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PRIDE Project in Development and the Environment

Programmatic Environmental Assessment for American Near East Refugee Aid (ANERA) on Cooperative and Municipal Development

October 1994

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The objective of the Project in Development and the Environment (PRIDE) is to help the U.S. Agency for International Development (AID) design and implement programs that foster the agency's environmental and natural resources strategy for sustainable economic growth in the Near East and Eastern Europe.

PRIDE provides AID and participating countries with advisory assistance, training, and information services in four program areas: (1) strategic planning, (2) environmental policy analysis, (3) private sector initiatives, and (4) environmental information, education, communication, and institutional strengthening.

The project is being implemented by a consortium selected through open competition in 1991. Chemonics International is the prime contractor; subcontractors include RCG/Hagler, Bailly, Inc.; Science Applications International Corporation; Capital Systems Group, Inc.; Environomics, Inc.; Industrial Economics, Inc.; Lincoln University; and Resource Management International, Inc. In addition, AID has entered into a cooperative agreement with the World Environment Center to support implementation of PRIDE.

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DRAFT

Programmatic Environmental Assessment for American Near East Refugee Aid (ANERA) on Cooperative and Municipal Development

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October 1994

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PREFACE

USAID's Asia/Near East Bureau requested that the Project for Development and the Environment (PRIDE) conduct an Environmental Assessment (EA) for the Ramallah Wastewater Systems project, to be implemented by American Near East Refugee Aid (ANERA) as well as three Programmatic Environmental Assessments (PEAs) for: (1) West Bank Integrated Rural Development/Capacity Building, to be implemented by Catholic Relief Services (CRS); (2) Institutional Development project, by Save the Children Federation (SCF); and (3) Cooperative and Municipal Development project, by ANERA.

The team included:

Jack Farmer	Team leader, water engineer/water resources management specialist
Joseph Karam	Environmental engineer/waste management specialist
Nader Al-Khatib	Municipal/industrial wastewater engineer
Ramez El-Titi	Water resources management specialist
Lena Dajani	Project administrator

A Scoping Session for CRS's Institutional Development project was conducted in September 1993. The PRIDE team implemented three remaining scoping sessions for SCF and the two ANERA projects on July 25 and 27, 1994, with the assistance of Paul des Rosiers of the ANE Bureau of USAID. The Scoping Statements were approved by USAID, allowing the PRIDE team to proceed with the EA and the three PEAs.

The four assessments were conducted from July 13 through September 30, 1994. This was during the transfer of limited authority for many government departments by Israel to the new Palestinian National Authority (PNA) in the West Bank and Gaza. During this period, as well as when this report was being written, the West Bank and Gaza environmental department was still under Israeli control. Due to various political factors it is uncertain when, and to what degree, environmental authority will pass from Israel to the PNA and what the new institutional structure will become. As a result of these conditions, this report will reflect the status at that time.

Data Collection

Some of the information and data collected was still in the form of Jordanian (for West Bank) and Egyptian (for Gaza) policies, rules, and regulations. The costs of water, services, etc., were converted to New Israeli Shekels. Much of the Israeli data was very sparse, sometimes incomplete, and of little hard statistical value. However, it was sufficient, in most cases, to confirm the need for continuing with various ongoing programs and the starting of new programs and activities while putting into place substantive monitoring and data collection activities.

To help offset the lack of hard data, the PRIDE team developed a large photographic file as an additional reference base. This file also reflects the magnitude of the existing environmental status.

Workshops

Five workshops were conducted. The first was an Overview Workshop on USAID Environmental Procedures. The results indicated that most private voluntary organization (PVO) personnel were not familiar with USAID general requirements nor with the technical aspects of the word "environment."

Therefore, the four individual PVO project workshops were revised to a more "open hearing" type format. These workshops were conducted mostly in Arabic, with both English and Arabic translations written on flip charts for complete understanding and acceptance of impacts, mitigation, monitoring, and management related to environmental issues and concerns.

The workshops were facilitated by Joseph Karam with support from other team members, Nader Al-Khateeb and Ramez El-Titi, and the PRIDE home-office project administrator, Lena Dajani.

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LIST OF ACRONYMS

ANERA	American Near East Refugee Aid
ARIJ	Applied Research Institute of Jerusalem
CARE	Cooperative for Assistance and Relief Everywhere
CDP	Cooperative Development Project
CIVAD	Israeli Civil Administration
CRS	Catholic Relief Services
EA	Environmental Assessment
IEE	Initial Environmental Examination
IPM	Integrated Pest Management
MCM	Million Cubic Meters
MOI	Ministry of the Interior
NGO	Nongovernmental Organization
NPA	National Palestinian Authority
PARC	Palestinian Agricultural Research Center
PEA	Programmatic Environmental Assessment
PHG	Palestinian Hydrology Group
PRA	Participatory Rapid Appraisal
PRIDE	Project for Development and the Environment
PVO	Private Voluntary Organization
SAR	Semi-Annual Report
SCF	Save the Children Federation
UNDP	United Nations Development Program
UNRWA	United Nations Relief and Works Agency
USAID	United States Agency of International Development
VAD	Village Affairs Department

EXECUTIVE SUMMARY

A. Background

American Near East Refugee Aid (ANERA) has submitted a proposal to the U.S. Agency for International Development (USAID) to strengthen the capacity of selected Palestinian cooperative and municipal institutions to deliver economy-stimulating services (USAID Project Number 294-0004).[1] ANERA's proposed program aims to:

- Increase marketed production of agricultural commodities by strengthening cooperatives.
- Increase marketed production of manufactured goods and services by strengthening municipalities.

The proposed agricultural and industrial activities will be undertaken with Palestinian cooperatives and municipalities.

The ANERA proposal is subject to USAID environmental procedures pertaining to USAID funding of projects and programs overseas.[2] Based on these requirements, the need to conduct a Programmatic Environmental Assessment (PEA) is a result of a positive threshold decision after an Initial Environmental Examination (IEE). The positive threshold decision recognized that the ANERA Cooperative and Municipal Development Program could result in potentially significant environmental impacts in light of both the diversity of the projects and activities that could be funded and the geographic locations of these projects and activities.

A preliminary list of perceived negative environmental impacts was prepared during pre-scoping held at USAID/Washington on April 12-15, 1994. On May 24, 1994, the Project for Development and the Environment (PRIDE) was requested to carry out PEAs for West Bank/Gaza PVO Community Development and Environmental Infrastructure Activities, including the ANERA proposal for cooperative and municipal development.

As an initial component of the PEA, and in accordance with the USAID Environmental Procedures (22 CFR 216), a Scoping Session was held on July 25, 1994 in East Jerusalem. The purpose of the scoping session was to inform interested parties of the purposes of the PEA of the ANERA program and to solicit their assistance in identifying any significant environmental or social issues concerning the proposed program.

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[1] ANERA, "Cooperative and Municipal Development in the West Bank and Gaza, The Proposal and Annexes," Revised: March 1994.

[2] 22 CFR 216 (Code of Federal Regulations, AID Environmental Procedures).

The scoping session was attended by 27 individuals representing USAID, ANERA, and other PVOs (Save the Children Federation—SCF, Catholic Relief Services—CRS, Palestinian Agricultural Research Center (PARC), Applied Research Institute of Jerusalem (ARIJ), Cooperative Development project (CDP), Bethlehem University, the Cooperative for Assistance and Relief Everywhere (CARE), Environmental Protection and Research Center/Gaza Strip, United National Development Program (UNDP), West Bank Department of the Environment, and PRIDE.

B. Major Issues and Concerns Raised at the Scoping Session

- Odors and groundwater contamination resulting from improper/inadequate solid waste disposal and siting.
- Collection, treatment, and disposal of wastewater (including septage) and solid waste debris.
- Magnitude of industrial waste generated (oils, grease, detergents, etc.) and methods for safe treatment and disposal.
- Safe handling and use of pesticides/fertilizers.
- Ultimate disposal of used pesticide and fertilizer containers.
- Adequacy of potable water supplies and increased use of water resources (i.e., new wells in Gaza).
- Soil erosion and storm-water runoff from construction activities involving new reservoirs, wells, pipelines, roads, etc.
- Destruction/disruption of aquatic and terrestrial habitats and cultural/ archaeological sites.
- Exposure of residents and workers (farmers) to environmental health problems.
- Increased electricity use.
- Worker accidents during construction and operations.
- Potential seismic and flooding hazards of interventions.
- Consider use of solar heat/radiation for pest control at agricultural sites as an alternative to insecticides.
- Coordination of project with public institutions, other donors, and among other PVOs/nongovernmental organizations (NGOs) and research institutes.

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- Testing of agricultural products by qualified laboratories both for local and international markets.

C. Environmental Impact and Mitigation Measures

The following potential environmental impacts and possible mitigation measures were found.

C1. Irrigation Projects

Potential Environmental Impacts	Possible Mitigation Measures
Soil erosion	Build permanent storm-water drainage
Soil and ground water pollution	Educate farmers about the importance of safe and environmentally sound use of pesticides
New wells in Gaza Strip	Avoid new well projects in the Gaza Strip
Well rehabilitation in Gaza Strip	Conduct pump tests on all rehabilitated wells to ensure that withdrawals do not exceed permitted capacity
Water degradation due to poor maintenance	Maintain and operate all systems properly
Loss of ground water recharge	Use drip irrigation to take advantage of pressure differentials and conserve water.
Livestock and wildlife watering points	Provide for livestock and wildlife watering points along major irrigation pipelines
Plant wildlife	Study impacts on plant wildlife on a case-by-case basis

C2. Industrial Parks and Wholesale/Retail Markets

Potential Environmental Impacts	Possible Mitigation Measures
Siting	Choose site locations judiciously
Noise and air pollution	Design buildings to reduce noise
Solid waste storage and collection	Establish a solid waste management program
Solid waste disposal	Promote environmentally sound sanitary landfills
Domestic sanitation	Incorporate individual toilets in each workshop, with connections to sewer line or septic tanks
Non-dangerous liquid waste	Provide for in-shop wastewater drainage and collection
Dangerous liquid waste	Disallow any industry that may generate dangerous liquid waste, unless it installs adequate pre-treatment
Storm-water collection and disposal	Design and build storm-water drainage network
Cost recovery	Set lease amounts and services charges sufficiently high to sustain quality services
Loss of habitat for fauna and flora	Consider impacts on endangered species on a case-by-case basis

D. Recommendations for ANERA Project

This assessment indicates that all but one of the proposed ANERA Cooperative and Municipal Development project activities will pose no major adverse environmental impacts, provided appropriate mitigation, monitoring, and management measures are implemented. The Abassan irrigation well project in the Gaza Strip is expected to have significant adverse environmental impacts that may not be readily mitigated under the current circumstances. This well project and any other new well project in the Gaza Strip should not be funded by ANERA or USAID.

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ANERA should take all necessary measures to ensure that each cooperative or municipality implements:

- All necessary mitigation measures in project design, construction, and operation and maintenance.
- Appropriate monitoring plan to ensure environmental impacts are kept to a minimum and respond to situations where unacceptably high impacts are detected.

In addition, ANERA should implement the following management measures:

- Designate an in-house environmental officer.
- Require cooperatives and municipalities to (1) review and revise all engineering designs to incorporate proposed mitigation measures, and (2) prepare monitoring and management plans.
- Provide technical assistance to cooperatives and municipalities in environmental planning and management.
- Organize and conduct lessons-learned workshops.

Recommended management measures for cooperatives and municipalities are as follows:

- Designate an environmental officer.
- Prepare and submit to ANERA revised engineering designs as well as environmental monitoring and management plans.
- Develop cost recovery mechanisms to ensure long-term sustainability of the project.
- Conduct environmental awareness campaigns.

E. Recommendations for USAID

A summary of findings based on activity type and recommended USAID action is provided below.

Activities or Activity Type	Recommended USAID Action
Agricultural extension services	Fund
Proposed irrigation infrastructure projects (except Abassan well)	Fund but require implementation of recommended mitigation, monitoring, and management measures

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New wells in Gaza Strip (including Abassan well)	Do not fund at this time
Light industrial parks	Fund but require implementation of recommended mitigation, monitoring, and management measures
Wholesale and retail markets	Fund but require implementation of recommended mitigation, monitoring, and management measures

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SECTION I
BACKGROUND AND OBJECTIVES

This introductory section presents an overview of the American Near East Refugee Aid (ANERA) Cooperative and Municipal Development Program background and objectives, discusses the overall objectives of the programmatic environmental assessment (PEA), and describes the organization of the report.

A. Program Background and Objectives

ANERA has submitted a proposal to the U.S. Agency for International Development (USAID) to strengthen the capacity of selected Palestinian cooperative and municipal institutions to deliver economy-stimulating services (USAID Project Number 294-0004).[1] ANERA's March proposal is a reformulation and updating, in response to USAID's comments, of a proposal it submitted to USAID in January 1994.

ANERA's proposed program aims to:

- Increase marketed production of agricultural commodities by strengthening cooperatives.
- Increase marketed production of manufactured goods and services by strengthening municipalities.

The proposed agricultural and industrial activities will be undertaken with Palestinian cooperatives and municipalities.

B. USAID Environmental Requirements

The ANERA proposal is subject to USAID environmental procedures pertaining to USAID funding of projects and programs overseas.[2] Based on these requirements, the need to conduct a PEA was established as a result of a positive threshold decision resulting from an Initial Environmental Examination (IEE).

B1. Initial Environmental Examination

The USAID West Bank/Gaza Strip Institutional Strengthening Working Group met in Washington, DC, on March 25, 1994, and completed an IEE, which recommended a positive threshold decision. The IEE with a positive threshold decision was prepared and submitted to the Bureau's Environmental Officer (BEO) for approval, which was obtained on March

[1] ANERA, "Cooperative and Municipal Development in the West Bank and Gaza, The Proposal and Annexes," Revised: March 1994.

[2] 22 CFR 216 (Code of Federal Regulations, AID Environmental Procedures).

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Exhibit I-1
Major Issues and Concerns Raised at the Scoping Session

- Odors and groundwater contamination resulting from improper/inadequate solid waste disposal and siting
- Collection, treatment, and disposal of wastewater (including septage) and solid waste debris
- Magnitude of industrial waste generated (oils, grease, detergents, etc.) and methods for safe treatment and disposal
- Safe handling and use of pesticides/fertilizers
- Ultimate disposal of used pesticide and fertilizer containers
- Adequacy of potable water supplies and increased use of water resources (i.e., new wells in Gaza)
- Soil erosion and storm-water runoff from construction activities involving new reservoirs, wells, pipelines, roads, etc.
- Destruction/disruption of aquatic and terrestrial habitats and cultural/archaeological sites
- Exposure of residents and workers (farmers) to environmental health problems
- Increased use of electricity
- Worker accidents during construction and operations
- Potential seismic and flooding hazards of interventions
- Consider use of solar heat/radiation for pest control at agricultural sites as an alternative to insecticides
- Coordination of project with public institutions, other donors, and among other private voluntary organizations (PVOs) and NGOs and research institutes
- Testing of agricultural products by qualified laboratories both for local and international markets

31, 1994. The positive threshold decision recognized that the ANERA Cooperative and Municipal Development Program could result in potentially significant environmental impacts in light of both the diversity of the projects and activities that could be funded and the geographic locations of these projects and activities.

A preliminary list of perceived negative environmental impacts was prepared during pre-scoping held at USAID/Washington during the period of April 12-15, 1994. On May 24, 1994, the Project for Development and the Environment (PRIDE) was requested to carry out PEAs for West Bank/Gaza PVO Community Development and Environmental Infrastructure Activities, including the ANERA proposal for cooperative and municipal development.

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B2. Scoping Session

As an initial component of the PEA, and in accordance with the USAID Environmental Procedures (22 CFR 216), a Scoping Session was held on July 25, 1994, at the Pilgrim's Palace Hotel in East Jerusalem. The purpose of the scoping session was to inform interested parties of the purposes of the PEA of the ANERA program and to solicit their assistance in identifying any significant environmental or social issues concerning the proposed program.

The scoping session was attended by 27 individuals representing USAID, ANERA and other PVOs (Save the Children Federation—SCF, Catholic Relief Services—CRS) Palestinian Agricultural Research Center (PARC), Applied Research Institute of Jerusalem (ARIJ), Cooperative Development project (CDP), Bethlehem University, Cooperative for Assistance and Relief Everywhere (CARE), Environmental Protection and Research Center/Gaza Strip, United Nations Development Program (UNDP), West Bank Department of the Environment, and PRIDE.

As required by the USAID environmental procedures, a Scoping Statement Summary and a Scoping Session Report were prepared following the scoping session.[3] The Scoping Statement Summary was submitted to the USAID Asia/Near East Bureau's Environmental Officer for review and approval, which was obtained on August 1, 1994.[4] The Statement Summary synthesizes issues and concerns raised during the scoping session. The Scoping Session Report documents in detail the issues and concerns raised at the scoping session and provides abbreviated minutes of the meeting. Exhibit I-1 outlines the major issues and concerns raised at the scoping session.

C. Programmatic Environmental Assessment Objectives

The objectives of this PEA are to:

- Satisfy the USAID procedures for funding of USAID programs and projects overseas (see subsection B.).
- Address issues and concerns raised by the IEE (see subsection B1.) and during the Scoping Session (see subsection B2.).
- Identify possible environmental impacts of activities that could be funded under the program.
- Propose specific mitigation, monitoring, and management measures to reduce or control those environmental impacts.

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[3] Letter from Karen D. Turner, USAID Affairs Officer, Jerusalem to Jeff Goodson, Bureau Environmental Officer, Bureau for Asia and the Near East, "Scoping Statement Summary for the SCF project (294-0159.53) and the ANERA project (294-0004)," July 28, 1994.

