3	23	2	115
Camel	1.6	341	3	5	0	200

The table shows that the majority of total livestock is composed of sheep/goats which represent 82 per cent of the total livestock with an average number of 2,233 sheep/goats per community. Every community has at least two horses (or donkeys which are counted together with horses) because they are considered an important transportation and agricultural facility.

Animal water consumption (See Maps 8 and 14)
Since different types of animals are present in the study area, and the daily water consumption for livestock depends on the specific animal, environmental factors, water quality, type of feed and the animals' physiological conditions (for example the average water consumption for sheep and goats was found to range from 4 to 8 l/h/d in Ibziq but from 6 to 12 l/h/d in Jiftlik, while the sphere standard indicates 5 l/h/d as a minimum), it was decided to reduce them all to equal TLU livestock units. This allowed for comparison of the results and a common analysis. The results show that the average water consumption for a TLU (the equivalent TLU consumption is obtained dividing the consumption of each animal for its TLU parameters and averaging the values obtained among the different animals in the community) is about 70 l/LSU/d, ranging from 52 to 94 l/LSU/d. The highest values are usually located in communities served by network or using filling points.

Typology (See Map 5)
In the study area, 50 communities are Bedouin and villages, usually larger, are 15.

House typology (See Map 3)

Once again, Bedouin communities and villages are very diverse: in Bedouin communities 68 percent of housing units are tents, 28 percent are corrugate metal sheet structures and 4% are made of concrete.

Cisterns (See Map 12)
Cisterns are not very common in the study area and are not considered a primary water supply source. This is mainly a result of low rainfall rates in the area, and more importantly, Israeli-imposed obstacles to the construction of new cisterns, or rehabilitation of existing ones. Only 12 communities have cisterns of which two are using them as storage facilities from tankering and not for gathering rainwater. All the communities that possess cisterns rely mainly on another water source. The total number of cisterns in the study area is 267 with an average of 22 per community (considering just the communities with cisterns). The cisterns usually hold 60 CM ranging from 25 to 80 CM.

Even in communities with a large number of cisterns, this is considered an accessory source to complement the main one. The total quantity of water gathered in these cisterns in the study area is 7,490 CM/year (which is about 28 CM/cistern/year) ranging from 250 CM/community/y to 1,500 CM/community/y with an average of 750 CM/community/y (considering just the 10 communities which are using rainwater harvesting systems). As an example, rainwater harvested in cisterns in Yarza community cover to some extent its water needs in winter, while the rest of the year the cistern is used as a storage tank for water tankered from Tamoun PWA well.

Networks (See Maps 9, 16 and 17)
According to the survey results only 15 village communities are served by water networks. Networks are usually present in the larger villages. Networks are managed by Mekorot in eight communities (such as the villages of Bardalah, Ein al Beida, Kardalah, Fasayel, and Zbeida) while the remaining are supplied by the PWA. A total of 2,514 connections are present in the study area with an average of 168 per community.

The coverage ranges from 43 per cent to 100 per cent; the majority of the served communities are fully covered (nine communities have 100 per cent coverage). Multiplying the number of people in each community by the relevant coverage percentage, 18,602 in the study area are served by a network, which represents 65 per cent of the total population.

The network water service is continuous in just nine communities out of the 15 served. Calculating the total population of these communities, it is noted that water service in the larger communities is usually continuous, while the smaller networks placed in limited communities do not provide continuous service. Eighty-two per cent of the total served population is continuously supplied while 18 per cent is not.

Water supplied through the network is usually fairly cheap, ranging from 1.5 (community served by the nearby Ain Shibli spring) to 4.2 NIS/CM (Furush Beit Dajan community). In some communities people are not paying for the water even if a price is set. Since the average price of water in our study was assessed at about 4 NIS/CM, this value is also assumed as indicative asset in those communities where people are not paying for water.

Springs (See Map 9)

Nineteen communities rely on Palestinian springs for their water. Two of these also have cisterns for rainwater harvesting and the other three also rely on filling points. People get the water from this source either directly from the spring itself in jerry cans that are transported by mule or by trucks (depending on the location of the community from the spring). Examples of communities depending on springs for their domestic supply include Ras Al Auja Bedouin, Dawa and Basaliah. The cost of water from springs varies from 0 in Atraf Aluja (Bedouin community) to 40 NIS/CM in Efjem, with an average value of 15.6 NIS/CM, influenced by the transportation costs.

Unfortunately, the discharge capacity of some of these springs, considered an important water resources for some Bedouin communities, has decreased in recent years due to drought (as in the case of Malih spring). Others are completely dried up in the summer months (Al Auja spring), while remaining springs are controlled by settlers who prohibit people from using them (Ein Hilwa spring in Malih area). Ain Shibli and Tana springs produce 28 l/s and 3.8 l/s respectively. Auja spring, used mainly for agriculture, is one of the main resource in the area reaching up to 220 l/s during winter time, nowadays, decreased probably due to Alberih urbanization. It is seasonal and in the summertime water does not run along the irrigation channel. Fuqa & Tehta spring supplies the community of Yanoun with 2.2 l/s. Shosa spring (yield not tested) has a sufficient discharge for Diook Alfoga Bedouins community and other surrounding communities.
In this phase of the study, spring discharge was not measured in all the springs due the difficulties in access (no water meter or sealed).

Wells (See Map 9)

The communities of Ibziq, Atouf, Aqaba, Ras Alahmar and Yarza rely on PWA Tamoun well as their main source for domestic water supply. It is operated by Tamoun Municipality and it discharges 41 l/s. Marj Na'jah is supplied by 61 l/s well(PWA data). Related water cost is conditions by cost of transportation and ranges from 15 to 40 NIS/CM. It is also worth mentioning that 30 per cent of the residents in Furosh Beit Dajan depend on private agricultural wells.

Filling points (See Map 9)

Fourteen communities in the study area were found to rely on filling points for their water supply, among which three also use springs as water sources. The filling points are legal and they are usually positioned on the main Mekorot pipeline (e.g. Mikhmas, Taybeh) or on other Palestinian Water Authoritiy main pipelines (e.g. Ein al Sultan, Awarta). People in these communities transport water from these filling points to their localities by private and community tankers. The cost of the water from the filling points does not vary greatly among the communities, ranging from 15 to 30 NIS/CM. The discharged capacity of the filling points ranges from 4 to 200 CM/hour with an average value of 24 CM/hour. Communities that rely on filling points adjacent to settlements, checkpoints, and military camps sometimes suffer from the harassment of Israeli settlers and military forces.

Other water sources (See Map 9)

Agricultural wells, irrigation systems or networks belonging to other communities used as filling points for domestic purposes are considered “other” water sources. The most important resource is Ein al Beida irrigation system, which supplies 14 communities.

The average cost of these resources is vastly diverse, based on transportation costs and the condition of the supply service. Some communities pay for the water alone at 3 NIS/CM while for others the price rises as high as 50 NIS/CM.

In the following table, the number of communities depending on similar main sources and details of other sources are reported.

Main Source	N°
Filling Point	12
Network	12
Network & Other	1
Network & Spring	1
Other	16
Spring	16
Spring & Filling Point	2
Well	5
Total	65

Other sources	N°
Ein Al Beida Irrigation system	14
Az Zubeidat network	1
Fasayel network	1
Mekoroth & Agricultural Wells	1
Total	17

Prevalent water sources (See Map 9)
Villages are usually served by networks while Bedouin communities rely mainly on wells, springs, filling points and other sources. Sixty per cent of the total population relies on water networks, 10 per cent on filling points and the remaining sources are about homogeneously distributed.

Prevalent income sources (See Map 6)
Main income-generating activities in the Jordan Valley are related to the typology of the community. Bedouin communities rely mainly on herding (88 per cent of all Bedouin communities), while 40 per cent of the villages rely on agriculture and 20 per cent on herding. The most important income generating activity is herding (42 per cent of the total population), followed by agriculture (37 per cent) while other activities are not really relevant (five per cent). (The remaining population is represented by individuals with mixed income sources). However, feedback from the field emphasizes the obstacles that are created by Israeli policies. These range from limited access to grazing lands to limited access to markets for selling products. These obstacles are aggravated by natural disasters such as frost or water scarcity due to lower than the already-low rainfall average.

Water cost (see Map 15)
The water cost is obviously related to the water source. While networks are always cheap (in every community served by network the price is less than 5 NIS/CM), other sources are more expensive. The cost for the supply from springs, wells and filling points is linked to the distance that the community has to cover to reach them. The average cost in the study area is 18 NIS/CM ranging from 0, in those communities that collect water from agricultural wells or scattered sources for free, to 50 NIS/CM in some communities that are using Ein Elbeida irrigation system which is distant.

Distance (See Map 18)

Distance is a crucial factor that influences water tankering cost. Even a short distance difference can imply a large increase in water price. Twenty-eight communities are located nearby the source they use so don't have to cover great distances and transportation prices are cheap. The overall average distance from the water source is 3,4 km while the average distance among the communities located far from the source is 6 Km. The maximum value registered is 17,4 km.

Notes from the field

Some findings gathered during the field visits couldn't be easily represented in the database, but are worth mentioning as an important part of the information about these communities. The notes from the field are listed below:

Names	**NOTES**
Al Zu'bi (Al Farisiya group)	People tanker water from different points located in Ain Beida Irrigation system
Algerb Bedouins	Nowadays only one family lives in the locality, while the other 6 families moved to the west as in Ain Samya and in Mekhmas
Amriyeen Bedouins	Nowadays only 3 families are still in the locality, while the other 10 families moved to other localities in the west as in Ain Samya
Al 'Auja	The water source belongs to Mekorot system
Al 'Auja Bedouins	This locality includes all Bedouins around Al'Auja village, where people use both Auja spring canal and the filling point
Al Baq'a	This locality is part of Mlehat locality where people belong to the same tribe
Bardala	The water source belongs to Mekorot system
Ad Dawa	People transport water from the spring by donkeys. Spring water generally used for domestic and animal drinking purposes, is also used for citrus trees irrigation that are planted near the spring area
Lifjim	There are some water seepages (small springs) in the area mainly used for animal watering, named Al Hafeera and Beer Abu Al Daraj
'Ein el Beida	The water source belongs to Mekorot system
'Ein Samiya	Water is supplied from the filling point of Ain Samya wells
Al Jubiye (Al Farisiya group)	This locality can be classified as agricultural area, where most of the people are irrigation farmers.
Fasayil al Fauqa	The water source belongs to Mekorot system
Fasyil al Tahta	The water source belongs to Mekorot system
Fasayil al Wusta	The water source belongs to Mekorot system through a random connections by PVC pipes
Furush Beit Dajan	70% of the population are covered by the network supplied from Mekorot system, while the other 30% cover their water needs through water transported by tankers from agricultural wells
Jahalin Abu Dahuk	Sometimes water is supplied from nearby relatives and friends in Aqbat Jaber Camp. People transport the water

	from Aqbet Jaber by tankers
Al Jiftlik	The water source belongs to Mekorot system
Khirbet Samra Bedouins	People tanker their water from different points in Ain Beida Irrigation system
Kardala	60% of the people are connected to the network supplied from Mekorot main pipe line, while the others (40%) cover their water needs through water transported by tankers from the farmers connections to Mekorot system.
Mu'arrajat Centre (Khalayfa)	80% of the people stay in Murajat during April-November, after that period most of them move to other localities like Ain samya, Abu Kash, Jawal, Jaba'a
Maghayir ad Dir	This locality is part of Mlehat locality where people belong to the same tribe
Marj Ghazal	The water source belongs to Mekorot system
Marj Na'ja	5% of the water is supplied by tankers from the village well
Marj Na'ja Herders	People tanker their water from different points in Zubeidat
Mu'arrajat East (Milehat/School side)	This locality is part of Mlehat locality where people belong to the same tribe
Mu'arrajat Centre (Al Mahanieh)	Nowadays the locality is inhabited since people move to different areas to the west. Generally, people stay in this locality from September to April
An Nuwei'ma al Fauqa Bedouins	This locality is served by Nuweemah network that is supplied by Al Nuweimah spring
Ras 'Ein al 'Auja	People are supplied by water mainly from Auja spring, while in summer months, when the spring id dried, Auja filling point represents the main water source
Khirbet Tana	Water is transported by small tankers owned by inhabitants
Um Al Jmal ('Ein al Hilwa group)	People tanker their water from different points in Ain Beida Irrigation system
Um al 'Obor	People cover their drinking water needs from Zubeidat network, while other domestic purposes are covered from the community's well that is characterized by high salinity

4. Conclusions

The target area studied in the Jordan Valley comprises both large villages and small communities with a total population of 28,246 living in 65 communities. It is characterized by a large diversity of conditions. While some large communities (even those in Area C) are reached by essential services, a large number of smaller communities (most of them Bedouin) are living in difficult conditions.

This difference is reflected also in the inhomogeneous access to safe water. The presence of a water network and the related status of the service are important in making selection for future intervention. While in small communities relying on water tankering, average human water consumption is about 30 l/c/d, in villages served by good networks (especially if the payment is not claimed) water consumption exceeds 100 l/c/d (with a minimum rate of 76 l/c/d). Similarly, the cost of the water varies dramatically depending on its source.

A significant finding is that the total number of people served by the water network is 18,000, 65% of total target population, although this number declines greatly if we include only those networks in good condition that supply water continuously. Upgrading of the obsolete distribution system should be considered for future interventions in order to consolidate the number of population reached by safe piped water and, where still possible, extend the distribution line.

It will be important, as a first step for future stages of the study, to cluster communities facing similar vulnerabilities.

The presence of a network affects both the access to water for human or animal consumption. The most vulnerable communities are the Bedouins that rely on springs during the winter time but completely depend on water trucking during the summer time. Networks and filling points are often far away and transport cost heavily weigh on their weak economic condition. Most of the most vulnerable people rely on herding and they are exposed to many Israeli-imposed restrictions regarding movement and access to water sources. The lack of cisterns due to Israeli impediment and the consequent low storage capacity do not allow to have a safe quantity of water to afford the summer season and they compel to depend on frequent travel of small size (3.7 mc) tankers. Israeli authorities apply restrictive planning and zoning regimes to Palestinian communities living in Area C, making it extremely difficult to carry out legal constructions, including for very basic infrastructure projects

These communities should be the main target of future interventions for domestic water or for animal watering.

Agriculture is diffused in the area and it depends on old irrigation system poorly managed and maintained because of scarcity of funds and impediment to improve the infrastructure due to the Israeli policies in Jordan valley. Farmers own few dunums and the quantity of irrigated water is not enough to optimize productivity.

The upgrading of storage facilities should be a solution to emergency preparedness to match with frequent drought events, mainly characterizing the summer season. Intervention in improving water access should alleviate the poor condition of these communities already suffering by limited access to grazing lands for herders and to limited access to markets for selling agriculture products.

5. Annexes

5.1 - Literature review summary

5.2 - Literature review grid

5.3 - Data collection sheets

5.4 - Database description

5.5 - Database

5.6 - Maps

5.7 - GIS files (only on file)

5.8 - Literature review material (only on file)

5.1 Literature review summary

The following pages include a narrative description of the material published by a number of organizations working in the sector relevant to our target area. Some additional information has also been tabulated in a database (see Annex 5.2).

Community-based organizations/groups can be partnered by organizations in their projects, as for example the Water User Associations (WUAs), which are regulators for farmers, able to bridge their technical expertise and help jointly overcome financial obstacles. In the Jordan Valley WUAs include the Azoghby Well Water Users Association – Ein al Beida, Frush Beit Dajan Cooperative Association for Protected Agriculture – Frush Beit Dajan, Ma'roof Abu Samrah Cooperative Association – Al Jiftlik and the Agricultural Land Cooperative Society – Al Jiftlik, as well as associations developed for managing the larger springs.

UCODEP has mapped two feeding centers in the Jordan Valley – one in the northern part of Ein Al Beida and the other in the southern part of Jericho. They also offer veterinary services generally not available and very much in need.

Jordan Valley Solidarity advocacy group represents a strong partner in efforts to highlight water and environmental issues, as well as violations in the oPt. The Jordan Valley Solidarity campaign is a network of Palestinian grassroots community groups from all over the Jordan Valley and international supporters, aimed at protecting the Palestinian presence in and the unique natural environment of the Jordan Valley.

The latest census conducted by the Palestinian Central Bureau of Statistics (PCBS) in 2007 resulted in a series of publications with detailed information about population, establishments, housing and buildings in all communities across the West Bank (website available with many other information).

The Palestinian Water Authority (PWA), in cooperation with the Ministry of Agriculture (MoA), has designed 19 projects for short term, medium term and long term implementation in the process of developing a water resource development plan for the Jordan Valley

The MoA has also complied data for 19 communities including information about agricultural production and the number of animals raised by each community reported by animal type.

