

The Status of the Environment in the West Bank

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Preface

The challenge of balancing societal development and environmental preservation can be achieved by proper policies and management. As stated in Agenda 21: “integration of environmental and developmental concerns and greater attention to them will lead to the fulfillment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future.”

Sustainable development requires improving and maintaining the well-being of the people and ecosystems. It requires the integration of economic, social and environmental objectives in planning and decision making processes. The status of the environment and the sustainability of development within that environment is a function of the management of human activities, the resources available and the distribution of these resources.

Throughout recent history, the Palestinian population has experienced displacement and restrictions on movement which greatly hinder development. In 1948, 87.5% (approximately 714,000 people) of the Palestinian population were displaced. Many of these people are still living as refugees all over the world. Again, when Israel occupied the West Bank in 1967, about 300,000 Palestinians lost their lands, further densely concentrating the Palestinians in the West Bank. The impact of the prolonged Israeli occupation has left the Palestinian Territory in a situation where sustainable development is currently out of reach. During the years of occupation, Palestinians had little control over their own affairs. Management of the environment and issues such as, wastewater, domestic solid waste, industrial waste, hazardous waste, noise and air pollution in the Palestinian Territory were of little concern to the Israeli authorities. The Israeli policy of land control continues to place pressure on the Palestinian population by confiscating land to build settlements and by-pass roads that serve mainly the Israelis.

Thus, Palestine is a unique place where environmental conditions and political conflicts have been intertwined causing a complex web of interrelations. This book represents the final report of the West Bank Environmental Information System Project that the Applied Research Institute-Jerusalem(ARIJ) executed with a grant from the Austrian Department for Development Cooperation through the Society for Austro-Arab Relations (SAAR).

It is useful here to record the sequence of events that surrounded the implementation of this project, which officially started July 1, 1994. The idea of this project was originally initiated in 1992 during the second meeting of the Multilateral Working Group on Environment, which took place in the Hague. The Dutch delegation made a presentation on the value and scope of environmental profiles and the Palestinian delegation expressed interest in conducting an environmental profile for all the Occupied Palestinian Territory (OPT), out of its conviction that environmental information is an essential ingredient for

sound environmental planning. The Israeli delegation rejected the idea, but expressed no objection to conduct an environmental profile for the Gaza strip.

At that time, the Middle East Peace Process was moving very slowly especially at the bilateral track. Out of its aspirations for peace, and realizing the catastrophic environmental situation in Gaza, the Palestinian delegation accepted this compromise on the assumption that a West Bank environmental profile will be conducted as a second phase. The Dutch Department for Developmental Cooperation and the Palestinian technical team on environment worked out the details of an agreement to initiate the Gaza Environmental Profile, which was signed by the Palestinian Economic Council for Development and Reconstruction (PECDAR). A Dutch consultancy firm (IWACO) was contracted to implement this project in collaboration with Palestinian experts and in coordination with the Palestinian technical committee for the environment. Volume 1 of the Gaza environmental profile was completed in June 1994. This coincided with the signing of the first Oslo agreement in May 1994 and the movement of the Palestinian leadership to Gaza and Jericho. The Palestinian Ministry of Planning and International Cooperation (MOPIC) established a Directorate for Environmental Planning (EPD) which became responsible for completing the Gaza Environmental Profile and the second and third volumes were published in January 1995.

There was a need to conduct an environmental profile for the West Bank that would compliment the Gaza Environmental Profile and bring into the forefront the political realities which are impacting the potential for sustainable development in the West Bank. The Austrian government expressed its willingness to support a West Bank environmental profile. The steering committee of the Technical Committees, which were established by the Palestinian leadership to support the negotiating teams and prepare the grounds for the Palestinian National Authority to assume its responsibilities, approved this project and delegated ARIJ to execute it. During the course of the project, several major political landmarks took place: the Oslo I & II agreements, the movement of the PLO to Gaza and Jericho, establishment of the PNA, elections of the Palestinian Legislative Council and new elections in Israel.

The original proposal stipulated the publication of one environmental profile for the West Bank. However, due to the nature of the transitional period, as outlined in the Oslo agreements, it was deemed essential to publish a series of district profiles as the data get collected. As a result, eight environmental profiles for the West Bank districts have been prepared during the past two years. These were published both in book format and on disseminated through Internet to become accessible worldwide. ARIJ organized workshops at the profiles were concluded through which ministries, authorities, municipalities, village councils, universities, non-governmental organizations and other local organizations attended and participated in discussing the findings. This proved to be very beneficial and fruitful as it allowed the dissemination of information to the Palestinian community and its utilization for formulating projects and plans to rehabilitate the Palestinian environment. Putting the environmental information on Internet was very useful to donors, governments, academicians and others as evident by the number of hits to ARIJ web site.

This document provides the overall description of the state of environment in the West Bank. The information presented here has been organized according to the new guidelines provided by the United Nations Environmental Program (UNEP) for state of the environment reporting to make it positioned within a sustainable development context. It goes beyond the classic provision of environmental data and discussion of environmental issues towards deep analysis of the inter-linkages between environmental issues that lead to a more realistic and comprehensive assessment of the state of environment. This book is divided into five parts. Part one includes information about the history, society and economy of the Palestine. Part two is a description of the physical characteristics and natural resources of the West Bank. It includes information about topography, geology, soil classification and type, climate, water resources and biodiversity. Part three outlines the pressures on the environment from land use, agriculture, population, industry, energy and transportation. Part five describes the status of the major components of the environment after being exposed to pressures. Part five includes an overall assessment of the environment and the actions that should be considered to protect the environment

ARIJ is proud to present the results of its work, which shows the importance of team work and the interdisciplinary nature of environmental affairs. This is the first time that a Palestinian institution assumed the responsibility of building an environmental information system (EIS) and producing an environmental profile for the West Bank. During this project, Israel imposed severe travel restrictions on the movement of Palestinians which hampered the collection of data and caused a delay in the time schedule. Nevertheless, the project produced a base line information about the state of environment in the West Bank, which is essential for assessing past and future environmental changes.