[4] Letter to Karen D. Turner, USAID Affairs Officer, Jerusalem from Jeff Goodson, Bureau Environmental Officer, Bureau of Asia and the Near East, August 1, 1994.

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D. Programmatic Environmental Assessment Methodology

This section describes the PRIDE team and the methodology it used for this PEA.

D1. The PRIDE Team

The PRIDE team was composed of:

Jack Farmer	Team leader, water engineer/water resources management specialist
Joseph Karam	Environmental engineer/waste management specialist
Nader Al-Khatib	Municipal/industrial water-wastewater engineer
Ramez El-Titi	Water resources management specialist
Lena Dajani	Project administrator

PRIDE team members were in the field in the West Bank and Gaza between July 17 and September 14, 1994. During this period, the PRIDE team conducted all field investigations necessary to complete this PEA as well as two other PEAs for USAID-funded projects (SCF and CRS) and one Environmental Assessment for the Ramallah Wastewater Management System project (ANERA). After returning to Washington, the PRIDE team worked through September to complete the report on this PEA and other PEAs and EA. Reports on these other PEAs and EA are available under separate cover.

D2. Meetings or Site Visits with All Parties Concerned

The PRIDE team attended the scoping session described in subsection B2. The team also met with all major parties concerned by the ANERA proposed Cooperative and Municipal Development project. The team held several meetings with ANERA staff and representatives from participating cooperatives and municipalities to discuss the various activities that will be funded under this project and gather data on alternatives considered.

D3. Data Collection from Research Institutes and NGOs

The PRIDE team also collected data on environmental characteristics and potential impacts from various local research institutes and nongovernmental organizations (NGOs), including ARIJ and the Palestinian Hydrology Group (PHG). The PRIDE team also consulted recent Palestinian and international publications.

D4. Workshops

The PRIDE team organized two half-day workshops:

- One half-day workshop with ANERA staff and staff from the other two PVOS (SCF and CRS) to review USAID environmental procedures.

- One half-day workshop (August 31, 1994) with ANERA staff to discuss preliminary findings of the field investigations and exchange ideas about

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potential environmental impacts and possible mitigation, monitoring, and management measures. A summary of this workshop is provided in Annex A.

Both workshops provided an excellent opportunity both for ANERA staff to appreciate the purpose and methodology of USAID PEAs and for the PRIDE team to learn about local experiences in environmental management.

E. Organization of the Report

This report is organized in six sections and two annexes as follows:

(1) **Background and Objectives** is this introductory section.

(2) **Program Description** describes the proposed program activities.

(3) **Environmental Setting** describes the generic environmental setting of the West Bank and Gaza, including physical environment, cultural and aesthetic setting, socioeconomic environment, and institutional setting.

(4) **Environmental Impacts and Mitigation Measures** discusses likely environmental impacts of program activities during construction and operation and possible mitigation measures to reduce, control, or eliminate those impacts.

(5) **Monitoring and Management Measures** describes proposed environmental monitoring and management measures.

(6) **Conclusions and Recommendations** presents a summary of findings and recommendations of this PEA.

- Annex A provides a summary of exchanges during the mid-course evaluation held at ANERA offices on August 31, 1994.

- Annex B contains a copy of a letter from ANERA to the PRIDE team identifying a new, revised list of agricultural extension activities.

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SECTION II
PROGRAM DESCRIPTION

This section describes the proposed Cooperative and Municipal Development Program for the West Bank and Gaza Strip. It provides a program overview and summarizes proposed program activities.

A. Program Overview

ANERA's proposed Cooperative and Municipal Development Program for the West Bank and Gaza Strip aims at increasing marketed production of agricultural and manufactured products by strengthening cooperatives and municipalities.

A1. Agricultural Development through Cooperatives

Because of the importance of agriculture in the West Bank and the pivotal role played by agricultural cooperatives, ANERA's strategy is to strengthen Palestinian agricultural cooperatives as business and agricultural institutions. ANERA's proposed program seeks to improve the management of:

- Key intangible agricultural resources, notably extension services
- Priority tangible resources, primarily water
- Key cooperatives, namely administrative and financial management capabilities, and member participation

These objectives emphasize institution building through improved resource management, and improved services and strengthening of cooperative management capabilities. ANERA's proposed program will target critical farmer needs, as outlined in Exhibit II-1.

Achieving greater efficiency in water use (including reuse) is clearly among the most important West Bank/Gaza Strip agricultural priorities. Historically, it is the largest sectoral consumer of water. To combine the efficiency promoting extension, training, and technical assistance, the strategy of this activity focuses on:

- Improved irrigation storage and conveyance infrastructure.
- Well drilling (one well), and well, spring, and pump rehabilitation.
- Water conservation (and reuse) technologies, and high value methods and crop varieties.

Exhibit II-1
Critical Farmer Needs in the West Bank and Gaza Strip

ANERA's proposed program will target critical farmer needs such as:

- More cost-effective, productive, safe, and environmentally sound use of pesticides and fertilizers (e.g., minimizing the use of agrochemicals and applying Integrated Pest Management (IPM)).
- More efficient and water conserving irrigation methodologies and crop varieties.
- Improved methods of marketing and quality control.
- More efficient and healthier livestock production.
- Improved management of financial and technological resources in farms and farmer cooperatives.

A2. Urban and Industrial Development through Municipalities

Due to high urbanization in the West Bank and Gaza (about 50 percent) and the political, socioeconomic and cultural importance of urban centers, ANERA's integrated urban development strategy aims to improve municipalities' capacity to manage and deliver critical environmental and industrial support services. ANERA's proposed program focuses on:

- Improving municipal planning capabilities
- Enhancing institutional capabilities
- Implementing selected infrastructure interventions

Infrastructure interventions will concentrate on stimulating urban industry through municipal industrial zone development and agribusiness and trade through municipal wholesale and retail market development.

B. Program Activities

ANERA has proposed a number of agricultural and municipal development activities.

B1. Agricultural Development Activities

As indicated in Table II-1, ANERA has proposed five agricultural extension activities and six irrigation development projects. ANERA will also provide institutional building and training and overall project support for these activities.

Table II-1
Proposed Agricultural Cooperative Activities

Proposed Agricultural Cooperative Activities	Proposed Budget ($)
Agricultural Extension	
1. Brucellosis Extension	140,000
2. Protected Grazing Area	80,000
3. Mother Grape Rootstock Farm	60,000
4. Decrease in Pesticide Use	80,000
5. Production of Seedless Grapes	35,000
Total Agricultural Extension	395,000
Irrigation Infrastructure	
1. Al Fara'a Irrigation Pipeline	500,000
2. Marj Na'jeh Reservoir	100,000
3. Ramallah Springs Rehabilitation	130,000
4. Rafah Irrigation System	80,000
5. Beit Lahia Irrigation System	40,000
6. Abassan Irrigation Well	350,000
Total Irrigation Infrastructure	1,200,000
Institutional Support, Training and Technical Assistance	200,000
Project Support	400,000
TOTAL	2,195,000

B1a. Agricultural Extension Activities

ANERA has revised the list of agricultural extension activities presented in the March 1994 proposal. In a letter to the PRIDE team,[1] ANERA identified new agricultural extension activities for the West Bank and Gaza (see Annex B for a copy of this letter). Table II-1 contains the new list of proposed agricultural extension activities.

[1] Letter to Jack Farmer, PRIDE team leader from Lance Matteson, ANERA representative, Jerusalem, August 24, 1994.

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Only one extension activity (brucellosis) targets the livestock sector while the other four activities address the plant production sector. ANERA will concentrate on two agricultural extension activities in the first year of the program: brucellosis extension and mother grape rootstock farm. Following is a brief description of these two activities. Annex A provides a summary description of all five proposed agricultural extension activities.

Brucellosis Extension Service Program

The purpose of the brucellosis extension service program is to help Palestinian farmers protect their livestock (sheep, goats, cattle) from infection with Brucellosis, a disease that affects both livestock and humans on a wide scale in the West Bank and Gaza Strip. The spread of brucellosis has serious documented economic impacts on livestock farmers and health impacts on consumers of meat and dairy products in the West Bank and Gaza Strip.

Working with the Palestinian Veterinary Service of the Ministry of Agriculture and the Ministry of Health, ANERA will:

- Implement a more efficient vaccination program.
- Educate the farmers about safe practices to prevent the spread of the disease and to protect the environment, including proper disposal of destroyed livestock.

For this activity, ANERA will use the mobile vet clinics previously funded by ANERA and qualified staff trained in Jordan.

ANERA will implement this activity in two phases over a three-year period. In the first phase, ANERA will purchase all necessary equipment, such as vacuum test tubes, laboratory equipment, cold chain equipment, and computers. In the second phase, ANERA will hire six veterinarians, two physicians, and a computer programmer who will implement the program. The Palestinian Veterinary Services and Ministry of Health will carry on the project after the initial three years of ANERA's involvement.

Mother Grape Rootstock Farm

ANERA will help the Hebron Marketing Cooperative establish a modern mother grape rootstock nursery for the Hebron and Bethlehem districts, which are planted with more than 65,000 dunums of vineyards. The nursery site will have a surface area of eight dunums. The activity will:

- Provide a reliable supply of grape rootstock resistant to phylloxera, which attacks non-resistant grape stocks throughout the West Bank.

- Increase and develop private-sector grape stock nurseries.

- Increase the supply of grafted grapevine plants.

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- Strengthen the role of extension agents to conduct in-field workshops on the biology of grape phylloxera, disease identification and propagation, resistant rootstock, and related viticultural practices.

- Help growers identify phylloxera infection at an early stage.

ANERA will implement the activity in two phases over a three-year period. The first phase will end in March 1995 and will involve construction of the modern nursery, including:

- Fencing of the nursery site
- Preparing the land and disinfecting the soil
- Installing the irrigation network
- Planting the rootstock

In the second phase, two technical experts will be hired to establish a small viticulture laboratory at the nursery site; they will have full technical responsibility for operating the nursery for two years. Total responsibility for running the project will be turned over to the Hebron Marketing Cooperative after three years.

B1b. Irrigation Infrastructure Projects

ANERA has proposed six irrigation infrastructure projects covering a wide range of activities, including:

- Well drilling (one well) and rehabilitation and spring maintenance
- Irrigation water storage and conveyance
- Water conservation methods

The following description of activities is based on the revised ANERA proposal (March 1994) and the site visits conducted by the PRIDE team. However, some discrepancies appeared between the information presented in the proposal and that obtained during the site visits. For example, according to the proposal, the Rafah Ahlieh Cooperative irrigation well (Gaza Strip) has a capacity of 250 meter^3/hour and is used to irrigate 400 dunums. While meeting with Cooperative officials, however, the well was said to have a 100 meter^3/hour capacity and irrigate 100 to 120 dunums of land. Similar discrepancies were noted for other proposed activities. In general, the figures quoted in ANERA's proposal appear greater than those obtained during the site visits. However, these discrepancies should not affect the findings and recommendations of this PEA.

1. Jericho Agricultural Marketing Cooperative Al-Fara'a Irrigation Pipeline

ANERA proposes to help the Jericho Agricultural Marketing Cooperative establish a modern irrigation network for both member and non-member farmers in Al Fara'a Jiftlik (population of 18,000 people), 30 km north of Jericho. Specifically, the activity will finalize the fourth and most crucial phase of a major pipeline from the Fara'a spring through the Jiftlik valley, which will increase agricultural production and farmer income.

The activity will replace the old deteriorated open concrete canal with a closed pipeline. Given the large altitude differential (150 meters) between the water headworks and ultimate irrigation sites, water will reach irrigated areas by gravity and under sufficient pressure to allow drip irrigation without the need for pumps, thereby lowering equipment and energy costs for farmers.

The main crops involved are vegetables such as tomatoes, eggplants, and beans. Total cost of the activity is estimated to be $1,560,000, with USAID/ANERA funding only a portion of this total cost ($500,000).

2. Jericho Agricultural Cooperative
Marj Na'jeh Irrigation System

ANERA proposes to help the Jericho Agricultural Cooperative establish a modern irrigation network and storage system for member farmers in the Marj Na'jeh village, located 50 km north of Jericho. Project activities include:

- Building a 1,000 meter^3 storage reservoir on top of the hill. Water will be pumped up to the reservoir from the existing two wells (capacities 150 meter^3/hour and 250 meter^3/hour). The high level differential (about 52 meters) will create at least a 30 meter head at the last drip irrigation line.

- Purchasing and installing 1.5 km of metallic main pipes (diameter of 4 to 6 inches). Individual farmers will purchase their own dripper systems.

Switching to drip irrigation techniques will save water and allow irrigation of 300 additional dunums of agricultural land, in addition to the 1,000 dunums currently under irrigation. Total cost of the activity is estimated at $176,000 and the proposed USAID/ANERA share is $100,000.

3. Ramallah Agricultural Marketing Cooperative
Spring Rehabilitation

ANERA will help the Ramallah Agricultural Marketing Cooperative to establish modern irrigation systems for member farmers in several villages. The activity will rehabilitate and modernize about 20 springs in the Ramallah area (out of a total of 200 springs, including seasonal springs), thereby increasing the surface area of land irrigated from 500 dunums (currently) to 700 dunums (after project implementation). These springs currently discharge between 1 liter/second and 15 liters/second each, but the majority of the springs discharge between 1 liter/second and 4 liters/second. Vegetables are the main crops: tomatoes, eggplants, lettuce, beans, cucumbers, and radishes.

Activity components include:

- Storage tank construction
- Replacement of open earth canals with concrete canals or pipelines
- Replacement of traditional surface irrigation methods with modern drip irrigation

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It is estimated that 800 farm owners will benefit from this activity. Total cost of the activity is $223,850; the proposed USAID/ANERA share is $130,000.

4. Rafah Ahlia Agricultural Cooperative Irrigation System

The purpose of this activity is to help the Rafah Ahlia Agriculture Cooperative to establish a modern irrigation network to member farmers in Rafah by:

- Constructing a 500 meter^3 reservoir
- Installing 300 meters of pipelines (4" to 6")
- Providing training, extension, and technical support

The activity will increase irrigated areas by about 200 dunums serving 42 families.

According to the cooperative chairman, the cooperative has its own well of 100 meter^3/hour capacity (250 meter^3/hour in ANERA's proposal) and currently irrigates 100 to 120 dunums (400 dunums in ANERA's proposal). Crops are vegetables, lentils, strawberries, potatoes, and flowers. Total cost of the activity is $98,200. The proposed USAID/ANERA share is $80,000.

5. Beit Lahiya Agricultural Cooperative Irrigation System

ANERA proposes to help the Beit Lahiya Agricultural Cooperative to establish a modern irrigation network to server farmers of the Beit Lahiya area. The activity entails installing a 500 meters, 6-inch pipeline to irrigate recently reclaimed 30-dunum area (40 dunums in ANERA's proposal). An existing irrigation well of 60 meter^3/hour capacity will provide the water. Seventeen farmers are expected to benefit from the activity, which is estimated to cost $49,500, with USAID/ANERA's share equal to $40,000.

6. Abassan Kbira Village Council Irrigation Well

ANERA proposes to help the Abassan (Gaza Strip) Village Council establish a modern irrigation network for the farmers of the Abassan region by:

- Drilling a new ground water well
- Constructing a 500 meter^3 reservoir with one generator and two pumps
- Installing a 2.5 km pipeline (8" to 12" diameter)
- Training council staff and farmers in use of the system

The well is expected to have a discharge of 100 meter^3/hour, which would be sufficient to irrigate 300 dunums of land.

B2. Municipal Development Activities

Municipalities are pivotal to promoting agricultural and industrial production and marketing since workers and consumers are concentrated in and around urban centers. As indicated in Table II-2, below, ANERA proposes to help different West Bank and Gaza Strip municipalities build industrial parks and wholesale or retail markets. ANERA also will provide institutional and training as well as overall project support for these activities.

B2a. Industrial Parks

ANERA proposes to help the Municipality of Nablus and the Hebron Chamber of Commerce and Industry establish industrial parks within municipal borders.

Nablus Light Industrial Park [2]

ANERA proposes to help the Municipality of Nablus (population 120,000; 70 km North of Jerusalem in the West Bank) erect a light industrial park on eight dunums of land in Eastern Nablus. The park will contain 86 workshops, 12 x 4 meters each, on two floors. The purpose is to create job opportunities for local citizens, including inhabitants of three nearby refugee camps, and plan a single light industrial area near a residential area. The project has been approved by the Higher Planning Council and the Health Department of the Civil Administration. The shops are designed to open inward to a courtyard to reduce noise pollution and aesthetic nuisances and to minimize outward expansion. A list of potential renters include: textile sewing (wool and silk), clothing and leatherworks, cotton mattresses, leather shaping and shoe repair, hairdressers, goldsmithing, rattan furniture, aluminum assembly, cardboard boxes, carpentry, repair shops (eyeglasses, watches, radios, TVs), printing presses, traditional handicrafts, cosmetics packing, coffee grinding, and also a cafeteria. Issues not resolved include wastewater treatment and solid waste collection and disposal. Estimated costs for building the park is $1.65 million, excluding land costs (estimated value $1.5 million).

Hebron Handicraft and Light Industrial Complex [3]

ANERA proposes to help the Hebron Chamber of Commerce and Industry establish a handicraft and light industrial complex. The proposed handicraft and light industrial complex will be built on a 26-dunum plot of land in the Hebron industrial area. It will be the first of three industrial complexes to be built in the Hebron industrial area (the other two will be devoted to semi-light and heavy industries). Project objectives are to:

- Regroup all Hebron handicraft and light industries within the industrial area
- Reduce environmental impacts and truck traffic in residential areas
- Provide better services to handicrafts and industries
- Enhance the Town Planning and Urban Scheme

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[2] Based on site visit with the Municipality of Ramallah conducted by the PRIDE team on July 26, 1994.

[3] Municipality of Hebron, "Handicraft and Industrial Complex Project (in Arabic)," not dated.