MA'AN Development Center has published a number of fact sheets about the Jordan Valley including:

- “The Plight of the Jordan Valley Bedouin” in both Arabic and English. It includes social information about the estimated 15,000 Bedouin (case studies on service provision and livelihoods support, advocacy)
- “Draining Away” describes access to water supply and distribution in the Jordan Valley; wastewater and sanitation situation discussed in case studies and in the context of the humanitarian crisis.
- “To Exist is to Resist: Eye on the Jordan Valley” is a detailed summary for the issues affecting the area in relation to Israeli violations of basic human rights and international law as well as policies of isolation and expulsion deriving from the construction of the barrier.

Movement restrictions, demolitions and relevant displacement as per access to community services including education, health, water and sanitation are discussed in oanther fact published by OCHA and Save the Children.

The impact of the water crisis in Al Auja area, mainly concerning the al Auja spring, was conducted by the UAWC and aims to scientifically document the impact of the agricultural and domestic water shortage on the economic and social life of the farmers (restoration of water rights, dams for storm runoff in the wadis, new wells for both domestic and agricultural purposes, new crop cultivation techniques).

"Food Security and Nutrition Survey of Herding Communities in Area C", carried out by UNRWA-UNICEF and WFP, gives an overview about nutrition and food security of a sample of households targeted by the project and proposes an integrated surveillance system catering to both nutrition and disease surveillance and the consolidation of the information into a Health Management Information System.

Within the framework of the "Developing Sustainable Water Management in the Jordan Valley" project, the Applied Research Institute, Jerusalem (ARIJ), along with other organizations from the partner countries, has developed Spatial Risk Modeling for Water Shortage and Nitrate Pollution in the Lower Jordan Valley expanding across occupied Palestinian territory, Jordan and Israel. The report illustrates the effects of pollution and the unsustainable nature of fish farming and water-intensive crop production in aid regions, and formulates recommendations (water allocation among the domestic, agricultural, industrial and touristic sectors and wastewater treatment).

The "Palestinian Agro-production Calendar and Marketing Potentials for the Local, Israeli and Abroad Markets: Case Study of the Tubas Governorate Report", prepared by ARIJ, describes the importance of the agricultural sector in the oPt, its vital contribution to the Palestinian economy and the challenges farmers face (natural resources, socio-economic conditions, land use/land cover, agro-production calendar, high potential exportation of the Tubas governorate.

A presentation prepared by ARIJ entitled "Agro-Marketing System in the Jordan Valley Constraints and Potentials" provides figures about cultivated land areas and livestock sizes. Some socio-economic background is also discussed including employment and the constraints facing agricultural production and marketing channels (water management, agricultural production and costs, soil salinity, market competition from Israeli products, and movement restrictions). In another presentation, ARIJ illustrates the Jordan Valley's physical features including details about land use and breakdown of land cover, cultivation trends, geopolitical status and segregation plans.

The *Jericho Regional Development Study Project in Palestine* (2006), prepared by the Japan International Cooperation Agency (JICA) in cooperation with a number of NGOs and local governmental authorities, describes the uniqueness of the Jericho Region as well as regional strengths, weaknesses, opportunities and threats (employment, tourism, land use water availability and demand, and agricultural production).

Under the framework of the *Feasibility Study on Water Resources Development and Management in the Jordan River Rift Valley,* prepared by JICA in cooperation with a number of organizations, a detailed report of four volumes was compiled to formulate a basic plan for efficient utilization of water for agriculture and water resource development in the Jordan River. Main topics of the volumes are hydrogeological context, including infrastructure analysis and development, meteorological and hydrological data, hydrogeology and storm water harvesting, spring water conveyance systems, pilot projects (spring, agricultural wells and software components).

PHG has conducted several Socio-economic baseline surveys for 200 farmers in the Jordan Valley (socio-economic data, water quality and quantity, services provided) and for 29 wells (technical data and workability). Further studies together with PAC covered

other 8 wells and related crop patterns, cultivated land areas, water prices, irrigation methods and agricultural facilities. PARC also prepared a detailed survey on agriculture water use for Al Auja, Al Nuweima and Al Dyuk Spring systems. 29 wells and 19 springs were inventoried by House of Water and Environment (HWE) enhancing hydrogeological characteristics and use.

The German-Israeli-Jordanian-Palestinian Joint Research Programme on Water Resources Evaluation for a Sustainable Development in the Jordan Rift Basin (2009), reports an extensive scientific description of the geological and hydrogeological settings of the area (scientific papers: *The Water of the Jordan Valley: Scarcity and Deterioration of Groundwater and its Impact on the Regional Development)*.

In 1998 FORWARD team conducted a preliminary assessment of the potential for harvesting storm water runoff in the catchment areas and elaborated a study with feasibility study for check dams and harvesting schemes, geology and soil properties.

5.2 Literature review grid

Title	Organization(s)	Funder	1st Key Words	2nd Key Words	3rd Key Words	Publish Year	Type	Hyperlink	Geographical Coverage
Draining Away The water and sanitation crisis in the Jordan Valley	MA'AN Development Center	Representative Office of Norway	Water	Sanitation	Bedouin	2010	Fact Sheet	Draining Away, MAAN.pdf	The Jordan Valley in general with three specific case studies of Joubiah, Humsa, Al Malih and Al Auja in addition to some examples of demolition and confiscation
The Plight of the Jordan Valley Bedouin	MA'AN Development Center	Representative Office of Norway	Bedouin	Displacement	Access	2008	Fact Sheet	Jordan Valley Bedouin - English, MAAN.pdf	The Jordan Valley in general with three specific case studies of Al Malih, Jahalin and Az Zubeidat
بدو الأغوار صراع من أجل الوجود	MA'AN Development Center	Representative Office of Norway	Bedouin	Displacement	Access	2008	Fact Sheet	Jordan Valley Bedouin - Arabic, MAAN.pdf	The Jordan Valley in general with three specific case studies of Al Malih, Jahalin and Az Zubeidat
To Exist is to Exist: Eye on the Jordan Valley	MA'AN Development Center	Representative Office of Norway	Settlements	Checkpoints	Living conditions	2007	Fact Sheet	To Exist is to Resist Eye on the Jordan Valley - English, MAAN.pdf	The Jordan Valley in general with specific data about settlements in the area, checkpoints, popultaion figures of Palestinian communities and service coverage
البقاء مقاومة - عين على الأغوار الفلسطينية	MA'AN Development Center	Representative Office of Norway	Settlements	Checkpoints	Living conditions	2007	Fact Sheet	To Exist is to Resist Eye on the Jordan Valley - Arabic, MAAN.pdf	The Jordan Valley in general with specific data about settlements in the area, checkpoints, popultaion figures of Palestinian communities and service coverage
The impacts of the water crisis in Auja area	UAWC	Medico International	Al Auja	Agriculture	Water scarcity	2009	Report	The impact of the water crisis in Auja area, UAWC.pdf	Al Auja, Jericho
Food Security and Nutrition Survey for	UNRWA, UNICEF and WFP		Food security	Nutrition	Area C	2010	Report	Food Security and Nutrition Survey for Marginalized	The results of the survey are reported on a governorate level in the

Marginalized Communities in Area C								Communities in Area C, UNRWA-UNICEF and WFP.pdf	West Bank
The Hydrochemical History of the Rift	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Hydrochemistry	Rift	Saline water	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	The Jordan Valley in general
Characterization of aquifer environments by major and minor elements stable isotopes of sulfate	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Hydrochemistry	Isotopes	Aquifer	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	The Jordan Valley in general with specific sampling points
Characterization of recharge areas by rare earth elements and stable isotopes of H_2O	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Hydrochemistry	Isotopes	Recharge	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	The Jordan Valley in general with specific sampling points
Regional hydrochemical and hydrogeological aspects of groundwater in the Jordan-Dead Sea Rift system	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Hydrochemistry	Hydrogeology	Groundwater	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	The Jordan Valley in general with specific sampling points
Geophysical investigations of the hydrogeological basins in the central Jordan Valley	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Hydrology	Geophysical	Hydrogeology	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	The central Jordan Valley
Hydrogeology and flow pattern along the Fazael-E-Salt	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact	Federal Ministry of Education amd Research	Hydrology	Hydrogeology	Groundwater	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	Along the Fazael-E-Salt

cross section	on the Regional Development book, lead by H. Hötzl								
Lake Tiberias and its dynamic hydrochemical environment	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Hydrology	Hydrochemistry	Lake Tiberias	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	Lake Tiberias
Retreat of the Dead Sea and its effect on the surrounding groundwater resources and the stability of its coastal deposits	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Hydrology	Groundwater	Dead Sea	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	Dead Sea
The uppermost aquifer in the Wadi Qilt area	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Aquifer	Groundwater	Wadi Qilt	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	Wadi Qilt, Jericho
3-D hydrogeological model of the Marsaba-Feshkha region	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Aquifer	Hydrogeology	Marsaba-Feshkha	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	Marsaba-Feshkha
Groundwater flow and transport model of the Jericho area	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Groundwater	Flow	Transport	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	Jericho, West Bank
Hydrochemistry and isotope hydrogeology in the Jericho area /Palestine	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional	Federal Ministry of Education amd Research	Hydrochemistry	Hydrogeology	Isotope	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	Jericho, West Bank

	Development book, lead by H. Hötzl								
A GIS based hydrosystem model for the Jericho Plain, Palestine	Found in the "Water of the Jordan Valley" Scarcity and Deterioration of Groundwater and its impact on the Regional Development book, lead by H. Hötzl	Federal Ministry of Education amd Research	Hydrology	GIS	Jericho	2009	Scientific paper	The Water of the Jordan Valley, Google Books.mht	Jericho, West Bank
Spatial Risk Modeling for Water Shortage and Nitrate Pollution in the Lower Jordan Valley	Applied Reserch Institite-Jerusalem (ARIJ)	European Commission (EC)	Water Shortage	Nitrate	Modeling	2002	Report	Spatial Risk Modeling for Water Shortage and Nitrate Pollution in the Lower Jordan Valley.pdf	Lower Jordan Valley
Humanitarian Update, Special Focus: The Jordan Valley	OCHA		Humanitarian	Movement	Economy	2005	Fact Sheet	Humanitarian Update - Special Focus Jordan Valley, OCHA.pdf	The Jordan Valley in general with Al Jiftlik as a specific example
Fact Sheet: Jordan Valley	Save the Children UK and MA'AN Development Center	European Commission (EC)	Displacement	Movement	Services	2009	Fact Sheet	Jordan Valley, Save the Children and MAAN.pdf	The Jordan Valley in general with a family from Al Jiftlik as a case study
Final Report on Water and Environmental Risk Modeling	Applied Reserch Institite-Jerusalem (ARIJ)	European Commission (EC)	Allocation	Management	Model	2000	Report	Final Report on Water and Environmental Risk Modeling, ARIJ.pdf	
The Palestinian Agro-production CalendAr and Marketing Potentials for the Local, Israeli and Abroad Markets: Case Study of the Tubas Governorate	Applied Reserch Institite-Jerusalem (ARIJ)	Action Against Hunger - Spain	Agriculture	Production	Marketing	2008	Report	The Palestininan Agro-production Calender and Marketing Potentials for the Local, Israeli and Abraod Markets, ARIJ.pdf	The oPt in general with Tubas Governorate as a case study
Agro-Marketing System in the Jordan Valley Constraints and Potentials	Applied Reserch Institite-Jerusalem (ARIJ)		Agriculture	Production	Marketing	2006	Powerpoint Presentation	Agro-Marketing System in the Jordan Valley Constraints and Potentials.pdf	The Jordan Valley in general

Natural Resources in the Jordan Valley: Constraints and Potentials	Applied Reserch Institite-Jerusalem (ARIJ)		Resources	Land use	Challenges	2006	Powerpoint Presentation	Natural Resources in the Jordan Valley Constraints and Potentials, ARIJ.pdf	The Jordan Valley in general
Jericho Regional Development Study Project in Palestine	Japan International Cooperation Agency (JICA)		Development	Region	Plan	2006	Report	Available only in hardcopy	The Jericho and Tubas Governorates in general with a specific volume on Jericho City
Socio-economic Baseline Survey in the Jordan Valley - West Bank, Palestine	Palestinian Hydrology Group (PHG)	Japan International Cooperation Agency (JICA)	Socio-economy	Survey	Farmers	2007	Report	Socio-economic baseline survey in the Jordan Valley - West Bank, Palestine, PHG.pdf	The Jordan Valley in general
Baseline Survey for 29 Wells, Jordan River Rift Valley - West Bank, Palestine	Palestinian Hydrology Group (PHG)	Japan International Cooperation Agency (JICA)	Well	Survey	Groundwater	2007	Report	Baseline Survey for 29 Wells, Jordan River Rift Valley - West Bank, Palestine, PHG.pdf	The Jordan Valley in general
Profile Survey for 8 Wells in the Jordan River Valley - West Bank	Palestinian Hydrology Group (PHG) and Agriculture Development Association (PARC)	Japan International Cooperation Agency (JICA)	Well	Survey	Groundwater	2008	Report	Profile Survey for 8 Wells in the Jordan River Valley, West Bank, PHG and PARC.pdf	The Jordan Valley in general
Detailed Survey on Agricultural Water Use	Agriculture Development Association (PARC)	Japan International Cooperation Agency (JICA)	Agriculture	Survey	Spring	2007	Report	Detailed Survey on Agricultural Water Use, PARC.pdf	The springs of Al Auja, Al Nuweima and Ad Dyuk
Inventory Survey for Rehabiltation of Wells	House of Water and Environment (HWE)	Japan International Cooperation Agency (JICA)	Well	Survey	Groundwater	2007	Report	Inventory Survey for Rehabilitations of Wells, HWE .pdf	The Jordan Valley in general
Inventory Survey for Rehabiltation of Spring Water Conveyance System	House of Water and Environment (HWE)	Japan International Cooperation Agency (JICA)	Spring	Survey	Groundwater	2007	Report	Inventory Survey for Improvement of Spring Water Conveynace, HWE .pdf	The Jordan Valley in general
The Feasibility Study on Water Resources	Japan International Cooperation Agency (JICA)		Resources	Management	Development	2008	Report	Available only in hardcopy	The Jordan Valley in general

Development and Management in the Jordan River Rift Valley									
The Potential for Stormwater Harvesting in the Eastern Surface Catchment of the West Bank	Forward	United States Agency for International Development (USAID)	Stormwater	Surface Catchment	Runoff	1998	Report	The Potential for Stormwater Harvesting in the Eastern Surface Catchment of the West Bank, Forward.pdf	The Eastern Surface Catchment
Census Final Results - Summary (Population, Buildings, Housing, Establishments) Jericho & Al Aghwar Governorate	Palestinian Central Bureau of Statistics (PCBS)		Census	Population	Housing	2009	Report	Census Final Results - Jericho and Al Aghwar - PCBS.pdf	Jericho & Al Aghwar Governorate
Census Final Results - Summary (Population, Buildings, Housing, Establishments)Tubas Governorate	Palestinian Central Bureau of Statistics (PCBS)		Census	Population	Housing	2009	Report	Census Final Results - Tubas Governoarte, PCBS.pdf	Tubas Governorate
Census Final Results - Summary (Population, Buildings, Housing, Establishments) Nablus Governorate	Palestinian Central Bureau of Statistics (PCBS)		Census	Population	Housing	2009	Report	Census Final Results - Nablus Governoarte, PCBS.pdf	Nablus Governorate
Final Results: Housing Report - Jericho & Al Aghwar Governorate	Palestinian Central Bureau of Statistics (PCBS)		Census	Housing	Population	2009	Report	Final Housing Results - Jericho and Al Aghwar, PCBS.pdf	Jericho & Al Aghwar Governorate

Final Results: Housing Report - Tubas Governorate	Palestinian Central Bureau of Statistics (PCBS)		Census	Housing	Population	2009	Report	Final Housing Reults - Tubas, PCBS.pdf	Tubas Governorate
Final Results: Housing Report - Nablus Governorate	Palestinian Central Bureau of Statistics (PCBS)		Census	Housing	Population	2009	Report	Final Housing Reults - Nablus, PCBS.pdf	Nablus Governorate
Census Final Results: Population Report - Jericho & Al Aghwar Governorate	Palestinian Central Bureau of Statistics (PCBS)		Census	Population	Housing	2009	Report	Final Population Results - Jericho and Al Aghwar, PCBS.pdf	Jericho & Al Aghwar Governorate
Census Final Results: Population Report - Tubas	Palestinian Central Bureau of Statistics (PCBS)		Census	Population	Housing	2009	Report	Final Population Results - Tubas, PCBS.pdf	Tubas Governorate
Census Final Results: Population Report - Nablus	Palestinian Central Bureau of Statistics (PCBS)		Census	Population	Housing	2009	Report	Final Population Results - Nablus, PCBS.pdf	Nablus Governorate
Agricultural data	Ministry of Agriculture (MoA)		Agriculture	Livestock	Farming	2009	Excel Sheet	Agricultural Statistics, MoA.xls	19 communities in the Jordan Valley

5.3 Collection sheets

Assessment of Water Availability and Access in the Areas Vulnerable to Drought in the Jordan Valley

Data collection sheet

Name of community:…….. Date:……..……..

Other name:…….

