National Biodiversity Strategy And Action Plan For Palestine

(A Regional Project)

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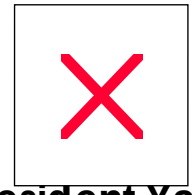


Foreword by President Yasser Arafat

The well being of the Palestinian people depends, in the short run, on the political peace process and the guarantee of ownership of our land.

In the long run, it is the health of this land and the related natural resources– as the environmental context within which a sustainable development must take place– that will underwrite the prosperity of the Palestinian people and their diverse local communities. Chief among the factors that determine the health of the environment is the diversity of what nature has bestowed on this land– the plants, the animals and the habitats they need to continue their life.

As an emerging country on the international scene, we are committed to the preservation and sustainable use of Palestine's rich heritage of land, water and marine natural resources.

The civilisations that have rooted themselves in this productive and blessed land are among the oldest on earth. The survival and flourishing of these civilisations have always depended on its geographic location at the meeting point of the three continents of the Old World– Africa, Asia and Europe. This unique position has given Palestine a particularly rich biological diversity. In addition, the many lifestyles that have developed in this corner of the world over the centuries have all contributed to the solid traditions of wise and sustainable use of the biodiversity in Palestine.

Today, these rich biological resources and the indigenous knowledge of our people are among the most important natural and social resources we have to build a prosperous nation.

Recognising the enormous importance of this biodiversity for the regional and global communities adds to the heavy burden of responsibility that already lies on our shoulders to preserve and use biological resources at the local and national levels sustainably and wisely. In this process, the role of the public at large, and especially the local communities of farmers, Bedouins, fishing folks, urban dwellers and others is paramount. The government, the local communities, the non-governmental organisations– with support from the international community– must all come together in well-organised efforts for collaborative management of biodiversity to carry out this common responsibility jointly.

The National Biodiversity Strategy and Action Plan for Palestine (BSAPP) is the crucial step in carrying out our commitment to this responsibility. It

must guide the actions of the government, as well as the civil society and the local communities towards a prosperous and sustainable future for Palestine. The local communities, who have struggled for the liberation of Palestine, now have an indispensable role to play, which is no less sacred. They must use their traditional wisdom to guide the nation in the management of our very scarce natural resources, including rangelands, forests, farmlands, marine and freshwater resources, and the remaining wild and semi-wild lands. For we must assure Palestine's future generations that they will inherit– in a much better condition than we did– the resources we have borrowed from them. The prosperity of our people and our very sense of identity as Palestinians will continue to depend on the integrity of the land as our natural heritage.

On behalf of the Palestinian people, I express my thanks to all those who have contributed to the elaboration of the BSAPP at the national and international levels, especially to the Palestinian Environmental Authority and its Head.

We are proud of the progress we are making so far, and look forward to signing and ratifying the Convention on Biological Diversity to reflect our sincere commitment to the implementation of its articles.

By approving the National Biodiversity Strategy and Action Plan for Palestine, we commit ourselves to the implementation of its strategic recommendations and programmes of action. This approval puts an obligation on all of the institutions and agencies of the Palestinian National Authority to reflect BSAPP's strategic programmes of action in their policies and practices. This requires systematic planning and co-ordination with the various ministries and bodies charged with the management of natural resources in Palestine.

Yasser Arafat

Preface by the Head of the Palestinian Environmental Authority

The rich traditions that the civilisations of Palestine had developed over time for the wise and sustainable use of natural recourses survived until recent decades. For example, the Bedouins managed the use of rangelands efficiently by taking advantage of seasonal variations in their carrying capacity. Farmers used many indigenous varieties and friendly environmental techniques for the production of food for subsistence and export. Fishing communities benefited from the riches of the sea in keeping with its biological cycles. Thus, Palestine had both the potential for keeping up with an increasing population and providing for its development and prosperity.

This picture, however, changed drastically due to severe social and political changes. The occupation of the Palestinian lands by Israel forced the traditional users of the biological resources to crowd on to an ever-shrinking land and water resource base. This reality brought with it, among other problems, the rapid depletion of the biological diversity.

The Israeli occupation of our lands for more than 30 years has left us with many social, political, economic and environmental problems. Living under occupation, with our land and its resources out of our control, we have had no option but to put more pressure on what little of the natural environment is left for us to use for subsistence and survival. In addition, the already tight pieces of agricultural land that Palestinian farmers are tilling are diminishing every day by toxic wastes and pollution dumped by Israeli settlements in illegally seized Palestinian lands.

Now, as we are well on our way towards statehood and sovereignty, an urgent agenda for strategic action must be initiated to ensure the sustainable development of the country. This brings with it a grave responsibility for stewardship over our resources. It is after all, this very biological diversity that is the goose that lays the golden egg of resources for sustainable development of our country, now and in the future. Protection of the environment and its biological diversity is not a luxury for the Palestinians, but a fundamental necessity for survival and prosperity.

As an emerging country, we are taking urgent steps to address our local environmental problems. At the same time, we are slowly waking up to the realities of global environmental disasters caused by the inhabitants of this earth.

Protecting biodiversity in Palestine will have many economic benefits. It will create job opportunities in a wide-range of biodiversity programmes, including the management of natural resources, protected areas, land use, etc. In addition, we need to invest in the protection of our biological resources in

order to attract the myriad of pilgrims to the holy lands to enable them to visit the ecological riches of Palestine as well as its ethnic, religious and cultural diversity.

It was these realisations that led the Palestinian Environmental Authority (PEnA) to undertake, with welcome international assistance, the Biodiversity and Action Plan for Palestine (BSAPP). The development of the BSAPP, which has taken place as a collaborative effort involving both the civil society and agencies of the government, is very timely. Many factors are threatening the survival and continued capability of biodiversity related resources to meet national and global needs. The most serious threats result from the delayed hand-over of our land resources, causing undue pressure on the meagre amount of land already in our possession, and the risk of rapid unsustainable development.

The approval by H.E. President Yasser Arafat of the BSAPP clears the way for all stakeholders– government institutions and the civil society alike– to sit down together to work out clear collaborative agendas of action. PEnA offers all its resources and good will to all institutions of the government and the civil society to implement together the practical implications of BSAPP's strategic proposals and recommendations.

Special thanks are due to H.E. President Yasser Arafat for his continued support of the indispensable work of environmental protection with which PEnA is charged.

Our great gratitude goes for the generous support of the international community, particularly the Global Environmental Facility (GEF), the United Nations Development Programme and its Programme of Assistance to the Palestinian People (UNDP/PAPP), the Swiss Development Co-operation (SDC), and the technical assistance provided by the World Conservation Union (IUCN).

We are also thankful for the ceaseless efforts and dedication of our Project Manager, Dr. Mahir Karaki, whose capable direction and co-ordination of this complex task have resulted in a timely BSAPP.

The development of the BSAPP is the product of a consultative process that involved a technical Task Force as well as all stakeholders including selected local communities. These institutions and individuals are listed in this volume. To all who helped with this process, our deep gratitude.

Dr. Sufian Sultan
Project Co-ordinator

Acknowledgements

The Palestinian Environmental Authority is very grateful to the Global Environment Facility (GEF), the United Nations Development Programme and its Programme of Assistance to the Palestinian People (UNDP/PAPP), the Swiss Development Co-operation (SDC) and the World Conservation Union (IUCN) that provided financial and technical support to the development of this Strategy and Action Plan.

The Palestinian Environmental Authority would also like to acknowledge the sincere dedication and commitment of a variety of individuals who generously dedicated their time and expertise to this collective endeavour. Among them, particular thanks go to Inger Anderson, Hani Daraghmi, Timothy S. Rothermel, Annick Tonti, Francis Parakatil, Mohammed Taghi Farvar, Richard Salter, Grazia Borrini-Feyerabend, Mark Riopelle, Sami Musallam, Azzam Tubaileh, Musa Abu Gharbiyya, Kamal Quba'a, Jad Ishaq, Leonardo Hosh, Kim Zander, Abdallah Al Laham, Adel Ibreighith, Ali Shaath, Abdallah Abdallah, Adimar Es-Ghier, Ibrahim Jadallah, Jawad Wadi, Shahir Hijji, Imad Atrash, Adnan Budieri, Nadia Handal, Younis Sbeih, Nadia Khudhari, Yousef Abu Asa'ad, Al Arrouab College, Roubina Qsous, Nader Hreimat, Rana Abu Adas, Fayez Kawasmi, Eng. Hazem H. Qawasmeh, Monia Sughaier, and Rami M. Zaro.

BSAPP Executive Summary

Palestine's ancient civilisations have always prospered on the basis of its unique geographic position linking the three continents of the Old World: Africa, Asia and Europe. This position has placed Palestine's biomes among the richest biological diversity in the world and has given it a position of strength in trade in the region. Throughout time, the people of the Holy Lands in Palestine have been known for their sophisticated systems of sustainable resource husbanding in farming, rangeland management and fishing. The great civilisations that rose here in the heart of the fertile crescent owed much of their prosperity to their shrewd stewardship of natural resources. Today, this biological diversity, which includes many unique species of wild and domesticated animals and plants and their genetic variety and habitats, is severely threatened. The recent history of the Occupied Territories has forced its once flourishing local communities of Bedouins, fishing folks and farmers to put more pressure on an already tight and shrinking resource base in pursuit of their increasingly unsustainable livelihood. Crowded out of the best lands and natural resources in the whole region, they have pushed many of the native species of plants and animals of local and global importance towards extinction.