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Table II-2
Municipal Development Activities

Municipal Development Activities	Budget ($)
Light Industrial Parks	
1. Nablus Light Industrial Park	800,000
2. Hebron Industrial Park	800,000
Total Light Industrial Parks	1,600,000
Wholesale and Retail Markets	
1. Gaza Retail Market	~400,000
2. Khan Younis Wholesale Market	450,000
Total Wholesale and Retail Markets	850,000
Institutional Support, Training & Technical Assistance	200,000
Project Support	400,000

Project execution will be in three phases. All infrastructure for the entire project plus 50 industrial units will be built in the first phase for a total cost of about $840,000, including $290,000 for infrastructure (roads, water supply, electricity, and sanitation). Additional industrial units will be built in the second phase (18 units for about $180,000) and the third phase (44 units for about $430,000). ANERA proposes to contribute $800,000 towards the implementation of this light industrial complex. Table II-3 indicates the types and numbers of handicrafts and light industries designated for each project phase.

B2b. Wholesale and Retail Markets

Municipalities are pivotal to promoting agricultural and industrial production and marketing since workers and consumers are concentrated in and around urban population centers. ANERA proposes to help the Municipalities of Gaza and Khan Younis establish a retail and a wholesale market, respectively.

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Table II-3
Proposed Distribution of Industries for the Hebron Light Industrial Complex

Industry Type	Phase I	Phase II	Phase III
Auto mechanic	25	10	5
Auto body shop	10		10
Smith	15	8	4
Carpenter			15
Stone Cutting			10
TOTAL	50	18	44

Gaza City Retail Market

While the Municipality of Gaza needs both a wholesale and a retail market, the Municipal Council has decided to start with the retail market as a first priority. During the occupation, the main street (Omar Al Mukhtar Street) in Gaza City has gradually become the center of a very busy street side market. Today about 500 vendors sell all kinds of products along both sides of the main street near the municipality. All these vendors are conducting their trade illegally, but depend on their business as the sole source of income for their families.

Clearly, the ad-hoc retail market created by these vendors has become a major problem for the municipality and people of Gaza City because it causes:

- Noise and odor pollution
- Traffic congestion and accidents
- Serious health and environmental hazards due to poor hygiene at meat and fish stands, trash and littering, and absence of water and sanitary services

The Municipality of Gaza wants to relocate the street side vendors to a new site where they can continue to conduct their trade without creating all the problems mentioned above. The Municipality of Gaza, in cooperation with the Palestinian police, have decided to establish a retail market at the old railway station on a 4,000 square meter site. Like the existing market, the new site is accessible to the public because it is in a central location off of Omar Al Mukhtar Street. The Palestinian police surveyed the vendors and found that they are willing to move to the new site location when the retail market is established. All infrastructure needs such as electricity, water, and sanitation are available at the proposed site.

The Technical Department of the Municipality prepared preliminary layout designs for a simple low-cost retail market. The proposed design will accommodate only about half of the vendors and the municipality will need to find another site to relocate the remaining vendors. The proposed market will be fenced and will have:

- 270 ground-level small shops (2 x 1.5 x 2.2 meters)
- One main entrance and a parking lot for 24 cars
- Public toilets (under the direct control of the municipality)

All shops will be provided with electricity. The municipality will restrict their use to prevent any changes in the objectives of this project and to prevent the establishment of any kind of industry that can endanger the environment. Solid waste will be collected in a containers that can be removed by the municipality.

Project cost estimates range from $300,000 (Municipality figures) to $500,000 (ANERA figures), including the costs of constructing a wall around the market). The municipality will lease shops to individual vendors at reasonable rates that will be determined by the Municipal Council.

Khan Younis Wholesale Market

ANERA proposes to help the Municipality of Khan Younis construct a wholesale market, including 30 wholesale fruit, vegetable, and meat shops. The market will serve the city of Khan Younis—population 80,000—and the surrounding populated areas of Khan Younis refugee camp (40,000 people), Abassan (5,000 people), Abassan Kbira (10,000 people), and Qurara (8,000 people). The wholesale market also could serve the town of Rafah, five km away.

SECTION III
ENVIRONMENTAL SETTING

A. Physical Environment

A1. Physiography

A1a. Geography

The West Bank and Gaza Strip have a land area of 6183 square km. The West Bank, including the neutral and military zones around Jerusalem but excluding the 210 square km comprising the surface area of the Dead Sea within the West Bank boundaries, has a total surface area of 5,606 square km. It has a maximum length of 137 km along the longitudinal axis between Zububa in the north and the southernmost boundary line south of Al Samu. The width varies from 31 km along the latitude connecting Jerusalem with the northern tip of the Dead Sea to 58 km along the latitude starting from Qalqilya along the western boundary and intersecting the Jordan River northeast of Zubeidat.

The West Bank contained eight administrative districts in 1967. In 1968, their number was reduced to seven and their borders were redrawn by the Israeli administration, enlarging the Tul Karem and Jenin districts at the expense of Nablus, partitioning the rural parts of the Jordanian/Jerusalem District between those of Bethlehem and Ramallah, and including in the entire geographical region of the Lower Jordan Valley in the Jericho Jordan Valley District.

The Gaza Strip extends over an area of 367 square km. It has an average maximum length of 45 km between the boundary near Beit Hanoun in the north and Rafah in the south. The width varies from 6 km near Deir Al Balah in the center to 13 km near Rafah. [Center for Engineering and Planning, 1992]

A1b. Topography

The area of the West Bank and Gaza Strip is divided into five distinct physiographic zones on the basis of topography. These zones are the Jordan Valley zone, Eastern Slopes zone, Central Highlands (Mountainous) zone, the Semi Coastal (Fertile) zone, and the Coastal Zone. [Al Khateeb et al. 1993, Center for Engineering and Planning 1992]

The Jordan Valley Zone. This zone extends along the western bank of the Jordan River from the point where the boundary intersects the river in the north to the northern tip of the Dead Sea in the south. It has an area of approximately 400 square km and lies within 0 to 400 meters below sea level. The Jordan Valley zone has a "natural greenhouse" characteristic and good fertile agricultural land is available. Average rainfall ranges from 50-250 millimeters/annum; and its major products are bananas, off-season vegetables, and citrus.

The Eastern Slopes Zone. This zone lies between the Jordan Valley in the east and the Central Highlands in the west. It extends from the areas east of Jenin in the north to the Dead Sea in the south and includes the slopes along its western shore. This zone has an area of approximately 1500 square km with altitude varying from 800 meters above sea level to 50 meters below sea level. The major crops are barley and legumes and the annual rainfall is around 250 millimeters/annum.

The Central Highlands Zone. This zone extends from Jenin in the north to the Hebron in the south. It has an area of about 3500 square km and altitudes exceeding 1000 meters above sea level. The rainfall in this zone ranges from 450 to 700 millimeters/annum and the major crops are olives, stone fruits, and grapes.

The Semi-coastal Zone. This zone represents an extension of Palestinian Mediterranean coastal lands and comprises parts of the Jenin and Tulkarem sub districts. It has an area of approximately 400 square km, and altitudes ranging from 100 to 300 meters above sea level. This zone is characterized by fertile lands with shallow groundwater. The rainfall is plentiful and often reaches over 600 millimeters/annum. The major crops are vegetables, citrus, field crops, olives, and stone trees.

The Coastal Zone. This zone extends along the southern part of the Palestinian Mediterranean shore to the north and south of Gaza City. It has a total area of 367 square km and altitudes ranging from 20 to 40 meters above sea level. It is characterized by sandy soils and very shallow aquifers. Annual rainfall ranges from 200 millimeters in the south to 400 millimeters in the north and the major crops are citrus and vegetables.

A2. Climate and Meteorology

The West Bank and Gaza are part of a subtropical zone with summer and winter climates and brief transition periods between the two seasons. The summer is generally warm and dry, with the hottest month being August and temperatures ranging between 18 to 38 degrees Celsius. The months of June through August are dry and generally have no rain. The winter is cool and wet with the coldest month being January with temperatures ranging between 5 degrees to 10 degrees Celsius. [Al Khateeb, 1989] About 70 percent of the average rainfall in the West Bank and Gaza Strip falls between November and March, and includes heavy rainstorms. In January and February, snow occasionally falls at the higher elevations of the central highlands, especially around Jerusalem. [Center for Engineering and Planning, 1994]

The average annual amount of rainwater falling on the West Bank has been estimated between 2000 and 3000 million cubic meters (MCM) while the amount of rainwater in Gaza is estimated at about 125 MCM/year. Roughly 75 percent of the rainfall evaporates, the remaining water infiltrates into the soil and recharges the groundwater reservoirs or appears as short-lived runoff in rivers and streams. [World Bank, 1993]

A3. Air Quality and Noise

Air quality and noise pollution pose serious problems to the environment. Vehicle emission standards and controls are nonexistent in the West Bank and Gaza and are well above acceptable international guidelines, particularly during rush hour in the city centers.

Smoke and odors from burning household rubbish and other solid wastes in the open streets, and uncontrolled effluent discharges from settlements, cities, and villages further aggravate the degradation of the air quality. In industrial areas, the natural and industrial dust from stone quarries causes heavy inversion layers, especially on the hot and still summer days.

Noise pollution from traffic, construction sites, and infrastructure rehabilitation is an ongoing problem.

A4. Water

A4a. Resources

Rainfall is the main source of water in the West Bank and Gaza, replenishing surface and groundwater supplies. Rainfall on the highlands recharges the groundwater aquifers draining to the east and west. The western slopes are gentler than the eastern ones and receive considerably more rain, hence they have a much higher recharge rate than the eastern aquifers draining towards the Jordan Valley.

Surface water. The only perennial river in the West Bank is the Jordan River. No agreement among the riparians has been reached to share this resource. Prior to 1967, the Jordan River was a source of water for the Palestinians. The Palestinians have been denied access to the Jordan River water by the Israelis since 1967/1968. Peace Agreement discussions, however, are now taking place related to the Jordan River and other water resources shared by Palestine, Israel, Jordan, and others in the region. There are about 300 springs near the base of the mountain ranges. Only about 120 of these flow year-round, while the remaining ones flow only during the winter rainy season. The total annual discharge of all springs is estimated to reach about 100 MCM, but only half of this amount is freshwater. The other 50 MCM has a high salt content and originates mainly from the springs along the northern and western shore of the Dead Sea.

Groundwater. The structure of the aquifers in the region is complex. The aquifers spanning the West Bank and Israel are not only richer but the water quality is much higher than that of the aquifers spanning Gaza and Israel. Usually, distinction is made among three main aquifers underneath the West Bank and Israel.

The largest aquifer is the western aquifer, which extends to the Mediterranean coast. Its annually renewable recharge is generally estimated at 335 MCM, whereas the eastern aquifer yield is estimated at only 105 to 125 MCM/year. Together with the annual recharge of the northeastern aquifer estimated at about 140 MCM/year, the total annual recharge of the aquifers amounts to about 580 to 600 MCM. [World Bank, 1993]

Water rights for both the Jordan River and groundwater supplies are agenda items under discussion as part of the peace agreement. While several plans exist for sharing water, it is not possible now to predict the outcome. It is clear, however, that water is a critical resource and will remain a subject of extreme importance.

A4b. Supply

As illustrated in Table III-1, 58 percent of West Bank communities, or 74 percent of the population, are supplied by piped water networks that deliver a higher quality of water than that taken from other sources, such as cisterns or springs. Households that have access to piped water, on average, consume more water and maintain a higher standard of personal and household hygiene than those who are not covered by the piped water network.

Table III-1
Access of West Bank Communities to Piped Water

Community Access to Piped Water	Number	Percentage
With Access	307	58
Without Access	220*	42

Source: Infrastructure and Health Services in the West Bank: Guidelines for Health Care Planning, The Health Development Information project, 1993.
* Including ten communities in the Hebron district where piped water services had been disconnected.

In the 307 communities where piped water is available, an average of 98 percent of the households are connected to the network. However, there are considerable variations in the availability of piped water between the eight West Bank districts. For example, in the Jenin district, only 47 percent of the population are covered by piped water networks; in contrast, there is 100 percent coverage in the Jerusalem district. In general, the central region of the West Bank, where 92 percent of the population is covered by piped water networks, enjoys better coverage than either the north, with 86 percent coverage, or the south, with 55 percent coverage. Actual water availability and delivery percentages, however, are much lower due to water shortages in systems operations.

In the West Bank, 42 percent of the rural communities (26 percent of the population) do not have access to piped water networks. As Table III-2 indicates, the most common source of water for these communities comes from rain-fed cisterns, where little is known about the water quality. In all West Bank rural communities, with the exception of two, rain-fed cisterns are used as either the main or secondary source of water for domestic use, even where households had access to piped water networks.

Table III-2
Non-Piped Water Supplies in West Bank Communities

Main Source of Water	Number of Communities	Percentage
Cisterns Only	171	78
Cisterns and Springs	31	14
Springs Only	3	1
Cisterns Fed by Piped Spring Water*	13	6
Tanks	2	1
Total	220	100

Source: Infrastructure and Health Services in the West Bank: Guidelines for Health Care Planning, The Health Development Information project, 1993.
* Thirteen communities had piped networks that carried water from local community springs to household cisterns, which were also used for storing rainwater.

Table III-3
Sources of Piped Water in West Bank Communities

Source of Piped Water	Number of Communities	Percentage
Mekorot	195	63.5
Municipalities and Local Springs	50	16.4
Jerusalem District Water Undertaking	51	16.6
Bethlehem District Water Undertaking	11	3.5
Total	307	100

Source: Infrastructure and Health Services in the West Bank: Guidelines for Health Care Planning The Health Development Information project, 1993.

The major supplier of piped water in the West Bank is Mekorot, the Israeli Water Authority. Mekorot directly supplies 63.5 percent of the piped water networks in rural communities of the West Bank. The remaining 36.5 percent of the piped water networks are controlled by the only two Palestinian authorities in the West Bank, the Jerusalem District Water Undertaking and the Bethlehem District Water Undertaking. These two water authorities provide water directly to communities in the central region of the West Bank or to local city councils who serve as water sub-distributors within their own communities.

A5. Soils

Soil physiognomy in the West Bank and Gaza Strip are affected by parent rock and local climate and display a wide range of soil types. In mountainous areas, the topsoil is washed off faster than new soil can form from the bedrock beneath. The young soil usually has no chance to mature and age; therefore, most soils in these areas are classed as young.

In the Tulkarem and part of the Jenin sub-districts, soils are characterized by heavy terra rossa and alluvial types. Most of these soils are suitable for farming. Much of the remaining soils in the West Bank are light gray to grayish brown. These soils are not particularly fertile but they may be enriched by manure and chemical fertilizers.

In the coastal region, besides the barren dune belt along the shore, are coarse-grained hamra soils, which are adaptable to farming because of a fine textured layer of mineral coating each grain. [Center for Engineering and Planning, 1992]

A6. Geology

The predominant geology and outcrops in the West Bank are carbonate sediments from the Cretaceous Age. Old and young rocks are barely visible. Jurassic and Lower Cretaceous rocks, limestone, chalky limestone, marls, and sandstone are visible in the core of the Judean Anticline in the extreme north of the West Bank. In Gaza, the geology typical to the coastal aquifer is sand, sandstone, and pebbles.

A7. Terrestrial and Aquatic Resources

Wildlife resources. High population pressure and intensive land use in the Gaza Strip and West Bank since the end of the 19th century have prevented wildlife populations from flourishing. Overgrazing, hunting, and agricultural and industrial activities have disturbed the natural habitat of most of the indigenous fauna. The overgrazing of land by the Palestinian sheep and goat herds push the wildlife further and further into the desert. The pollution of springs and streams from direct dumping of sewage effluent from the settlements and the random dumping of village garbage and trash near or in waterways are destroying the natural water holes for most wildlife, as well as many domestic livestock.

Some 56 mammal species have been recorded in the Gaza Strip, but only rodents and small insectivorous mammals, such as shrews and hedgehogs, have recently been observed in any numbers. The present situation for other larger mammals remains unclear due to the lack of recent surveys and investigation, but they are thought to be present in very small numbers or not at all. In contrast, non-indigenous rodents such as the brown rat and the house rat are abundant in disturbed, densely populated areas.

Amphibia and reptiles have also experienced a decline in supporting habitats. Intensive human use of water resources has contributed to the drying up and pollution of much of the moist environments amphibians require. Land use and agricultural practices have disturbed most of the suitable habitats for terrestrial reptiles, but adequate data on the present occurrence of local reptiles are lacking.

The near absence of natural vegetation and biotopes and the intensive land use of the region curtail the suitability of the area as a breeding and over-wintering place for birds. However, the West Bank and Gaza are a historical migratory resting stop for a large number of birds on their way to and from the European, Asian, and African continents. Migratory birds that rest in the West Bank include European goldfinch, heron, storks, kingfishers, yellow and white wagtails, ducks, pelicans, and vultures, some of which remain over winter.

The destruction of wetlands; pollution of springs, rivers and lakes; the enormous quantities of plastic and trash dumps; and especially the uncontrolled use of fertilizers and pesticides have led to a dramatic drop in the bird population. This, in turn, has led to the extinction of entire species, as well as a large number of species of birds being endangered.

Aquatic resources. Due to the pollution of the Jordan River, indigenous fish are on the decline and many fish caught there are considered unsafe to eat. Cattails and rushes can still be seen in marshy areas and along streams and rivers, but are sometimes found to be dying out in areas near uncontrolled sewage dumping. Water hyacinths, known for their water purification properties, are still found but in small numbers.

Marine and coastal resources (fisheries). Fish production around the Gaza coast has declined in recent years. In a ten-year span, catches have dropped by 3,000 tons/annum. The low nutrient levels in Nile water discharge after the closure of the Aswan High Dam may have contributed to this disruption in catch size.