Community ID:……

Section I:
Community General nformation:

		Notes
Respondent name/position/contact details		
Governorate		
GPS Reference		
Type of community	1. City/town 2. Village 3. Refugee Camp 4. Herding community/Bedouins 5. Other, specify: _____	
No. of population		
No. of families		
Houses condition (choose all that apply):	1. Zinc 2. Concrete 3. Tents 4. Caves	

Section II: Water Consumption:

Animals Consumption	L/head/day: …… Total water consumption……..

Section III: Livestock and Agriculture:

Livestock and Agriculture General Information:	
Flock size (Community animals total number)	…….
Flock breeds (number)	Goat/sheep:…… Cow:…… Horse/donkey:…… Camel:…….

Section IV: Socio-Economic:

B1- Main income source in community	☐ Herding …….. ☐ Gov./NGO Employee or Private sector ……. ☐ Farming …… ☐ Other, specify: _____ …….

B2- Which of the following are the main sources of the:

No.	**Source**	NIS/month	% of families
1.	Worker, employee….etc		
2.	Working in livestock		
3.	Agricultural work		
4.	Income from trade		
5.	Income from social security payments (social insurance, pension, Zakat, UNRWA..etc.)		

Assessment of Water Availability and Access in the Areas Vulnerable to Drought in the Jordan Valley

Name of community/area: ……..…
Coordinates: ……
Population: ……
Name of clan: ……..…… Name of family: ……..……..
Name of interviewee: ……..…… Position: ……..…….. Number: ……..
Date: ……..

Water Sources

☐ Springs

Cost NIS/m^3	Quantity supplied to community m^3/day	Average discharge m^3/hr	Coordinates	Spring name

☐ Rainwater harvesting cisterns

Quantity of water stored (m3/yr)	Average size (m^3)	Number of rainwater harvesting cisterns

☐ Groundwater wells

Cost NIS/m^3	Quantity supplied to community m^3/day	Average discharge m^3/hr	Coordinates	Well name

☐ Filling points

Distance from community, km	Cost NIS/m^3	Quantity supplied to community m^3/day	Average discharge m^3/hr	Coordinates	Name

☐ Water network

Water supplied through the network is:	Cost NIS/m^3	Water supply l/c/d	Quantity supplied to community m^3/day	Percentage of coverage	Number of persons connected
1. Regular 2. Irregular					

Consumption l/c/day	Average total water supply
Yes No	Is follow up required for water issues on the community?

5.4 Database collection

Code	Description	Unit	Methodology Used
Name	The name of the community as known by the locals and agreed upon by counterpart organizations (OCHA in particular)	-	Initially developed from existing list modified following interviews with communities and meetings with counterparts
N	North coordinate – Palestinian Grid	-	Marked using GPS, taken in a random point within the central most part of the community
E	East coordinate – Palestinian Grid	-	Marked using GPS, taken in a random point within the central most part of the community
POP	Number of people living in the community	-	Estimates collected through interviews with community representatives crosschecked with PCBS
FAM	Number of families/households living in the community	-	Estimates collected through interviews with community representatives crosschecked with PCBS
HUM_CONS	Quantity of water consumed for drinking and domestic purposes	l/c/d	Estimates collected through interviews with community representatives
ANI_CONS	Average quantity of water consumed for the livestock in the community	m^3/d	Estimates collected through interviews with community representatives
SHEEP_N	Total number of sheep heads in the community	-	Estimates collected through interviews with community representatives
SHEEP_C	Average quantity of water consumed by a single sheep in the community	l/head/d	Estimates collected through interviews with community representatives
COW_N	Total number of cows in the community	-	Estimates collected through interviews with community representatives
COW_C	Average quantity of water consumed by a single cow in the community	l/head/d	Estimates collected through interviews with community representatives

CAMEL_N	Total number of camels in the community	-	Estimates collected through interviews with community representatives
CAMEL_C	Average quantity of water consumed by a single camel in the community	l/head/d	Estimates collected through interviews with community representatives
TYPE	Classification of the communities according to type (Bedouin community and villages)	-	According to previous classifications and observation
HOUSE_TYPE	The prevalent type of dwellings in the community (zinc, concrete, tents or caves)	-	The percentage of each of the dwelling types defined was determined by direct observation. The prevailing type was determined according to the highest percentage.
CIST_N	Total number of cisterns available in the community including both used and unused	-	Estimates collected through interviews with community representatives
CIST_AV_SI	The average size of the cisterns in the community	m^3	Estimates collected through interviews with community representatives and by visiting a selected sample from the community
CIST_WS_Y	Estimated quantity of water collected by rainwater harvesting	m^3/yr	Estimates collected through interviews with community representatives to determine the volume of the cistern that is filled following the rainy season
NET_CON_N	Actual number of households connected to a water network	-	Data provided by the village councils
NET_COV	The percentage of households connected in reference to the total number of households	%	Data provided by the village councils
NET_WS_D	The estimated quantities of water supplied through the network to the community	m^3/day	Data provided by the village councils and from water bills when available
NET_COST	The a cubic meter of water supplied through the network	NIS/m^3	Data provided by the village councils
NET_SUPPLY	Description of the water supply frequency being it either continuous or discontinuous	-	Data provided by the village councils in addition to some random perceptions from the public
SPRING	The name of the spring used by	-	Previous lists developed by PWA

	the community for domestic purposes (water not supplied through a network)		also verified by the community representatives
SPRI_COST	The costs entailed in using spring water for domestic use (including the cost of the water (if any) and transport)	NIS/m^3	Estimates collected through interviews with community representatives and from tanker owners
WELL	The name of the well used by the community for domestic purposes (water not supplied through a network)	-	Previous lists developed by PWA also verified by the community representatives
WELL_COST	The costs entailed in using water abstracted from a well that is not connected to a network for domestic use (including the cost of the water and transport)	NIS/m^3	Estimates collected through interviews with community representatives, from tanker owners and the well operators
FP	The name of the filling point used by the community for domestic purposes (water not supplied through a network)	-	Previous lists developed by PWA also verified by the community representatives
FP_DISC	Estimated capacity of the filling point providing a community	m^3/hr	Quantified based on the size of the pipe and how long it takes to fill a tanker according to the owners
FP_COST	The costs entailed in using filling points for domestic use (including the cost of the water (if any) and transport)	NIS/m^3	Estimates collected through interviews with community representatives and from tanker owners
OTHER	The name of any water source supplying a community other than what was previously mentioned such as irrigation network, agricultural wells, etc.	-	Based on interviews with the community representatives
OTHER_COST	The costs entailed in using other sources for domestic use (including the cost of the water (if any) and transport)	NIS/m^3	Estimates collected through interviews with community representatives
INC_SOURCE	The prevalent income source of the residents of the community (e.g. herding, agriculture, etc.)	-	The percentage of households relying on different income sources was determined through interviews with community representatives. The prevailing type was determined according to the highest percentage.

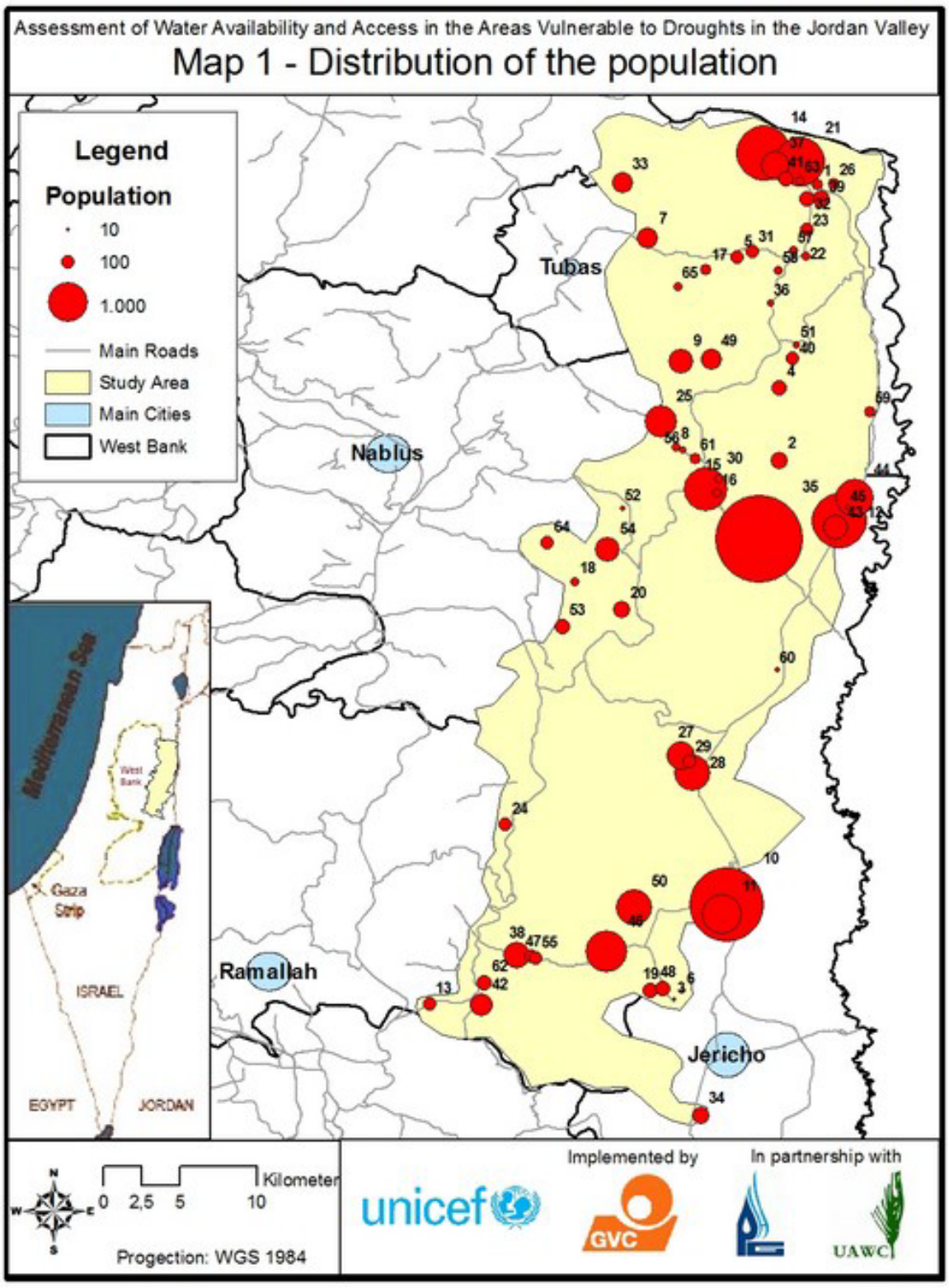
MAIN_WS	Indication of the prevalent water source within the community	-	Estimates collected through interviews with community representatives
COST	Overall cost of water in the community	NIS/m³	Estimates collected through interviews with community representatives
TLU	Total number of Tropical Livestock Units in the community	-	Calculated multiplying the number of every type of animal for its TLU parameter (sheep=0.1, horses=0.4, cows=0.7, camels=1.6) and summing them
TLU_CONS	Average quantity of water consumed by a single TLU in the community	l/TLU/d	Calculated dividing the consumptions of the different type of animals for their TLU parameter and averaging them
SHEEP_EQ	Equivalent total number of sheep in the community	-	Calculated dividing the total TLU in the community for sheep TLU parameter (0.1)
SHEEP_EQ_C	Average quantity of water consumed by a single equivalent sheep in the community	l/sheep/d	Calculated multiplying the total TLU consumption in the community for sheep TLU parameter (0.1)
DIST	Average distance that the community has to cover to reach the water source	Km	Calculated with GIS from track marked on the field following the routes used for water supply