The goal of the National Biodiversity Strategy and Action Plan for Palestine (BSAPP) is to reverse this process through mobilising the resourcefulness of the Palestinian people, and judiciously guiding and applying international technical and financial support for this purpose. It aims at nothing less than the restoration and rehabilitation of Palestine's diversity of species, genetic resources and the ecosystems in which they can flourish. Far from considering this task a luxury, Palestine, in approving the BSAPP, is according it an order of priority on the same level as its continuing struggle for national territorial integrity. As custodians of this global heritage, Palestinians are coming to realise that– until both present and future generations are assured of the environmental safety of their biological diversity– their own food and environmental security is threatened. The activities presented under the five objectives that follow are intended to elaborate ways for the preservation and sustainable use of these irreplaceable resources.

The Strategy is presented in five objectives, each with its action agenda given at three priority levels divided into immediate, medium- and long-term. The objectives reflect five principles that guide the formulation of the BSAPP. Highlights of selected actions for each objective are presented below.

Table 1: BSAPP's Objectives

BSAPP Objective	Selected Agenda Actions

Objective 1 Conservation of Palestine's Biodiversity	□ In situ conservation areas are set aside to conserve endemic, threatened and endangered biodiversity of global significance. □ Protect and rehabilitate degraded habitats and ecosystems of especial importance for rangeland and forest biological diversity □ Develop national policies, regulatory measures, and other legal frameworks addressing biodiversity conservation and sustainable use □ Identify and legally establish a representative system of protected areas/nature reserves (including wetland protected areas) addressing globally significant biodiversity, and facilitating information exchange.
Objective 2 Sustainable use of Palestine's biodiversity	Sustainable: □ Tourism and ecotourism programs. □ Biodiversity friendly agriculture □ Supervised/Controlled forms of hunting and plant collections □ Proper Management of grazing and controlled access to rangelands □ Forest management and production □ Biodiversity friendly pastoral production □ Management of fisheries, land and water resources, and integrated pest management
Objective 3 Enhancement of local knowledge, skills and improvement of people's attitudes and practices for the conservation and the sustainable use of biodiversity	□ Survey, understand and strengthen traditional resource management institutions. Information and training on indigenous threatened species and their uses **Awareness campaigns:** □ *Formal and informa education programs* □ Biodiversity awareness campaigns, □ Social communication activities □ Artists, elders, religious leaders and teachers / values of biodiversity into the popular culture. □ School clubs for the protection of nature.

Objective 4 Equitable sharing of biodiversity benefits within Palestine	Participatory action research on benefits and costs of conservation of biodiversity Strengthen local capacity for maintaining and benefiting from crop and various wildlife diversity. Support traditional systems of resource management to obtain larger market share for domesticated products harvested sustainably. Equitable licensing/use arrangements for marine fishing, grazing and other uses of common biodiversity resources, balancing commercial and subsistence use. National Trust Fund for biodiversity conservation and sustainable use established to benefit local Palestinian communities
Objective 5 Development of Palestinian institutional and human resource capacity in the field of biodiversity	Training courses in natural resource management, focussing on plants and wildlife of major importance in Palestine and on participatory action research and collaborative management methods (protected areas management; field-based, problem-based learning). Systems of collaborative management of natural resources (stakeholders negotiate their own benefits). Revise university curricula and establish courses and workshops to train local specialists, in the conservation and management of biodiversity. include indigenous knowledge and practices Develop training programs in eco-tourism.

(The full agendas for action and other details are in Part I of the BSAPP)

Based on the objectives and action plans, a list of priority initiatives/ project profiles were put together by the Technical Working Group. A list of these projects follows. Part II has summary description of the project objectives, activities, outputs and indicative budgets.

Table 2: Priority Initiatives (Projects) for BSAPP

Name of Project	
1.	Development and Management of a Palestinian Protected Areas System
2.	Development of Management Plans/Structures in Designated Protected Areas Based on Biodiversity Surveys and Inventories
3.	Protecting and Using Traditional Indigenous Knowledge and Property Rights for Biological Diversity
4.	Implementation of Biosafety Measures on Biotechnology in Palestine
5.	Habitat Restoration (including rangelands, forests, wetlands, sacred groves and integrated agro-ecosystems)
6.	Collaborative Management of Biodiversity
7.	Combating Desertification and Coping with the Adverse Effects of Climate Change
8.	Elaborating and Enforcing a National Legislation/Legal Frameworks on Biodiversity
9.	Establishing a Biodiversity Information and Social Education Centre
10.	Promotion of Eco-tourism/Economical Aspects of Biodiversity
11.	Coastal Zone Management in Gaza and the Dead Sea
12.	Establishment of a Gene Bank in Palestine

Introductory Note

BSAPP in the International Context

Biological diversity (biodiversity for short) is defined as the variety and genetic variability of all species of plants, animals and micro-organisms and the ecosystems that form their habitats. It is the outcome of over 3,000 million years of evolution and the foundation for the directions it will take in the future. Ecological stability is guaranteed mainly through biological diversity. In essence, it is the insurance policy for life on earth (Agenda 21).

A society concerned about biodiversity in its sea and land territories needs to deal with who should have access to natural resources and who should benefit from them. This links biodiversity to the larger issue of sustainable development. In recognition of the importance of biodiversity, during the 1992 UNCED Conference (the Rio Earth Summit) a Convention on Biological Diversity (CBD) was open for signature. One year later, a hundred and sixty eight countries had signed, making the CBD one of the most widespread conventions in existence.

By joining together the CBD nations commit themselves to its goals; namely, (i) the conservation of biodiversity; (ii) the sustainable use of biodiversity resources, and (iii) the equitable sharing of benefits arising from biodiversity. Moreover, signatory nations agree to elaborate a National Strategy and Action Plan to operationalise the goals of the CBD in accordance with its Articles 6 and 26 (*see Annex II)*, as well as to implement all if its other articles.

Several other international environmental conventions are related to the goals of the CBD. Thus, actions related to CBD should be consistent with these other international conventions.

As Palestine approaches statehood, it takes its responsibilities for the conservation and sustainable development of its natural resources seriously. The Palestinian National Authority recognises that the conservation of the diversity and abundance of its biological resources depend on the well being of its present and future communities. It has therefore seized the opportunity to take the first step in defining a Palestinian national strategy in keeping with the provisions of the Convention.

Background on the BSAPP

The intent of the National Biodiversity Strategy and Action Plan of Palestine (BSAPP) is to provide a strategic basis for the conservation and sustainable use of biodiversity in the Palestinian Territories. The development of the BSAPP was funded by the Global Environment Facility (GEF) through the UNDP/PAPP and executed by the Palestinian Environmental Authority (PEnA).

Institutional concern with the environment in Palestine has developed with the creation of PEPA and, later, the EPD. These were established to lead the working group on the environment during the multilateral negotiations. PEnA was created by a Presidential decree

in late 1996 and was charged policy, regulation and implementation of environmental protection and conservation programmes and activities.

In late 1997, both the GEF and the Swiss Development Co-operation (SDC) approved complementary projects to support the elaboration of the BSAPP. The GEF project, which was administered by UNDP/PAPP, is a part of a larger regional programme that includes both Jordan and the Palestinian Authority. The SDC component was co-ordinated by IUCN which has provided continuing support in facilitating the planning process through advice on the development of work plans, organisational structure, terms of reference for national and international technical working groups, and review of interim technical reports and assisting the Project Manager with the finalisation of the BSAPP.

As the national executing agency, PEnA is the focal point for the implementation of the BSAPP. Staff specialists from PEnA were assigned to various tasks of technical support for the activities of the project. A National Steering Committee for Biodiversity in Palestine was formed comprising representatives from various government institutions, non-governmental organisations and academic establishments. The Committee advised the project manager on the elaboration of the BSAPP, reviewed various reports of the technical working groups and acted as a forum for discussion to achieve consensus on the main approach and components of the BSAPP.

BSAPP Objectives and Methodology

The goal of the BSAPP is to contribute to the conservation and sustainable development of Palestine's biodiversity and to chart a course for strengthening human capacity for this task. In order to contribute to this goal, five objectives were arrived at through a wide range of consultative processes, as follows:

1. The conservation of Palestine's biodiversity;
2. The sustainable use of Palestine's biodiversity;
3. The enhancement of local and traditional knowledge and skills and the improvement of people's attitudes and participation for the conservation of biodiversity and the sustainable use of biodiversity;
4. The equitable sharing of biodiversity benefits within Palestine; and,
5. The development of Palestinian human resource capacity in the field of biodiversity.

These objectives blend those of the CBD with the realities of the Palestinian national concerns. They are flexible and their focus can be modified as more information becomes available, through the monitoring and evaluation of the implementation of the BSAPP ("learning by doing").

In order to assess and analyse the biodiversity situation in Palestine, PEnA contracted a number of national experts with competence in different areas of biodiversity conservation, including flora, fauna, marine and freshwater, social, economic and legal issues, climate, as well as agro-biodiversity. The production of the BSAPP has been influenced by the urgent need for policy options at a time when Palestine needs to plan rational use of its natural resources, particularly those related to biological diversity and the potential for sustainable development. Therefore, the reports of the technical working groups were used as the scientific base upon which the BSAPP was elaborated. The essence of these reports

constitutes the Situation Analysis, which appears as Part III of this document. The work of the technical working groups also formed the foundation for a more detailed country study that is in process.