Recent regulation of the fishing industries may have also contributed to reduced production. Hours for fishing near beaches have been restricted and fish auctioning has been moved to area 500 meters from the beach. In addition, the fisheries industry is hampered by outdated equipment and vessels.

However, the lack of a suitable fishing port in the Gaza Strip has been the greatest impediment to the industry, although some jetties traditionally used for loading and unloading general cargo still exist and are being used in fair weather. Support facilities for the sector are basic; infrastructure is limited to some ice production, fish auction halls, and boat building and engine repair facilities.

There is no aquaculture in either Gaza or West Bank, even though the demand for fish is high. Substantial technologies that utilize brackish water resources or raise fish from human wastewater exist. Wastewater treatment technologies based on macrophytes, which produce products that can be effectively used for animal feeds, may have potential at a fraction of the costs of traditional wastewater treatment systems. These systems are, however, very land intensive.

Plant communities. There are many wildflowers in the West Bank, 80 percent blooming from February to May with some flowers reaching their peak as late as July. The rains transform what looks like desert most of the year into green and colored fields with many types of wildflowers.

However, without an awareness campaign some of these flowers, plants, and trees—some indigenous only to the West Bank area—will disappear. Contributors to this

problem are open grazing for sheep and goats, expansion of agricultural and housing areas, decreased wetlands, pollution of the waterways, and the lack of designated wildlife conservation areas with specific conservation guidelines.

Endangered species. Although information is often fragmentary and inaccurate, data indicate many animals are on the decline. Due to the lack of formal studies and any real designated areas dedicated to wildlife protection, it is very difficult to obtain any reliable data upon which to base quantitative estimates of declines. At present, animals that used to be seen in the West Bank area but now have disappeared include the Syrian bear, the wolf, the Syrian woodpecker, the crocodile, and the ostrich.

According to Imad Atrash, a Palestinian environmentalist, plant life has also suffered and the following should be placed on the local endangered list: sumac, salvia (sage), thyme, Palestinian pistachio tree, carob tree, ficus tree, wild orchid, iris, crocus, mountain lily, and desert tulip. Many of the ancient olive orchards are being cut down to make way for settlements and infrastructure projects. With the great abundance of olive wood being used in the tourist industry for wood carvings, there should be some immediate control over the cutting of trees.

Nature conservation areas. There are no Palestinian nature conservation areas in either the West Bank or the Gaza Strip. There are 48 Natural Reserves and National Parks in Israel, with only five of these lying within the West Bank and Gaza. As of this date, it has not been determined whether these parks and reserves will be turned over to the National Palestinian Authority (NPA) Ministry of Tourism.

In the Gaza Strip, some small areas remain of nature conservation value near the outlet of the Wadi Gaza. The near pristine flora and fauna of the nearby dunes and salt marshes merit special care and consideration to preserve their condition. Although the vegetation of the mobile dunes is grazed by a few remaining Bedouin herds, it remains the only example of desert flora in the Gaza Strip. Around 500-1000 meters from the coastline, inland between the resorts of Gush Katif and Neve Dekalim, is an outstanding example of this valuable landscape and floristic and faunal diversity. No activities planned for SCF, ANERA, or CRS will affect this area around Wadi Gaza.

There is a great need for many parks for both wildlife protection and for nature conservation. Only when these areas are designated can the real wildlife awareness campaigns and the preservation of the Palestinian nature heritage begin.

Public awareness. Environmental awareness in this region is still in its infancy. This, combined with the degree of political tension and lack of government and nongovernmental resources, have produced environmentally unfriendly practices. Only one environmental organization, Children for the Protection of Nature, currently exists in the West Bank and Gaza. This organization was funded, in part, by SCF. The organization's program has spread to over 40 schools in Gaza, Hebron, Bethlehem, Jerusalem, Ramallah, Jericho, Nablus, Jenin and other places throughout the West Bank and Gaza.

The organization promotes the preservation of the environment through an educational program aimed at Palestinian children. Educational activities include classroom lectures,

poster campaigns, and a quarterly magazine issued by Education for Awareness and Involvement in Cooperation with the Department of General and Higher Education—NPA. Teachers organize summer camps that target environmental awareness programs with participation in intensive lectures, field trips, and archaeological visits. These activities have attracted attention abroad, notably in Italy, where children exchange environmental and economic information with Palestinian children.

There are no recent lists or studies on wildlife found in the West Bank, with the exception of those of Imad Atrash of the Children for the Protection of Nature program. He is attempting, through an environmental awareness program introduced to the Palestinian school system and with the help of the International Development Research Centre, to study and identify indigenous animals, birds, and fish that are present in the West Bank, as well as those in danger of extinction.

B. Cultural and Aesthetic Conditions

B1. Archaeological, Historical and Cultural Sites

Three cities—Nablus, Bethlehem, and Jenin—have been identified as zones that may be impacted by the project. These cities and the surrounding areas have been inhabited for thousands of years and contain sites that have deep religious significance for Christians, Jews, and Muslims. Also located within these zones are many historical sites, including ruins from the Romans, Byzantines, and Crusaders.

There are several examples of historical, cultural, and archeological sites located within these three cities. El-Kabir Mosque, said to be the site where Joseph's blood-stained coat was presented to his father as proof of the death of his favorite son, lies in the project area. The Church of the Nativity, considered to be one of the oldest churches in the world and believed to be the birthplace of Christ, and the Milk Grotto Chapel, where it is believed that Mary, Joseph, and the baby Jesus sought shelter on their way to Egypt also lies within the project area. In addition, the three cities are home to the tomb of the matriarch Rachel, the ruins of an ancient Roman amphitheater, the convent of Jacob's Well, and the traditional site of Joseph's Tomb. Just outside the city of Nablus are the remains of the biblical city of Shechem.

The activities proposed in this report are limited in scope and size, and are not anticipated to impact any of the above referenced historical, cultural, or archeological sites. The establishment or upgrading of wastewater treatment facilities and the creation of roads will not disturb the groundwater levels at these sites; therefore, there will be no damage caused by rising water levels. Construction activities are not anticipated to cause any adverse impacts, since there are no known sites where construction or upgrading activities are planned. However, should a new site be discovered during the course of project activities, the appropriate authorities would be contacted immediately.

B2. Aesthetic Settings

As an earlier section of this report outlines, the West Bank and Gaza have a wide variety of topography, top soil, and vegetation cover. However, an unfortunate but common element in the West Bank and Gaza's landscape is increasing desertification, which is caused by several factors, such as:

- Drought due to changes in climatic conditions, especially the decrease in rainfall and increase in mean temperature.
- Deforestation resulting from urbanization, clearing land for Israeli security purposes, tourism/olive tree carvings, firewood/charcoal production, etc.
- Damage to mountain farm terraces constructed and maintained by previous generations of villagers but neglected by current farmers.
- Uncontrolled domestic livestock grazing, especially sheep and goats, which destroy wild plant life and planted vegetation.
- Pollution of wetlands due to uncontrolled irrigation and use of water sources with high salinity.
- Casual picking of wild plants and endangered plant species and/or collecting and selling for income.
- Quarry areas and stone cutting workshops and industrial plants too close to agricultural lands, causing the agriculture to die from the dust in the air.
- Soil erosion near stone quarries as a result of transporting stones by heavy trucks.
- Construction of roads and residential areas to support the agricultural areas.
- Forest fires, set by accident on purpose.
- Overpumping of groundwater that leads to increased soil salinity, decreasing land productivity, or total destruction of agricultural land, especially in Gaza.

The landscape's aesthetic condition is also affected by poor solid waste management due to:

- Institutional weakness in residential garbage collection.
- Increasing quantities of industrial and commercial solid waste.
- Lack of modern techniques in solid waste handling and disposal such as recycling, reuse, sanitary landfill, etc.
- Improper garbage disposal site selection due to lack of institutional enforcement.

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C. Socioeconomic Conditions

C1. Demography

A census of the population has not been taken in the West Bank and Gaza since 1967. Instead, population data are based on estimates and statistical models and are often inconsistent and inaccurate. For example, in 1980 and 1987, the Central Bureau of Statistics and the Ministry of the Interior (MOI) published population estimates of the West Bank showing differences of more than 40 percent as shown below:

Organization	Region	Year	Population Estimate
Central Bureau of Statistics	West Bank	1980	704,000
MOI	West Bank	1980	871,000
Central Bureau of Statistics	West Bank	1987	858,000
MOI	West Bank	1987	1,252,000

The Central Bureau of Statistics estimates represent "present population" at the end of a calendar year. Births and deaths are estimated by using parallel figures from within Israel and neighboring countries because of under-reporting of actual deaths. MOI figures are based on population registration (identity cards) data. MOI figures, therefore, include residents who are temporarily or permanently living abroad, and their children, who are registered for summer visits only. Under-reporting of deaths tends to inflate the population data.

C2. General Land Use

Land use and development depend on a number of factors, including: prevailing soil characteristics, climate, population distribution and density, availability of water and other natural resources, type and level of economic activity, and regulations imposed by the Israeli authorities on Palestinians. Of the total land area of the West Bank and Gaza Strip, it is estimated that 2300 square km (37 percent) are easily cultivable, 2250 square km (37 percent) have a limited capacity for cultivation (but may be reclaimed), and that some of the remaining areas that are not suitable for cultivation could be developed into good grazing lands. The table below shows major land use components in the year 1990. [Center for Engineering and Planning, 1994]

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Land Use Components in the West Bank & Gaza, 1990

LAND USE	AREA (km)	PERCENT
Cultivated Lands	1,945	1.5
Forests	30	0.5
Built-up Areas:		
Palestinian Communities	200	3.2
Israeli Settlements	70	1.1
Roads	10	0.2
Grazing and Desert	3,928	63.5
TOTAL	6,183	100.0

C3. Economy

Overview. For the past 25 years, lack of employment opportunities have made it necessary that Palestinians look for work either in Israel or abroad. Since 1967, Palestinians have been a large and relatively cheap source of manual labor for Israel. In March 1993, in response to unrest caused by the Intifada, Israel closed its borders to most of the Palestinian workforce. Employment opportunities decreased drastically at that time and less than half the number of workers are currently allowed to work in Israel. Outside Israel, and especially in the Arabian Gulf countries, Palestinians make up a highly educated and skilled work force. Remittances to the West Bank from Palestinians living and working abroad have been an important stimulus to the Palestinian economy. However, since 1991, work opportunities for Palestinians decreased substantially in the Gulf because of their political support of Iraq during the Gulf War. Without the remittances from Palestinians working in Israel and the Gulf, increasing unemployment in the West Bank and Gaza, and increasing prices for land and real estate, the Palestinian economy is in a state of crisis.

In the public sector, municipalities do not have enough funds to sustain basic public services. Water services are interrupted for several days at a time. Power outages are frequent. The quality of drinking water is often below World Health Organization standards. And garbage collection services have broken down, leaving it in the streets.

With regard to public services, taxes and fees are collected by either the Israeli Civil Administration (CIVAD) or the municipalities. Whereas the municipalities are able to collect earnings from some public utilities, many revenue-generating taxes—such as fuel and vehicles—go to the CIVAD and are not reinvested in the municipality. The result is poor quality services or total lack of public services for Palestinians. For example, road

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construction and maintenance is poor, and roads in the West Bank and Gaza, except those designated as "Israeli settlement security roads" are old and in disrepair. The municipality's lost revenues and their inability to borrow have been the primary reasons for this.

Both revenues and spending by the CIVAD and the municipalities are low by international standards, at about 16 percent of gross domestic product (GDP)—or a mere 12 percent of gross national product (GNP)—between 1987-1991, with no clear trend. On the other hand, statutory income tax rates are significantly higher in the West Bank and Gaza than in Israel.

The lack of revenue available for public services is supplemented by aid from other organizations and donors. Many organizations operating in the West Bank and Gaza provide quasi-public services. Foremost amongst these is the United Nations Relief and Works Agency (UNRWA), which provides basic services to approximately 40 percent of West Bank residents and 60 percent of refugees. UNRWA has spent $100 million annually in recent years, equivalent to 4.5 percent of GDP, 85 percent to education and health.

Before Jordan broke off administrative ties to the West Bank in 1988, Jordanian aid amounted to an estimated $50 million/year, dropping to $15 million thereafter. Aid from other Arab governments provided an estimated $15 million/year in 1988-89. Other Arab nongovernment agencies, UNDP, the European Community, and a large number of non-Arab NGOs have also provided resources and services to the West Bank and Gaza. These funds are treated as near-government capital inflows and spending.

Economic development is hindered by a number of factors: depleted land and water resources in the face of an increasing population; increased loss of land to Israeli settlements; restricted access of Palestinian sheep and goat farmers to land designated as military land or a nature reserve; and restricted access to water.

The lack of real zoning regulations and public land utilization policy has created uncertainty and become a barrier to industrial expansion. The freeze on the building of housing on land beyond the municipal boundaries has distorted land prices. Aquaculture (fish production) is carried out by Israelis on land controlled by them along the Jordan River. However, Palestinians are not allowed to implement this activity.

The economics of the West Bank and Gaza are characterized by an unusual dependence on external sources of economic growth. In the future, policies will be central to a reorientation in the pattern of development.

C4. Transportation, Telecommunications, and Power Networks

C4a. Transportation

The existing transportation facilities in the West Bank and Gaza are inadequate for future economic development. In recent years, investments in transport infrastructure have been primarily designed to increase Israeli security and incorporate the Israeli settlements in the West Bank with the Israeli economic and social structure.

These policy objectives have resulted in the construction of modern and high standard roads linking the settlements with major centers in Israel, often bypassing the Palestinian cities, towns, and villages. On the other hand, the road networks serving the majority of the Arab population have been largely neglected. As a result, two weakly connected road networks have emerged serving two sets of distinct transport demands. Sea and air transport services are nonexistent.

C4b. Telecommunications

The communication services have been affected much like the transportation sector. Postal and telephone services that link the main and secondary urban areas are extremely inadequate and deficient, particularly in the rural areas. By the year 1990 some 14,000 people were engaged in transportation and communications activities, accounting for only about 5 percent of the total labor force.

C4c. Power Networks

The majority of the electric power is supplied by Israeli companies. The major Palestinian producers of electric power (including the Jerusalem District Electric Company) and several municipalities are linked-up with the Israeli grid and purchase electricity from the Israeli Electric Corporation. The total amount of purchased electrical power is estimated at around 700 million kilowatt-hours/year. The Palestinian producers of electrical power were restricted in developing their power stations. While about 95 percent of the urban population enjoys continuous electrical power supply, only about 45 percent of the rural areas have continuous electric supply. The rest of the population that has access to electricity is supplied with power for only a few hours a day. In general, the demand for electricity is satisfied in urban areas, but not in rural areas. Less than 5 percent of the supply of electric power is locally produced. [Center for Engineering and Planning, 1992]

C5. Public Health and Safety

At the time this report was prepared the main parties concerned with public health services in the West Bank and Gaza Strip included CIVAD, the NPA, UNRWA, PVOs, and private for-profit providers such as hospitals/clinics, private doctors, and private laboratories.

In the Gaza Strip and Jericho area, the public health services are the responsibility of the NPA, UNRWA, and other private parties. In the rest of the West Bank, they are the responsibility of the CIVAD, UNRWA, and private parties.

According to the World Bank report (September 1993) the public health conditions in the West Bank and Gaza Strip are similar to those typically found in lower-middle income countries. The total fertility rate was estimated in 1987 to be 7.2 births/woman for the Gaza Strip and 6.5 for the West Bank. The population growth in the West Bank was 4.4 percent in 1992 and 5.0 percent for the Gaza Strip. [Health in Judea and Sameria and Gaza, 1992-1993, Ministry of Health, Jerusalem, May 1993] The infant mortality rate is 40 to 45 infant deaths per thousand live births. Life expectancy is 65 to 66 years. Data is not available about life expectancy of men and women separately.

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Moderate and severe malnutrition are virtually unknown. Food supplies are adequate in quantity and fairly well distributed. The customary diet is rich in proteins and fiber and low in animal products, but provides too little of some micro-nutrients, particularly iron. Weaning practices generally are also sound.

The types of diseases found in the Gaza Strip are somewhat different from the West Bank. The two areas are distinct in terms of environmental conditions, economic circumstances, social situations, and social services. However, the reports that are available do not reveal major differences, except in the area of chronic adult-onset diseases.

Gaza. The World Bank reports high prevalence rates for cardiovascular diseases, hypertension, diabetes, and cancer—diseases usually associated with highly developed counties. Gastrointestinal and respiratory infections are reported as major problems in the Gaza Strip but not in the West Bank. High rates of respiratory, skin, and gastrointestinal infections continue to be reported by residents of refugee camps due to crowded housing and poor environmental sanitation. Communicable childhood diseases such as mumps, whooping cough, tetanus, measles, and polio have been largely controlled through a successful child immunization program.

Living conditions in the Gaza Strip are much worse than per capita incomes would lead one to expect. Nearly three quarters of the population are registered refugees, and 55 percent of these people live in refugee camps operated by UNRWA. Most of the camps have no organized sewage collection system, and none has an adequate system of sewage treatment for collected wastes. All the camps are provided with solid waste collection facilities, but none is served by a proper disposal site. The solid wastes are accumulated at surface disposal sites without further treatment.

Outside the refugee camps, about a third of the population is served by a solid waste collection system. Surface disposal sites are available rather than properly designed sanitary landfill. Wastes often leach into the aquifer, contaminating drinking water supplies.

More than half of the households in the refugee camps in the Gaza Strip are served by a piped water supply in the dwelling, and two thirds have access to some source of piped water. More than 90 percent of the time, the water is disinfected at the source. Inadequate water supply, poor water quality, and unsanitary disposal of liquid and solid wastes nonetheless contribute to a high incidence of gastrointestinal and parasitic infections. In addition, the fluoride content of the groundwater in the area north of Gaza City is reported to be (naturally) high enough to lead to the mottling of teeth and bone diseases.