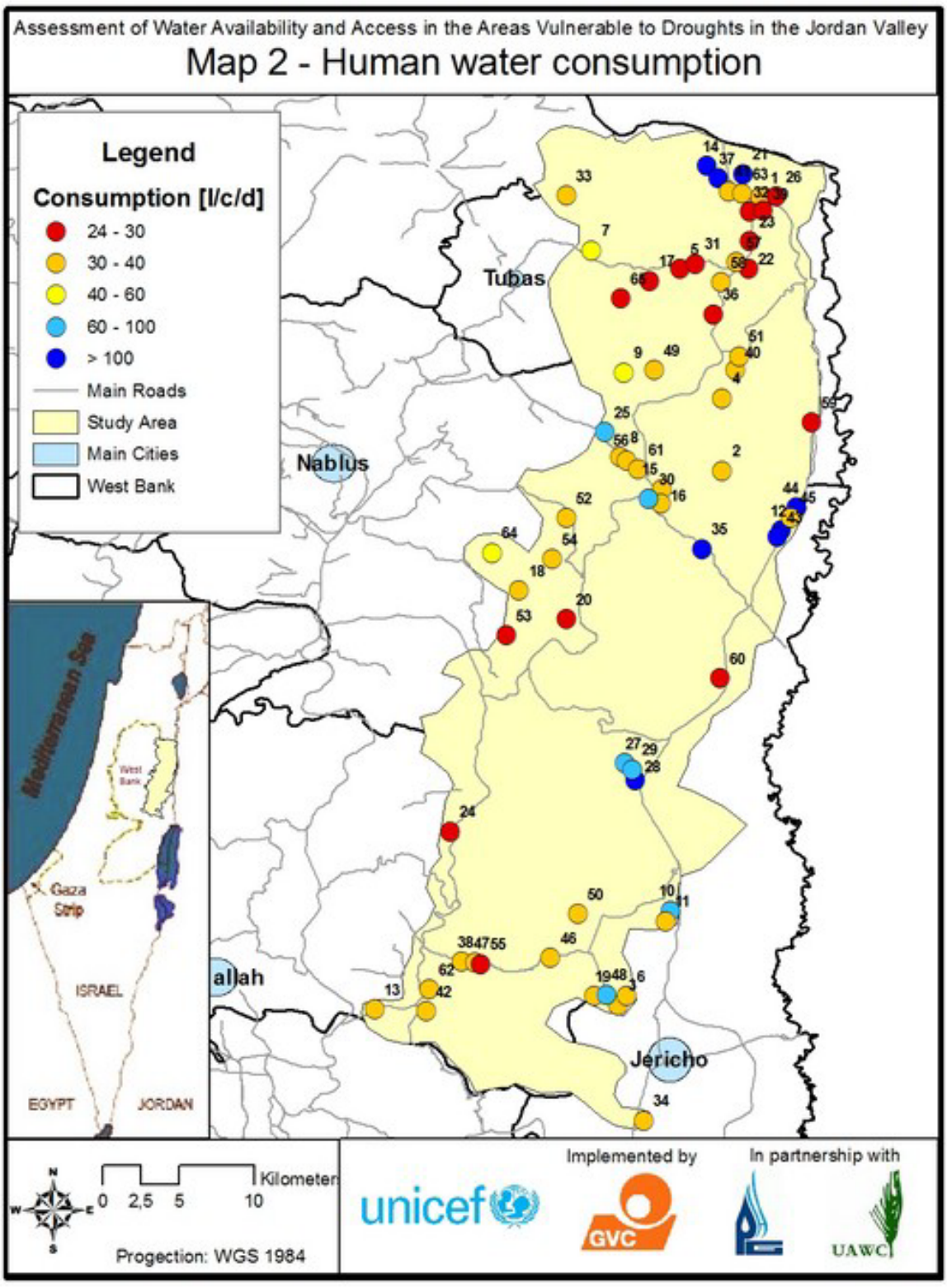
5.5 Database

ID	NAME	N	E	GOVE	POP	FAM	HUM_CONS	ANI_CONS	SHEEP_N	SHEEP_C	COW_N	COW_C	CAMEL_N	CAMEL_C	HORSE_N	HORSE_C
1	Al Zu'bi (Al Farisiya group)	32.36803	35.5171	Tubas	74	9	35	0.7	55	9	0	0	0	0	6	30
2	Al Farsha (Basalia al Fauqa group)	32.20646667	35.49478333	Nablus	180	30	34	17.2	2000	8	2	35	0	0	51	22
3	Algerb Bedouins	31.89085	35.43324	Jericho	9	1	32	0.4	30	10	0	0	0	0	2	30
4	Al Hadidiya	32.24926667	35.49478333	Tubas	130	11	37	24.5	3000	8	0	0	0	0	20	25
5	Al Meeta (Hammamat al Malih group)	32.32568333	35.46981667	Tubas	120	14	26	24.5	3000	8	0	0	0	0	20	25
6	Amriyeen Bedouins	31.89617	35.43825	Jericho	24	3	34	0.75	60	10	0	0	0	0	5	30
7	Al 'Aqaba	32.3368	35.41733333	Tubas	300	45	56	9.5	1500	6	10	32	0	0	10	20
8	Athmawwia (Basalia al Fauqa group)	32.21465	35.4342	Nablus	52	8	33	9.2	1270	7	0	0	0	0	15	22
9	Atoof	32.26468333	35.43685	Tubas	370	48	55	64.3	8000	7.5	41	40	0	0	104	25
10	Al 'Auja	31.94665	35.46406667	Jericho	3500	580	76	53.2	5000	10	10	50	15	60	60	30
11	Al 'Auja Bedouins	31.94055	35.4612	Jericho	1000	165	32	129.9	12000	10	10	50	100	60	115	30
12	Az Zubeidat	32.17136667	35.52976667	Jericho	2000	270	110	2.6	300	7.5	0	0	0	0	10	35
13	Al Baq'a	31.88837	35.28956	Jericho	114	12	32	11.1	720	9	0	0	0	0	5.8	30
14	Bardala	32.38651667	35.4856	Tubas	1960	245	130	48.5	3500	8	500	40	0	0	15	30
15	Basalia al Tahta	32.19595	35.45936667	Nablus	49	8	36	6.3	870	7	0	0	0	0	8	22
16	Basalia al Tahta	32.18741667	35.45836667	Tubas	44	9	33	10.7	1500	7	0	0	0	0	6	22
17	Al Burj ('Ein al Hilwa group)	32.318664	35.451572	Tubas	84	12	24	20.3	2500	8	0	0	0	0	12	25
18	Ad Dawa	32.13574	35.37484	Nablus-Aqraba	60	10	32	4.8	700	6.5	0	0	0	0	12	22
19	'Ein ad Duyuk al Fauqa Bedouins	31.89618333	35.41903333	Jericho	154	22	35	13.8	1620	8	0	0	0	0	30	30
20	Lifjim	32.11903	35.4025	Nablus-Aqraba	168	28	28	70.3	7000	9	150	42	0	0	36	27
21	'Ein el Beida	32.38171667	35.50695	Tubas	1600	250	123	28.3	1500	8	400	40	0	0	10	30
22	'Ein al Hilwa	32.32606667	35.51041667	Tubas	48	5	30	34.2	325	6.5	462	30	0	0	10	30
23	Nabe' Ghazal (Al Farisiya group)	32.34221667	35.51075	Tubas	100	11	30	17.8	2500	7	0	0	0	0	15	23
24	'Ein Samiya	31.99346667	35.33418333	Ramallah	110	20	28	13.7	2000	6.6	0	0	0	0	25	20
25	'Ein Shibli	32.2295	35.42506667	Nablus	650	111	89	13.7	1200	8.5	70	40	0	0	30	25
26	Al Jubiye (Al Farisiya group)	32.3686	35.52656	Tubas	80	9	30	0.5	60	7	0	0	0	0	3	25
27	Fasayil al Fauqa	32.03393333	35.43698333	Jericho	500	80	80	19.3	2000	9	15	50	3	60	10	35
28	Fasyil al Tahta	32.0238	35.44353333	Jericho	800	70	120	15.2	1500	9	0	0	20	60	12	35
29	Fasayil al Wusta	32.03013333	35.44175	Jericho	100	15	80	2.1	200	9	0	0	0	0	6	35
30	Furush Beit Dajan	32.18998333	35.45146667	Nablus	1200	170	69	7.2	800	7.5	10	30	0	0	42	20
31	Hammamat al Malih	32.32895	35.47883333	Tubas	100	7	24	7	600	8	65	30	0	0	9	25
32	Hmayyer (Al Farisiya group)	32.35968333	35.51088333	Tubas	150	14	30	8.7	1200	7	0	0	0	0	15	25
33	Ibziq	32.36911667	35.40275	Tubas	268	38	33.6	42.6	5000	6.3	300	35	0	0	28	20
34	Jahalin Abu Dahuk	31.82273	35.44853	Jericho	180	30	35	25	1200	10	2	50	200	60	30	30
35	Al Jiftlik	32.16046667	35.48266667	Jericho	5000	700	160	83.8	9000	9	35	50	0	0	30	35
36	Khirbet Samra Bedouins	32.29911667	35.48963333	Tubas	31	6	30	18.3	1950	9	0	0	0	0	7	23
37	Kardala	32.37931667	35.4925	Tubas	500	60	150	10.2	1200	8	10	40	0	0	6	30
38	Mu'arrajat Centre (Khalayfa)	31.91663333	35.34076667	Jericho	480	60	33	65.1	7000	9	0	0	0	0	70	30
39	Khallet Khader (Al Farisiya group)	32.36006667	35.519	Tubas	176	17	30	9.3	1300	7	0	0	0	0	10	23
40	Mak-hul	32.26618333	35.50246667	Tubas	120	14	35	28.5	3500	8	0	0	0	0	20	25
41	Khirbet Tell el Himma	32.37158333	35.49836667	Tubas	150	17	32	17.6	1800	7	150	30	0	0	20	25
42	Maghayir ad Dir	31.88739	35.31979	Jericho	342	36	32	33.3	2160	9	0	0	0	0	29	30
43	Marj Ghazal	32.16733333	35.52738333	Tubas	400	60	150	2.5	300	7.5	0	0	0	0	15	35
44	Marj Na'ja	32.18473333	35.53883333	Jericho	950	120	120	20	1500	7.5	200	43	0	0	5	35
45	Marj Na'ja Herders	32.17891667	35.53501667	Jericho	13	2	32	1	100	7.5	0	0	0	0	4	35
46	Mu'arrajat East (Milehat/School side)	31.91883333	35.3934	Jericho	1140	120	32	66.5	7200	9	0	0	0	0	58	30
47	Mu'arrajat Centre (Al Mahanieh)	31.91593	35.34893	Jericho	115	23	33	14	1440	9	0	0	0	0	25	30
48	An Nuwei'ma al Fauqa Bedouins	31.89726667	35.42653333	Jericho	128	16	100	8.6	1000	8	0	0	2	60	15	30
49	Khirbet ar Ras al Ahmar	32.2659	35.45461667	Tubas	259	37	32	54.5	6500	8	2	35	0	0	70	21
50	Ras 'Ein al 'Auja	31.94468333	35.40953333	Jericho	800	80	33	52.5	5000	10	0	0	0	0	82	30
51	Khirbet Samra	32.27433333	35.50488333	Tubas	37	6	38	8.4	900	9	0	0	0	0	12	23
52	Sh'ieb Al Beer	32.17875	35.40255	Nablus-Beit Furik	25	3	32	2.9	500	5.5	0	0	0	0	6	22
53	Khirbet Telll al Khashaba (another name Twayyel)	32.10941	35.36728	Nablus-Aqraba	150	17	30	26.1	3000	8	40	38	0	0	22	25
54	Khirbet Tana	32.15435	35.39408333	Nablus	375	57	31	26.3	4500	5.5	0	0	0	0	70	22
55	Mu'arrajat Centre (Tayameen)	31.91525	35.35205	Jericho	100	20	28	8.6	1000	8	0	0	0	0	23	25
56	Thra' Awwad (Basalia al Fauqa group)	32.21263333	35.43828333	Nablus	31	8	35	6	820	7	0	0	0	0	8	22
57	Um Al Jmal ('Ein al Hilwa group)	32.32966667	35.50285	Tubas	47	6	32	7.4	1000	7	3	35	0	0	7	22
58	Um Al Khzouk ('Ein al Hilwa group)	32.31796667	35.4941	Tubas	45	4	31	11.4	1600	7	1	40	1	60	4	28
59	Um al 'Obor	32.2349	35.54746667	Tubas	78	13	28	15.8	300	7	300	45	0	0	5	30
60	Um Daleen	32.08393333	35.4933	Jericho	20	3	26	3.2	300	10	0	0	0	0	4	35
61	Wadi Abu Sider (Basalia al Fauqa group)	32.20743333	35.44528333	Nablus	66	12	36	15.7	2200	7	0	0	0	0	15	22
62	Wadi As Seeq	31.90037	35.32164	Ramallah	150	22	33	5.2	650	7	0	0	0	0	25	25
63	Khallet Hamad included in Khirbet Tell el Himma	32.37027	35.50668	Tubas	60	7	31	7.6	1000	7	15	30	0	0	8	25
64	Yanun	32.15818	35.35878	Nablus-Aqraba	120	20	50	5.2	450	10	0	0	0	0	23	30
65	Khirbet Yarza	32.30833333	35.435	Tubas	60	12	27	15.3	1270	6	175	40	0	0	21	25

ID	TYPE	HOUSE_TYPE	CIST_N	CIST_AV_SI	CIST_WS_Y	NET_CON_N	NET_COV	NET_WS_D	NET_COST	NET_SUPPLY	SPRING	SPRI_COST	WELL	WELL_COST	FP	FP_DISC	FP_COST	OTHER	OTHER_COST	MAIN_WS	COST	INC_SOURCE	TLU	TLU_CONS	SHEEP_EQ	SHEEP_EQ_C	DIST
1	bedouins	Zinc	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation system	3	Other	3	Agriculture	8	83	80	8.3	0
2	bedouins	Tents	0	0	0	0	0	0	0		Ain Shibli	15		0		0	0		0	Spring	15	Herding	222	62	2220	6.2	4.2
3	bedouins	Concrete	0	0	0	0	0	0	0			0		0	Nuweimah Filling Point	20	25		0	Filling Point	25	Herding	4	88	40	8.8	3.6
4	bedouins	Tents	0	0	0	0	0	0	0		Ain Shibli	32		0		0	0		0	Spring	32	Herding	308	71	3080	7.1	15.4
5	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	50	Other	50	Herding	308	71	3080	7.1	11.4
6	bedouins	Concrete	0	0	0	0	0	0	0			0		0	Nuweimah Filling Point	20	25		0	Filling Point	25	Herding	8	88	80	8.8	3.5
7	village	Concrete	40	50	1000	0	0	0	0			0	Tamoun	15		0	0		0	Well	15	Herding & Agriculture	161	52	1610	5.2	0
8	bedouins	Tents	0	0	0	0	0	0	0		Ain Shibli	17		0		0	0		0	Spring	17	Herding	133	63	1330	6.3	2.1
9	village	Concrete	20	60	600	0	0	0	0			0	Tamoun	16		0	0		0	Well	16	Herding	870	65	8700	6.5	7.7
10	village	Concrete	0	0	0	500	100	266	3.5	Continuous		0		0		0	0		0	Network	4	Herding	555	71	5550	7.1	0
11	bedouins	Tents	0	0	0	0	0	0	0		Auja	10		0	Auja Filling point	15	15		0	Spring & Filling Point	15	Herding	1413	71	14130	7.1	1.1
12	village	Concrete	0	0	0	270	100	220	4	Continuous		0		0		0	0		0	Network	4	Agriculture	34	81	340	8.1	0
13	bedouins	Zinc	0	0	0	0	0	0	0			0		0	Mekhmas filling point	20	25		0	Filling Point	25	Herding	74	83	740	8.3	0
14	village	Concrete	40	60	0	245	100	254	4	Continuous		0		0		0	0		0	Network	4	Herding & Agriculture	706	71	7060	7.1	0
15	bedouins	Tents	0	0	0	0	0	0	0		Ain Shibli	17		0		0	0		0	Spring	17	Herding	90	63	900	6.3	4.4
16	bedouins	Tents	0	0	0	0	0	0	0		Ain Shibli	25		0		0	0		0	Spring	25	Herding	152	63	1520	6.3	6.7
17	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	50	Other	50	Herding	255	71	2550	7.1	0
18	bedouins	Tents	3	50	100	0	0	0	0		Al Dawa	0		0		0	0		0	Spring	0	Agriculture	75	60	750	6	0
19	bedouins	Zinc	0	0	0	0	0	0	0		Shosa	17		0		0	0		0	Spring	17	Herding	174	78	1740	7.8	0.6
20	bedouins	Tents	15	70	500	0	0	0	0		Ain Shibli	40		0		0	0		0	Spring	40	Herding	819	73	8190	7.3	17.4
21	village	Concrete	0	0	0	250	100	197	4	Continuous		0		0		0	0		0	Network	4	Herding & Agriculture	434	71	4340	7.1	0
22	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	33	Other	33	Herding	360	61	3600	6.1	7.8
23	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	25	Other	25	Herding	256	64	2560	6.4	0
24	bedouins	Tents	0	0	0	0	0	0	0			0		0	Ain Samya well No.3	200	15		0	Filling Point	15	Herding	210	58	2100	5.8	0
25	village	Concrete	0	0	0	86	90	52	1.5	Discontinuous	Ain Shibli	0		0		0	0		0	Network & Spring	2	Other	181	68	1810	6.8	0
26	bedouins	Zinc	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation system	5	Other	5	Agriculture	7	66	70	6.6	0
27	village	Zinc	0	0	0	80	100	40	4	Discontinuous		0		0		0	0		0	Network	4	Herding & Other	219	72	2190	7.2	0
28	village	Concrete	0	0	0	70	100	96	4	Continuous		0		0		0	0		0	Network	4	Other	187	72	1870	7.2	0
29	bedouins	Tents	0	0	0	15	100	8	4	Discontinuous		0		0		0	0		0	Network	4	Other	22	89	220	8.9	0
30	village	Zinc	0	0	0	70	70	62	4.2	Discontinuous		0		0		0	0	Mekoroth & Agricultural Wells	0	Network & Other	4	Agriculture	104	56	1040	5.6	0
31	bedouins	Zinc	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	50	Other	50	Herding	109	62	1090	6.2	10.2
32	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	17	Other	17	Herding	126	66	1260	6.6	0
33	bedouins	Tents	12	70	840	0	0	0	0			0	Tamoun	40		0	0		0	Well	40	Herding	721	54	7210	5.4	12.9
34	bedouins	Zinc	0	0	0	0	0	0	0			0		0	Ain Sultan Filling point	24	20		0	Filling Point	20	Herding	453	71	4530	7.1	5.9
35	village	Tents	0	0	0	700	100	800	4	Continuous		0		0		0	0		0	Network	4	Agriculture	937	83	9370	8.3	0
36	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	25	Other	25	Herding	198	74	1980	7.4	0
37	village	Concrete	0	0	0	36	60	45	4	Continuous		0		0		0	0		0	Network	4	Agriculture	129	71	1290	7.1	0
38	bedouins	Tents	5	60	300	0	0	0	0			0		0	Taibah chek pilnt	20	25		0	Filling Point	25	Herding	728	83	7280	8.3	2.5
39	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	25	Other	25	Herding & Agriculture	134	64	1340	6.4	0
40	bedouins	Tents	0	0	0	0	0	0	0		Ain Shibli	32		0		0	0		0	Spring	32	Herding	358	71	3580	7.1	0.8
41	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	17	Other	17	Herding	293	58	2930	5.8	1.7
42	bedouins	Zinc	0	0	0	0	0	0	0			0		0	Mekhmas filling point	20	20		0	Filling Point	20	Herding	228	83	2280	8.3	1.3
43	village	Concrete	0	0	0	60	100	60	4	Continuous		0		0		0	0		0	Network	4	Agriculture	36	81	360	8.1	0
44	village	Concrete	0	0	0	114	95	114	4	Discontinuous		0		0		0	0		0	Network	4	Agriculture	292	75	2920	7.5	0
45	bedouins	Tents	0	0	0	0	0	0	0		Az Zubeidat	15		0		0	0		0	Spring	15	Herding	12	81	120	8.1	1.6
46	bedouins	Zinc	0	0	0	0	0	0	0			0		0	Well No 5	3	8		0	Filling Point	8	Herding	743	83	7430	8.3	0.9
47	bedouins	Tents	0	0	0	0	0	0	0			0		0	Karamelo	4	25		0	Filling Point	25	Herding	154	83	1540	8.3	3.5
48	bedouins	Zinc	0	0	0	7	43	13	2	Continuous		0		0		0	0		0	Network	2	Herding	109	64	1090	6.4	0
49	bedouins	Tents	0	0	0	0	0	0	0			0	Tamoun	25		0	0		0	Well	25	Herding	679	61	6790	6.1	8.1
50	bedouins	Zinc	0	0	0	0	0	0	0		Auja	3		0	Auja Filling point	15	25		0	Spring & Filling Point	25	Herding	533	88	5330	8.8	5.2
51	bedouins	Tents	27	60	0	0	0	0	0		Ain Shibli	22		0		0	0		0	Spring	22	Herding	95	74	950	7.4	16.5
52	bedouins	Zinc	0	0	0	0	0	0	0		Shueib Al Beer	10		0		0	0		0	Spring	10	Herding	52	55	520	5.5	0
53	bedouins	Zinc	45	70	1400	0	0	0	0			0		0	Awarta	45	30		0	Filling Point	30	Herding	337	66	3370	6.6	10
54	bedouins	Tents	10	25	250	0	0	0	0		Al Ain Al Fuqa & Ain Teht	7		0		0	0		0	Spring	7	Herding	478	55	4780	5.5	0
55	bedouins	Tents	0	0	0	0	0	0	0			0		0	Karamelo	4	25		0	Filling Point	25	Herding	109	71	1090	7.1	3.6
56	bedouins	Tents	0	0	0	0	0	0	0		Ain Shibli	17		0		0	0		0	Spring	17	Herding	85	63	850	6.3	3.6
57	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	25	Other	25	Herding	105	58	1050	5.8	7.9
58	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation System	25	Other	25	Herding	164	59	1640	5.9	8.6
59	bedouins	Zinc	0	0	0	0	0	0	0			0		0		0	0	Az Zubeidat network	25	Other	25	Agriculture	242	70	2420	7	8.2
60	bedouins	Zinc	0	0	0	0	0	0	0			0		0		0	0	Fasayel network	17	Other	17	Herding	32	94	320	9.4	9.5
61	bedouins	Tents	0	0	0	0	0	0	0		Ain Shibli	17		0		0	0		0	Spring	17	Herding	226	63	2260	6.3	1.6
62	bedouins	Tents	0	0	0	0	0	0	0			0		0	Karamelo	4	25		0	Filling Point	25	Herding	75	66	750	6.6	3.5
63	bedouins	Tents	0	0	0	0	0	0	0			0		0		0	0	Ain Beida Irrigation system	17	Other	17	Herding	114	58	1140	5.8	1.6
64	village	Concrete	25	60	1500	11	50	3	4	Discontinuous	Yanoun (Fuqa & Tehta)	0		0		0	0		0	Spring	4	Herding	54	88	540	8.8	0
65	bedouins	Tents	25	80	1000	0	0	0	0			0	Tamoun	25		0	0		0	Well	25	Herding	258	60	2580	6	8.5