Although it is anticipated that priorities may change or be refocused during BSAPP implementation, it is important to have a clear initial focus for activities and actions that will move Palestine towards the overall goal. Towards this end, an Agenda for Action has been developed for each of the five BSAPP objectives. These agendas list and prioritise recommended actions as immediate, medium-term or long-term priority. Each agenda is intended to represent a list and schedule of activities that can realistically be achieved. It should be noted that although actions are listed under individual objectives, some activities will actually work toward two or more objectives. For example, training scientists in species identification will help both to conserve Palestine's biodiversity (Objective 1) and to increase human resource capacity (Objective 5).

During the course of preparations a number of activities for improved public awareness were carried out all over Palestine. These included illustrated talks and discussion groups in schools, organisation of an international conference on biodiversity and education in collaboration with national NGOs, production of posters on endangered flowers, birds, mammals, and wetlands, various information brochures on biodiversity, the BSAPP and the CBD, and a related documentary film.

For more details on the methodology employed for the elaboration of BSAPP and some of the activities including in the promotion of public awareness that were undertaken during the life of the project, please refer to Annex III.

Gaps and Driving Forces Affecting the BSAPP

There are five types of gaps that affected BSAPP's elaboration and implementation:

1. A gap in information. This relates to the lack of primary scientific data, information and documentation on biodiversity in Palestine. Most reports were compiled from secondary sources, with some informal field verification. Although this method effectively captures the broad trends on the status of biodiversity in the country, a more exacting scientific approach is needed for monitoring and assessment purposes. Primary information on the exact number of species, their populations and habitats is needed for all biological kingdoms (*Prokaryota*, *Protoctista*, *Fungi*, *Plantae* and *Animalia*). Work should begin with the flowering plants, large mammals and birds. Continuing to work down through the food chains. This approach will provide an indication of the health of Palestine's habitats.

2. **A gap in human resources.** There are very few biologists (especially marine and wildlife biologists and taxonomists), oceanographers, conservation managers, etc. There is also a need for experienced human resources that can work with collaborative management and community-based initiatives and programmes. This gap will take some time to fill, and so interim steps are needed. Such steps would include training courses for university professors, graduate students, government experts, and community groups in species identification, scientific wildlife data collection, social and economic aspects, and other issues dealing with the conservation and sustainable use of biodiversity in Palestine priority.

3. **A gap in legal frameworks.** This includes the lack of an adequate environmental policy and legal framework on which to base all activities for the conservation and sustainable use of biodiversity in Palestine. This is mainly the result of the political situation affecting the country. Given these circumstances it is imperative that adequate environmental policies and legislation be prepared and implemented incorporating biodiversity concerns.

4. **A lack of coordination among national and local stakeholder agencies in biodiversity.** The existing political constraints imposed by the Israeli occupation has created a situation where the geographical integrity of the Palestinian lands and freedom of movement are hampered. This has restricted communication among national and local stakeholders in the field of biodiversity.

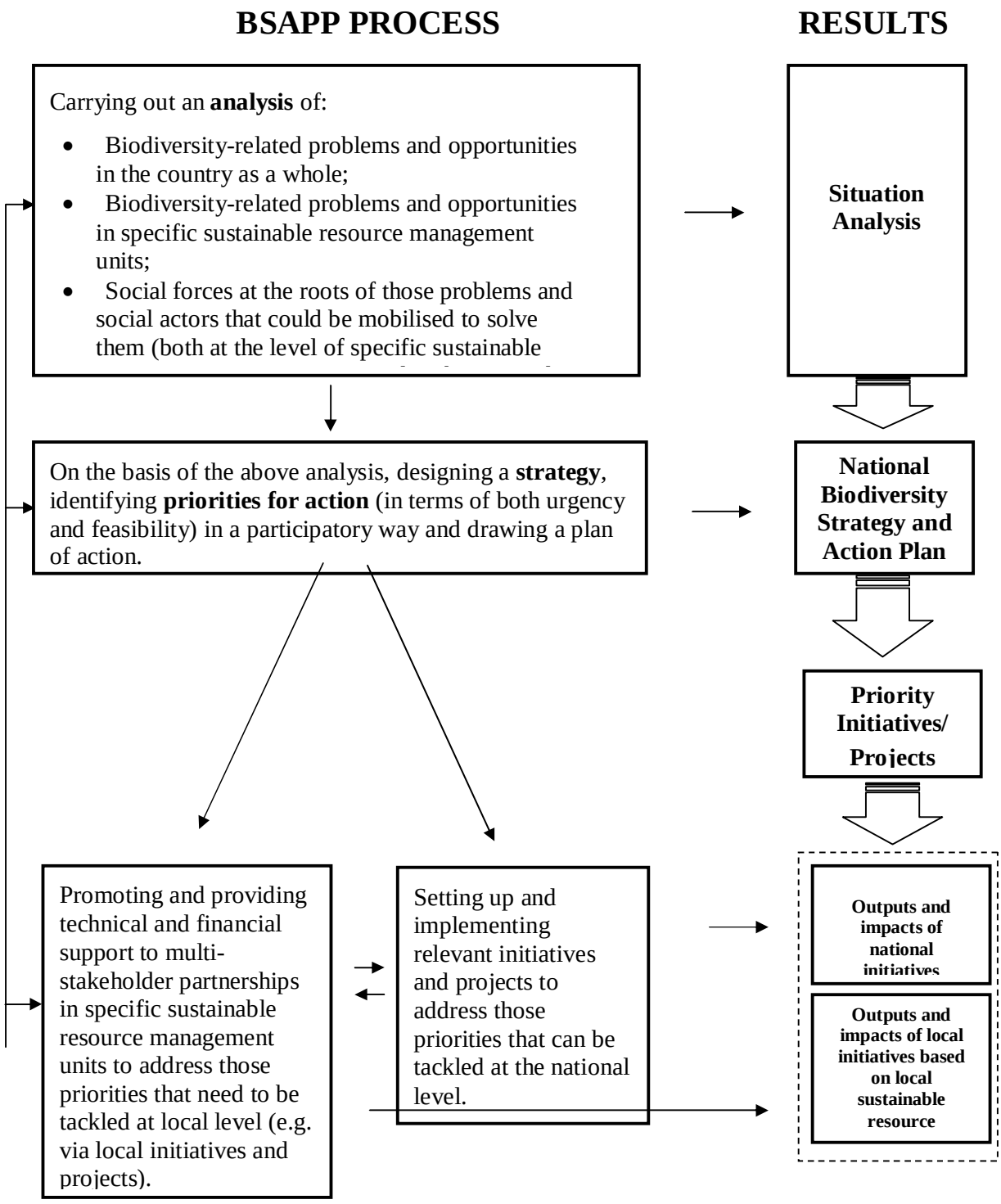
5. **Inadequate awareness and commitment to biodiversity.** The Israeli occupation of the West Bank and Gaza Strip over the years has left the Palestinian society with damaged infrastructure in all aspects of life including education and environment. This has resulted in decline of awareness and commitment to environmental issues, especially those related to the conservation of biodiversity in Palestine. Due to lack of proper education emphasizing on environmental issues, biodiversity concerns no longer became a priority. Therefore, strategic planning and systematic efforts should be exerted, as outlined in this strategy, to reverse this process.

The BSAPP Formulation Process

The formulation of the BSAPP involved a wide process of consultations and interactions among the Project Co-ordinator, Project Manager, the Technical Working Group and its Steering Committee, the various national and international agencies and experts, and the civil society including NGOs, universities and local communities and stakeholders.

The diagram below gives a graphic presentation of the BSAPP process and outputs. The **process** shown therein is inherently **iterative**. The analysis of issues, problems and solutions proceeds along with the participatory identification of priorities, the setting up of national initiatives and local partnerships and the implementation of projects– each process element complementing and feeding into the others.

Figure 1:The BSAPP Formulation Process and Outputs



Guide to the Reader

The results of the BSAPP are summarised in three major inter-related parts.

Part I gives the BSAPP vision, guiding principles, objectives and the agendas for action in terms of immediate, medium- and long-term priorities. These are based on the reports of the technical working groups and wide-scale consultations and public discussions. Each of the objectives is followed by a section on the threats and constraints in order to justify the proposed actions. The potential partners involved in the implementation of each objective are also proposed at the end of each section pertaining to each objective.

Part II is a collection of carefully selected projects, the outline of which describes briefly the objectives, outputs, and activities together with their indicative budget. The funding and implementation of these strategic proposals will take the protection of biodiversity in Palestine a long way towards the achievement of its goals and objectives.

The technical material produced by the Technical Working Groups upon which the BSAPP is based is presented in the Situation Analysis in **Part III**. It provides information on the Palestinian society, economy, geography and the status of biological diversity in the territories– including terrestrial flora and fauna, marine and freshwater biotic resources, and agro-biodiversity. The threats and impacts affecting these resources, as well as the legal and institutional frameworks for biodiversity in Palestine are given at the end of this Part. A more detailed version of this work will be presented separately as the Country Study for Palestine.