The West Bank. In the West Bank the natural environment is generally healthier than that of the Gaza Strip. Population densities are much lower, potable water supplies are safer and more abundant, housing is less crowded and incomes are, on average, substantially higher. Additionally, only about 9 percent of the population lives in refugee camps, and the camps themselves are much smaller.

In the West Bank, approximately 70 percent of the households (including villages, towns, and refugee camps) are connected to a water supply system. The percentage of the West Bank population that actually has access to piped water supplies is 73.2 percent.

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In rural areas 42 percent of the communities (26 percent of the population) of the West Bank do not have access to piped water, and depend on rainwater harvesting and spring water for their domestic use. Any additional water is supplied by tankers. [Barghouthy, M. 1993]

Less than 2 percent of the residential areas in the West Bank, where less than 10 percent of the population lives, have wastewater collection and disposal systems, and only 21 percent of the residential areas have solid waste collection and disposal services. [Barghouthy, M. 1993]

Cisterns are often a preferred source of drinking water, even when a piped water supply is available. People prefer the taste of cool water from the cistern to the warm, chlorinated, and sometimes salty municipal supply. Cistern water also lathers better for washing because of its lower hardness.

In 1993, SCF commissioned the Water and Soil Research Unit of the Department of Chemistry at Bethlehem University to conduct a sampling and analysis campaign for rainwater cisterns in West Bank villages. The Water and Soil Research Unit analyzed 20 samples for total coliform and fecal coliform: 10 samples from three northern West Bank villages and 10 samples from three villages in the Southern West Bank. The analysis indicated high total and fecal coliform per 100 milliliters, often "too numerous to count." Furthermore, the "differential tests" conducted by the laboratory showed a variety of coliform bacteria including: *Klebsiella pneumonia, Klebsiella oxytoca,* and *E. coli*. These types of bacteria are known to cause throat infections and gastro-intestinal diseases. Based on these results, the Water and Soil Research Unit strongly recommended that water from these sources not be used for drinking, washing vegetables or fruits, or dishwashing unless boiled or chlorinated.

The causes or sources of water contamination in rain-fed cisterns include:

- Dirty catchment area (house roof, reservoir roof, ground) due to the presence of plant debris (leaves), animal waste (pigeons, goats, sheep, etc.), and other human activities (washing clothes, drying crops).
- Removal of water from the cistern using a contaminated bucket.
- Seepage of contaminants from nearby cesspits.
- Lack of a "lip" around catchment to prevent animal waste from falling in.

Also, according to SCF, some villagers poured small amounts of diesel into the cistern to kill insects, mosquitoes, and worms and prevent them from entering the water. As a result, these people were drinking water contaminated with diesel.

Data are not available on the incidence of water-borne diseases that could be linked to the poor quality of water from rain-fed cisterns, springs, or canals. Nevertheless, data strongly suggest that water not supplied publicly is often not fit for drinking without prior heating or chlorination. This appears to be true for most rain-fed cisterns and for contaminated springs and canals.

C6. Tourism and Recreational Areas

Tourism and related services have traditionally constituted a major source of national income [Center for Engineering and Planning, 1992]. Tourist sites are scattered throughout the West Bank. The most important cities are:

- **Jerusalem.** A holy city for three of the world's religions. Important sites include: Al-Aqsa Mosque, the Church of the Holy Sepulchre and Via Dolorosa, and the Temple Mount.
- **Jericho.** Considered the world's oldest city, it has many historic sites.
- **Bethlehem.** The birthplace of Jesus, and one of the most important sites of Christianity.
- **Hebron.** Regarded as a holy city by Muslims, Christians, and Jews.
- **Nablus.** The Neopolis of the 1st century and is the site of Joseph's Tomb and Jacob's Well.
- **Gaza.** One of the five great Philistine cities. It has several important sites of archeological and religious importance, including Sampson's Tomb.

C7. Industrial Activities

The Palestinian industrial sector has, for more than a decade, been characterized by prolonged stagnation resulting from a combination of internal and external constraints. Although the sector's average annual contribution to the GDP increased from around $50 million in the mid 1970s to around $150 million in the late 1980s, its relative share of GDP has remained at an average of about 8 percent. The total number of persons employed in industry in the West Bank (excluding olive oil presses and stone quarries) remained constant at 16,000 to 17,000. The combined West Bank/Gaza Strip industrial sector constituted a mere 1.4 percent of Israel's industry. The West Bank industry is the least productive sector in the region's economy. West Bank and Gaza industry remains underdeveloped, small-scale, and traditional.

Simcha Bahiri [Industrialization in the West Bank and Gaza Strip, WBDP 1987] explored the constraints on industrial development of the West Bank and recorded "economic, administrative, political, and cultural" barriers that have resulted in a continuation of the backward, underdeveloped nature of industry despite a relatively rapid rise in the consumption of industrial goods.

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Table III-5 shows the type of industry and its production account of all industrial units.

C8. Agricultural Activities

Historically, the agricultural sector in the West Bank and the Gaza Strip has played a major role in the economy. The current situation of this sector is not sustainable and reflects distortions in labor markets, external markets and trade arrangements, and the impact of policies and regulatory constraints.

Table III-5
Industries and Percentage of Production
in the West Bank and Gaza

Type of Industry	Percentage of Production
Textile, Clothing, Leather	30
Metal Production	24
Wood Works	20
Food, Beverage, Tobacco	9
Non-Metallic Minerals Production	12
Pharmaceuticals, Plastics, and Others	5

Source: Center for Engineering and Planning, 1992.

Based on available information (thought to be incomplete), the land area of the West Bank under cultivation covers 5.8 million dunums, and the area of the Gaza Strip is 360,000 dunums. In the West Bank, approximately 4 percent of the total land area is irrigated, with slightly more than 1.5 million dunums under cultivation. In the Gaza Strip, 165,000 dunums are under cultivation by Palestinian farmers, two thirds of which are irrigated. Gaza and the West Bank display some differences in crop and production patterns.

The climate in the West Bank and Gaza allows production of early crops in the Gaza Strip and the Jordan valley. Precipitation is the major source of water in the West Bank and Gaza, although it is relatively modest and highly variable. Less than 10 percent of the arable lands in the West Bank and Gaza are irrigated; field crop yields are highly susceptible to changes in precipitation and variations in weather patterns. While the area under irrigated cultivation has increased, improved technology and production techniques have reduced water usage per crop and area unit. In the West Bank, irrigated land under cultivation by Palestinians has remained constant since 1967, while the area under cultivation in the Gaza Strip has increased by 50 percent. The total water used for irrigated agriculture in 1990 was between 145 and 165 MCM, with the West Bank accounting for 80 to 95 MCM and the Gaza Strip for 65 to 70 MCM.

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Until the mid 1980s, agriculture in the West Bank and Gaza lost workers, many of whom took up employment in Israel. However, an increasing number of people are seeking employment in agriculture—the traditional depository of surplus labor—due to rapid population growth, return from Gulf employment, limited employment opportunities in other sectors, stricter implementation of Israeli policies, and the effects (since 1987) of the Intifada.

Most Palestinians live in areas with modest agricultural potential like the western hilly areas, where rain-fed tree planting, field crops, and livestock operations prevail. The least populated areas, the Jordan valley and the semi-coastal region, have the most promising agricultural potential.

The agro-ecological zones of the West Bank are outlined in Table III-6, below:

Table III-6
Agro-ecological Zones in the West Bank and Gaza

Agro-ecological Zone	Rainfall	Soil	Crops
Semi-coastal	600	Alluvial and heavy terra-rossa	Variable
Central Highland	High	Shallow soil depth	Grapes, olives, vegetables, grains
Eastern Slopes	Low	Steep Mountains	Grazing
Jordan Valley	200	Sandy and calcareous	Semitropic Vegetables
North Coastal	Moderate	Sandy and alluvial	Citrus, strawberry
Middle Coastal	Modest	Sandy and Loess	Vegetables, citrus
South Coastal	200	Sandy and Loess	Vegetables

About 60 different types of crops are grown in the West Bank and Gaza, including citrus fruits, vegetables, olives, field crops, grapes, almonds, plums, apricots, apples, figs, dates, strawberries, etc.

Irrigation techniques differ according to location, availability of water, and type of irrigated crop. Sprinkler irrigation and drip irrigation are used.

C9. Pesticide Use

The excessive and uncontrolled use of pesticides is the characteristic phenomenon of the agricultural sector in the West Bank and Gaza. According to a survey conducted by the Center for Environmental and Occupational Health Sciences and the Agricultural Work Committees Union the following preliminary results were obtained.

- The quantities of pesticides used are in excess of the required dose. In the Jordan Valley, Jenin, and Tulkarem areas, the applied quantities for vegetable cultivated lands are 4 to 6 kg/dunum, while in the Gaza Strip applied quantities are 4.5 to 7.5/dunum. A normal average would be 1 to 2 kg/dunum.

- Incorrect application methods by the farmers were reported, including improper spraying techniques, eating and smoking during spraying, and not following required safety precautions.

- Pesticide stores do not meet required specifications. Stores are close to houses; many have little or no ventilation; material from larger containers are re-packaged to smaller ones without safety measures; and the small containers are sold without instruction labels. Contamination of animal feed and veterinary medicines sold in the same stores is prevalent.

- The safety period required between the application of pesticides and picking of agricultural products is ignored.

- The Hebron area consumes about 10.5 tons annually of Hexanol, Hexaconazole, and Lindane. The mixture is used as a cattle dip to remove and destroy parasites on livestock.

- Most of the instruction labels for application methods and doses are written either in Hebrew or English rather than in Arabic.

According to the Ramallah Marketing Cooperative, most of the pesticides used in Ramallah area are manufactured and registered in Israel, and the remainder (less than 10 percent) are of European origin.

In the Gaza Strip, due to intensive agriculture, farmers use methyl bromide (a potentially carcinogenic material) as a soil sterilant or seed treatment to destroy insect larvae in grain or as a method of weed control. [Wihaidi, A., Dept. of Agriculture, GS]

Among the pesticides used in the West Bank are Roager, Resek, Adiman, Mostang, Lepacede, and Dorspan. The Israeli Ministry of Agriculture, Department of Plant Protection and Inspection's January 1993 report "Pesticides for Plant Protection—Registered for Use and Sale in Israel" has over 370 products listed by common names.

D. Institutional Setting

D1. Palestinian Environmental Protection Authority

Environmental regulations and guidelines for the NPA are slowly being developed. At present, however, agreement has not been reached on the placement of the environmental program in a ministry. Administration and enforcement of environmental regulations can only be addressed after such decisions are made.

D2. Agricultural Department

As a result of the Peace Accord Agreement signed by the Palestinian Liberation Organization and Israel in Cairo on 5 May 1994, the Department of Agriculture in the Gaza Strip and the Jericho area are now run by the NPA.

The NPA Department of Agriculture consists of several divisions, including the Water Division, the Agricultural Extension Division, and Veterinary Division. The Water Division has overall jurisdiction over water resources in Gaza Strip, which are entirely underground. At the present time, it is responsible for allocating water resources to the various uses, namely drinking water and agriculture. The Water Division undertakes the water quality analyses.

In the West Bank, excluding the Jericho area, the Central Agricultural Organization is a unit of Israeli's Civil Administration based in Ramallah district. The West Bank is divided into the six districts of Hebron, Ramallah, Jordan Valley, Nablus, Jenin, and Tulkarm. Each district office has an extension unit, a veterinary service, a forestry unit, a regional experimental station, and an administrative office.

D3. Civil Administration (CIVAD)

The CIVAD is a branch of the Israeli Military Government responsible for civil affairs administration in the West Bank (except for the Jericho Area). It is headed by the chairman of the CIVAD in the West Bank Area.

Civil services are provided to West Bank inhabitants through about 35 departments. Each department is headed by an Israeli military officer, but services and activities are performed by Palestinian employees.

One of the important departments that belonged to the CIVAD is the Department of Environment. It was responsible for all environmental affairs within its jurisdiction area, including water quality analyses, wastewater treatment plant design and performance, industrial activities control, pesticide use control, and air pollution control. The department has its head office in Ramallah and six district offices in Hebron, Bethlehem, Ramallah, Nablus, Jenin, and Tulkarm. Forty-one environmental inspectors and four engineers are employed in addition to an administrative staff. However, the department is still under Israel control and as of the writing of this report has not been transferred to the NPA. However, with the large area of responsibility and little true enforcement powers, the Department of Environment has not been very effective.

The Village Affairs Department (VAD) used to be a department of the CIVAD under the direction of the social welfare officer. Currently, the VAD is a coordinator between international NGOs such as ANERA and CRS and other CIVAD offices. As an intermediary organization, VAD studies the proposals submitted by NGOs, estimates the cost of the proposals, and writes recommendations on behalf of the NGOs to the inspector to approve the proposals. The inspector is responsible for ensuring that the NGO's fieldwork is carried out in rural areas before approval is issued. VAD's responsibilities are mainly in the rural areas; however, they have some responsibility over NGO projects in municipal areas. The

VAD has one main office in Nablus city with a director, two engineers, and one secretary. As a result of the Agreement between Israel and PLO, negotiations have cleared the way for VAD to be transferred to the NPA soon.

D4. Applied Research Institute of Jerusalem

Founded in 1990, the ARIJ is a non-profit organization dedicated to promoting sustainable development in the occupied Palestinian territories and the self-sufficiency of the natural resources.

Although initially conceived to confront issues facing the agricultural community, ARIJ has since broadened its agenda to include a wide spectrum of environmental concerns. Early research priorities focused on cultivation in marginal lands, livestock production, agro-industries and marketing, and water management and utilization.

As water issues gained precedence, the Water Research and Dryland Farming Units were created to better identify research goals and implement project objectives. Recently, the Environmental Research Unit was established in the West Bank and Gaza. It assists in the formulation of strategy options, policy guidelines, and national standards and legislation. A precursor to these objectives is the development of a comprehensive environmental database that will serve the region as a foundation for in-depth research. Additionally, ARIJ has instituted a Resource Center that publishes and makes available to the local community a wide range of scientific data, literature, and periodicals.

ARIJ receives technical and financial support from a variety of international governmental and NGOs who grant funding on a project basis. ARIJ projects are currently being funded by the Ford Foundation, the Canada Fund, and the International Development Research Center.

ARIJ is concerned with environmental studies in Palestine related to the following topics:

- Water
- Environment
- Rainfed Farming
- Wastewater Irrigation

ARIJ has published several studies with local and international institutions such as Harvard University, ICARDA, Global Environment Facility, etc. ARIJ is now working on a Water Allocation System project that will develop a land use system and environmental information system. ARIJ is also working on a pesticide survey project. At this time 29 researchers are employed by ARIJ part time.

SECTION IV
ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This section discusses potential environmental impacts of the ANERA proposed cooperative and municipal development activities. It also proposes specific mitigation measures to control, reduce or eliminate these potential environmental impacts.

A. Impacts and Mitigation Measures for Cooperative Development Activities

Agricultural extension activities are primarily technical assistance to farmers. Irrigation infrastructure projects entail construction. Environmental impacts of both types of activities are very different and thus are addressed separately.

A1. Agricultural Extension Services

ANERA's proposed agricultural extension activities generally are environmentally friendly and should improve the environmental situation in the West Bank and Gaza. The brucellosis program, for example, will promote a healthy livestock sector in the West Bank and Gaza by helping to achieve the following objectives:

- Reduce the number of livestock (goats, sheep, cattle) brucellosis infections.
- Reduce the number of human infections.
- Slow the spread of the disease.
- Reduce productivity losses suffered by farmers.
- Reduce human health treatment costs.
- Provide basic data on the disease, its spread, and the effectiveness of vaccines used.
- Strengthen institutional capabilities of the Veterinary Service of the Ministry of Agriculture and the Ministry of Health.
- Promote international cooperation among Palestinians, Israelis, and Jordanians in the fight against zoonotic diseases.

Likewise, the mother grape rootstock project will promote a resistant, environmentally sound grapevine industry in the West Bank. The project will:

- Provide a reliable supply of grape rootstock resistant to phylloxera, which attacks non-resistant grape stocks throughout the West Bank.

- Increase and develop private-sector grape stock nurseries.
- Increase the supply of grafted grapevine plants.
- Strengthen the role of extension agents, who will conduct in-field workshops on the biology of grape phylloxera, disease identification and propagation, resistant rootstock, and related viticultural practices.
- Help growers identify phylloxera infection at an early stage.

A few negative environmental impacts may occur, however, if appropriate measures are not taken to ensure the success of these agricultural extension services. In particular, increased grapevine culture could lead to widespread, excessive, and unsound use of certain pesticides and fertilizers.

Mitigation Measures

Where ANERA's activities may lead to increased pesticides use down the road (e.g., mother grape rootstock farm and production of seedless grapes), ANERA should educate farmers about:

- The environmental and economic adverse impacts of excessive pesticide use.
- Methods to decrease pesticides use, including IPM.
- Appropriate use of fertilizers to minimize impacts on groundwater and reservoirs.

ANERA has budgeted for a special activity to decrease pesticide use. This activity should incorporate USAID's guidelines on pesticide use, as stipulated in 22 CFR 216.

A2. Irrigation Infrastructure Projects

As discussed in Section II, ANERA has proposed six irrigation infrastructure projects covering a wide range of activities, including:

- Drilling one new well
- Well rehabilitation and spring maintenance
- Irrigation water storage and conveyance
- Water conservation methods

Negative environmental impacts may result from these project activities, during both construction and operation and maintenance.

Construction activities may generate waste materials that require proper disposal, including construction wastes such as cement powder, concrete, and aggregates. Soil erosion and storm-water runoff may be expected as a result of excavation and piling of excavated

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materials. Construction machinery and equipment generally will produce localized noise pollution affecting construction workers and populations living in the immediate vicinity of the construction site. Air pollution also may result from dust generation and energy consumption. Work accidents may occur during the construction phase related to excavation, pipe laying, and concrete handling.