6. Maps


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 1 - Distribution of the population
Legend
Population
10
100
1.000
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Ramallah
Jericho
Mediterranean Sea
Gaza Strip
West Bank
ISRAEL
EGYPT
JORDAN
N
W
E
S
0 2,5 5 10
Kilometer
Progection: WGS 1984
Implemented by
In partnership with
unicef
GVC
UAWC


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 2 - Human water consumption
Legend
Consumption [l/c/d]
24 - 30
30 - 40
40 - 60
60 - 100
> 100
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
allah
Jericho
Mediterranean Sea
West Bank
Gaza Strip
ISRAEL
EGYPT
JORDAN
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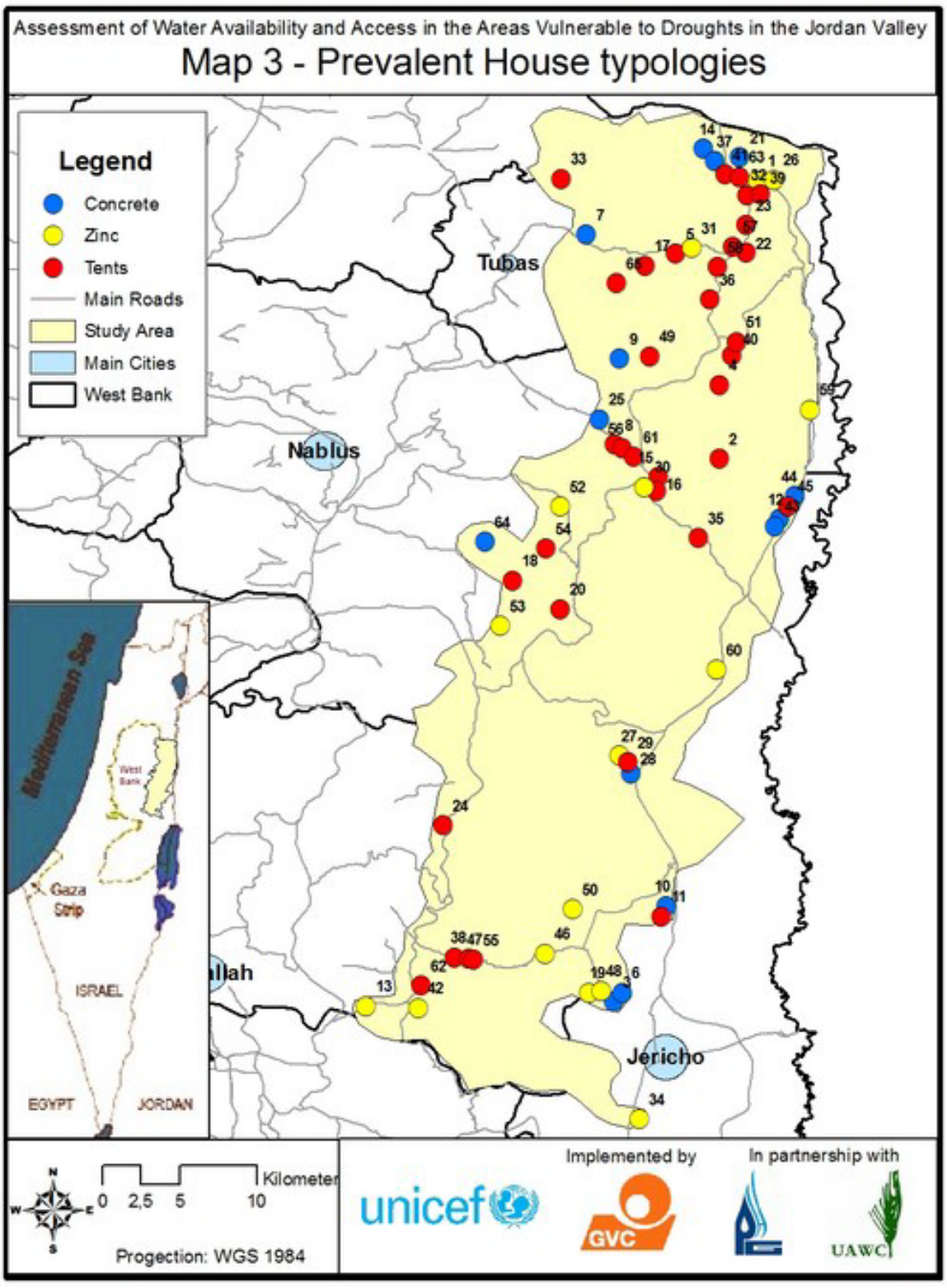
S
0 2,5 5 10
Kilometer
Progection: WGS 1984
unicef
Implemented by
GVC
In partnership with
UAWC


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 3 - Prevalent House typologies
Legend
Concrete
Zinc
Tents
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
Gaza Strip
West Bank
ISRAEL
EGYPT
JORDAN
Kilometer
0 2,5 5 10
Progection: WGS 1984
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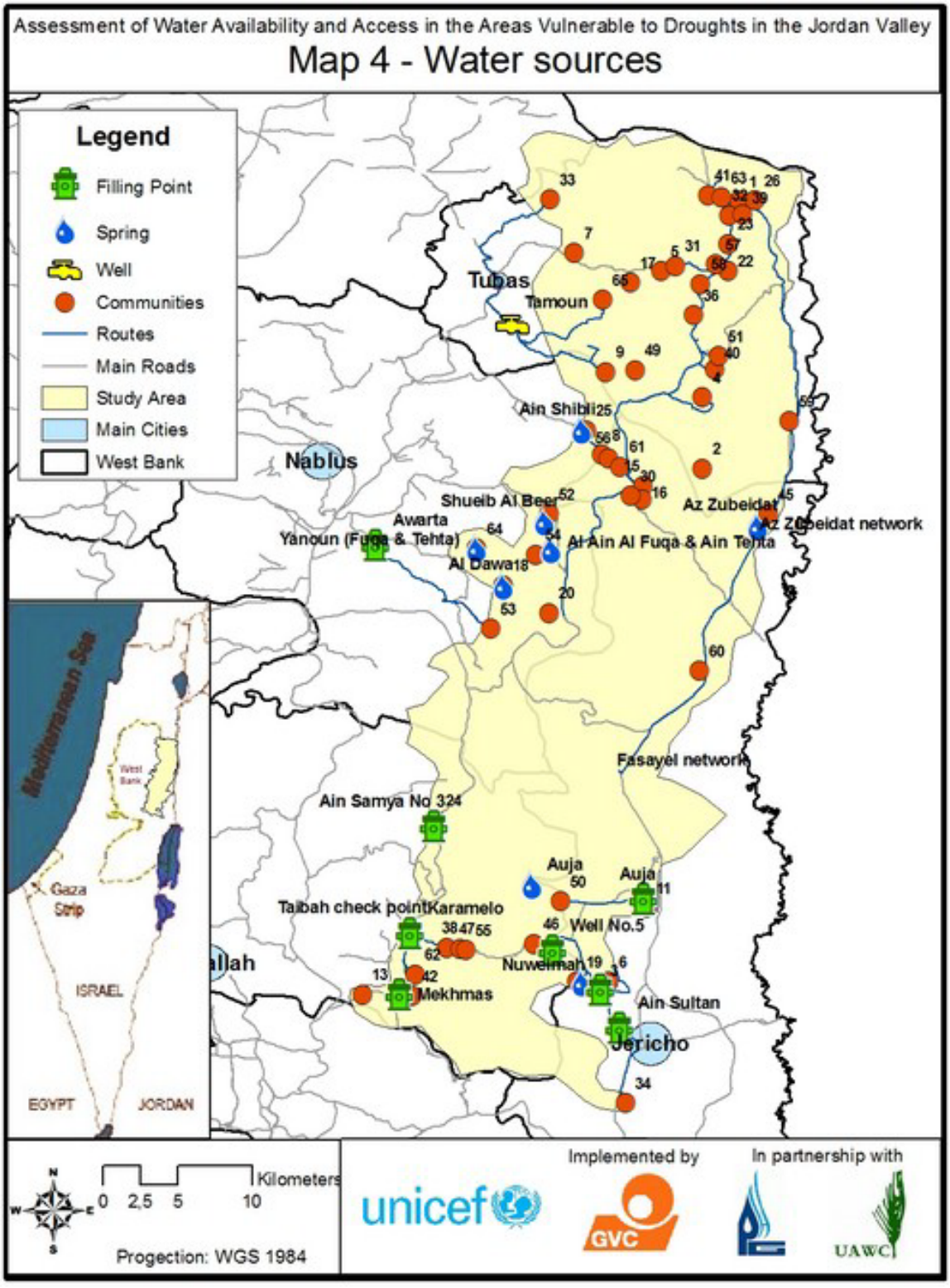
Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 4 - Water sources
Legend
Filling Point
Spring
Well
Communities
Routes
Main Roads
Study Area
Main Cities
West Bank
Tubas
Tamoun
Nablus
Ain Shibli
Shueib Al Beer
Awarta
Yanoun (Fuqa & Tehta)
Al Dawa
Al Ain Al Fuqa & Ain Tehta
Az Zubeidat
Az Zubeidat network
Fasayel network
Ain Samya No 3
Auja
Auja
Taibah check point
Karamelo
Well No.5
Nuweiman
Mekhmas
Ain Sultan
Jericho
Mediterranean Sea
West Bank
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometers
0 2.5 5 10
Progection: WGS 1984
Implemented by
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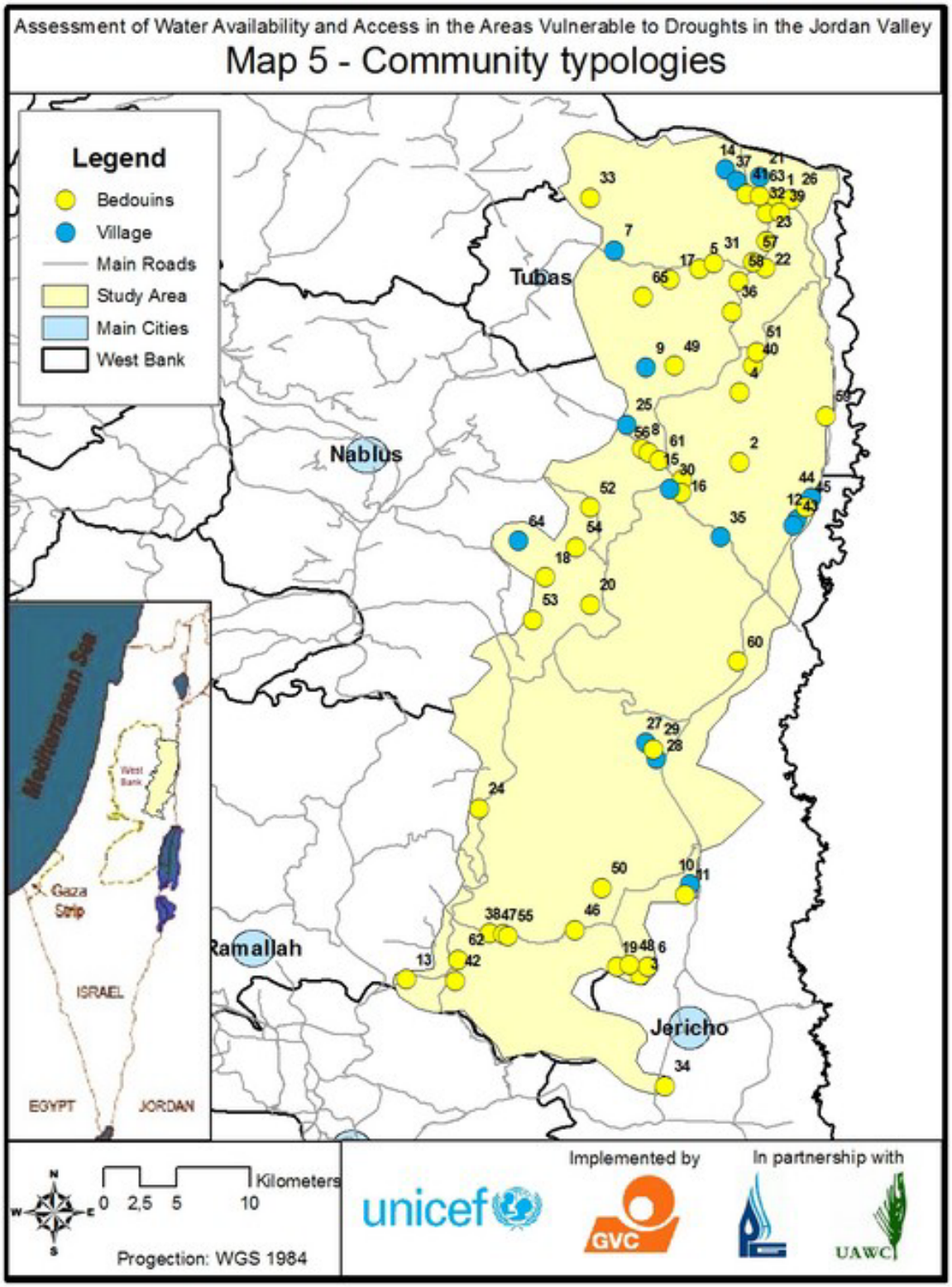
GVC
UAWC


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 5 - Community typologies
Legend
Bedouins
Village
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Ramallah
Jericho
Mediterranean Sea
Gaza Strip
West Bank
ISRAEL
EGYPT
JORDAN
Kilometers
0 2,5 5 10
Progection: WGS 1984
Implemented by
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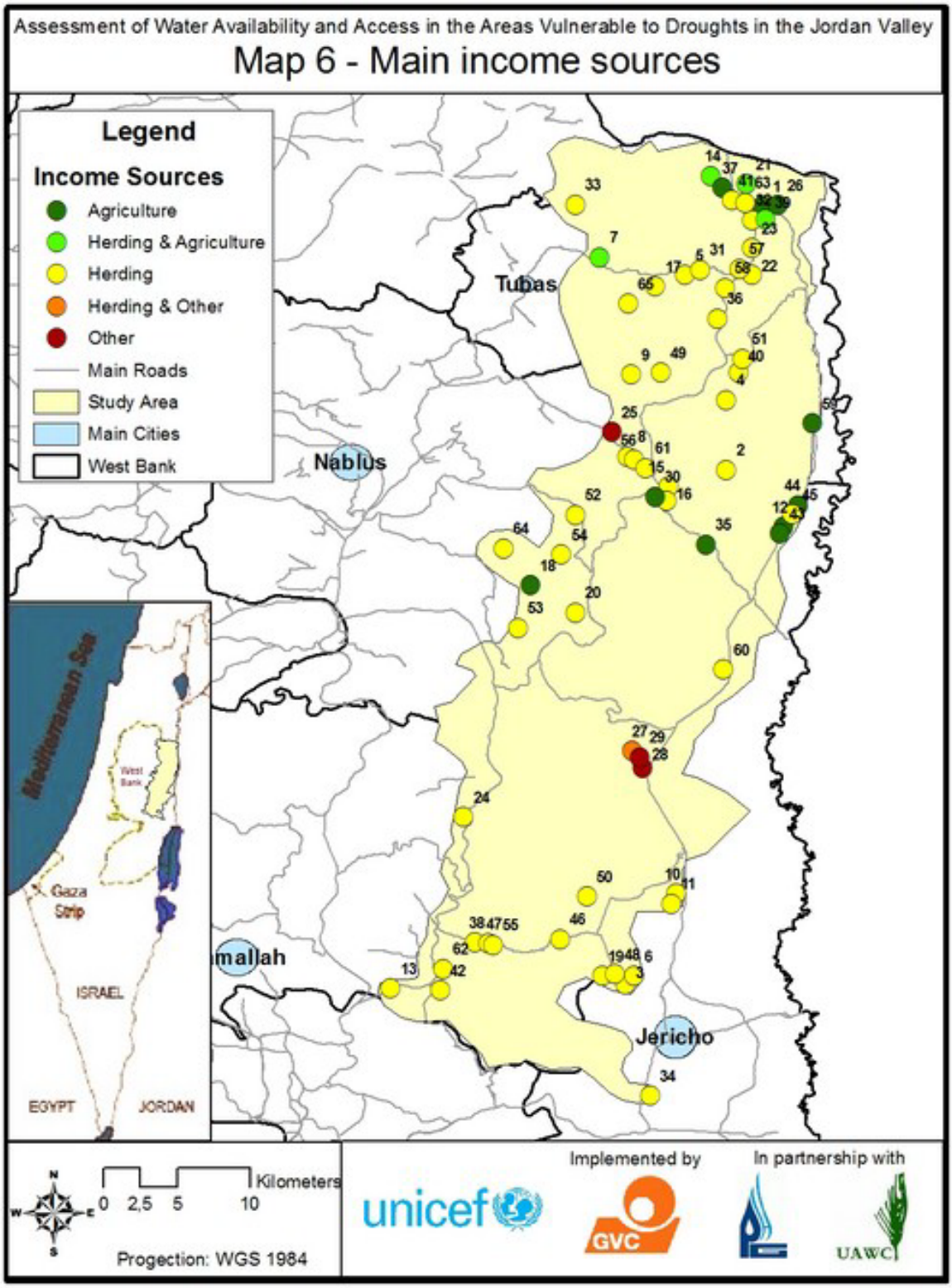
GVC
UAWC