National Biodiversity Strategy and Action Plan for Palestine

(BSAPP)

Part I:

STRATEGY AND ACTION PLAN

Part I. National Biodiversity Strategy and Action Plan for Palestine (BSAPP)

A Vision for Palestine

The societal vision of the BSAPP is to arrive at:

- **A stage of pride in the Palestinian people in conserving and enhancing the rich heritage of biological diversity in species, genetic wealth and the ecosystems on which they depend for survival, and**
- **The sustainable use of its related natural resources for the benefit of present and future communities that live in the Holy Land of Palestine.**

The BSAPP will pursue this overall goal through activities implemented under five objectives described in the following sections.

BSAPP Guiding Principles

The following principles have been identified as over-arching considerations to guide the elaboration the National Biodiversity Strategy and Action Plan for Palestine:

1. Integrity of Palestinian Land and Marine Resources and Their Biotic Wealth

- Palestine's special situation of lack of control over all its land and marine resources makes it necessary to adopt the over-riding principle of insuring the integrity of land and marine resources. This principle must be reflected in all strategic actions for the conservation and sustainable use of biological resources.

2. Intrinsic Value of All Forms of Life

- Palestine is endowed with rich biotic resources, many of which are now threatened and some are extinct. The future development of the country must reflect the **intrinsic value** of its landscapes, ecosystems, habitats, populations, species and genes
- It is the duty of every Palestinian individual and organisation **to care for the biodiversity heritage** and use it sustainably and equitably
- **Sustainability** for Palestinian biodiversity involves: (a) respecting the ecological integrity of natural systems and their carrying capacity, (b) minimising the possible negative impact of developmental projects and activities in Palestine. (c) Taking remediation measures against the negative impacts of Israeli activities including settlements on Palestinian lands (d) avoiding risks to the biological integrity of biodiversity, and (e) investing in Palestinian human and material resources in the rehabilitation and conservation of natural resources.
- Equity in the use of Palestinian biodiversity means that the benefits of the sustainable use of biodiversity shall be shared equitably and fairly among all

Palestinian people, through: (a) redressing the rights of access of Palestinian communities and individuals that have suffered from the alienation of land and other biodiversity related resources, (b) linking the improvement of the living conditions of local disadvantaged groups and communities to the sustainable use and development of biodiversity, (c) insuring that the cost of assessing the risks and impacts of development interventions are borne by those who propose to do them (e.g., the "Polluter Pays" principle), and not by local communities and disadvantaged or potentially adversely-affected groups.

3. Collaborative Management of Biotic Natural Resources

- All affected communities and groups will participate in decisions on policies and actions that affect their rights and entitlements to biotic resources.
- Careful institutional arrangements will be arrived at among all primary and secondary stakeholders with respect to the management of biotic resources, protected areas, and their sustainable use.
- The traditional knowledge of the Palestinian people must be supported, protected and utilised as a rich heritage on which to base the conservation and sustainable use of biodiversity in such areas as rangelands, farming and fishing zones, and natural areas.

4. Responsible Public Management

- Public planning and decision-making on biological and natural resource management in Palestine shall be based on informed decisions with adequate information on the full analysis of the impacts, costs and benefits of such actions on economic, social and environmental aspects of resource management.
- Where adequate information is not available to properly assess the risks emanating from resource management activities, the Precautionary Principle (as defined in the Rio Declaration on Environment and Development, *see Annex III)* shall be applied, where such action will be postponed for however long it takes to correctly assess the impact.
- Government decision making and implementation of resource management issues must be based on openness, accountability and transparency to the public and the other stakeholders. Administrative processes must be simplified and as non-bureaucratic as possible, to encourage participation in all levels of competence and avoid undue concentration of decision making at higher levels.
- Given that natural resource issues transcend administrative and disciplinary boundaries, it is necessary to ensure a co-ordinated inter-sectoral approach, with cooperation among all involved parties, whether governmental or in the civil society.

5. Learning by Doing

- As the proposals and actions set in the BSAPP require an on-going process of "learning-by-doing," adequate monitoring and re-assessment procedures must be built into every action implemented. This will ensure that there are vivid and constructive analysis-and-action cycles mutually feeding and enriching each other.

Objective 1: The conservation of Palestine's biodiversity

Threats and Constraints

- One of the major constraints facing Palestine in the conservation of its biodiversity is the political reality of denial of access and control over land and natural resources as agreed in the international peace accords signed with Israel including Oslo I, Oslo II and Wye River. For example, all occupied lands in the West Bank of the Jordan River should have been returned to Palestinian control by now. This has not taken place, leaving the Palestinians with little option but to overuse the very limited percentage of land under their control. A similar situation exists with marine and freshwater resources, since Palestinians control only a few narrow fishing zones in violation of the Peace Accords, and have no access at all to the waters of the Jordan River. They are also currently limited to access to no more than 15% of their groundwater.
- Climate change and desertification, with the related problems of overgrazing and over use of water resources, as well as deterioration and pollution of soils with plastic and chemical wastes and extensive use of agricultural chemicals all post major threats to Palestine's biological diversity.
- Destruction of wildlife and ecosystems by the Israeli occupation.

Agenda for Action

Immediate Priority (implementation within *1*-5 years)

- Evaluate critically existing secondary data on Palestine's biodiversity (including ongoing academic research and Israeli-held data) and identify knowledge gaps.
- Initiate studies on marine biodiversity, including marine mammals, reptiles and flora aimed at the preservation of marine and coastal habitats (e.g., the dune systems in southern Gaza, Wadi Gaza and the turtle beaches).
- Update information on invertebrates, fishes, amphibians, reptiles, birds and mammals, including species and habitat status, and initiate research, survey and monitoring programmes.
- Update information on floral and agricultural biodiversity, including microflora, fungi, medicinal plants, documentation on number and status of indigenous and introduced agricultural species, diversity and status of forest resources, phyto-geographical boundaries and buffer zones, extinct species, and initiate research, surveys and monitoring programme in this regard.
- Identify and legally establish a representative system of protected areas/habitats, including endemic, domesticated and endangered species habitats and habitats of important plant species, with the widest possible representation of Palestinian biodiversity. Ensure that the resident communities are involved in establishing those protected areas and in managing them.
- Establish in situ conservation programs, in particular for endangered and rare animal and plant species, and always in collaboration with local resident communities and other relevant social actors

- Place a moratorium on all hunting activities to allow wildlife populations to recover, and institute hunting schedules and quotas

Related activities

- Identify, define and manage wetland resources and establish wetland-protected areas such as Ain Fashkha, Wadi Gaza, Ain Qult, Ain Qiunya and the Dead Sea Area including Jericho and the Jordan River for their touristic values.
- Establish at least one RAMSAR site (Wetlands of International Importance)
- Conserve, protect, and manage rare/endangered species such as the triton *Triton vittatus*, the marsh frog *Rana ridibunda*, the tree frog *Hyla arborea savignyi* and the Syrian frog *Pelobates syriacus*
- Manage stray domestic animals and wildlife in rural areas, and set up a wildlife veterinary services centre
- Rehabilitate and restore habitats for large mammals, co-ordinate habitat rehabilitation with rangeland rehabilitation
- Ensure that environmental pollution does not threaten critical habitat, and encourage the treatment and management of wastewater through appropriate infrastructure development
- Ensure that solid waste disposal sites do not threaten critical habitats. Clean up solid waste including accumulated waste along beaches, and encourage the development of sanitary landfill sites.
- Foster international co-operation, national planning processes and policy reforms to support biodiversity conservation
- Combine offsite facilities such as zoos, botanical gardens and seed banks to protect biodiversity and to help mobilise its benefits.

Mid-term Priority (implementation within *6*-10 years)

- Establish policies, legislation and regulations for the conservation and management of species and habitats
- Establish a botanical garden/gene bank for the *ex situ* conservation of indigenous agricultural species.
- Establish a botanical garden/gene bank for the *ex situ* conservation of wild plants.
- Restore degraded lands in ways that enhance both their productivity and biodiversity.
- Protect natural ecosystems from the introduction of exotic plant and animal species, by:

- encouraging use of native rather than introduced species for aquaculture, mariculture and agriculture;
- monitoring the population of introduced species and varieties, as well as the effects of hormones and antibiotics affecting wildlife health;
- establishing environmental screening procedures for importation of plant and animal species, banning or strictly controlling the import of potentially invasive species, and establishing quarantine controls on all imports;

- establishing an expert committee on biotechnology/genetic engineering to advise on regulatory requirements for dealing with biotechnology and genetically engineered organisms;
- Developing bio-safety policy, legislation and regulations dealing with the handling, release and disposal of exotic or genetically engineered organisms.

- Regulate commercial access to genetic resources.
- Control trade in plant and animal species listed in CITES.
- Strengthen crop and livestock genetic resource conservation, and implement the Global Initiative for the security and sustainable use of Palestinian plant genetic resources.
- Introduce appropriate environmental impact assessment procedures for proposed projects likely to have significant impacts upon biological diversity, providing for suitable information to be made widely available and for public participation, where appropriate, and encourage the assessment of the impacts of relevant policies and programs on biological diversity.
- Promote regional co-operation for biodiversity conservation by establishing trans-boundary-protected areas.
- Promote integrated pest management techniques (using indigenous species) and organic farming to reduce effects of agro-chemicals on indigenous invertebrates.
- Ratify all regional and international treaties and conventions related to biodiversity conservation.