Potential environmental impacts during operation and maintenance of the proposed irrigation infrastructure projects may include the following.

Soil Impacts

- Soil erosion and storm-water runoff may occur due to engineered facilities such as reservoirs, valve chambers, and pumping stations.
- Soil pollution may result from inappropriate and excessive pesticides use and improper disposal of agricultural wastes (such as nylon sheets).

Air Quality and Noise Impacts

- Air quality may be affected due to the byproduct gases resulting from fuel combustion in stationary power generators and movable agricultural machines.
- Although some activities will reduce the use of water pumps, noise problems may still result from the operation of electricity generators (in areas without electricity power lines) and pumps proposed in other activities.

Water Resources Impacts

Except for the Abassan irrigation well, all proposed irrigation infrastructure projects have definite positive environmental impacts, such as the reduction in evaporation losses and surface water seepage due to improvements over traditional open channel irrigation methods (Fara'a Irrigation, Spring Development, Marj Na'jeh). However, negative impacts on water resources may include:

- Increased exploitation of groundwater may affect its quality, especially in the Gaza Strip, where an increase in groundwater salinity is expected due to overpumping.
- Potential pesticides may introduce pollutants to the ground water.
- Water balance may be affected, especially in Gaza, where increased water deficit is obvious and in the Fara'a Irrigation project, where an underground recharge source may be eliminated.

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Terrestrial and Aquatic Resources Impacts

- Some activities that propose exploitation of surface water may affect the terrestrial and aquatic resources, such as in the Far'a irrigation pipeline project, which may eliminate livestock and wildlife watering by replacing the open canal system with closed pipes.

Public Health and Safety

- The potential for using pesticide may create health problems to farmers, their families, neighbors, and consumers due to excessive use and lack of safety measures during application and storage.

- Work accidents are possible during pumping and other agricultural activities.

Land Use

- Positive impact will result from increasing the agricultural area and bringing into use bare lands.

- Construction of reservoirs, laying of pipes, and digging of wells may introduce slight changes in the character of the land.

Table IV-1 summarizes key environmental impacts of the proposed irrigation infrastructure projects and identifies recommended mitigation measures to reduce, control, or eliminate these impacts.

B. Impacts and Mitigation Measures for Municipal Development Activities

Light industrial parks and wholesale and retail markets generally pose similar environmental impacts. These types of projects potentially have overall positive environmental impacts, as illustrated by the Halhoul wholesale market, which is described in Exhibit IV-1. On the positive side, both types of projects:

- Reduce urban traffic congestion, increasing traffic and pedestrian safety, economic productivity, and general welfare.

- Prevent illegal produce market transactions, preventing unsafe products for human health.

- Reduce noise pollution to residential neighborhoods.

- Facilitate and reduce the infrastructure investment required for water, electricity, solid waste collection, and telephone.

- Facilitate produce quality and health and safety control by the municipality, and protecting workers and public health.

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Table IV-1
Environmental Impacts and Mitigation Measures for Irrigation Infrastructure Projects

Potential Environmental Impacts	Possible Mitigation Measures
Soil Erosion. Storm-water runoff and soil erosion may occur due to engineered facilities such as reservoirs, valve chambers, and pumping stations	Build permanent stormwater drainage networks at reservoir site and other facilities
Soil and Groundwater Pollution. Increased agricultural activities may lead to soil and ground water pesticide pollution. Plastic sheets abandoned in the fields kill livestock that eat them and cause aesthetic nuisance	Educate farmers about the importance of safe and environmentally-sound (1) use of pesticides (including IPM) and fertilizers and (2) disposal of plastic sheets used in agriculture after harvesting
New Wells in Gaza Strip. Drilling new wells in the Gaza Strip may further lower the water table and increase the salinity of an already precarious aquifer	Avoid new well projects in the Gaza Strip unless (1) project sponsors can satisfactorily demonstrate that the new well would not have negative environmental impacts; and (2) all well permitting is secured for the project
Well Rehabilitation in Gaza Strip. Excessive pumping from rehabilitated wells would contribute to aquifer depletion and further salinization	Conduct 24 hour pump tests on all rehabilitated wells to ensure that withdrawals do not exceed permitted capacity
Water Degradation due to Poor Maintenance. Poor maintenance of important engineering works, such as the headworks of the Al-Far'a irrigation system, may lead to significant water quantity losses (e.g., water diversions) and water quality degradation (e.g., mixing with sewage in Al-Far'a)	Maintain and operate all systems properly and in an environmentally sound manner to ensure long-term sustainability (see Section VI on management measures)
Loss of Ground Water Recharge. Replacing natural drainage in river beds will eliminate a major source of ground water recharge in the dry season	Use drip irrigation to take advantage of pressure differentials and conserve water. Aquifer recharge losses should be offset by the reduction in water evaporation and pumping rates downstream (e.g., Far'a Valley). Monitor water levels in local area wells to determine if there are adverse impacts on groundwater recharge
Livestock and Wildlife Watering Points. Replacing open channels with pipelines may deprive animals from crucial drinking water source. Shepherds may break pipelines or valves to provide drinking water for livestock	Provide for livestock and wildlife watering points along major irrigation pipelines
Plant Wildlife. Wild plants (flowers, trees) in spring river beds (e.g., Al-Far'a valley) will die in the absence of a reliable source of water	Study impacts on plant wildlife on a case-by-case basis. Design and implement, as appropriate, wildlife protection programs, especially for endangered plant species. If necessary, allow for a minimum amount of water to continue to be discharged in wadis or open channels

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Exhibit IV-1
The Halhoul Wholesale Market

Funded by ANERA, the Halhoul wholesale market has resolved a major environmental problem in the West Bank town of Halhoul while promoting efficient marketing of agricultural produce in the Hebron area. Before the Halhoul market was built, all wholesale and retail transactions took place on the main street in Halhoul, which is on the Jerusalem-Hebron road. The previous market was characterized by:

- Significant delays and inefficiencies with trucks and donkeys stationed haphazardly along the street to load and unload crops and produce.
- Traffic congestion and accidents involving pedestrians who were knocked down by cars and killed.
- Health hazards due to solid waste piles, poor drainage, and animal (donkeys) excreta spread along the main street.

To overcome these problems, the Municipality of Halhoul, with the help and support of ANERA, constructed a wholesale market in 1986. The market is now very active and serves the town of Halhoul and the nearby villages. It has 22 wholesale fruit and vegetable shops plus a refrigerated underground area. The municipality leases the shops to wholesale merchants for 600 Jordanian Dinars (about $860)/shop/year. Wholesale merchants collect a 10 percent fee from farmers and producers on all wholesale transactions conducted at the market; they keep 6 percent and give 4 percent to the municipality. Commissions on wholesale transactions represent a major source of income to the municipality and are used to maintain the facility and provide other municipal services.

Today, solid wastes are collected efficiently and daily by the municipality, which charges each shop 40 Jordanian Dinars/year for this service. Truck loading and unloading is done efficiently thanks to specifically designed loading docks. Use of animals for transportation has dramatically decreased. The main Jerusalem-Hebron road is no longer congested in Halhoul and looks clean and free of trash and litter. Farmers and wholesale merchants are both equally satisfied with the services provided by the Halhoul market, including the Hebron District Agricultural Marketing Cooperative, which is providing agricultural extension services to the many farmers who visit the market to sell their produce. Parking places are available. While water is supplied through the municipality, sewage is collected in a collective infiltration pit that has not been emptied since the market opened in 1986. Groundwater contamination is suspected due to sewage infiltration into the ground. Building a septic tank rather than infiltration pits would prevent groundwater contamination.

- Create a new financial resource for the municipality that will allow it to provide efficient services to the public that can improve the health, environment, and standard of living of populations.

- Improve solid waste collection and disposal to reduce odor problems.

Adverse impacts are usually linked to a lack of adequate sanitary services, as evidenced by site visits to the industrial area of Bait Jalap and the wholesale markets of Nablus and Bethlehem, where large quantities of solid waste are generated daily and accumulate on site. Drainage conditions are poor and can create nuisance problems to the public. Wastewater is usually disposed in infiltration pits where it infiltrates the soil and pollutes groundwater resources. No measures are taken to provide for safe disposal of harmful wastes (solid or liquid), and sometimes the solid and liquid wastes are dumped together in one container. In addition, some merchants and industrialists lack basic environmental awareness (some of the industrialists interviewed were not familiar with the location of solid waste containers). Moreover the food quality in some of these markets is not safe and the municipalities do not inspect or monitor the cafeterias. In the case of the Gaza retail market, the proposed site is currently used as a parking place for lorries and trucks. An environmentally sound alternative parking area for these lorries and trucks needs to be found before they can be removed.

Adverse environmental impacts posed by the Nablus light industrial park and the Gaza retail market are discussed next.

B1. Environmental Impacts of the Nablus Light Industrial Park

As discussed in Section II, ANERA proposes to help the Municipality of Nablus build a 86-workshop light industrial park on eight dunums of land in Eastern Nablus. The PRIDE team met with Municipality of Nablus officials responsible for the project, including the city engineer, and visited the proposed project site. Based on these visits and past experiences with similar projects in the West Bank, the proposed light industrial park for Nablus is expected to have the following adverse environmental described below.

B1a. Noise and Air Pollution

To reduce noise pollution and aesthetic nuisances, the park's shops open inward to a square courtyard. This design also should minimize outward expansion. Nevertheless, noise levels around the industrial park will increase significantly due to:

- Traffic in and out of the industrial park (customers, suppliers, and workers) and loading and unloading of equipment and materials.

- Noisy machinery, such as electric sawing machines and printing presses. Under normal design circumstances, noise from these machines will travel through walls and may reach the vicinity of the park beyond acceptable levels.

Increased traffic will also produce concentrations of air pollutants such as carbon monoxide and nitrogen oxides. However, ambient concentration levels are not likely to exceed levels found in busy downtown Nablus. Other air pollutants will include aerosols from spray painting operations in handicrafts, furniture, and carpentry workshops.

B1b. Solid Wastes

Solid waste collection and disposal is a determinant factor of the environmental soundness of light industrial parks. During a visit to the ANERA-funded Beit Jala industrial park, solid waste collection and disposal appeared to pose the largest environmental problem. Only one dumpster was provided for the entire park, which meant that tenants in upper-level workshops had no easy or short access to the solid waste dumpster. One of the tenants interviewed did not even know the location of the solid waste dumpster. In addition, the dumpster was poorly maintained and it appeared that there was as much solid waste outside as inside the dumpster.

The Nablus industrial park project drawings do not explicitly indicate the number, size, type, and location of solid waste containers. There are no special provisions for handling and disposing dangerous solid wastes (e.g., solvent wastes, ink, dyes, paint residues, wood sawing residue, etc.). Responsibility for and frequency of solid waste collection, including sweeping and cleaning of common facility grounds, is not defined. Without clearly defined responsibilities for solid waste collection and disposal, solid waste may pile up inside the courtyard and on the outside curbs and streets. Uncollected solid waste heaps would cause the standard hygienic and aesthetic impacts on park employees and consumers, as well as nearby worshippers at the Mosque immediately adjacent to the park site.

B1c. Domestic Sanitation

The park design envisions the use of communal latrines on each floor, one set for men and another for women. The communal latrines will be hooked to the main sewer line passing through one of the four streets adjacent to the proposed park site. Failure to provide for individual toilets in each shop is in sharp contrast with other industrial projects, such as the Beit Jala industrial park, built with the help and support of ANERA.

West Bank experience clearly demonstrates the failure of communal latrines due to uncontrolled access and poor maintenance. One reason for poor maintenance is lack of sufficient water. As a result, communal latrines lack basic hygiene requirements such as adequate supply of toilet paper, sufficient amounts of water to flush the latrines and wash hands, etc. Another fundamental reason is ill-defined or unassumed institutional responsibility for controlling access to and maintaining public toilets. Without access control, the communal latrines at the proposed Nablus industrial park are likely to be visited by outsiders, including worshipers at the nearby mosque.

B1d. Liquid Wastes and Stormwater Collection and Disposal

The project design doesn't include individual wastewater collection and disposal within each shop. However, it does incorporate a stormwater runoff system to evacuate

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stormwater falling on the courtyard. Stormwater will be mixed with sewage from the communal latrines and discharged into the sewer network.

Shop managers will not be able to dispose properly of any wastewaters resulting from spills (oil change) or washing operations (car wash, auto body shops). The Municipality of Ramallah industrial park is a striking example of what happens in this case. Without in-shop drainage and collection system for wastewaters, wastewater from spills and washing operations run off to the courtyard, where they accumulate due to the absence of any water evacuation system.

B2. Environmental Impacts of the Gaza Retail Market

By relocating streetside vendors from the Omar Al Mukhtar Street (the main street in Gaza City), the proposed Gaza retail market will help solve a crisis situation characterized by traffic congestion and accidents, noise and air pollution, poor hygienic conditions, and overall environmental degradation (see Section II, B2.). However, the proposed retail market may pose similar adverse environmental impacts at the new site location, as discussed next.

B2a. Site Location and Local Traffic

The proposed site offers the market advantages of a central location, not far from the Omar Al Mukhtar Street. Although the site is surrounded by streets on four sides, traffic congestion may be expected in the absence of an adequate circulation and parking plan. Also, because the site is in the middle of a residential area (two-story buildings), local populations may complain about increased noise and air pollution. Odors also may occur if certain products are not restricted (meat and fish), but the municipality intends to restrict such products for hygienic and environmental reasons.

The proposed site is currently used as a parking lot for a fleet of at least 20 trucks. Truckers will not accept leaving the site if they are not offered a satisfactory alternative, and may demand an alternative site nearby, which would pose significant environmental impacts (traffic congestion, noise, and air pollution).

B2b. Site Capacity

In its current design, the proposed project would solve the problem of streetside vendors in Gaza only partially. According to the market design proposed by the municipality (270 shops), only about half the streetside vendors would be relocated to the new site location. The remaining vendors would continue to conduct their business along the Omar Al Mukhtar Street until another site is found to relocate them. The project design could probably be revised to accommodate all 500 vendors (e.g., by building two stories) but then the project scope would change dramatically (more expensive, more permanent facilities).

B2c. Market Design (Shops, Parking Lot)

The proposed design calls for building 270 ground-level shops. The shops are quite small (2 x 1.5 x 2.2 meters) but the municipality believes this size would be acceptable to

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retailers. It is not clear, however, whether the retailers have been consulted about this or other aspects of the proposed design. Shop walls and ceilings will be made of metal sheets, which would be hot in the summer.

The parking lot inside the market is quite small, with only 24 spaces allocated for the entire market. As a result, pressures will increase for parking on adjacent and nearby streets, exacerbating traffic congestion problems. No distinction is made between parking for consumers and temporary parking for services (loading and unloading of merchandise).

B2d. Solid Waste Storage and Collection

The preliminary Gaza retail market project drawings do not explicitly indicate the number, size, type, and location of solid waste containers. Responsibility for and frequency of solid waste collection, including sweeping and cleaning of common market grounds, is not defined. Without clearly defined responsibilities for solid waste collection and disposal, it may pile up inside the market as well as on the curbs and streets outside. Uncollected solid waste heaps would cause the standard hygienic and aesthetic impacts on vendors and consumers as well as nearby populations.

B2e. Public Toilets

The proposed market design includes public toilets near the entrance to the market. The communal latrines will be hooked to the main sewer line passing through one of the four streets adjacent to the proposed market site. Given the scope of the market (small, retail shops), providing individual toilets in each shop may not be feasible. However, experience clearly demonstrates the failure of communal latrines due to uncontrolled access and poor maintenance. One reason for poor maintenance is lack of sufficient amounts of water. As a result, communal latrines lack basic hygiene requirements such as adequate supply of toilet paper, sufficient amounts of water to flush the latrines and wash hands, etc. Another fundamental reason is ill-defined or unassumed institutional responsibility for controlling access to and maintaining public toilets.

B2f. Stormwater Drainage

Given the preliminary nature of project drawings, no information was available on stormwater drainage. Without proper drainage and solid waste collection, the market will flood in the rainy season.

B2g. Maintenance and Provision of Services

The municipality recognizes the importance of this project not only because it will help solve the problems posed by streetside vendors in Omal Al-Mukhtar Street, but also as a new source of municipal revenues. Such municipal revenues would be needed to maintain the project and ensure its long-term sustainability. Without properly calibrated lease amounts and sanitation charges (solid waste and sewage fees) on merchants, however, the municipality would not be able to provide basic services and undertake routine maintenance and upkeep, which would have negative environmental impacts.

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Table IV-2 summarizes the potential environmental impacts of ANERA's proposed municipal development activities and identifies possible mitigation measures.