It is sincerely hoped that all Palestinian institutions will utilize and build on this information in their plans and programs to foster sustainable development in Palestine. ARIJ welcomes any comments on this publication emphasizing its role as a research institution that strives to assist in promoting sustainable development in Palestine.

An Overview of the Palestinian Environment

Palestine has a proud history. As the cradle of civilization and as a focal point of the world's three monotheistic religions it has a global influence which greatly exceeds its small size. It is a tiny piece of land whose coexisting religious, ethnic and political diversity is echoed in the remarkable range of ecological variation.

Palestine's geographical position has been both its blessing and its curse. Located at the meeting point between Eurasia and Africa, plants and animals of the three continents have interacted and spread throughout history. Consequently, this contributed to the rich diversity of Palestinian flora and fauna which has long captured the interests of ecologists and scientists alike. Figure 1 shows the geographical location of Palestine.

This diversity is also nurtured by the abruptness with which climatic zones, desert, steppe, Mediterranean woodland, and even oasis-join one another in this compact geographical area. There are places where, because of topographical peculiarities, the buffer zone between desert and woodland is so narrow that it is virtually indistinguishable. From an elevated vantage point in Jerusalem, for example, one may observe woodland and Mediterranean vegetation to the west and stark desert to the east, with the typically transitional steppe land scarcely discernible on the mountain ridge dividing the two zones.

A Historical Perspective

If one of our forebears were to return, he or she may have difficulty recognizing this as the same land described by early visitors as a land "flowing with milk and honey". Barren hills have taken the place of what was once rolling woodland covered with thickets and forests. Deserts have replaced grassland. A polluted and salty water now runs where once was the Jordan River. And the Dead Sea has sunk so low that it is now two separate seas and still dropping. Gone from the land are animals which were once plentiful - the ostrich, cheetah, leopard, lion (the last ones killed 800 years ago during the Crusades), Syrian bear, crocodiles and several kinds of deer - casualties, each of them, to human encroachment.

The first people to arrive in ancient geographical Palestine were hunters/collectors. Their habits and numbers were such that they interfered little with their host ecosystem. But once they began settling and farming the fertile valleys and hillsides they encroached quite radically upon the ecological status quo. Cultivated crops replaced native vegetation as vines and orchards replaced native forest and shrubland, maintained with terracing and man-made irrigation channels and drainage ditches. All was fine as long as this network of human alteration of the native plant and landscape received the attentive human maintenance it required. Unfortunately, such continuity was prevented by the succession

of wars brought to the area by subsequent waves of conquerors who killed or drove out the farmers. So-called human improvements and cultivated vegetation were left abandoned and fell into ruin, leaving the soil, now deprived of even its native cover, subject to extensive erosion. This was especially true at the higher elevations where the scantiness of the soil, combined with the erratic rainfall of the region, made it difficult for the original vegetation to reassert itself. Successive cycles of cultivation and neglect characterize the history of Palestine's arable land down through the centuries, as one invader followed another, bringing wars, often in close succession, which violated the countryside and left the landscape drastically and permanently changed.

Despite the legacy of adversity, the stubborn fertility of the land of geographic Palestine made it one of the most productive Syrian provinces prior to the arrival of the Crusaders. Frequent Crusader references depict a land spread with olive groves, orchards, vineyards, and watered gardens, hills covered with brushwood, and fields planted in corn, barley, oats, corn, lentils, sesame, millet, beans, flax, and indigo. And long after the departure of the Crusaders and the arrival of the Turks, the abundance of the Palestinian landscape and agriculture drew the admiring notice of such visitors to early nineteenth century Palestine as the French traveler, Volney, and the Englishman, Sir Moses Montefiore (Kishtainy, 1971). So, while we must be sobered by the consistent threat which the presence and activities of humans have brought to the environment and to the delicate balance of natural ecosystems, we must also be alert to the hope and responsive to the opportunity afforded by the tenacious resilience and adaptability of the natural world.

In the world at large, the past two decades have been characterized by a dramatic increase in environmental awareness and by a significant advancement in knowledge about our environment. Within that same period of time, the Palestinian Territories have been under Israeli occupation. Not only Israel did not facilitate any improvement or build environmentally sound policy, but it also followed a path of systematic destruction of the Palestinian infrastructure.

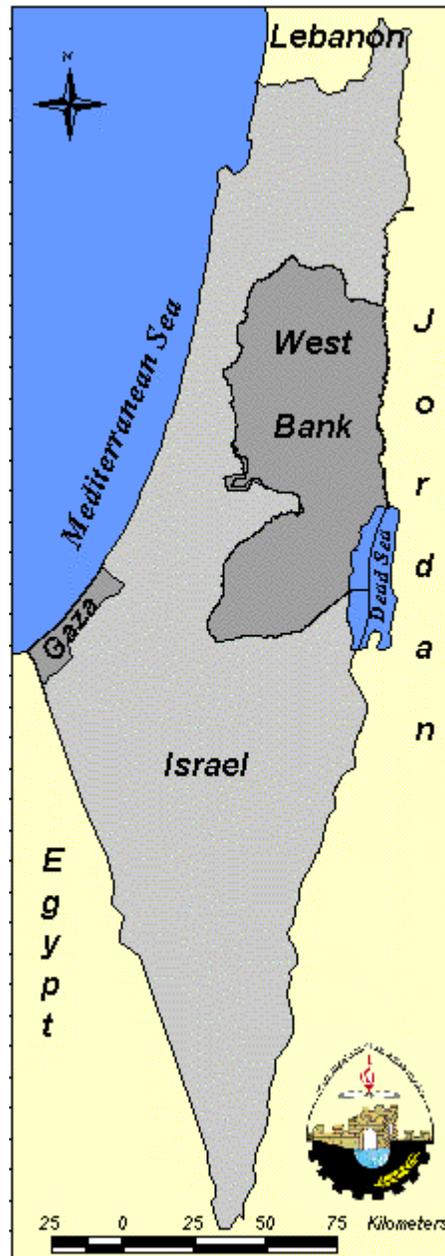


Figure 1: Regional location of Palestine.