Long-term Priority (implementation > 10 years)

- Re-introduce species to established and functional conservation areas, including:
  - Locally extirpated amphibians into wetlands and artificial ponds as part of pest management and habitat rehabilitation projects.
  - Locally extirpated species of birds.
  - Locally extirpated mammals such as Mesopotamian deer and roe deer.

Notes

Conserving Palestine's biodiversity needs to begin by understanding it. This is why many activities in this section deal with studies and research. Other activities aim at giving value to biodiversity in the eyes of the Palestinian people. Others specifically are meant to preserve and protect biodiversity both *in situ* and *ex situ* (including the marine environment, which has been so far fairly neglected). Still others aim at preventing destructive pollution

Importantly, the tasks above are not the exclusive prerogative of experts and scientists but need to see the active involvement of the Palestinian society at large and of the indigenous communities– including in particular farmers, Bedouins and fishing communities.

Potential partners

The Palestinian Authority including PEnA (Palestinian Environmental Authority), and MOA (Ministry of Agriculture), Palestinian NGOs, the private sector, local and indigenous communities, relevant international bodies such as IUCN (The World Conservation Union), Donor and Funding Agencies.

Objective 2: The sustainable use of Palestine's biodiversity.

Threats and Constraints

- Palestine is one of the West Asian countries that suffers from the lack of water availability and access. The major water resources of the West Bank are the Jordan River and the West Bank Aquifer System. Palestinians are not allowed to use more than 15% of their groundwater and are denied access to the Jordan River. The situation in Gaza is even more serious in terms of access to fresh water resources. The destruction of forests and rangelands exacerbates this very tight water situation and constitutes a major constraint for sustainable management and use of natural resources.
- The average population density of the Gaza Strip is approximately 2330 persons/km^2, while the population densities in the refugee camps range from 29,000 to over 100,000 persons/km^2. This has caused severe pressure on meagre natural resources, including on the biodiversity of the area.
- The Eastern Slopes agro-ecological region makes up most of Palestine's rangeland and grazing areas. Of the 150,000 ha existing rangelands, 127,500 ha are closed to Palestinians as a result of Israeli Settlements and military areas. Bedouins and other livestock raisers who used to have access to adequate land for grazing, are now forced to use a severely limited and overgrazed range area.
- The paucity of rivers and the damming of the major ones leading to the Eastern Mediterranean, have caused an extreme oligotrophy, which, together with the high salinity and temperature of these waters, cause a biological impoverishment in the flora and fauna of the eastern Mediterranean.
- The closing of the fishing grounds off the Sinai Peninsula after 1978 has resulted in a large drop in fisheries production. Meanwhile, Palestinian fishing communities are limited to only four small fishing zones in Gaza extending only 12 nautical miles, in clear contradiction with the Oslo Agreements, which give Palestine 20 nautical miles– while the Israeli and other international fishing vessels are engaged in heavy capture of this biota.

Agenda for Action

Immediate Priority (implementation within *1*-5 years)

- Assist fishing communities to develop fishery co-management arrangements in both freshwater and marine environments in Gaza strip, to prevent over-fishing and develop alternative livelihood schemes
- Establish collaborative management regimes in all rangelands being returned to Palestinian control and ensure that adequate attention is given to the conservation of biodiversity-related values (e.g., by proposing a moratorium on livestock grazing and fostering alternative livelihoods including ecotourism, bio-prospecting, groundwater recharge). Give adequate consideration to the need for a regional approach to the

management of rangeland ecosystems given the nomadic pastoral and transhumant nature of livestock management and rangeland use systems.

- Carry out participatory action research on the recovery capacity of rangelands, using grazing exclosures and other established methodologies, and apply results to the regeneration of Eastern Slope rangelands (e.g. via collaborative management agreements).
- Assist local communities including Bedouins to develop their own pilot system of permits or quotas for rangeland grazing based on legislation and land carrying capacity.
- Assist rural communities to develop systems of collaborative management of water resources, including rain-fed farming, water harvesting, catchments and watersheds.
- Assist rural communities to reduce usage of agrochemicals via integrated pest management systems.
- Develop participatory systems of land use planning that encourage the protection of existing agricultural land and forests and the rehabilitation of degraded land and forests (e.g., through better drainage, reforestation and replanting).
- Identify causes of desertification and indigenous knowledge of land and resource use to combat desertification.
- Encourage a better understanding of the value of medicinal plants and ensure its appropriate and sustainable use.

Mid-term Priority (implementation within *6*-10 years)

- Develop techniques for determining the value of biological resources, including sustainable local food systems, and incorporate those into local accounting and cost benefit analyses.
- Encourage sustainable grazing, including regulations for closed seasons and closed areas (e.g., areas of steep slopes) in lands under collaborative management agreements. For instance, the government could provide economic incentives, including cheaper commercial feeds and tax support to pen feeding.
- Promote ecotourism in established nature reserves and across a variety of ecosystems (desert, wetlands, highlands etc.), ensuring that the development of ecotourism activities takes full account of habitat sensitivities and ecotourism carrying capacities.

Long-term Priority (implementation > 10 years)

- Introduce economic and social incentives for biodiversity conservation and abolish perverse policies that lead to the loss of biodiversity.
- Establish policies that foster the development, acquisition and adaptation of sustainable biotechnologies.
- Conduct research on organic farming, focussing on the use of indigenous species and opportunities for expansion.
- Encourage research into the use of alternative feed resources and agro-processing by-products as ruminant feeds, in order to reduce pressures on native rangelands.
- Identify the ways in which climatic change and desertification affect the sustainable use of biodiversity and elaborate coping strategies for them.

Notes

The sustainable use of Palestine's biodiversity is promoted via sustainable production systems (e.g. traditional methods of agriculture, agroforestry, organic farming, and fishing with non-destructive methods, etc.) Participatory action research is fundamental to these efforts, as are governmental policies sensitive towards both sustainable agriculture and rural development, and policies for the management of rangelands, forests, and wildlife.

The active involvement of local resource management institutions and local associations of users should be promoted also via donor-assisted integrated conservation and development initiatives.

Potential Partners

Local and indigenous people and their communities, including farmers, Bedouins and fisher folk; the Palestinian Authority including PEnA (Palestinian Environmental Authority), MOA (Ministry of Agriculture), and Ministry of Planning and International Co-operation, Palestinian NGOs, Private sector, the relevant international funding organisations including ODA, IDA (International Development Association) and regional and sub-regional development banks (World bank), UNDP, UNEP, GEF.

Objective 3: The enhancement of local and traditional knowledge and skills and the improvement of people's attitudes and participation for the conservation of biodiversity and the sustainable use of biodiversity

Threats and Constraints

- The rapid erosion of traditional knowledge and skills of sustainable use of biodiversity resources is eliminating a rich source of indigenous know-how that is badly needed for rehabilitating and improving the status of this resource.
- Lack of a tradition of community participation including women, youth and community elders in public policy formulation and decision making is depriving the emerging state of Palestine of its most creative cultural background and human capacity for its future prosperity
- The over-riding inappropriate Israeli model of development and its lack of respect for the natural environment, together with the blind adoption of this model by Palestinian farmers, engineers, planners and others in their own approach to development have precluded the use of their own traditional knowledge and the quest for more appropriate models for agriculture, industry, energy production, roads, urban development, etc.
- The relatively low literacy rate of 65 % in Palestine is a constraint to access information on the conservation of natural resources and biodiversity.

Agenda for Action

Immediate Priority (implementation within *1*-5 years)

- Survey, understand and strengthen the traditional resource management institutions still active for biodiversity conservation and the sustainable use of natural resources in Palestine. Carry out participatory action research with elders and other knowledgeable people on rehabilitating such systems that may have fallen in disarray.
- Provide rural communities with information and training on indigenous threatened species and their uses. Provide rural communities with access to appropriate technology innovations that can be effectively incorporated in their own resource management systems and help them conserve biodiversity.
- Continue current biodiversity awareness campaign, targeting all sectors of Palestinian society including government and other decision-makers.
- ***B***uild social communication activities (including two-way communication, discussion groups, participatory assessment exercises, etc.) with emphasis on:

- Traditional and indigenous systems of resource management and their fundamental role in maintaining biodiversity, using natural resources sustainably and developing genetic biodiversity of domestic species
- Marine environmental issues, including dangers of over-fishing and marine pollution and the need to protect marine mammals and sea turtles.
- The importance of invertebrates in maintaining ecological balance.

- The importance of amphibians and their habitats in relation to pest management and ecological balance.
- The importance of reptiles and their habitats, their ecological role and their importance as a source of food for globally endangered migratory birds.
- The importance of birds and their habitats, emphasising the location of Palestine along a globally important spring and fall flyway for migratory birds.
- The importance of mammals and their conservation.
- The importance of medicinal plants.

- Work with Palestinian artists, elders, religious leaders and teachers to build awareness of the importance and values of biodiversity into the popular culture.
- Promote awareness for increased Palestinian sense of responsibility to conserve its repatriated biodiversity at all levels.
- Establish a network of school clubs for the protection of nature.

Mid-term Priority (implementation within 6-10 years)

- Strengthen national or sub-national institutions providing information on the conservation and potential values of biodiversity.
- Assist the Ministry of Education with development of a curriculum that includes the basic concepts of environmental education.
- Develop appropriate environmental education facilities (interpretative staff and display centres, nature walks etc.) in protected areas.
- Carry out research on the specific ethical, cultural, and religious concerns of Palestinian people related to conservation of biodiversity.