Table IV-2
Environmental Impacts and Mitigation Measures for Industrial Parks and Wholesale/Retail Markets

Potential Environmental Impacts	Possible Mitigation Measures
Siting. Environmental impacts are either exacerbated or reduced depending on site location	Choose site locations judiciously and not on the basis of municipal ownership of land
Noise and Air Pollution. Increase in car traffic and human activities (including loading and unloading) will produce localized noise and air pollution, which may exceed acceptable levels for neighboring populations	Design buildings so as to reduce noise propagation. Restrict uses to low-noise activities, especially in residential areas. Organize traffic and parking to reduce traffic congestion and facilitate loading/ unloading of raw materials and products
Solid Waste Storage and Collection. Poorly stored and uncollected solid waste causes aesthetic pollution and health impacts on consumers, employees, and neighbors	Indicate clearly in all engineering designs the number, size, type, and location of solid waste containers. Collect solid waste daily to prevent solid waste accumulation and the propagation of odors and insects
Solid Waste Disposal. Improper disposal of solid waste may pollute groundwater and drinking water resources (through leachate formation), pose health hazards to workers and landfill intruders, and scar the landscape	Promote environmentally sound construction, operation, and closure of sanitary landfills for solid waste disposal. Provide for separate collection and disposal of dangerous wastes (e.g., solvent wastes, ink, dyes, paint residues)
Domestic Sanitation. Communal latrines may produce unhygienic conditions due to uncontrolled access, poor maintenance, and inadequate supply of water	To the extent feasible, incorporate individual toilets in each workshop, with connections to sewer line or septic tanks (if no sewer network). Otherwise, control access to communal latrines and ensure proper daily maintenance
Non-Dangerous Liquid Waste. Without adequate drainage and collection, washwaters generated in-shop will run outside the shop, where they may accumulate in the absence of a water/wastewater evacuation system	Where non-dangerous wastewaters may be generated on shop floors (car wash, auto body shops, etc.), provide for in-shop wastewater drainage and collection, with a direct connection to the sewer network

Potential Environmental Impacts	Possible Mitigation Measures
Dangerous Liquid Waste. Certain industrial liquid wastes may pose health hazards or upset wastewater treatment plant operations if discharged directly into the sewer network	Disallow any industry that may generate dangerous liquid waste, unless it installs adequate pre-treatment before discharging waste into the sewer network
Storm-water Collection and Disposal. Without adequate drainage, stormwater may flood engineered facilities, creating a nuisance and sometimes property damage. Stormwater discharged into the sewer network may overload sewage treatment facilities	Design and build stormwater drainage network. Dispose stormwater separately from wastewater. Outside urban centers, use stormwater to recharge groundwater
Cost Recovery. Without properly calibrated lease amounts and sanitation charges on industrialists and merchants, the municipality would not be able to provide basic services and undertake routine maintenance and upkeep, which would have negative environmental impacts	Set lease amounts and services charges sufficiently high to sustain quality services (e.g., street cleaning, solid waste collection and disposal) and facility maintenance and upkeep. As appropriate, assess commissions on transactions as an extra source of income (wholesale markets)
Loss of Habitat for Fauna and Flora. Certain construction projects may threaten endangered species by disturbing their habitat	Consider impacts on endangered species on a case-by-case basis. Proceed with project only if there are no known impacts on endangered species

B3. Mitigation Measures for Irrigation Infrastructure Projects

Soil

- Take proper drainage measures at construction sites to prevent soil erosion and surface runoff
- Minimize, properly store, and remove construction wastes periodically from the site
- Install permanent drainage system at reservoir site, well, and pumphouses

Noise and Air Quality

- Use modern machines with minimum pollutant emissions.
- Provide exhaust systems to the electricity generators to minimize air pollution problems
- Provide noise proofing to the pump and electricity generator houses

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Public Health and Safety Measures

- Construction workers should wear protective clothes to prevent work accidents
  During Operation Mitigation Measures
- Protective clothes and safety measures should be applied during pesticide applications
- Store pesticides away from residents and food
- Crops should not be picked before the safety period

Land Use

- Restore top land surface after the installation works to minimize land use alteration

Terrestrial and Aquatic Life

- Construct livestock watering points at several stations along the pipelines

C. Mitigation Measures for Municipal Development Activities

- Solid waste collection and disposal should be done efficiently each day to prevent the accumulation of wastes beyond storage capacity.

- Wastewater disposal by sewers is essential to avoid the infiltration and pollution of the groundwater. If no sewerage system is available, then septic tanks should be constructed and emptied regularly.

- Harmful liquid wastes should be discharged separately and not with domestic waste.

- Awareness among the beneficiaries of these markets should be improved.

- Municipalities should have an efficient health or environmental department to supervise the quality of the products and services provided. At the same time, the municipality should enforce the regulations.

- The Municipality of Gaza should provide a new parking place for the lorries that have been parking for many years in the new market place.

- Infrastructure of all services should be provided to these markets, including telephones (especially for emergency and other services) and water (sanitation).

- The design process should consider the past difficulties and lessons learned in similar projects implemented by other municipalities and the design deficiencies should be completed.

SECTION V
MONITORING AND MANAGEMENT MEASURES

This section describes proposed environmental monitoring and management measures to accompany the ANERA proposed cooperative and municipal development project.

A. Monitoring Measures

Environmental monitoring tracks certain environmental indicators over time to ensure that expected positive environmental impacts are actually exhibited and potential adverse environmental impacts are kept to a minimum. Developing a monitoring program for any activity requires three steps:

- Identify and select environmental indicators.
- Evaluate selected environmental indicators in a baseline year.
- Track selected environmental indicators at regular time intervals (e.g., annually, semi-annually, monthly).

Table V-1 provides a list of possible environmental indicators for the types of cooperative and municipal development activities proposed by ANERA. Clearly, the cost of monitoring increases proportionately with the number of environmental indicators tracked. Hence it is important to keep the number of environmental indicators to the minimum necessary to accurately monitor the environmental performance of a given project. Selection of key environmental indicators depends on the general characteristics of the environmental setting in which a particular project is implemented. Therefore, it should be done by the cooperative or municipality, with technical assistance support from ANERA, on a case-by-case basis.

B. Management Measures

This section identifies environmental management measures that should be undertaken by ANERA, cooperatives, municipalities, and USAID.

B1. ANERA Management Measures

As the primary recipient of USAID funding to implement the cooperative and municipal development project, ANERA bears ultimate responsibility for ensuring that projects funded under this program will be environmentally sound and promote sustainable development. That is, it is ANERA's responsibility to ensure that each cooperative or municipality implements:

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Table V-1
Possible Environmental Indicators for
Cooperative and Municipal Development Activities

Activities	Possible Environmental Indicators	
Brucellosis Extension Program	• Numbers of animals and humans infected • Number and percentage rate of abortions • Productivity of livestock: milk, babies, weight by age • Farmers income from livestock • Vaccination levels	• Public awareness among: - producers/farmers - meat and dairy product consumers • Number of veterinarians working on issue • Number of animals killed (to prevent more infections) • Degree of cooperation with neighboring countries
Irrigation Infrastructure Projects	• By type of crop: - irrigated area (dunums) - production (tonnes) - pesticides used and quantities • Price paid for water and cost recovery	• Water resource characteristics: - yield or discharge (relative to permit levels) - water table level - salinity, etc. • Water losses (evaporation, seepage, network losses)
Light Industrial Parks and Wholesale/Retail Markets	• Noise levels • Traffic congestion • Daily solid waste quantities, number and size of containers, and frequency of collection	• Daily quantities of solid waste left uncollected • Characteristics of wastewaters generated by specific industries • Log of complaints from tenants, neighbors, and consumers

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- All necessary mitigation measures in project design, construction, and operation and maintenance.

- Appropriate monitoring plan to ensure environmental impacts are kept to a minimum and respond to situations where unacceptably high impact levels are detected.

Following are specific management measures that ANERA should undertake as it implements the Cooperative and Municipal Development project.

Designate an In-house Environmental Officer

ANERA should designate an in-house environmental officer for the Cooperative and Municipal Development project. This environmental officer will be responsible for:

- Approving engineering designs revised to incorporate necessary mitigation and monitoring measures.

- Working with other ANERA experts in charge of specific projects to ensure that environmental safeguards are incorporated in their project choices and design.

- Ensuring that water use activities are sustainable and do not deplete the water resource.

- Liaising with cooperatives and municipalities to ensure that construction activities meet environmental specifications.

- Overseeing monitoring activities conducted by cooperatives and municipalities (note: actual monitoring should be conducted by cooperatives and municipalities themselves).

- Preparing environmental reports to be included in semi-annual reports (SARs) to USAID.

- Building environmental safeguards in future ANERA proposals.

Require cooperatives and municipalities to (1) review and revise all engineering designs to incorporate proposed mitigation measures, and (2) prepare monitoring and management plans

As discussed in Section IV on environmental impacts, certain preliminary engineering designs lack basic environmental safeguards, such as adequate provisions for solid waste and wastewater collection and disposal. As appropriate, ANERA should require each cooperative or municipality to revise basic engineering designs so as to incorporate key mitigation measures identified in Section IV.

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In addition to basic engineering designs, ANERA should require cooperatives and municipalities to prepare a monitoring plan and a management plan for each proposed activity. While ANERA may help cooperatives and municipalities prepare such plans (through technical assistance and training), ultimate responsibility for drafting and implementing these plans should be left to the cooperatives and municipalities themselves.

Provide technical assistance to cooperatives and municipalities

ANERA should provide technical assistance support to cooperatives and municipalities in environmental planning and management, including:

- Identifying environmental impacts and mitigation measures.

- Developing environmental monitoring and management plans, including cost recovery mechanisms.

Technical assistance can be on a project-by-project basis as well as in the form of training programs. ANERA should coordinate its environmental training activities with USAID and other PVOs and NGOs in the West Bank and Gaza Strip. For example, ANERA should nominate participants to the USAID-sponsored environmental training program that will be held this fall (one week in the West Bank and one week in the Gaza Strip).

Organize and conduct lessons-learned workshops

ANERA should organize at least two planning workshops:

- One workshop for irrigation infrastructure projects.
- One workshop for light industrial parks and wholesale and retail markets.

Each workshop should last one day. Workshop objectives are to:

- Build environmental safeguards in proposed projects.
- Discuss possible environmental impacts of proposed projects.
- Identify possible mitigation, monitoring, and management measures.
- Share ideas and experiences relative to similar projects.
- Develop a full understanding of USAID environmental requirements.
- Identify new sources of information.
- Work together for a better environment in the West Bank and Gaza.

A maximum of 25 persons should participate in each workshop, as outlined next.

<u>Participants in Workshop for Irrigation Infrastructure Projects</u>

Participants in the workshop for irrigation infrastructure projects should include select members from different organizations, as suggested in the following schedule:

3 to 4	participants from ANERA, including the designated environmental officer

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6 to 8 participants from participating Agricultural Marketing Cooperatives: one or two from each Cooperative (Jericho, Ramallah, Rafah, and Beit Lahia)

6 to 8 beneficiaries of past irrigation infrastructure projects, both funded by ANERA and other PVOs. Invite both farmers and cooperative administrators from past projects

4 to 5 participants from specialized research institutes or NGOs such as the Palestinian Agricultural Relief Committee, ARIJ, and the PHG.

Participants in Workshop for Light Industrial Park and Wholesale and Retail Market Projects

Participants in the workshop for light industrial parks and wholesale and retail markets should include select members from the following organizations:

3 to 4 participants from ANERA, including the designated environmental officer

6 to 8 participants from participating municipalities: one or two from each municipality (Gaza City, Khan Younis, Nablus, Hebron), including the city engineer

6 to 8 persons involved in past industrial park or wholesale/retail market projects, both those funded by ANERA (e.g., Beit Jala industrial park, Halhoul wholesale market, Ramallah industrial park) and those funded by other PVOs (e.g., Bethlehem wholesale and retail market funded by SCF). Invite mix of persons representing:

- Industrialists (for industrial parks) or merchants (or wholesale and retail markets) leasing space in past projects.
- City engineers in the municipalities that built these past projects.
- Experts from the PVOs that provided support to implement those projects.

4 to 5 participants from specialized research institutes or NGOs such as the Palestinian Agricultural Relief Committee, ARIJ, and the PHG.

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Exhibit V-1
Proposed Preliminary Agenda for Lessons-learned Workshop on Industrial Park and Wholesale/Retail Market Projects

8:30 am	*Registration* *Coffee and Tea*
9:00 am	Introductions Workshop Objectives and Program Workshop Method, Techniques of Brainstorming
9:45 am	ANERA's Proposed Municipal Development Activities: - Nablus Light Industrial Park (10 min. presentation by Nablus City Engineer) - Hebron Light Industrial Complex (10 min. present. by Hebron City Engineer) - Gaza Retail Market (10 min. presentation by Gaza City Engineer) - Khan Younis Wholesale Market (10 min. by Khan Younis City Engineer) - Questions and Answers (15 min.)
10:40 am	*Coffee/Tea Break*
11:00 am	Potential Environmental Impacts of Municipal Development Activities: - Brainstorming in four small groups (50 min.): -- two groups discuss light industrial parks -- two other groups discuss wholesale and retail markets - Small group presentations in plenary (20 min. total, 5 min. by group) - Group discussion and synthesis (20 min.)
12:30 pm	*Lunch*
2:00 pm	Possible Mitigation Measures for Municipal Development Activities: - Brainstorming in same four groups (50 min.) - Small group presentations in plenary (20 min. total, 5 min. by group) - Group discussion and synthesis (20 min.)
3:30 pm	*Coffee/Tea Break*
3:50 pm	Possible Monitoring and Management Measures: - Brainstorming in four small groups (50 min.): -- two small groups study measures to be undertaken by ANERA -- two other study measures to be undertaken by municipalities and tenants - Small group presentations in plenary (20 min. total, 5 min. by group) - Group discussion and synthesis (20 min.)
5:20 pm	*Adjourn*

Exhibit V-1 provides a proposed preliminary agenda for the lessons-learned workshop on light industrial parks and wholesale and retail markets. A similar agenda could be used for the lessons-learned workshop for irrigation infrastructure projects by replacing light industrial parks and wholesale/retail markets with irrigation infrastructure projects. After each workshop, ANERA should prepare a summary of issues and suggestions raised during the workshop and distribute this summary to all participants and USAID. Drawing on the lessons learned at the workshop, ANERA should also prepare a report with basic environmental recommendations for each type of project.

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B2. Management Measures for Cooperatives and Municipalities

Cooperatives and municipalities also should implement specific management measures to ensure that light industrial parks and wholesale and retail markets are environmentally sound and promote sustainable urban development. Recommended management measures for cooperatives and municipalities are described below.

Designate an Environmental Officer

Implementing cooperatives and municipalities should designate an in-house environmental officer who will be responsible for:

- Incorporating necessary mitigation measures into engineering designs and preparing environmental monitoring and management plans.
- Monitoring construction and operation activities to ensure environmental specifications are being met.
- Liaising with the ANERA environmental officer and reporting on environmental performance on a semi-annual basis.
- Raising environmental awareness among cooperative employees and farmers (for cooperatives) or municipal employees, industrialists, and merchants (for municipalities).

The environmental officer could be an engineer already employed by the cooperative or municipality, and should participate in environmental training sessions organized by ANERA, other PVOs, or donor agencies such as USAID.

Prepare and submit to ANERA revised engineering designs and environmental monitoring and management plans

As discussed in Section IV on environmental impacts and in Section V, A. on ANERA management measures, certain preliminary engineering designs lack basic environmental safeguards such as adequate provisions for solid waste and wastewater collection and disposal. As appropriate, each cooperative or municipality should revise basic engineering designs to incorporate key mitigation measures identified in Section IV. In particular, revised engineering designs should clearly show the location, type, size, and number of solid waste containers (for municipal development projects).

In addition to basic engineering designs, cooperatives and municipalities also should prepare a monitoring and management plan for each proposed activity. Cooperatives and municipalities should seek technical assistance from ANERA for preparing such plans. For example, municipalities should prepare a detailed solid waste management plan indicating the frequency of collection of solid waste and the disposal method. The municipality should demonstrate that the proposed solid waste management plan would ensure clean and litter-free facility grounds, given the distribution of containers proposed in the engineering designs.

Municipalities should also prepare and enforce rules and regulations for wholesale or retail market vendors, such as:

- Opening and closing hours
- Products to be sold
- Solid waste collection and disposal (what is vendor's responsibility?)
- Security
- Site manager, assistants, and project office on site
- First-aid
- Rules for parking and enforcement procedures

Municipalities also should provide for a quality cafeteria.

Cooperatives should prepare a monitoring program for pesticides use and should report on pesticide use to ANERA.

Develop cost recovery mechanisms to ensure long-term sustainability of the project

Cooperatives and municipalities should develop cost recovery mechanisms to ensure long-term sustainability of their projects. This requires setting charge levels at appropriate levels (water rates, lease amounts) to recover at least the costs of routine and long-term maintenance.

Conduct environmental awareness campaigns

Cooperatives and municipalities should conduct environmental awareness campaigns targeted at farmers and industrialists/merchants, respectively. Farmers, industrialists, and merchants should be encouraged to participate actively in environmental protection by assuming responsibility for proper solid waste storage, separate disposal of dangerous waste, environmentally sound use of pesticides, etc.

B3. Management Measures for USAID

Approve the Cooperative and Municipal Development Project with Specific Reservations

With proper mitigation, monitoring, and management measures, the cooperative and municipal development activities proposed by ANERA should have limited adverse environmental impacts. Table V-2 summarizes major environmental concerns that are sufficiently important to **warrant close oversight** by USAID to ensure that the right mitigation, monitoring, and management measures are put in place when implementing these activities. Other environmental concerns identified in this report are also important and ANERA, cooperatives, and municipalities should take all necessary measures to reduce, control or eliminate them, as discussed in this report.

Require ANERA to report on environmental performance as part of Semi-annual Reports

USAID should require ANERA to report on (1) actual and potential environmental impacts of activities funded under the Cooperative and Municipal Development project, and (2) mitigation, monitoring, and management measures taken to reduce, control, or eliminate these impacts. This reporting should be part of the SAR's submitted by ANERA to USAID. Reporting on environmental performance should not be limited to major environmental concerns (as defined above), but should cover all possible environmental concerns, both those included in this assessment and other environmental issues that may develop in the future.