The Land of the West Bank

At present, Palestine is divided into two geographic areas: the West Bank, including East Jerusalem, and the Gaza Strip. The total area of the West Bank covers 5,820 km² while the Gaza Strip covers 365 km².

For the purpose of this study, the West Bank is divided into eight districts ([Figure 2](#)): Hebron, Bethlehem, Jerusalem, Jericho, Ramallah, Nablus, Tulkarm, and Jenin. Although

these districts are divided on administrative rather than ecological lines, data collection and analysis were categorized according to these districts.

There are four climatic/geologic zones in the West Bank. These are defined as follows:

1. The Jordan Valley Region, extends along the western bank of the Jordan River. It is a low lying area (up to 375m below sea level), with a semi-tropical climate characterized by hot summers and warm winters. Rainfall is low in this eco-region, averaging 158 mm per year.
2. The Eastern Slopes Region, extends along the length of the eastern parts of the West Bank, covering an area of approximately 1,500 km². It ranges from 800 m above sea level to approximately 200 m below. As this region lies in the rain-shadow area of the Central Highlands, it is characterized by semi-arid climate with low rainfall ranging from 200 to 400 mm per year. The southern parts of the Eastern Slopes region are dry except for underground water to which Palestinians have restricted access. The northern parts, however, are rich in water resources, mainly springs.
3. The Central Highlands Region, includes a range of mountains and their western slopes area. This range extends over the length of the central parts of the West Bank, from Jenin in the north to Hebron in the south. The Central Highlands region constitutes a major part of the West Bank, covering an area of approximately 3,500 km² out of the West Bank total area of 5,820 km². This predominantly mountainous region ranges in elevation from 400 m to more than 1,000 m above sea level. Most major wadis in the West Bank run either eastward or westward from this range. This region is also the main catchment area of rain water which replenishes the West Bank underground water aquifers.
4. The Semi-Coastal region, is the smallest of the West Bank regions with an area of approximately 400 km². It comprises the northwestern parts of the West Bank, including parts of the Jenin and Tulkarm districts. In terms of climate, this region is considered an extension of the Mediterranean coastal region with elevation varying between 100 to 400 m above sea level. The Semi-Coastal Region is characterized by extensive plains which are highly cultivated with vegetables and field crops.

Following the landscape to the west of the West Bank is the fertile coastal plains running to the coast, on which lies major parts of the state of Israel and all of the Gaza Strip.

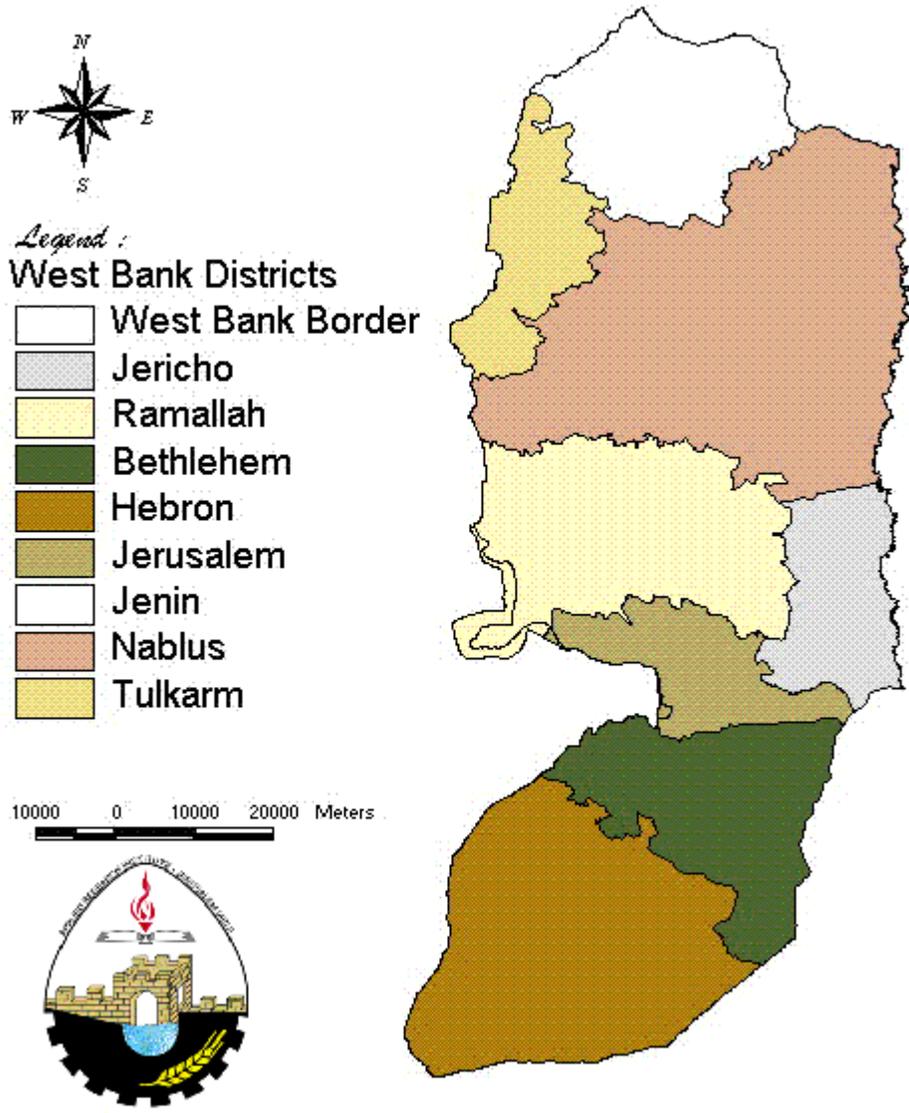


Figure 2: West Bank Districts.