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 6 - Main income sources
Legend
Income Sources
Agriculture
Herding & Agriculture
Herding
Herding & Other
Other
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
West Bank
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometers
0 2,5 5 10
Progection: WGS 1984
Implemented by
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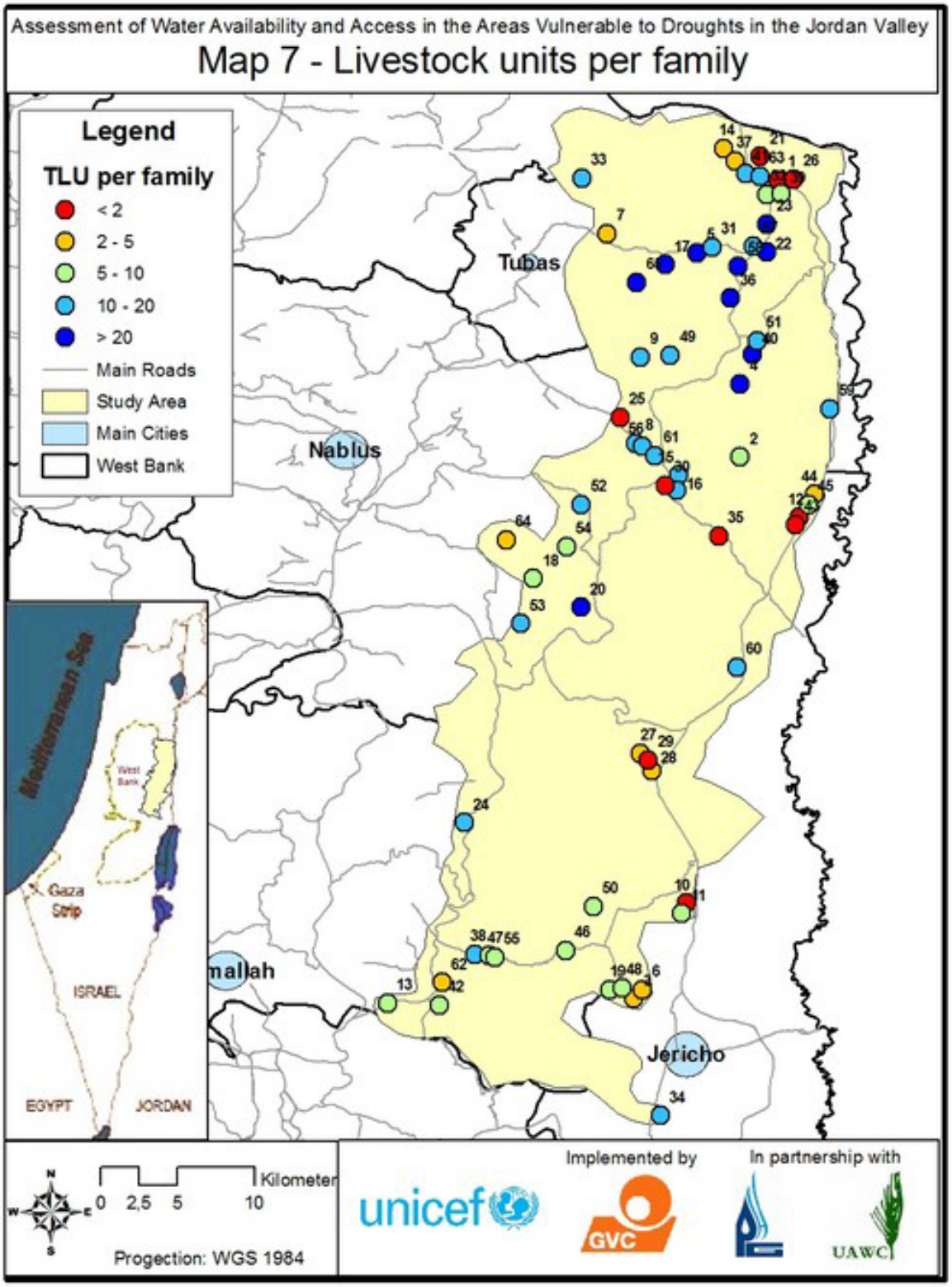
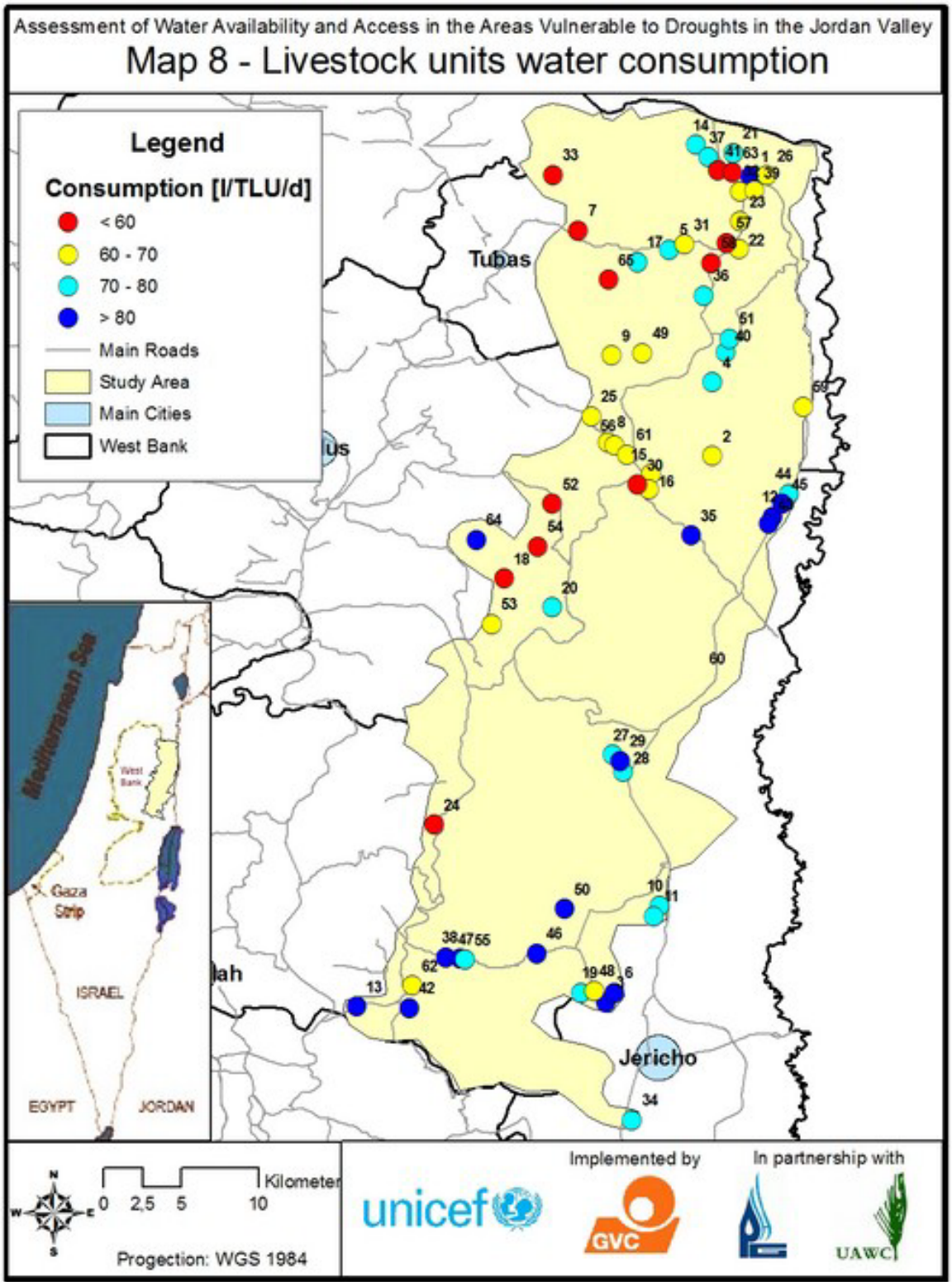

Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 7 - Livestock units per family
Legend
TLU per family
< 2
2 - 5
5 - 10
10 - 20
> 20
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometer
0 2,5 5 10
Progection: WGS 1984
Implemented by
In partnership with
unicef
GVC
UAWC


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 8 - Livestock units water consumption
Legend
Consumption [l/TLU/d]
< 60
60 - 70
70 - 80
> 80
Main Roads
Study Area
Main Cities
West Bank
Tubas
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometer
0 2,5 5 10
Progection: WGS 1984
Implemented by
In partnership with
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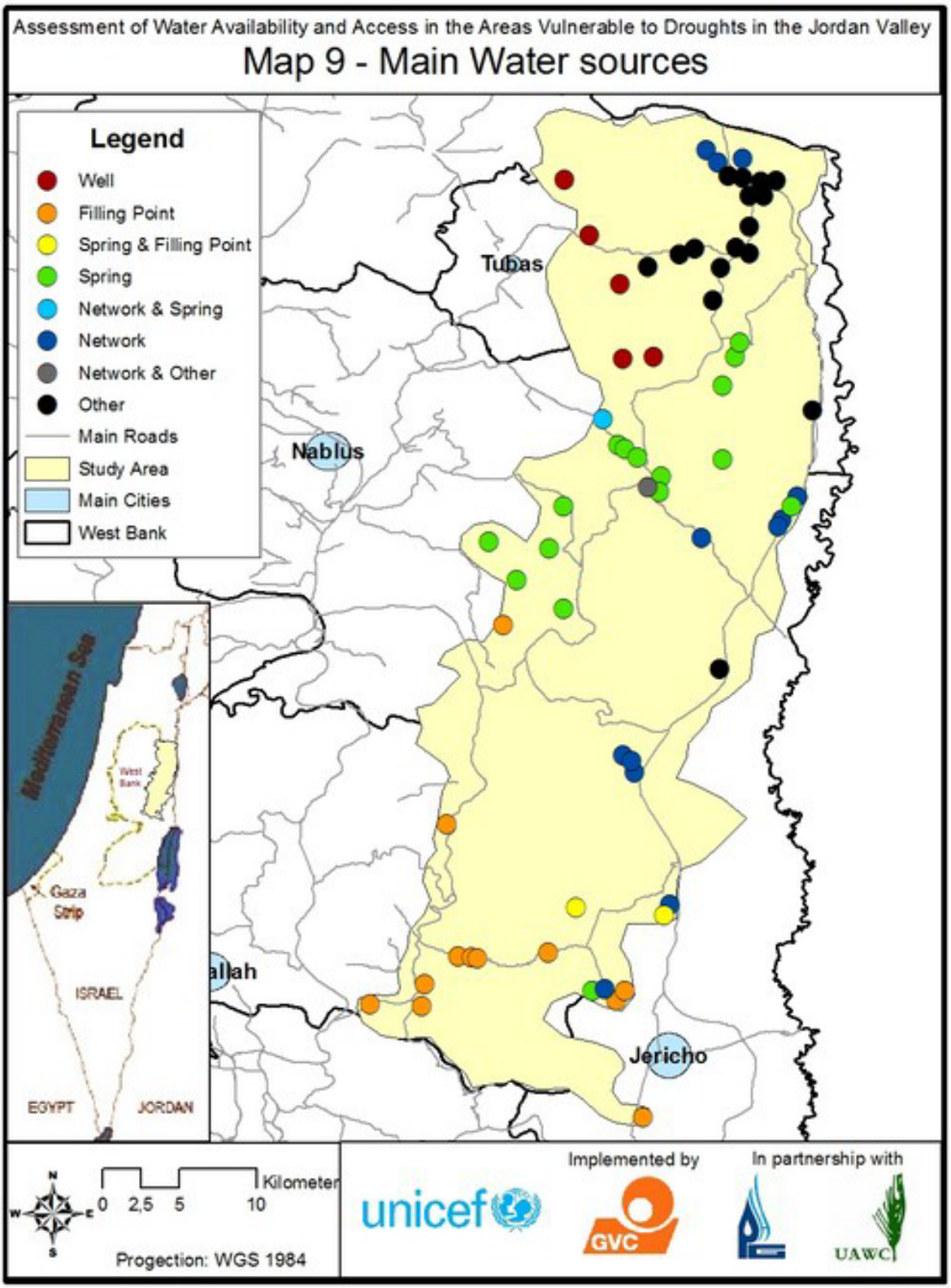
GVC
UAWC


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 9 - Main Water sources
Legend
Well
Filling Point
Spring & Filling Point
Spring
Network & Spring
Network
Network & Other
Other
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
N
W
E
S
0 2,5 5 10
Kilometer
Progection: WGS 1984
Implemented by
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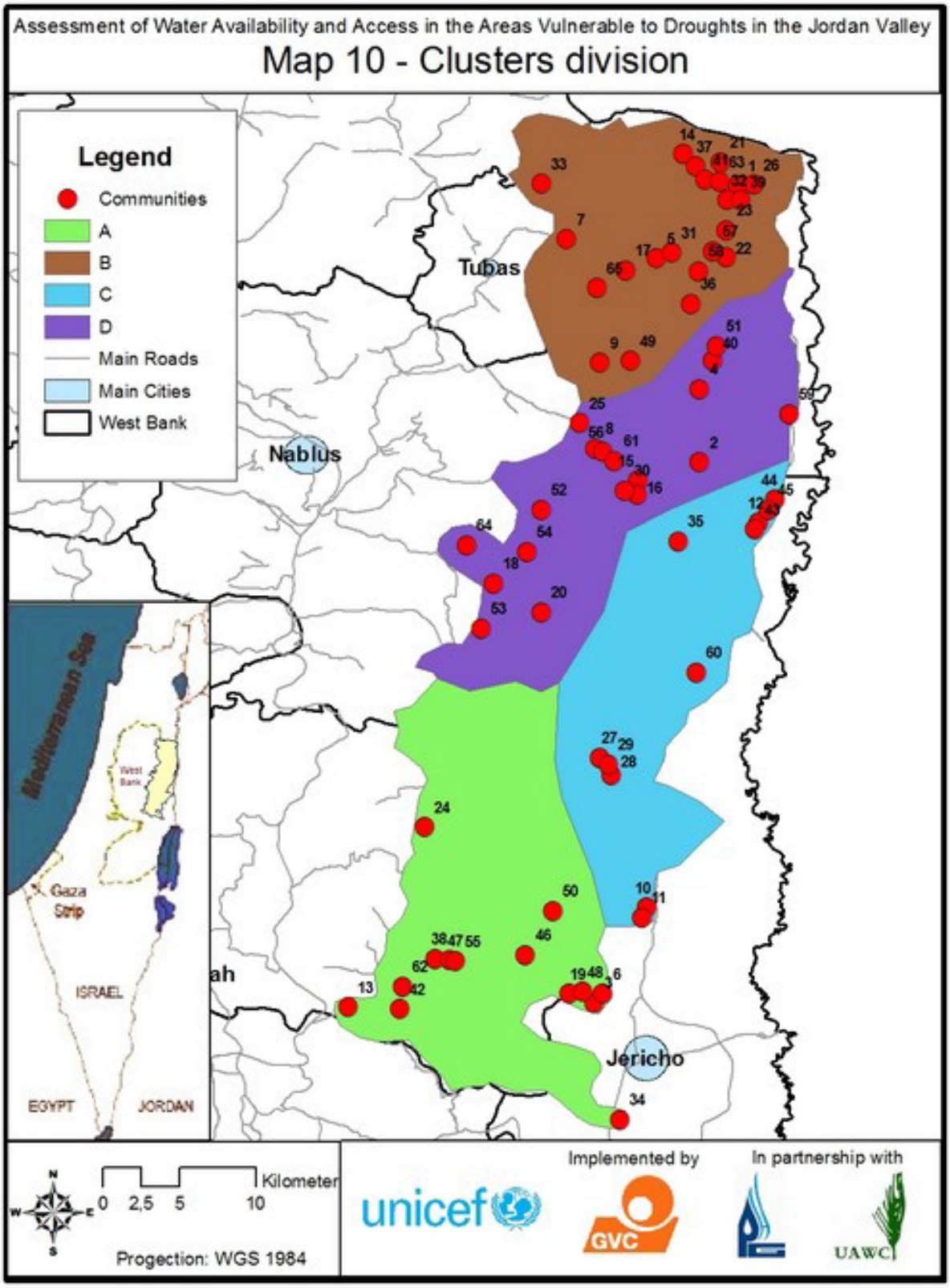
unicef
GVC
UAWC