Long-term Priority (implementation > 10 years)

- Ensure that the rehabilitation of archaeological sites for tourism includes environmental information and management.
- Establish a biodiversity information network to speed the flow of data for local, national and global assessments.

Notes

The full development of resource management capacity in Palestinian society (including knowledge, skills, attitudes and institutions) is here promoted in place of the more usual "awareness raising" initiatives. Moreover, rather than emphasising environmental values as top-down, "scientific" considerations, the chosen approach sees them – at least potentially – at the centre of traditional resource management systems (too often misunderstood and undervalued in modern societies). Conventional approaches, such as incorporation of biodiversity education in school curricula, are not neglected, but integrated within more participatory, culturally-sensitive and ultimately more effective approaches. In this sense, two-way communication systems (e.g. dialogues, participatory appraisal, radio talk shows, twinning of schools, etc.) are preferable to one way communication systems such as TV.

Potential Partners

Local and indigenous communities, the Palestinian Authority via the Ministry of Education, Ministry of Planning and International Co-operation, MOA (Ministry of Agriculture), PEnA (Palestinian Environmental Authority), Governmental schools, Palestinian NGOs, Private

schools, businesses, relevant international organisations including UNICEF, UNESCO, UNDP.

Objective 4: The equitable sharing of biodiversity benefits within Palestine

Threats and Constraints

- The deterioration of the economical situation in Palestine has caused a rapid decline in the standards of living (e.g., the per capita GDP in Palestine dropped from US$1800 in 1991 to US$800 in 1994, while the per capita GDP in Israel reached some US$16,000 with a comparable cost of living). Serious deterioration of the Palestinian environment and natural resources has been among the consequences of such economic deterioration as poorer people tend to rely on biomass for fuel wood and drive their range and agricultural lands harder to eke out a living.
- Palestinian farmers play a central role in the conservation of germplasm resources since they retain some seed stock for the preservation and evolution of new varieties. This positive role is now threatened by the pauperisation of local communities since they are increasingly having to consume their entire harvest and becoming more dependent on imported high-yielding varieties (HYVs). This situation is already narrowing the diversity of genetic resources.
- The continuing pressure of Israeli occupation has caused further impoverishment of Palestinian communities as they have been denied access to their lands and other natural resources. For example, access by Palestinians to both rangelands and ground water resources is limited to 15%, and bypass roads and land confiscation for Israeli settlements and security zones have removed land and other natural resources from use for the development of Palestinian communities. This situation has created serious constraints for the equitable sharing of natural resources, which, in turn has worsened the picture within Palestine, and has put further pressure on the diversity of biotic systems in Palestine.
- In the absence of a national government in Palestine between 1967 and 1994, a mix of economic and political considerations shaped Palestinian agricultural practices that adversely affected agro-biodiversity. In Gaza irrigated agriculture, for example, farmers shifted from fruit trees to high value cash crops such as strawberries and flowers: the area planted to citrus declined from 69,200 dunums in 1983 to 43,574 in 1996 (Isaac, 1998). In the rainfed areas of the West Bank, on the contrary, farmers shifted from field crops to the "improved" *Nabali* olive trees, which proved to be intolerant to drought, vulnerable to pests and diseases, and dependent on more water and agrochemicals. This trend, based mainly on a perception of insecurity of tenure in treeless lands, was not based on economic considerations as olives became a surplus product, while the food security suffered due to a reduction in staple crops.
- Another major threat to marine biodiversity in Gaza is a result of the extremely inequitable sharing in the benefits of marine biotic resources as Palestinian fishing communities are denied fair access. In addition, significant environmental pollution and habitat destruction in marine and coastal zones by Israeli settlements and other activities, have reduced potential economic and environmental benefits from both marine and coastal biodiversity.

Agenda for Action

Immediate Priority (implementation within *1*-5 years)

- Carry out participatory action research on the conservation of biodiversity and the actual or potential benefits and costs (e.g. damages by wildlife) it entails.
- Establish systems of collaborative management of natural resources, thus providing stakeholders with the possibility of negotiating the benefits they most value for the resources they are willing to help managing.
- Strengthen local capacity for maintaining and benefiting from crop and genetic diversity.
- Support efforts of indigenous people to maintain traditional systems of resource management and adapt them to modern pressures and conditions (e.g. support medicinal plant projects run by local communities)
- Encourage local communities to explore opportunities for developing a larger market share for domesticated products harvested sustainably.
- Establish equitable licensing/use arrangements for marine fishing, grazing and other uses of common biodiversity resources, balancing commercial and subsistence use.
- Include Palestinian rights and sovereignty over its biodiversity and the protection of its rights of intellectual property, particularly for the benefit of local communities.

Mid-term Priority (implementation within *6*-10 years)

- Establish "polluter pays" legislation to ensure that the cost for rehabilitation of damaged or impacted common biodiversity resources is not borne by subsistence users.
- Establish "developer pays" legislation to ensure that the cost of replacing lost common biodiversity resources is not borne by subsistence users.
- Manage ecotourism activities to ensure that they are sustainable, and that local communities are involved in ecotourism management and share in its benefits.
- Establish guidelines for the collection and export of genetic resources originating in Palestine, including equitable licensing arrangements and return technology transfer for materials used in pharmaceuticals or other biotechnology-based products.
- Promote recognition of the value of local knowledge and genetic resources and affirm local peoples' rights (especially of farmers).
- Promote the role of local communities in the management of wild lands, as well as, in stewardship of their natural resources as a whole.
- Include consideration of Palestinian rights and sovereignty over biodiversity-related issues in the international political agenda to ensure the integrity of ecological and natural resource management systems. This includes the adverse ecological impact of Israeli settlements in Palestinian lands as well as exploitation of ground water and other mineral resources, transportation schemes like bypass roads, tunnels, industrial and agricultural activities, interference with surface water regimes, and the impact of environmental pollution from local and transboundary Israeli sources on Palestinian ecosystems.

Long-term Priority (implementation > 10 years)

- Improve co-ordination and increase harmonisation of sector policies, programs and legislation in order to fill institutional gaps and reduce overlap.

Notes

The equitable sharing of biodiversity benefits within Palestine is pursued here mostly via the full participation of the Palestinian society (including indigenous communities, less privileged groups and women) in resource management systems. In this way, enhanced equity is combined with enhanced human dignity, and not limited to economic considerations.

Specifically, the promotion and support of multi-stakeholder meetings and collaborative management institutions promotes the active involvement of different social actors in management – which includes both the sharing of benefits and the sustaining of responsibilities. Economic incentives for sound resource management are also an important means to re-direct natural resource benefits in a more equitable way. Not less important is the equitable access of rural peoples, particularly, small farmers, landless, and indigenous people to land, water and forest resources and to productive technologies, financing, marketing, processing and distribution. Last but not least, in establishing protected areas the resident population needs to be involved and take part in decision making - including decision making on the allocation of economic and other benefits from the protected areas.

Potential Partners

Rural and indigenous communities, as well as the Palestinian Authority including PEnA (Palestinian Environmental Authority), MOA (Ministry of Agriculture), Ministry of Planning and International Co-operation, Palestinian NGOs, relevant international organisations (e.g. UNDP) and donors.

Objective 5: The development of Palestinian institutional and human resource capacity in the field of biodiversity

Threats and Constraints

- Many of the species of birds, mammals and other animals appearing in historic records and of great interest in Palestine are now either extinct or threatened as they are now registered in the IUCN Red List. This is due to a variety of threats and constraints on wildlife and their habitats in Palestine. These include urban expansion and Israeli settlements, lack of land-use policies, illegal and/or uncontrolled hunting and mistreatment of wildlife, degradation of habitat. The latter results from destruction of vegetation cover, wetlands, steppes, migratory grounds and routes, decrease in prey and food resources, lack of solid waste management, uncontrolled tourism, and unsustainable agricultural practices.
- There is a lack of human and technological capacity for biodiversity research, monitoring, documentation and policy and programme planning and implementation in Palestinian academic and research institutions, NGOs as the public and private sectors.
- Palestine is considered as one of the favourite countries for nature tourism and bird watching due to its species diversity. BirdLife International has defined 395 Important Bird Areas (IBAs) in the region, ten of which are located in Palestine. Much of the data related to birds and their habitats were compiled under the Israeli IBAs. Data are being updated, making it difficult to protect these areas properly.

Agenda for Action

Immediate Priority (implementation within *1*-5 years)

- Establish specialised training courses in natural resource management, focussing on plants and wildlife of major importance in Palestine and on participatory action research and collaborative management methods. This training will be fundamental to develop a Palestinian institutional and human resources capacity for protected area management. Field-based, problem-based learning should be emphasised. The target groups should include all stakeholders ranging from the local communities to research centres, the private sector, NGOs, and government institutions.
- Revise university curricula and establish courses and workshops to train local specialists (ecologists, taxonomists, botanists, agronomists, and social scientists), but also specialists in plants, invertebrates, fishes, amphibians, reptiles, birds and mammals, in the conservation and management of biodiversity. This training should include some understanding of indigenous knowledge and practices for biodiversity conservation and the sustainable use of natural resources.
- Develop training programmes in ecotourism (including business development for the tourist market).
- Enhance integration and co-ordination of policies, plans and legislation in relation to biodiversity conservation across the various sectors (fisheries, agriculture, rangeland management, protected areas, tourism, transport, etc.).