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Table V-2
Major Environmental Concerns and Remediation Measures *

Activities	Major Environmental Concern	Remediation Measure
Agricultural Extension Services		
All projects	No major environmental concern	N/A
Irrigation Infrastructure Projects		
Abassan Irrigation Well	New well may exacerbate the environmental degradation of an already precarious aquifer in the Gaza Strip	Do not fund new wells in Gaza unless (1) project sponsors can satisfactorily demonstrate that the new well would not have negative environmental impacts; (2) all permitting is secured for the project; and (3) pump tests indicate that there would be no transboundary effects or adverse effects on pre-existing wells within Gaza
Al-Far'a Irrigation Pipelines	Major concern over long-term sustainability of the project	Establish contract for routine maintenance of headworks. Charge all beneficiaries of the Far'a irrigation project for water use. Set water rates at levels sufficient to cover maintenance costs
All other projects	No major environmental concern	N/A
Light Industrial Parks and Wholesale and Retail Markets		
All projects in general	Major concern over certain environmental impacts, in particular proper solid waste and wastewater collection and disposal	Revise engineering designs to incorporate necessary mitigation measures. Prepare project-specific environmental monitoring and management plans

* See Section IV for other important environmental concerns & mitigation measures

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SECTION VI
CONCLUSIONS AND RECOMMENDATIONS

This section presents a summary of findings and recommendations of this PEA of the ANERA Cooperative and Municipal Development project.

A. Summary of Findings

This assessment indicates that all but one of the proposed ANERA Cooperative and Municipal Development project activities will pose no major adverse environmental impacts, provided appropriate mitigation, monitoring, and management are implemented. The Abassan irrigation well project in the Gaza Strip is expected to have significant adverse environmental impacts that may not be readily mitigated under the current circumstances. This well project and any other new well project in the Gaza Strip should not be funded by ANERA or USAID.

Specifically, the environmental assessment has identified three groups of activities proposed by ANERA under the Cooperative and Municipal Development project:

- Activities with no adverse environmental impacts include all agricultural extension services.

- Activities with potential adverse environmental impacts include:

  - All but one (the Abassan well project in the Gaza Strip) of the proposed irrigation infrastructure projects (potential impacts from pesticides use and poor maintenance of facilities)

  - All light industrial park and wholesale and retail market activities (potential impacts of inadequate solid and liquid sanitation)

- One proposed activity (the Abassan irrigation well) is expected to have major adverse environmental impacts (lowering of the water table, increased salinity of an already contaminated aquifer).

If appropriate mitigation, monitoring, and management measures are implemented, as discussed in Sections IV and V of this report, then potentially adverse activities above should have no significant adverse environmental impacts.

B. Recommendations

Table VI-1 summarizes the overall recommendations of this environmental assessment. Because agricultural extension services have positive and no adverse environmental impacts, no specific mitigation measures are warranted. Given the precarious situation of groundwater in the Gaza Strip, ANERA and USAID should not fund new wells

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in the Gaza Strip. All other proposed activities should be accompanied with appropriate mitigation, monitoring, and management measures, as outlined in this report.

In addition, USAID should require ANERA to report regularly on (1) actual and potential environmental impacts of activities funded under the Cooperative and Municipal Development project, and (2) mitigation, monitoring, and management measures taken to reduce, control, or eliminate these impacts. This reporting should be part of the SARs submitted by ANERA to USAID.

B1. Recommended Management Measures for ANERA

ANERA should take all necessary measures to ensure that each cooperative or municipality implements:

- All necessary mitigation measures in project design, construction, and operation and maintenance.
- An appropriate monitoring plan to ensure environmental impacts are kept to a minimum and respond to situations where unacceptably high levels of impacts are detected.

Specifically, ANERA should implement the following management measures:

Designate an in-house environmental officer who will be responsible for approving engineering designs revised to incorporate necessary mitigation and monitoring measures and preparing environmental reports for SARs to USAID.

Require cooperatives and municipalities to (1) review and revise all engineering designs to incorporate proposed mitigation measures, and (2) prepare monitoring and management plans.

Organize and conduct lessons-learned workshops, including one workshop for irrigation infrastructure projects and one workshop for light industrial parks and wholesale and retail markets.

Provide technical assistance to cooperatives and municipalities in environmental planning and management, including identifying environmental impacts and mitigation measures, and developing environmental monitoring and management plans, including cost recovery mechanisms.

USAID plans to provide training workshops on USAID environmental procedures. The structure, content, and target audiences for these workshops should be carefully considered and highly focused, and the workshops should be conducted at the earliest possible time consistent with the planning and arrangements necessary to accomplish this. In addition, USAID should consider allowing PRIDE to proceed to the next logical step, which is to further develop field-level guidelines on assessing levels of environmental impacts related to commonly funded activities, especially those being undertaken by NGOs and others requesting funding from USAID. These field-level guidelines would also help identify those

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activities in which additional technical and special expertise and assistance would be needed to make an accurate environmental assessment.

B2. Recommended Management Measures for Cooperatives and Municipalities

Recommended management measures for cooperatives and municipalities are as follows:

Designate an environmental officer to incorporate necessary mitigation measures into engineering designs and prepare environmental monitoring and management plans.

Prepare and submit to ANERA revised engineering designs as well as environmental monitoring and management plans that address the environmental issues raised in this assessment.

Develop cost recovery mechanisms to ensure long-term sustainability of the project, including setting charge levels at appropriate levels (water rates, lease amounts) to recover at least the costs of routine and long-term maintenance.

Conduct environmental awareness campaigns targeted at farmers and industrialists/merchants.

Table VI-1
Summary of Findings

Activities or Activity Type	Environmental Impacts	Recommended USAID Action
Agricultural Extension Services	No known adverse environmental impacts	Fund
Proposed Irrigation Infrastructure Projects (except Abassan well)	Potential adverse environmental impacts can be mitigated	Fund but require implementation of recommended mitigation, monitoring, and management measures
New wells in Gaza Strip (including Abassan well)	Significant adverse environmental impacts	Do not fund at this time
Light Industrial Parks	Potential adverse environmental impacts can be mitigated	Fund but require implementation of recommended mitigation, monitoring, and management measures
Wholesale and Retail Markets	Potential adverse environmental impacts can be mitigated	Fund but require implementation of recommended mitigation, monitoring, and management measures

C. General Recommendations for NGOs and USAID

C1. Recognition of Evolving Conditions in West Bank/Gaza

Authority, control and enforcement are essential to a sound environmental program. The physical environmental conditions have been exacerbated by prolonged neglect by authorities and the increasing deterioration of infrastructures. This is most pronounced in the Gaza Strip and is largely due to its dense population and depleted natural resources.

Furthermore, the PVO programs and activities were, in most cases, programs and activities that were considered as ongoing and/or continuing. These programs and activities were started with grant funds on an emergency basis with limited consideration for environmental impacts and mitigation, monitoring, and management measures.

Recognition of these circumstances by USAID, the PRIDE team, and the three PVOs led to a time consuming and demanding effort to gather environmental information/data on these programs and activities. In most cases the data was old information that had been revised or updated through "guesstimation." Data such as population and projections, land use, and economy varied depending on the source.

The PRIDE team was able to review the PVO's programs and activity descriptions of the present environmental settings; evaluate the environmental impacts; and make recommendations for mitigation, monitoring, and management. Due to the factors related to transition of authority, limited funding, control and enforcement capabilities, and the realization that there was no real Palestinian national, regional, and local environmental authority with enforcement powers, the PRIDE team had to be realistic and practical about our recommendations.

Separate activities were reviewed along with alternatives, so that different levels of environmental mitigation could be applied, monitored, and reported to USAID. This will allow USAID, in conjunction with the PVOs, to evaluate each environmental issue in context as it applies to a specific site and/or level of activity. Therefore, when conditions improve, USAID should make local determinations as to the degree the environmental guidelines can be implemented and enforced.

C2. Training

Through workshop evaluation sessions, the team was able to define an immediate technical need as well as a local demand for training in the conducting of Initial Environmental Evaluations (IEEs) as well as the use of environmental checklists in making basic environmental assessments. The conducting of scoping sessions also needs to be addressed to include the recommendation that the sessions should be held in the field near the impact area. A "public hearing" (similar to village level meetings) should be used. There is also a great need for environmental awareness programs and campaigns at all levels, including the holding of technical environmental training programs in conjunction with the local engineering associations.

The PRIDE team sees the need for environmental training to be made available to a broad cross-section of technical and professional personnel. The demand for environmental training is roughly estimated to be five to ten times more than the previous USAID estimate of 50 to 100 people. PVO personnel, partners, associates, consultants, private and public sector, etc. should get environmental training to meet their requirements. The level of training for field technicians up to and including the professional level should be offered.

C3. Finances

In the past, the Palestinians in the West Bank and Gaza Strip have benefited from their refugee status by USAID and other donors waiving some of the normal funding requirements and reverting to the emergency funding procedures. With the formation of a Palestinian National Authority, these waivers will not generally apply. Therefore, PVOs and NGOs should prepare to change the emergency funding status of their ongoing projects and new projects to USAID's normal funding requirement procedures. This includes assessments of environmental impacts and adherence to mitigation and environmental monitoring and reporting requirements.

At present this means that all program/project documentation files must be updated to fully reflect additional environmental costs and evaluations, including the pre-feasibility and feasibility level economic alternatives, along with the no-action alternatives. Documentation should indicate that the activities undertaken are both doable and sustainable and that the beneficiaries/users have the economic capability and possess the willingness-to-pay the costs (capital, O&M, etc.) to fully assure a successful project.

C4. Lessons Learned

The following are lessons learned that should be considered by future teams undertaking similar environmental assignments.

- The use of local consultants is a valuable asset to a team. They provide excellent local knowledge and contacts, source of information and material, and dual language expertise. They are one of the important elements in successful local workshops.

- When conducting an environmental assessment of this magnitude, especially under high security conditions and problems, there is a great need to be flexible in both scheduling and time commitments. However, this means additional time both in the field and in report writing.

- Greater effort should be given to pre-collection of project data activities and pre-departure review of same related to the environmental aspects. This would expedite the pinpointing of the more important areas of concern as well as the areas of data deficiencies.

- There is a profuse amount of written material, but when it is checked against the original source(s), the creditability of some specific data is questionable, i.e., population estimates and projections.

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- Time could be saved if available data could be secured in hard copy and on diskette. A scanner with optical character recognition (OCR) would be a great asset.

- Consultants should have a complete personal computer system, including printer. Virus detection and removal programs should be available for each unit.

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ANNEX A
MID-COURSE EVALUATION WORKSHOP

A half-day workshop was held at the ANERA offices on 31 August 1994 to discuss preliminary findings of the programmatic environmental assessment. Exhibits A-1 and A-2 provide the workshop agenda and objectives. Exhibit A-3 is a list of participants.

The workshop was interactive and participatory, and relied on brainstorming techniques to capture a variety of ideas from all participants. Following is a reproduction of flipcharts prepared by the facilitator (A., D., and E.) and produced by the participants during the workshop brainstorming sessions (all other flipcharts). The last flipchart is an evaluation of the workshop by all participants.

A. Brainstorming Techniques

Purpose

- Capture a variety of ideas in a short time

Criteria

- Define subject precisely
- Limit time
- Note ideas without criticizing them
- Ask questions only to clarify
- Conclude with synthesis

B. Brainstorming Example

"What are the characteristics of a good team?"

- Accept self evaluation
- Team members must be good listeners
- Sharing successes and failures/difficulties
- Same level of understanding among members
- Willingness to cooperate
- Members must be active participants
- Be able to achieve results on time
- Exchange opinions without interruption
- Self discipline
- Should have experience and qualification
- Should have a team leader (coordinator)
- Well informed about each other's activities

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- Seek feedback
- Evaluated by beneficiaries
- Transmitting and recording results
- Accepting consensus and being democratic

C. What Does "Environment" Mean to You?

- Basic human rights to get clean air, water, and food
- Maintain for future generations
- Maintain balance of nature
- Health security for people, animals, plants
- Development today without degrading the environment of tomorrow
- Keep resources safe for our use
- Aesthetics
- Public awareness
- A gift from God—we should keep it
- Balance of production and consumption
- Recycle/reduce waste
- Total surroundings: natural and manmade

D. Environmental Impacts

- Physical environment
- Socio-economic environment
- Institutional environment

E. Measures

- Mitigation measures
- Monitoring measures
- Management measures
- Always learn from past experiences:
  - Visit past project sites
  - Discuss environmental issues with:
    - -- beneficiaries
    - -- neighboring communities
    - -- authorities

F. Monitoring Measures

- Identify environmental indicators
- Evaluate indicators in baseline year
- Track indicators over time

G. Possible Environmental Indicators for Brucellosis Project

- Number of animals infected
- Number of humans affected
- Number and percentage rate of abortions
- Productivity of livestock: milk, babies, weight by age
- Farmers income from livestock
- Vaccination levels
- Public awareness among meat and dairy product consumers
- Public awareness among producers/farmers
- Number of veterinarians working on issue
- Number of animals killed (to prevent more infections)
- Degree of cooperation with neighboring countries
- Border control measures

Conclusions

- Need to focus on few select indicators

- Who will be responsible for tracking?
  - Project coordinator with monitoring specification
  - With health department and veterinarian services

H. Environmental Issues and Concerns for Retail Markets and Industrial Parks

- Solid waste management:
  - Collection points
  - Collection responsibility

- Are toilets sufficient?

- Wastewater disposal:
  - Is sewage line adequate?

- Criteria for relocating vendors: Who goes first?

- Source of revenue for municipality:
  - Will revenues be sufficient for proper maintenance?

- Design should ensure good air circulation (during hot summer days)

- Public acceptance:
  - by retailers to relocate
  - by consumers (easy access, parking, transportation)

- Is the design suitable/appealing, overall and at the shop level?

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- Loading and unloading of goods
- Environmental impact on neighborhood (noise, smell, insects, etc.)
- Need to learn from others' experience (e.g., Bethlehem, Halhoul, SCF)
- Easier to manage than street stalls
- Need to restrict products (no meat or fish...)

I. Possible Management Measures for Retail Markets and Industrial Parks

- Incorporate solutions to environmental issues in the design
- Open competition for architectural design (with environmental and budget specifications)
- Police to enforce relocation of vendors to new site, also specify criteria of relocation
- Conduct willingness to pay study
- Prepare contractual rules and regulations for vendors such as:
  - Opening and closing hours
  - Products to be sold
  - Solid waste collection and disposal (what is vendor's responsibility?)
  - Security
  - Site manager, assistants, and project office on site
  - First-aid
  - Rules for parking and enforcement procedures
  - Provide for good quality cafeteria
- Organize lessons-learned workshops with participants from:
  - Beit Jala industrial park
  - Halhoul wholesale market
  - Ramallah industrial park
  - Jabalia
  - SCF/Bethlehem wholesale and retail market

J. Workshop Evaluation

- All good but:
  - Is it applicable?
  - Where do we draw the line?
- Good idea to have an environmental officer at ANERA

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- Need to cooperate with environmental authority
- Need to incorporate environmental issues in projects
- Develop institutional capabilities for environmental management
- Positive meeting:
  - Staff learned a lot
  - Was not boring

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Exhibit A-1
Workshop agenda

8:00 am *Registration*
Coffee and Tea

8:30 am Introductions
Workshop Objectives and Program
Workshop Method, Techniques of Brainstorming

9:20 am The Cooperative and Municipal Development Program:
- Program Overview (10 min. presentation by ANERA)
- Group discussion

10:00 am Potential Impacts and Possible Measures for Agricultural Extension:
- The Brucellosis Extension Program (10 min. presentation by ANERA)
- Brainstorming and Group Discussion

10:45 am *Coffee Break*

11:05 am Potential Environmental Impacts of Markets and Industrial Parks:
- The Gaza Retail Market (10 min. presentation by ANERA)
- Brainstorming and Group Discussion

11:50 am Possible Management Measures for Markets and Industrial Parks:
- Brainstorming and Group Discussion

12:30 pm Workshop Evaluation
Summary and Wrap-Up

12:45 pm *Adjourn*

Note: Please no food or drinks outside the coffee break

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Exhibit A-2
Workshop Objectives

- Follow-on to workshop on USAID environmental procedures
- Learn to build environmental factors and values in ANERA's projects
- Update PRIDE team on the Cooperative and Municipal Development Project elements
- Exchange ideas on potential environmental impacts and possible mitigation measures
- Get feedback from ANERA on impacts and measures
- Identify new sources of information (contacts, references)
- Work together for a better environment in the West Bank and Gaza

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Exhibit A-3
List of Participants

From ANERA

- Wafa Dajani
- Kamal Khreish
- Ibrahim Matar
- Adnan Obeidate
- Ghada Rabah
- Issam Al-Shawwa

From USAID

- Majda Zaher (AID/Tel Aviv)

From PRIDE

- Lena Dajani
- Jack Farmer
- Joseph Karam (moderator)

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ANNEX B

ANERA AGRICULTURAL EXTENSION PROGRAM FOCUS LETTER

MIDDLE EAST HEAD OFFICE
8 Abu Obeidah El Jarrah Street
P. O. Box 19982 EAST JERUSALEM
Tel. 02-277076
Fax 972-2-894351

ANERA

AMERICAN NEAR EAST REFUGEE AID

GAZA OFFICE :
Shuhada' Street
P. O. Box 44, GAZA
Tel. 07-820328, 07-820329
Fax 07-821157 - Attn. ANERA

August 24, 1994

Mr. Jack Farmer
P **Bride Team leader**
American Colony Hotel
Room 25
Jerusalem

Dear Jack,

Follow-up to our discussion with your team wish to confirm that ANERA's Agricultural extension program under AID V has been refined to focus on the following activities.

1- Brucellosis extension services.
2- Mother grape rootstocks farm.
3- Reduction of usage of pesticides
4- Production of seedless grapes.
5- Education and agricultural extension publications.
6- Protected grazing area.

ANERA is planning to proceed in the implementation in the coming six months in activities and 1 and 2 mentioned above.

Enclosed please find a short description of the above proposed extension activities as well as detailed feasibility proposals for the Brucellosis, and mother grape rootstock activities.

With best wishes

Sincerely,

Lance Matteson
ANERA Representative
JERUSALEM

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