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 10 - Clusters division
Legend
Communities
A
B
C
D
Main Roads
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometer
0 2,5 5 10
Progection: WGS 1984
Implemented by
In partnership with
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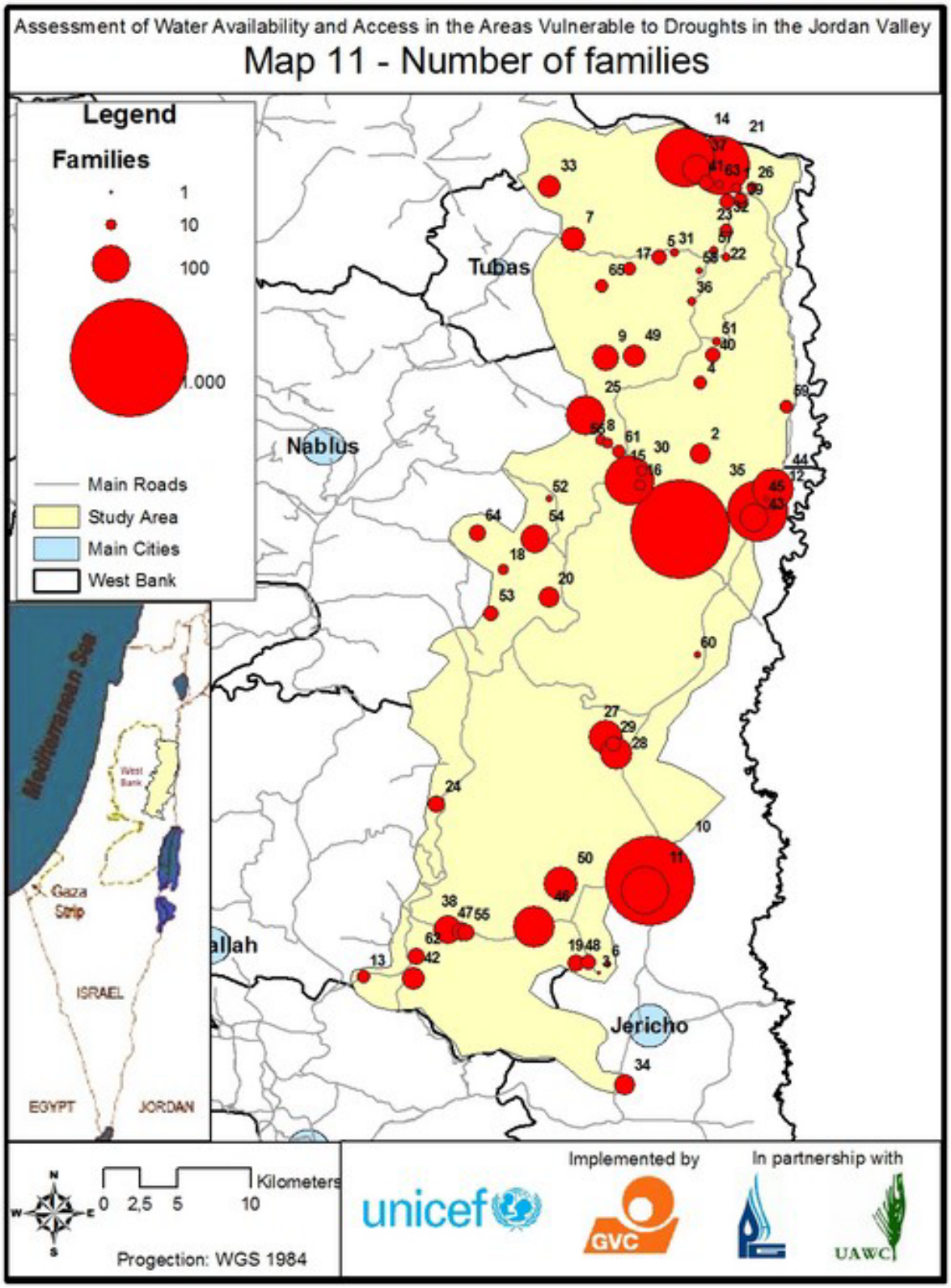
Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 11 - Number of families
Legend
Families
1
10
100
1.000
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometers
0 2,5 5 10
Progection: WGS 1984
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GVC
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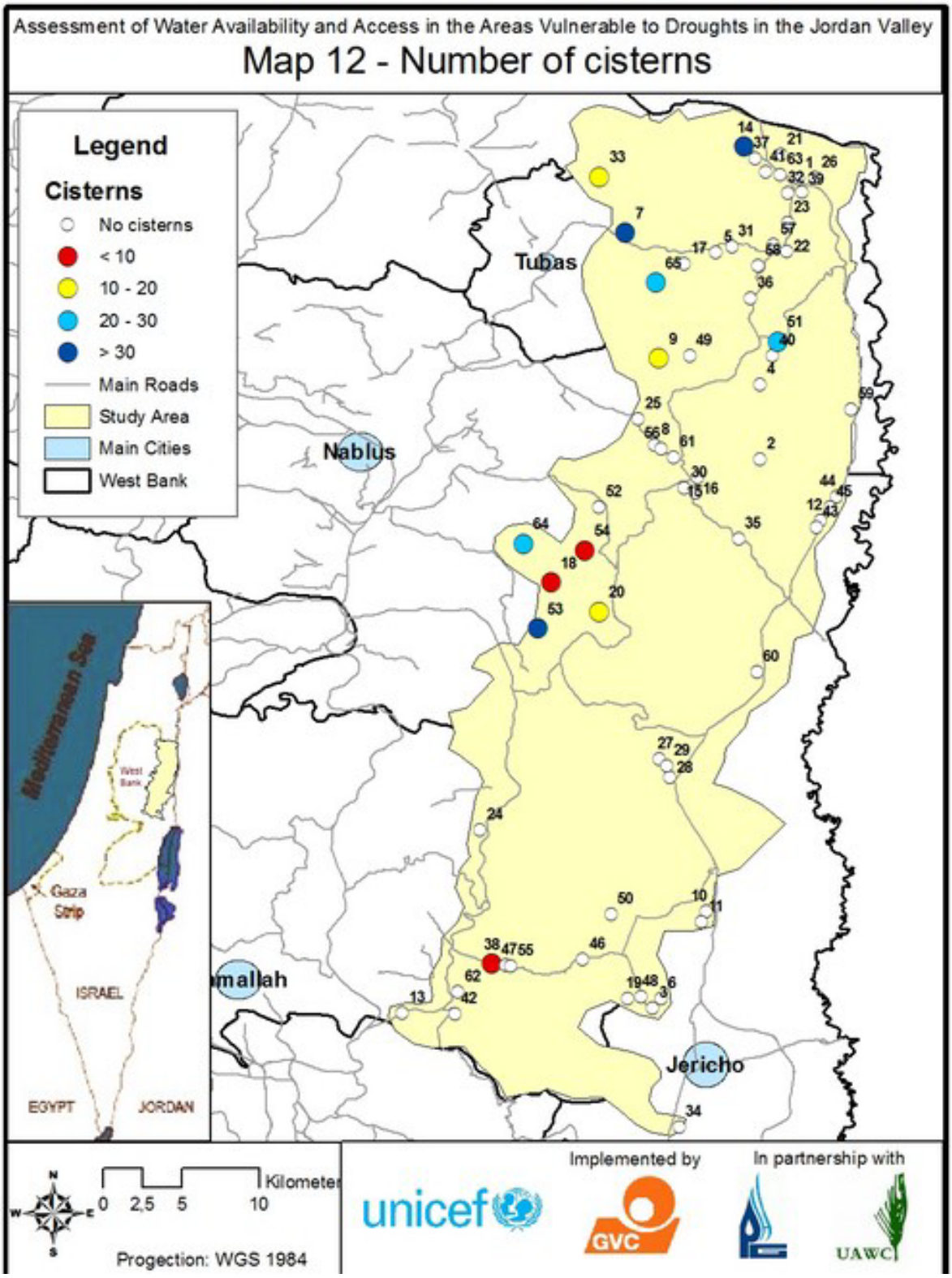
Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 12 - Number of cisterns
Legend
Cisterns
No cisterns
< 10
10 - 20
20 - 30
> 30
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometer
0 2.5 5 10
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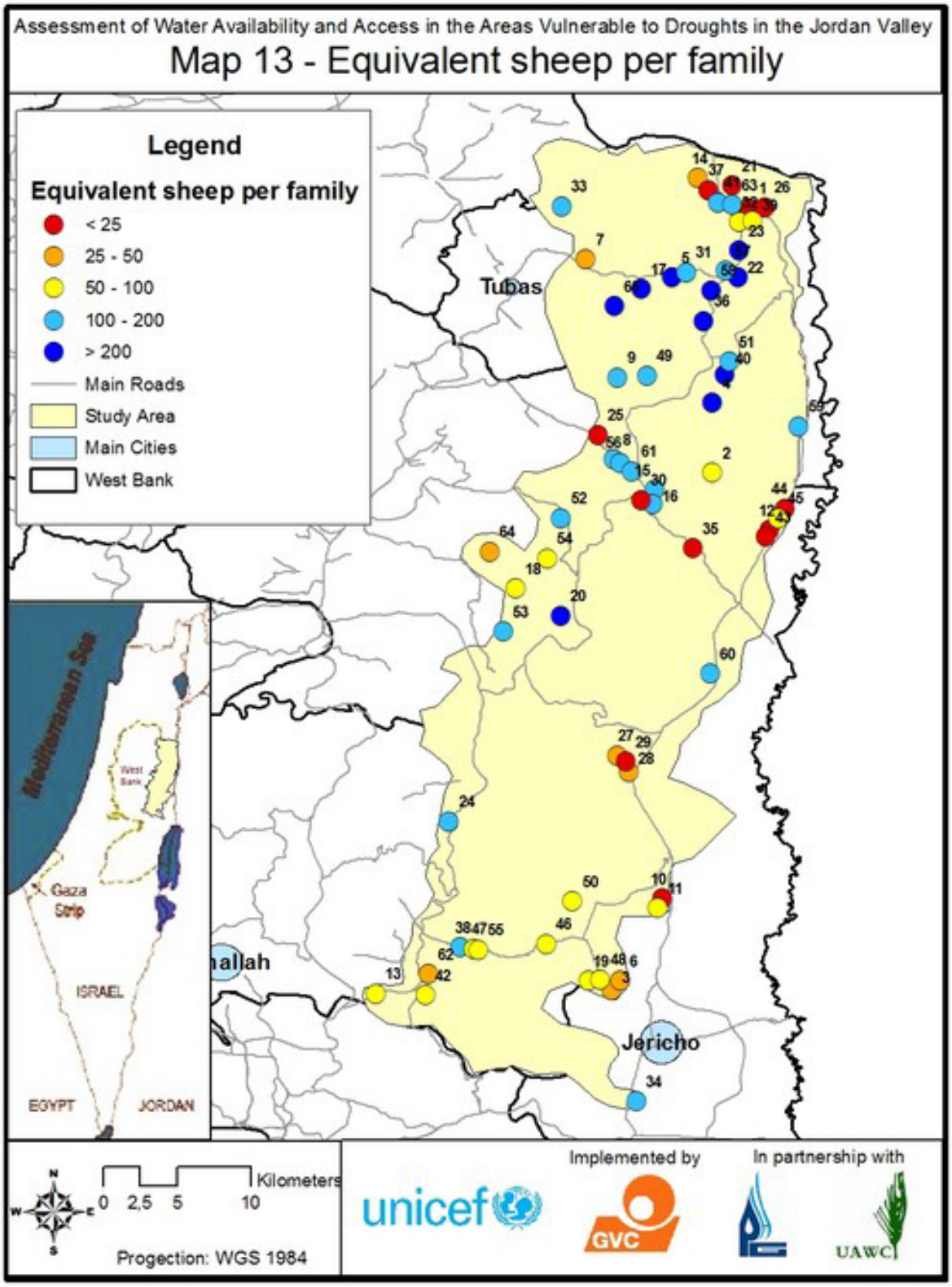
Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 13 - Equivalent sheep per family
Legend
Equivalent sheep per family
< 25
25 - 50
50 - 100
100 - 200
> 200
Main Roads
Study Area
Main Cities
West Bank
Tubas
Jericho
Mediterranean Sea
Gaza Strip
West Bank
ISRAEL
EGYPT
JORDAN
Kilometers
0 2,5 5 10
Progection: WGS 1984
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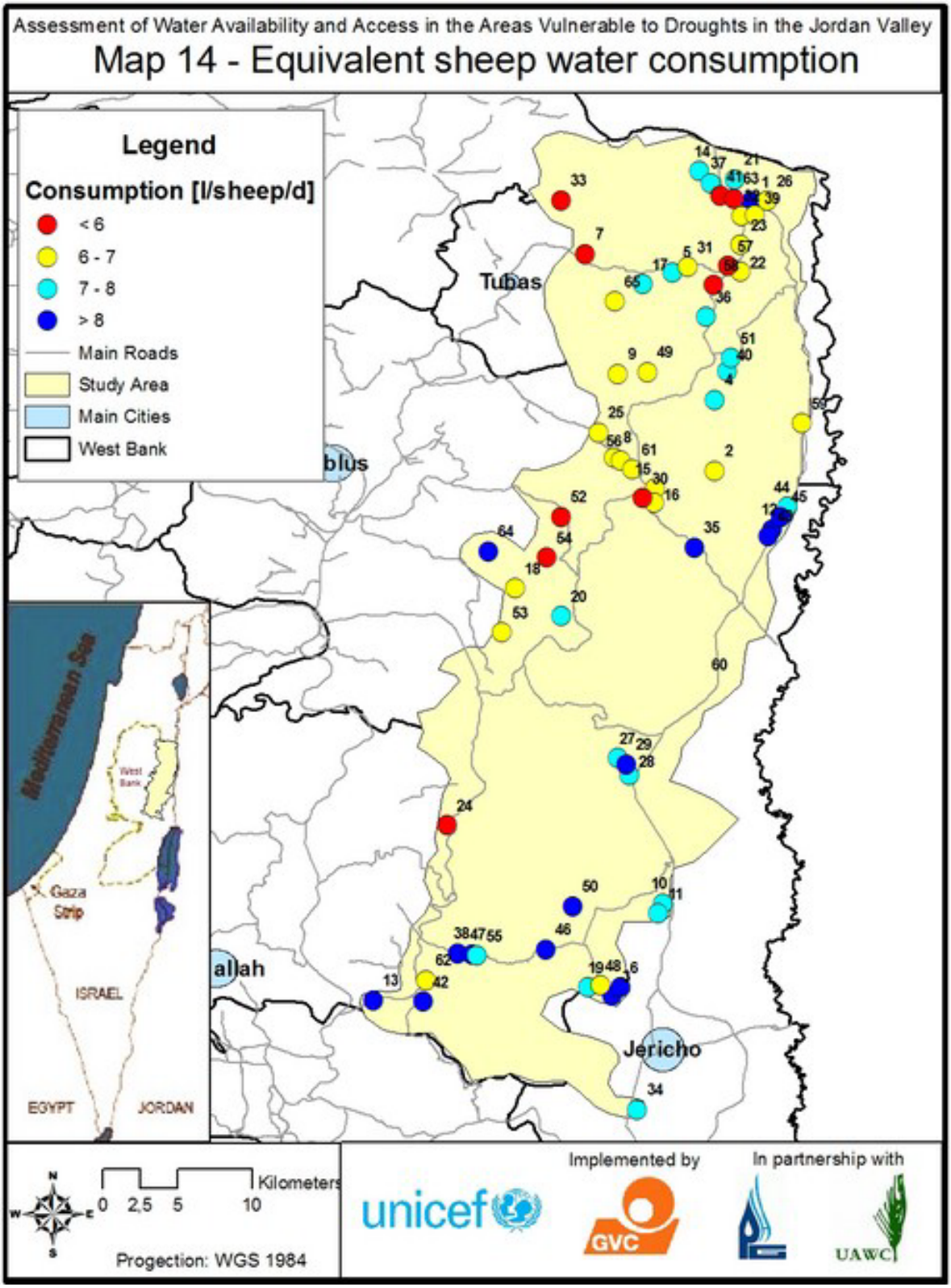
Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 14 - Equivalent sheep water consumption
Legend
Consumption [l/sheep/d]
< 6
6 - 7
7 - 8
> 8
Main Roads
Study Area
Main Cities
West Bank
Tubas
Jericho
Mediterranean Sea
Gaza Strip
West Bank
ISRAEL
EGYPT
JORDAN
Kilometers
0 2.5 5 10
Progection: WGS 1984
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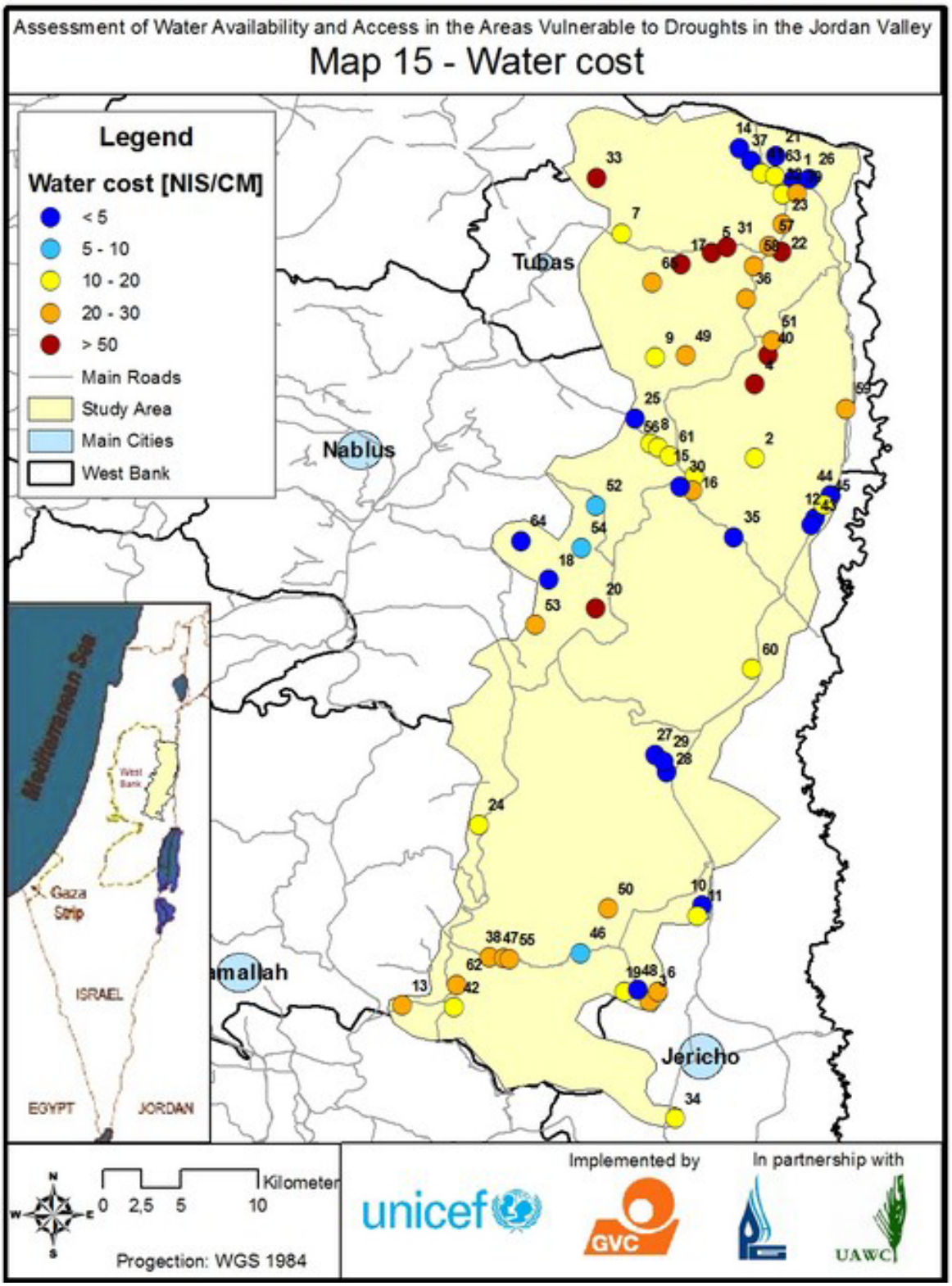
Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 15 - Water cost
Legend
Water cost [NIS/CM]
< 5
5 - 10
10 - 20
20 - 30
> 50
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometer
0 2,5 5 10
Progection: WGS 1984
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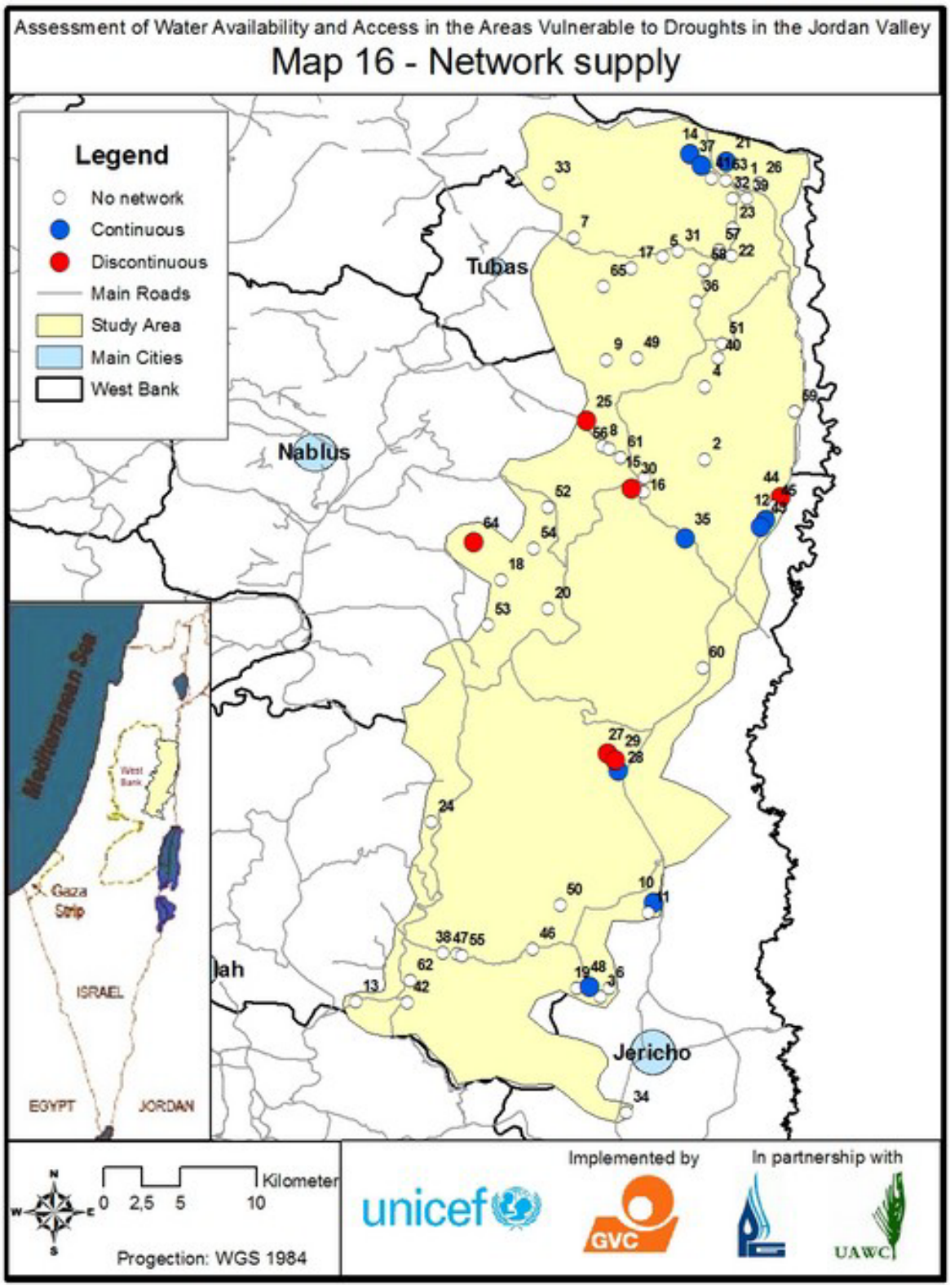
unicef
GVC
UAWC