Mid-term Priority (implementation within *6*-10 years)

- Strengthen the influence and capacity of non-governmental conservation and development organisations to promote biodiversity conservation.

Long-term Priority (implementation within > 10 years)

- Revise career incentives provided by the Palestinian government to increase the attractiveness of work in biodiversity related areas.

Notes

Establishing a training centre focussing on practical, applied and participatory skills can support Palestinian human resource capacity in the field of biodiversity. Men and women should be trained. Opportunities in other countries should be taken advantage of, but not emphasised.

Potential Partners

The Palestinian Authority including Ministry of Education, PEnA (Palestinian Environmental Authority), Ministry of Planning and International Co-operation, Ministry of Information, Ministry of Tourism, relevant Palestinian environmental and community-based NGOs, the local communities, the private sector, relevant international organisations including UNDP, UNESCO, the World Bank, IUCN, Bird Life International, Wetlands International, the British Council, local and international universities such as Bethlehem University, Bir Zeit University, Al Quds University, and others.

Monitoring and Evaluation

The Logical Framework of BSAPP's goals and objectives provides the larger framework for monitoring and evaluating progress towards the BSAPP's objectives and -ultimately - its goal. More specific sets of targets and measurable performance indicators relating to each initiative in the plan will be developed as part of the BSAPP implementation process.

The following table outlines BSAPP's goals and objectives in a logical framework format that incorporates performance measures, assumptions and risks, and that provides a framework for monitoring and evaluating progress towards the BSAPP's objectives and ultimately its goal. It is intended that a more detailed set of targets and measurable performance indicators relating to each action agenda will be developed as part of the BSAPP implementation process, along the lines of the indicative targets and indicators listed below

Table 3: Logical Framework for BSAPP

BSAPP Goal and Objectives	Expected Benefit/Result	Performance Indicators	Assumptions / Risks
Goal: Conservation and sustainable use of biodiversity within the framework of national sustainable development efforts in Palestine.	The development of Palestine such that future generations have every opportunity to meet their needs.	Palestine's ranking on the UNDP Human Development Index.	Palestine obtains control over its own resources and remains committed to sustainable development.
Objective 1: The conservation of Palestine's biodiversity.	The future generations will enjoy the benefits of Palestine's biodiversity	Rate of loss of genes, species, habitats and ecosystems.	PA sees benefits and has political will and capacity to act.
Objective 2: The sustainable use of Palestine's biodiversity.	The future generations will have access to Palestine's biodiversity.	Rate of loss of genes, species, habitats and ecosystems, as well as rate of loss or gain of renewal resources such as top soil and available freshwater	PA sees benefits and has political will and capacity to act.
Objective 3: The enhancement of local knowledge and skills and the improvement of people's attitudes for the conservation of biodiversity and the sustainable use of biodiversity	A public aware of the importance of biodiversity and capable (in terms of knowledge, attitudes, skills and resources) to make sustainable resource use decisions.	Percent of general public and resource users acting appropriately in using biodiversity.	Alternatives to unsustainable resource uses and practices are available
Objective 4: The equitable sharing of biodiversity benefits within Palestine.	Fairer sharing of the costs and benefits of biodiversity conservation within the Palestinian society Increased incomes and livelihood opportunities for all Palestinians.	Income distribution among population segments and industries that are highly dependent on biodiversity. Percentage of people who support biodiversity conservation initiatives	Economic incentives are geared towards equity. The poor and under-privileged have opportunities to participate in decision-making. Benefits from technological uses of biodiversity are shared fairly in society.
Objective 5: The development of Palestinian institutional and human resource capacity in the field of biodiversity	Recognition and/or acquisition of the biological and social knowledge and skills needed to conserve biodiversity and utilise in a sustainable way the natural resources.	Number of specialists trained in specific knowledge and skills and employed in biodiversity-related initiatives increase by 10%.	Funding resources are available for training programs and staff hiring.

Table 4: Indicative BSAPP Workplan

Activities	1-15 Nov 98	15-30 Nov	1-15 Dec	15-31 Dec	1-15 Jan 99	15-31 Jan	1-15 Feb	15-29 Feb	1-15 Mar
Workshop to discuss semi-final draft and participatory implementation plan									
Further editing of BSAPP document Publication lay out and colour pages Contacts with UNDP and donors on capacity building activities and basic priority projects									
Copy-editing of document									
Final version of document ready for the printer; agreement on short term funding of capacity building activities and some priority project obtained or about to be obtained; organising of BSAPP Launching Meeting									
BSAPP Launching Meeting									
Organizing and funding capacity building activities.									
Intensive training of relevant government and NGO staff in participatory conservation skills									
Eco-social management units identified within all Palestinian-controlled territories									
Setting up a project to design an educational reform and biodiversity information system including an information centre and network									
Setting up a project to design a Palestinian biodiversity legislation initiative including the establishment of various categories of protected areas									
Setting up a project to design a biotechnology initiative (with emphasis on bio-safety)									
Setting up a project to design a desertification control initiative to monitor climate change and its impact on biological diversity									

Activities	15-30 Mar	1-15 Apr	15-30 Apr	1-15 May	15-30 May	1-15 June	15-30 June	1-15 July	15-31 July
First contacts with key actors in the various Sustainable Resource Management Units and distribution of the BSAPP document; Organisation of social communication campaigns in the Sustainable Resource Management Units									
Carrying out social communication campaigns (e.g. interactive radio and TV programs, events, fairs, discussion groups, endorsement by local leaders, etc.)									
Providing support to stakeholder organising, as appropriate and upon specific request									
Organising and facilitating multi-stakeholder meetings in all eco-social units; local priorities finalised, local partnerships for solution beginning to be set up									
As appropriate, furthering the technical capacities of Strategy Implementation Body and NGO staff in participatory skills (e.g. via participation in specific training, meetings, seminars)									
Begin designing a system of representative Protected Areas									
Setting up a project for biodiversity surveys of threatened, endangered and rare species, genetic varieties and habitats in Palestine									
Setting up a project for *ex-situ* conservation through establishment of a gene bank and botanical garden									
Setting up a project for national survey of indigenous knowledge for biodiversity conservation									

Activities	1-31 Aug	1-30 Sept	1-31 Oct	1-30 Nov	1-31 Dec	Year 2000	Year 2001	Year 2002	Year 2003
Supporting the establishment of local partnerships in the eco-social units;									
Supporting the preparation of simple projects, including: Habitat restoration (e.g. natural forests and groves, rangelands) through the use of indigenous knowledge and the reintroduction of locally extinct endemic species Collaborative management for conservation (both preservation and sustainable use) of biodiversity based resources Marine and coastal zone management including the *mawasi* system Pilot initiatives in the sharing of economic benefits from biodiversity conservation, (including eco-tourism Setting up local Protected Areas Elaboration of specific, participatory management strategies and action plans for *in situ* conservation of threatened, endangered and rare species, genetic varieties and habitats Related the above, *(*for both domesticated and wild varieties) to *ex-situ* conservation Preserving indigenous knowledge of biodiversity conservation									
Local projects examined and funded									
Local projects implemented									
Local projects monitored and evaluated									

Priorities for BSAPP Implementation

In November 1998, a semi-final draft of the Palestine National Biodiversity Strategy and Action Plan (BSAPP) was produced by a BSAPP Task Force and its Steering Committee as a result of a consultative process with technical working groups, extensive discussion with various actors in the Palestinian society, a review of available information sources and technical assistance from IUCN and UNDP-GEF. On the basis of this document, twelve priority areas have been identified for immediate attention:

1. Designing and setting up a system of representative **Protected Areas**
2. Palestinian **biodiversity surveys** and elaboration of specific, **participatory management strategies and action plans** for *in situ* conservation of threatened, endangered and rare species, genetic varieties and habitats
3. *Ex-situ* conservation through establishment of a **gene bank and botanical garden** related to the *in situ* conservation programme above for both domesticated and wild varieties
4. **Habitat restoration** with natural forests and groves, and rangelands including through the use of indigenous knowledge and the reintroduction of locally extinct endemic species
5. **Educational reform and information system** including a biodiversity information centre and network
6. Biodiversity **legislation** including various categories of protected areas
7. Understanding, surveying and preserving **indigenous knowledge** of biodiversity conservation
8. **Collaborative management** for conservation (both preservation and sustainable use) of biodiversity based resources
9. Biotechnology (with emphasis on **bio-safety**)
10. **Marine and coastal zone management** including the *mawasi* system
11. Pilot initiatives in the **sharing of economic benefits** from biodiversity conservation, (including eco-tourism)
12. **Desertification control** including monitoring climate change and its impact on biological diversity

As stated in the BSAPP Guiding Principles, the development of the BSAPP needs to be an on going, “learning by doing” experience, involving institutional actors as well as local communities and the private sector. The produced document should be seen as a baseline and a starting point that requires constant updating, preferably from primary sources, keeping in mind political and institutional concerns.