Overall Assessment

Following this comprehensive profile of environmental conditions, it becomes important to offer an overall assessment of the West Bank environmental state. Such a task is rather difficult as it requires looking at the Palestinian environment from an objective but impartial eye. The real challenge here is how to dissociate the complex web that interweaves environmental, economic, social and political elements. A simple look at environmental indicators and trends may be misleading. Therefore, in the following pages, ARIJ will outline a full assessment of the environmental situation in the West Bank. However, lack of data in some sectors, such as in soil and air can make trend forecasting rather difficult. In such cases estimates are considered.

At present, the West Bank remains in a state of unprecedented political limbo. Throughout the Middle East most countries have moved from occupation to liberation directly, without passing through transitional stages. The national liberation movements within such countries immediately started the process of capacity building and reconstruction. In the case of Palestine however, the situation has been very different. Palestine is currently in the middle of a transitional period characterized by uncertainty. Moreover, Palestinian natural resources are being subjected to two conflicting and incompatible planning schemes which promise to lead to further environmental deterioration. Current environmental indicators and trends reveal that the situation is indeed deteriorating. Therefore, concerted effort needs to be undertaken to deal comprehensively with the environmental issues.

First impressions of the West Bank environment reveal striking evidence of environmental degradation. Pressure on the country's resources is intensifying and evidently are serious problems. Some of the worst cases can be found in pollution of water resources, air pollution, soil erosion, littering, land degradation and loss of natural habitat. The direct cause of these problems can be attributed to a variety of activities. These include random dumping of garbage, disposal of untreated wastewater, increased energy use and unsound management of water resources. Transboundary pollution, as well as deforestation and unsustainable agricultural practices also contribute. The roadsides, streets, neighborhoods and fields are littered with plastic bags, glass containers, paper tissues and materials which clearly reveals a lack of environmental awareness and concern. This assessment gives a brief description of the major environmental problems which have had negative effects on the natural resources; land, biodiversity, water and air.

Land

Palestine was described by early visitors as the land flowing with milk and honey. Nowadays, it is difficult to see evidence of such a description. The same land may now be characterized as one of desert and locust. Barren hills have taken the place of forests and deserts have replaced grassland. By looking at a satellite image, one can easily trace

the political boundaries of the West Bank and sea evidence of desertification and soil erosion. On the other hand one may also see green areas which characterize the land of Israel. The prolonged years of Israeli occupation has converted large areas in the West Bank to deserts. Indicators of desertification appear clearly in the Eastern Slopes where 85% of the area is closed and declared as an Israeli military zone. The subsequent depletion of plant cover in these areas encourages soil erosion and land degradation.

However, though desertification (especially in the Eastern Slopes) is progressing, one can also see spots of land reclamation. This is presently carried out by Palestinian farmers. Hundreds hectares of land are being reclaimed every year by Palestinians. Most of these newly reclaimed lands are planted with trees, particularly olives. The main driving force behind reclamation is to protect the land from Israeli expropriation. It is also an expression of attachment to the land. At the same time, asphalt jungles are coming up at an accelerated rate all over the West Bank.

An aerial photo for a specified area in the West Bank will also reveal several important things. For example, there are poor, narrow and badly maintained road networks connecting the Palestinian cities with villages. In the same photo, one can see good, wide and well paved by-pass roads connecting the Israeli colonies in the West Bank and with Israel. These by-pass roads encircle the Palestinian cities and villages in a manner that impedes their expansion. In addition, there are two types of rural human settlements which are clearly identified in the West Bank. The first comprises the Palestinian villages which are often built on non-fertile soil and promote organic extension of the landscape. The houses are built with flat roofs which are traditionally used for water harvesting. Most houses are surrounded by backyard farms which meet the family need for agricultural product. The second type is inorganic Israeli colonies, built on agricultural lands on hill tops. Features of Israeli housing inside these colonies include brick roofed villas, swimming pools and grassy areas.

Moreover, making a tour trip in the West Bank, one can clearly see that solid waste is dumped everywhere, sewage streams are flowing in many areas and air pollution from burning solid waste in free air, quarries and vehicles is evident.

Due to the absence of efficient collection systems, solid waste is dumped in all areas of the West Bank. The number and area of the dumping sites are not determined. This is because almost all municipalities and village councils specify one piece of land or more for this purpose. None of the dumping sites are fenced, lined or monitored. The scattered sites pollute the land, groundwater and distort the Palestinian landscape. Furthermore, industrial facilities generally dump their waste along with the domestic waste. Many of them, especially quarries and stone cutting facilities, dispose of their waste in nearby plots. These are often in valuable agricultural lands. Such practices have detrimental effects, not only on agricultural land but also on biodiversity and landscape.

It is estimated that in 1996, approximately 685,000 tons (2.055 MCM) of domestic waste was generated by Palestinians and Israeli settlers in the West Bank. This volume is estimated to cover between 100-200 hectares of land assuming a solid waste height

between one to two meters. Furthermore, large amounts of industrial and medical wastes are also generated every year. All this waste is currently mixed together, and ends up in dumps. Therefore, the area used for solid waste dumping is much greater. These areas are expected to increase dramatically with anticipated population growth and subsequent development of the industrial sector. Accordingly, control measures and comprehensive waste management plans need to be considered.