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 16 - Network supply
Legend
No network
Continuous
Discontinuous
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometer
0 2,5 5 10
Progection: WGS 1984
Implemented by
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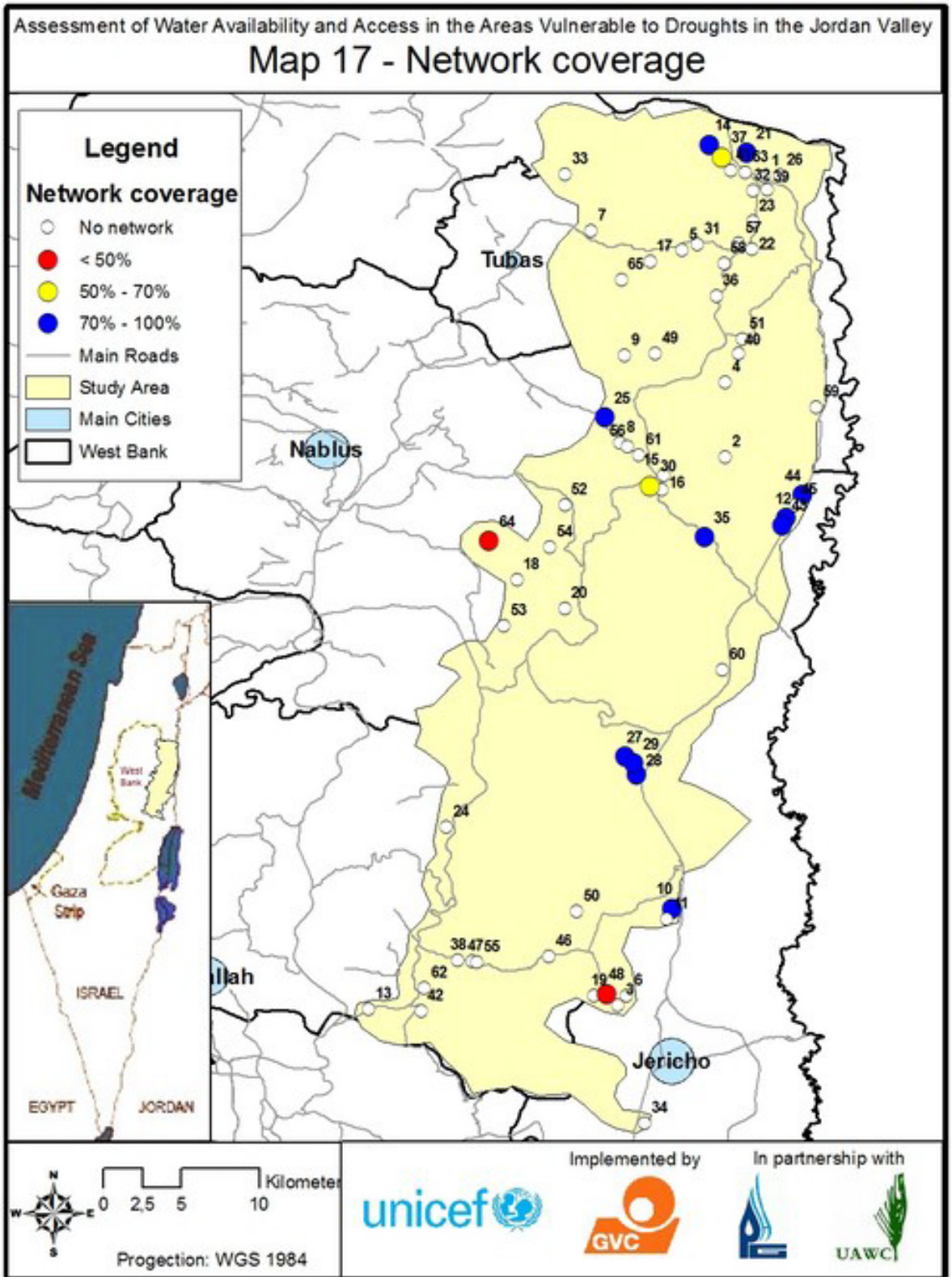
unicef
GVC
UAWC


Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 17 - Network coverage
Legend
Network coverage
No network
< 50%
50% - 70%
70% - 100%
Main Roads
Study Area
Main Cities
West Bank
Tubas
Nablus
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometer
0 2.5 5 10
Progection: WGS 1984
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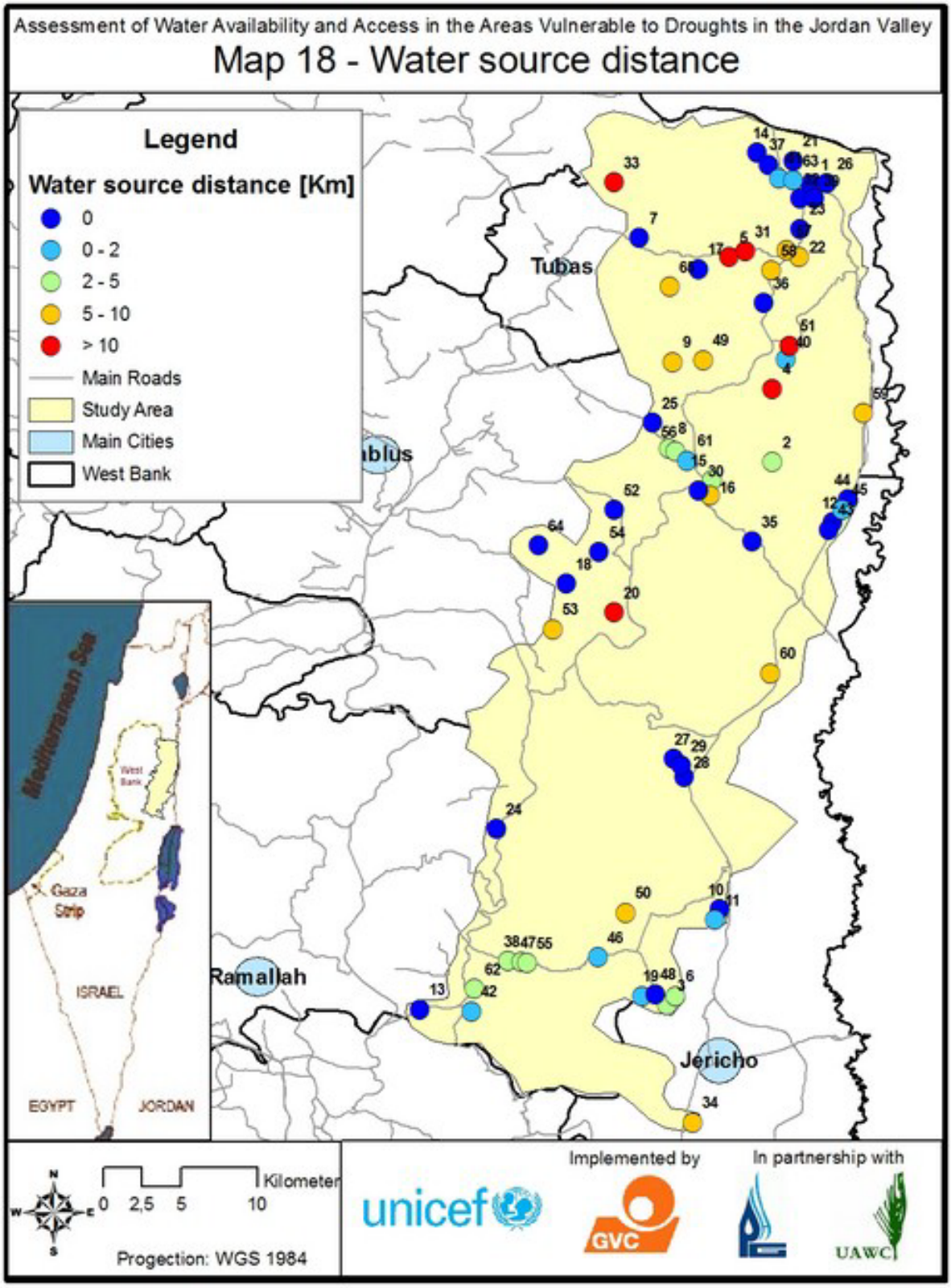
Assessment of Water Availability and Access in the Areas Vulnerable to Droughts in the Jordan Valley
Map 18 - Water source distance
Legend
Water source distance [Km]
0
0 - 2
2 - 5
5 - 10
> 10
Main Roads
Study Area
Main Cities
West Bank
Tubas
Ramallah
Jericho
Mediterranean Sea
Gaza Strip
ISRAEL
EGYPT
JORDAN
Kilometer
0 2,5 5 10
Progection: WGS 1984
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