The division of West Bank land into areas A, B and C with different control authorities, have intensified pressures on the West Bank. Presently, two competing and parallel planning schemes are under implementation. One is Israeli and the other Palestinian. The Israeli planning scheme is working towards intensifying the presence of Israeli settlers. This includes creating reality on the ground and limiting further expansion of the Palestinian built up areas (Palestinian Areas A and B). At the same time, the Palestinian planning scheme is trying to rehabilitate the West Bank infrastructure to provide housing for Palestinians and initiate developmental projects.

Over the past three years, Palestinians have been working strenuously to rehabilitate their environment. The Palestinian National Authority has launched a massive campaign to rehabilitate the deficient infrastructure. Those working toward this purpose include; the Ministry of Planning and International Cooperation, PECDAR (Palestinian Economic Council for Development and Reconstruction), the Ministry of Agriculture, the Ministry of Local Government and the Palestinian Water Authority. New roads, asphalt, water and wastewater networks, and electricity networks projects are being initiated. The West Bank is witnessing an unprecedented reconstruction program. The present PNA reconstructions since taking over responsibility in the West Bank is several times more than what Israel had done through the past 28 years of occupation and has helped to compensate for the lack of developments in the area.

Furthermore, the Ministry of Planning and International Cooperation, in cooperation with the Norwegian government has taken the initiative to prepare an emergency nature protection plan. This has begun within the framework of the of the Palestinian National Authority. The protection plan aims to preserve the natural resources and the natural and cultural environment. The project recently produced two documents; a map showing sensitive areas in the West Bank which need protection and a land use map for the West Bank. The project includes assessment for the agricultural land, water resources, biodiversity, cultural heritage and landscape of the West Bank.

At present, the current political atmosphere is not allowing the conditions which are required to rehabilitate the Palestinian environment. The Palestinian scheme for rehabilitation is believed to be fragmented, lacking comprehensivity and unsustainable as a result of the constraints imposed on Palestinian planners and decision makers. Many of the proposed projects encounter Israeli obstacles and restrictions. Such fragmentation makes it impossible to construct an effective and efficient national infrastructure. A natural outcome of this, is the impediment of a sound natural resource management scheme which is an essential prerequisite for promoting sustainable development.

Sustainable development in the West Bank could not be achieved if the land continues to be subjected to two different, incompatible planning schemes. It is expected that if the present situation proceeds, further environmental degradation will occur. The area of the West Bank is too small for such planning battles. The outcome of these schemes therefore, will result in the continuous deterioration of the West Bank's natural resources of land, water and biodiversity.

Biodiversity

A variety of factors account for the diversity of Palestinian wildlife. These include climatic variation, geological structure, location and the amount and distribution of rainfall. Environmental protection has been neglected for a long period of time and this has led to the deterioration of the West Bank's biological resources. Urbanization, deforestation, pollution, overgrazing and land confiscation to build Israeli colonies and military areas have greatly reduced plant biomass in the West Bank.

Many of the species that appeared in historical records are now extinct or threatened. It is estimated that over the past century, the number of documented extinct species is small compared to those predicted for the coming decades. The flora of Palestine includes 149 endemic species (6% of the total flora). Of these, 43% are found to be common, 27.5% are rare and 25.6% are very rare. Around 12 species of the endemic are extremely rare, such as *Polygonum palaestinus*, *Trichodesma boissieri*, and *Verbascum fruticosum*.

Current trends show that the natural plant cover is deteriorating and less favorable plant communities are replacing the original ones. For example, the domination of the thorny plant (*Sarcopoterium Spinosum*), is a result of intensive overgrazing in Wadi Sa'ir/Hebron. Desertification and soil erosion in the Eastern Slopes have also reached an advanced stage.

Fauna species in the West Bank are additionally subjected to extinction due to human activities. For instance, unregulated hunting has recently been practiced in the West Bank and is accordingly threatening various species. Deforestation, industrial and agricultural pollution have also helped to accelerate the process of wildlife degradation. Human actions have accentuated the rate of degradation to levels that nature cannot compensate. For example, between the years of 1801 and 1950, 73 species of mammals and 120 species of birds became extinct. This high rate of extinction threatens the dynamic balance, which the nature enjoys, with unpredictable consequences.

Ecological and economic realities clearly call for the conservation and management of biodiversity in the West Bank. Yet, environmental institutions in the West Bank are small and short of resources. Few of these organizations have the personnel or financial resources, needed even to support minimal programs. Their efforts are commonly fragmented and overlapping and the existing conservation planning they conduct is neither comprehensive nor strategic. *In situ* and *ex situ* conservation tools and technologies are not integrated in their work. The country lacks an adequate system of environmental laws. It also lacks instruments to ensure protection of the environment and

the sustainable use of its resources. Law which is presently implemented is ineffective, and the use of economic instruments to promote environmental protection is insufficient. Basic scientific knowledge is seemingly inadequate.

Moreover, almost all Palestinian pastures, nature reserves and forests are still under the Israeli authority. In the West Bank, there are 48 nature reserves, and only 13 of them are located under Palestinian control. The remaining reserves are in Area C under Israeli control. This makes it impossible for Palestinians to formulate or propose comprehensive plans and strategies for the protection of wildlife. Nevertheless, the Palestinian National Authority has recently launched a project to develop a biodiversity strategy plan in Palestine. It is worth mentioning that the criteria for defining nature reserves by Israel is questionable, as many Israeli colonies and military bases are built on nature reserves. It is estimated that approximately three kilometers square of the 33 km² designated as nature reserves have been used to build Israeli colonies and military bases.

Practical decisions for conserving and utilizing the natural resources in Palestine should be taken into consideration. The wildlife and the cultivated species of agriculture directly contribute to the major agricultural income for the West Bank economy. In this regard, participation of the community is essential.

Water

Water is a crucial and highly politically sensitive issue among Palestinians. At present, the West Bank is characterized as a water stressed area. Water availability is restricted by Israel's control over Palestinian water resources. A serious discrepancy, therefore, exists in the amounts of water supplied to Palestinians and Israelis as a result of the restrictions. On average, the yearly per capita consumption for Palestinians is estimated at 35 m³. This can be compared with the 140 m³/capita/year for Israelis. This discrepancy is not only limited to water quantities, but is also extended to water pricing.

Currently, around 80% of the population in the West Bank has access to piped water through distribution networks. However, this percentage does not reflect the real situation. The clean water supply through networks is intermittent and populations, especially in the summer, remain without water for extended periods of time. Thus, many Palestinians depend on cisterns as an alternative which supplies homes with fresh water two to three months per year. When cisterns are emptied, people have to buy more water at much higher prices. It is estimated that currently there are approximately 80,000 houses in the West Bank that utilize rooftops to harvest rainfall. Each cistern can supply an average 80 m³/year, implying a yearly total harvest of 6.4 MCM. On the other hand, Israeli settlers receive a continuous water supply, largely from wells in the West Bank. There is an urgent need for additional water to meet the suppressed demand of the Palestinians

The infrastructure in the Palestinian built-up areas in the West Bank is weak resulting in water resources becoming vulnerable to pollution through various sources. Deterioration of water quality in the West Bank originates from four main sources; domestic

wastewater, solid waste leachate, industrial effluents, and run-off from agricultural activities.

Wastewater generated from Palestinian cities, villages and Israeli colonies is the primary source of pollution. Such wastewater is discharged untreated into open areas or through cesspits. It is estimated that during 1996, approximately 90 MCM of domestic wastewater was discharged by Palestinians and Israeli settlers. Wastewater treatment is either inadequate or non-existent in the West Bank. The existing treatment plants are not functioning appropriately and are considered health hazards.

Industrial effluents including hazardous materials generated from the Palestinian industrial facilities and the industrial parks inside Israeli colonies, are similarly being disposed of untreated. Some of these industries such as tanning, electroplating, batteries, and metal finishing industries hold high concentrations of heavy metals and non-degradable toxic and hazardous waste. Unfortunately, no clear picture on the level of heavy metals in groundwater is available.

Groundwater quality is also highly affected by the solid waste leachate. The increasing waste generated by the growing population of the West Bank is dumped without planning. None of the existing dumping sites are lined to prevent leakage of leachate into the ground. Therefore, hazardous materials in the garbage continue to contaminate the groundwater and pose high health risk to the public.

The water table in the West Bank is deep in some areas (highlands areas) and in contrast very shallow in others (Jordan Valley area). It reaches approximately one meter in some areas. Shallow groundwater is vulnerable to pollution from various sources. This presents the need for a comprehensive study to locate the sensitive areas in the West Bank by Palestinians. To be effective, it needs to include geological structure, soil, rainfall, topography along with the groundwater table, water shed and flow. This map will help to identify location for landfills, wastewater treatment plants and industrial areas that will have less of an effect on groundwater in the West Bank.

Water resources are also contaminated by run-off agrochemicals from agricultural activities. Fertilizers and pesticides accumulated in the soil, filter downwards and may reach the groundwater table. It is estimated that 30,000 tons of fertilizers and 302 tons of pesticides were used in the West Bank in the 1994, which may have hazardous results. Surface drainage from treated croplands contains pesticides especially when surface irrigation is the main method of irrigation. A considerable amount of fertilizers and pesticides are also used by settlers in the West Bank, as they depend totally on irrigated agriculture. Unfortunately, data on quantities used is not available.

Quality measurements of groundwater in the West Bank, conducted by ARIJ in 1995, have shown that the nitrate level in some areas exceeds the permissible level (45 mg/l). This is particularly true in areas such as Nablus city and the Jericho area. Nitrates in groundwater is an indicator of pollution from fertilizers or/and wastewater. Other measurements of heavy metals and pesticides in groundwater are unfortunately not

available. Future estimates predict that groundwater quality will deteriorate with the expected population growth, if adequate measures are not taken to prevent pollution.

Moreover, the quality of water of the Lower Jordan River suffers from a constant rate of deterioration. By the time it reaches the Dead Sea, the water is highly saline and loaded with heavy metals and other pollutants. This is a result of sewage disposal from the colonies in the Jordan Valley area, agricultural return flows from irrigated areas, and the diversion of the brackish water originates in saline springs and wells in Israel to the Lower Jordan River in a way to control the salinity in the Lake Tiberias.

Palestinian officials at different national ministries have become aware of these water problems. They are currently working towards preventing pollution that affects groundwater. PECyDAR, the Ministry of Local Government, and PWA (Palestinian Water Authority) are working to rehabilitate the damaged infrastructure in the West Bank and Gaza Strip. The proposed projects include establishment and extension of sewage networks in many Palestinian cities and villages as well as establishment of wastewater treatment plants. In addition, the Environmental Planning Department (EPD) of the Ministry of Planning and International Cooperation in cooperation with GTZ are currently implementing a solid waste management project for the West Bank.

Air

Although air pollution is not recognized as a problem in the West Bank, it is believed that air quality is subjected to continuous deterioration. Lack of measurements and air monitoring stations however, continue to make the problem unclear to Palestinian planners, decision makers and the public. The possible air pollution factors affecting the West Bank include; industrial activities, transportation, energy consumption, open burning of solid waste and transboundary air pollutants.

There are significant air pollution problems associated with vehicles. It is estimated that during 1996 at least 78,000 tons of CO, 4,830 tons of SO_x, 7550 tons of NO_x, 7,800 tons of hydrocarbons (HC) volatile organic compounds, and 300 tons of lead were emitted by the Palestinian and settlers vehicles into the West Bank atmosphere during 1996. The level of lead is quite high and concentrated along major urban areas. Vehicles in the West Bank are increasing every year. A considerable number of which use diesel.

Transboundary pollutants which reach the West Bank from Israel are the other major source of air pollution. These air pollutants are carried from Israel to the West Bank by dominant western winds. Up to present Palestinians do not have monitoring stations to evaluate the danger of transboundary pollutants on the West Bank. However, Israeli studies have proven that ozone, formed from the photochemical reaction of NO_x, is increasing in the Jerusalem, Bethlehem and Hebron districts.

Industries in the West Bank also add to the air pollution problem. This is especially through the absence of laws and regulations which control emissions. Furthermore, the impact of industrial air emissions is increased due to industrial facilities being located in

close proximity to populated areas. Quarries and stone cutting factories emit huge amounts of dust into the air. Charcoal processing, is another major contributor to air pollution. It releases considerable amounts of particulate, carbon monoxide and dioxide, nitrogen oxides and volatile organic compounds (VOC) into the atmosphere. Moreover, large amounts of smoke and hazardous gases are produced and emitted into the air from several workshops and bakeries. These reuse used motor oil and old tires as fuel in their work.

There is a clear need for increased knowledge and data on air quality so that air pollution levels and trends may be identified. Thus, impact of air pollution on human health may be assessed. Current trends show that the problem of air pollution will increase. This is due to control regulations and laws to reduce emissions from vehicles, industries and burning solid waste in open areas are not formulated yet.

Reducing emissions in the transport sector requires attention to vehicles, fuels and alternative modes of transportation. The most vital measures to be taken include; investment in unleaded gasoline, taxes on leaded gasoline and tightened standards for vehicles. Unleaded gasoline has been introduced in the West Bank but is used only by newer vehicles. In addition, measures to reduce industrial emissions are also needed.

Sustainable Development and the Environment

The impact of the prolonged Israeli occupation has left the Palestinian Terin a situation where sustainable development is currently out of reach. The Arab- Israeli wars have left the majority of the Palestinian population displaced. International attention has focused far more on the political and territorial dimensions of the conflict than on the importance of developing a sustainable Palestinian society. Issues of pollution from human activity must be controlled and are of great significance, but the question of access to land and water and ability to build a sustainable society must be placed at the forefront. If peace is to last, environmental issues must be solved justly.

As a result of the Oslo Interim Agreements, for the first time in history, Palestinians have been given limited control over parts of the West Bank and Gaza Strip. They now have an opportunity to plan and manage some aspects of their life. Although this is helpful, the control only extends to 26% of the land since 74% of the land is still under the control of Israel. Therefore, the growing Palestinian population is being squeezed into smaller and smaller areas of land with nearly stagnant water resources. A new infrastructure within the Palestinian society must deliberately be developed to allow for the planning and sustainability of future systems. Key to planning for sustainability is an understanding of the amount of land area and resources available to the community.

It is imperative at this tenuous time in the peace process that Israelis, Palestinians and others review the realities of the development plans being laid down for the West Bank and Gaza Strip. To ensure a comprehensive and lasting peace, issues of environmental, economic and social sustainability must be adequately addressed.

The current peace process is moving the Palestinian community into a situation where development will not only be unsustainable, but impossible. The state of Israel continues to confiscate vast tracks of Palestinian land and the recently elected Likud government has assured the world that these practices will continue. It becomes apparent, that if the peace process continues as it is, Palestinians will be left with increasingly limited natural resources on which to build their state. This small area of land is inadequate to build an environmentally, economically or socially sustainable Palestinian community in the coming decades.

The land and natural resources available for building a sustainable society in the West Bank are limited. The present peace process, intended to provide a just solution in which both peoples can live, is moving toward legitimizing Israel's control over much of the natural resources of the West Bank, including Jerusalem. Although the final status negotiations officially began in May 1996, they were immediately stalled. To date, the Palestinian leadership has been unable to alter this course. Ghettos, city-islands which can be closed at any time by Israel have been established in the West Bank. Along with this, most Palestinians have no access to Jerusalem. The outcome of these unbalanced negotiations, thus far, has been an unequal peace.

The current political decisions being made by the Israeli government in regard to the West Bank are perpetuating a process of "de-development" of the Palestinian people. In all ways, economically, environmentally, and socially, daily life is more difficult now than before the Oslo Accords were signed. Future projections show that continuation of these policies can only lead to unsustainable life for Palestinians on what is left of the West Bank. Indeed, inequitable and unsustainable distribution of resources can only lead to future instability.

The outcome of the Palestinian-Israeli negotiations must be to give the Palestinian community a more hopeful future in which a functioning Palestinian society can grow. It requires that the Palestinians be given control of all of the West Bank and the Gaza Strip with a safe passage between them to ensure land integrity. This is, in effect, UN Resolutions 242 and 338 and these resolutions should be fully implemented.

Recommendations

The West Bank is at present passing through a critical stage during which wide developments in all sectors are expected. It is necessary at this stage to prepare a framework for assessing and directing development in a sustainable manner. The protection of the environment is an essential part in the development process. Achieving sustainable and equitable development in the West Bank requires effective integration of environmental and development programs, as rehabilitation of a damaged environment is more costly than protecting the environment. Recommendations for land, water, biodiversity and air problems are introduced at related chapters. The following recommendations suggest a general strategy to meet the challenge of protecting and rehabilitating the West Bank environment.

Institutions

Issues related to the environment in the West Bank and Gaza Strip are distributed throughout different ministries and agencies. For example, environmental planning is the responsibility of the EPD at the Ministry of Planning and International Cooperation. Other ministries have assigned departments to deal with environmental issues: the Ministry of Public Works; the Ministry of Agriculture; the Ministry of Labor; the Ministry of Economy and Industry; and the Ministry of Local Governments which has formed a special committee for environmental affairs. Coordination between these various environmental offices is inadequate. Distribution of environmental responsibilities throughout the Palestinian National Authority will only lead to confusion and duplication of efforts. The fragility of the Palestinian environment, along with the high rate of environmental degradation taking place at this time, cannot withstand further onslaught.

Strong institutional capacity is a critical pre-requisite at this time to improve the environmental situation. To achieve this, a centralized environmental authority is needed. Accordingly, the newly established Palestinian Environmental National Authority (PENA) must be responsible for the environmental management in Palestine. The following issues are among its tasks:

1. Preparation of a national environmental policy and plan
2. Setting environmental protection standards for air, water and land
3. Cooperating with other ministries and NGOs in the field of environmental protection
4. Conducting international environmental linkages
5. Setting environmental legislation and overseeing the enforcement of the legislation
6. Establishing adequate monitoring networks (laboratories and monitoring stations) to collect information and to present these information to the public

7. Conducting environmental impact assessment (EIA) studies for proposed projects before licensing
8. Promoting environmental education and public awareness.

It is also recommended at this period of time that governmental authorities, private sector, and non-governmental organizations working in the field of environment work together to create a national commission. This would function in a consultancy whose mandate would be to ensure sustainable development in Palestine. It would oversee new projects and national environmental plans.

Environmental Standards and Monitoring

The restrictions on availability of data throughout the occupation left planners and policy makers unable to construct a clear picture of the situation. Development of environmental standards and monitoring systems is one of the major issues that has priority. A Palestinian environmental standard based on international standards and appropriate to Palestinian conditions must be specified. For monitoring, an adequate number of well equipped laboratories and monitoring stations involved in measuring water, air and soil quality are essential to build an accurate picture of the environment in the West Bank. Satellite images and aerial photos are useful monitoring tools that can detect changes in land use and help in planning processes.

Information and Assessments

Information and assessments are crucial for expanding knowledge about environmental conditions and about the effects of various types of development within the fragile environment of the West Bank. An environmental information center responsible for data collection, acquisition, analysis and interpretation and presentation of information in forms appropriate for different audiences is needed. NGOs and the private sector have experience in environmental issues and could assist in data collection, processing and environmental assessment. It is recommended to use the capabilities of the geographic information systems (GIS) in data processing. The GIS is a powerful tool that can manage and display information in a very powerful manner. It can be used by planners at several levels: as a tool for assessing the impact of existing and proposed development activities; to locate airports, hospitals, industrial areas and dumping sites; for the operational management of many important environmental services such as water distribution and sewage collection networks.

Environmental Impact Assessment (EIA)

The EIA is a method to analyze the potential environmental impact of a proposed project and its alternatives prior to implementation. Many projects and actions are expected to be initiated in the West Bank in the coming few months. Establishment of standard EIA procedures is very necessary to ensure that the proposed project or action is environmentally sound.

Environmental Legislation

No effective legislation or regulatory programs for environmental protection exist in the West Bank. Working laws and regulations have been inherited from the Ottoman, British, and Jordanians and some amendments to Jordanian laws have also been made by the Israeli civil administration. There is a clear need for establishing environmental laws and regulations to improve management of the environment in the West Bank.

Capacity Building

Available Palestinian personnel with specialized expertise in environmental management are limited in number in the West Bank. However, many Palestinians are educated and have a high level of academic studies, but most of them lack the practical experience of environmental management. One reason for the failure of environmental projects such as wastewater treatment and recycling programs is the lack of experience among technicians and professionals. To acquire the skills needed for effective environmental management, several capacity building tools should be developed and used. Training programs and workshops are crucial at this period. Training for local government professional and managerial staff should cover a broad range of topics. Training can be undertaken at all levels within the organizations responsible for infrastructure provision, water quality management, solid waste management, and land management.

Public Education and Awareness

It is evident that the level of awareness in the West Bank of environmental issues is quite low. Governmental officials, industrial facility owners and workers, and the public at large lack environmental awareness. The problem of littering, water and land pollution, loss of biodiversity, and many health problems in the West Bank could be solved by raising the environmental awareness among people. The goal of raising awareness is to motivate affected groups to participate in environmental management and to apply pressure on government officials as well as polluters to improve environmental conditions. People need to be educated about local environmental quality, the effect of existing environmental management practices, and available alternatives. This can be achieved through public, non-governmental and private agencies and by disseminating information about environmental risks and how to mitigate them. The mechanisms for raising awareness can be through school curriculum; training programs for target groups such as school teachers, industrial facility owners, journalists and environmental specialists; public campaigns; and the media.

Localizing Agenda 21

The June 1992 United Nations Conference on Environment and Development in Rio de Janeiro adopted the strategy for environmentally responsible development in the next century. Governments adopted strategies and policies to translate Agenda 21 at the national and local levels. In Palestine, there is a need to localize Agenda 21 at the district

and municipal levels. This task has to be one of the priorities of the Palestinian Environmental National Authority.

Participation of NGOs

Throughout the years of occupation, services to the Palestinian community have been largely provided by non-governmental organizations, either international or Palestinian. With the absence of a national government, these organizations have worked to provide the deficient services. These NGOs have built up extensive experience in many fields. After the establishment of the Palestinian National Authority, the role of NGOs working in Palestine has been redefined. However, their role in complementing and reinforcing the work of the authority remains important for the Palestinian society.

There are a number of non-governmental organizations that are involved in environmental issues. Since they maintain good relationships with the local community and can be instrumental in implementing grass-roots projects, they should support the Palestinian National Authority with their expertise to develop future environmental policies

Encouraging Private Sector Involvement

Private sector involvement is essential in the advancement and improvement of environmental conditions in the West Bank. Environmental business will facilitate the transfer of capitals and environmentally sound technologies to the West Bank. The most financially viable environment-related investments are those that are good for both economic development and the environment such as energy conservation, recycling in domestic and industrial waste and waste minimization technologies.