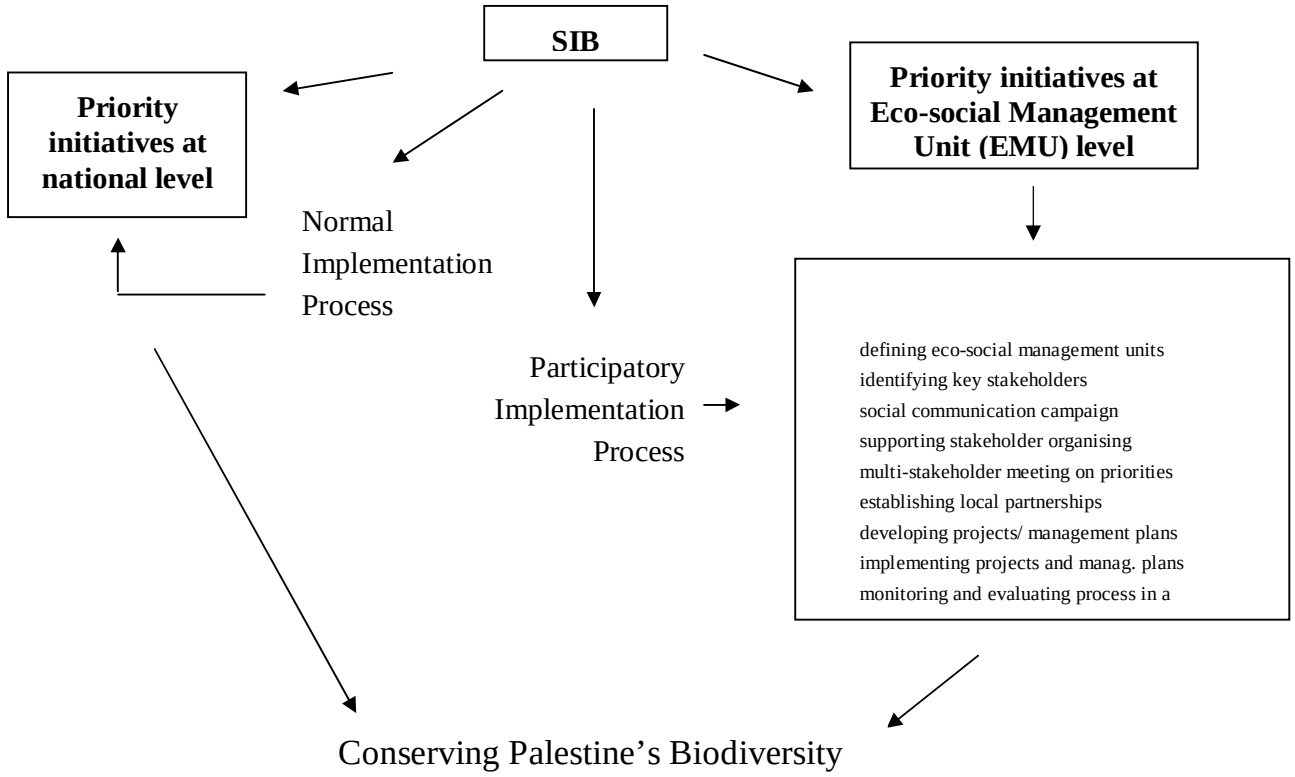
On the basis of these Guiding Principles, the priorities for action need to be made concrete with the full participation of various stakeholders in the Palestinian society and with due consideration to socio-political and environmental realities. In this way, the Biodiversity Conservation Strategy will enhance its meaningfulness and effectiveness, and will also become genuinely a "Palestinian” strategy.

Once the BSAPP is approved, the Strategy Implementation Body – including an Executive Arm and a Supervising Council) will take a different approach towards priorities that need to be tackled essentially at national level and priorities that need to be tackled essentially at the local (Sustainable Resource Management Unit) level. For the former, it will proceed to develop relevant initiatives and projects. For the latter, a Participatory Implementation Process will be pursued. For priorities that need to be responded via concerted action at national and local level, national initiatives and local participatory implementation processes will be pursued in an integrated way.

Priorities at Different Levels

Priorities at national level	**Educational reform and information system** including a biodiversity information centre and network
	Biodiversity **legislation** including various categories of protected areas
	Biotechnology (with emphasis on **bio-safety**)
	Desertification control including monitoring climate change and its impact on biological diversity
Priorities at local Sustainable Resource Management Unit level	**Habitat restoration** with natural forests and groves, and rangelands including through the use of indigenous knowledge and the reintroduction of locally extinct endemic species
	Collaborative management for conservation (both preservation and sustainable use) of biodiversity-based resources
	Marine and coastal zone management including the *mawasi* system
	Pilot initiatives in the **sharing of economic benefits** from biodiversity conservation, (including eco-tourism)
Priorities that need concerted action at national and local Sustainable Resource Management Unit level	Designing and setting up a system of representative **Protected Areas**
	Palestinian **biodiversity surveys** and elaboration of specific, **participatory management strategies and action plans** for *in situ* conservation of threatened, endangered and rare species, genetic varieties and habitats
	Ex-situ conservation through establishment of a **gene bank and botanical garden** related to the *in situ* conservation programme above for both domesticated and wild varieties
	Understanding, surveying and preserving **indigenous knowledge** of biodiversity conservation

Figure 2:Implementing National and Local Initiatives



Participatory Implementation Process

- Strategy Implementation Body will identify a number of Eco-social Management Units in Palestinian-controlled territories on the basis of both biodiversity-related considerations (e.g. encompassing a major ecosystem or necessary territory for the protection of a species) but also social considerations (encompassing the major social actors with interests and concerns on the territorial unit; feasibility of gathering all such actors) as well as management considerations (institutional mechanisms, etc.).

- For each sustainable resource management unit, the situation analysis and BSAPP document (including identified priorities) will be distributed to the key social actors within the Unit. The recipients will be asked to have a critical reading of the documents, identifying the points of convergence between the documents and their experiences, as well as the points of divergence and the missing considerations. (For social actors without familiarity with jargon-filled documents, some simple summary could be prepared and made available or even conveyed verbally or by videos; great care should be taken to present the documents as open and in need of input – including critical input – rather than as regulations coming from the government). With the document, an invitation will also be issued for a Sustainable Resource Management Unit-wide, multi-stakeholder meeting in which one or more priorities for action (or some new priorities, if this will be the consensus emerging from the group) will be tackled in detail and one or more initiatives will be designed to respond to those priorities.

- If a social actor will estimate to be in need of internal organising before being able to come to the meeting, Strategy Implementation Body – possibly via relevant NGOs - will support that process (both technically and financially, as appropriate).

- For each Sustainable Resource Management Unit, a first multi-stakeholder meeting will be organised for all relevant social actors willing to participate. The meeting will finalise a list of crucial priorities for the local conservation of biodiversity (on the basis of its unique opportunities and resources). In the meeting, the convened social actors will be invited to form appropriate partnerships to develop 'solutions' projects, as well as collaborative management agreements and institutions for the on-going, sustainable resource management units.

- Strategy Implementation Body will provide on-going assistance and support to the partnerships developed on the basis of the initial unit meetings and organises subsequent Sustainable Resource Management Unit meetings, as appropriate, at regular intervals. Such subsequent meetings and on-going support will result in a number of proposed initiatives and management plans that may require specific inputs (capacity building, technical support on specific issues, financing, etc.).

- Specific (simple and realistic) proposals – including an analysis of feasibility as well as expected environmental and social impacts - will be made to request such inputs. The proposals will be submitted – via Strategy Implementation Body – to a Fund to Support Biodiversity Conservation in Palestine, which will be set up by the appropriate interested donors. The Fund will judge as rapidly as possible on the merits of the proposals (final decision to be expected within a 3-month delay from presentation) and on the basis of a set of criteria to assure positive biodiversity conservation and social results in the spirit of the

strategy's objectives. The Fund will then disburse financial resources and organise technical assistance as necessary.

- The established local partnerships will implement the proposals with Strategy Implementation Body assisting in monitoring and on-going evaluation ("learning by doing").

The above **participatory implementation process** will be applied to any of the priorities for action identified as having particular relevance at local level, within one or a given Eco-social Management Unit (e.g. marine biodiversity in Gaza). It could also be applied for priorities that need to be responded to by concerted activities at national and local level. In this case, the activities outlined above will also be linked with activities at the national level.

Main results of the Participatory Implementation Process

- **More effective and sustainable initiatives** contributing to conserving biodiversity in Palestine.
- Greatly enhanced **ownership** of the Biodiversity Conservation Strategy **by the Palestinian society at large**, with a variety of social actors knowledgeable and engaged in biodiversity conservation activities.
- **Skills** to support participatory processes developed within Strategy Implementation Body (and among relevant NGO staff, as appropriate).

Essential assumptions/inputs of the Participatory Implementation Process

- Willingness of Strategy Implementation Body to consider the produced BSAPP document as a "working draft" in need of ample, on-going social discussion and confirmation;
- **Technical capacity to support the participatory implementation process** fully available to Strategy Implementation Body. This includes capacity to set up effective social communication campaigns, capacity to assist in organising and facilitating planning meetings and encouraging the proper utilisation of the participatory process (e.g. fostering active participation of all stakeholders; obtaining well-organised conclusions on the basis of a clear agenda and excellent facilitation; etc.), capacity to support monitoring and evaluation activities in a "learning by doing" mode, and so on. The development of such capacities may involve training of appropriate government and non-governmental staff in a number of practical skills, including:
    - multi-disciplinary situation analysis
    - identification of E analysis
    - social communication skills
    - support to stakeholder organising (in particular organising for environmental management and biodiversity-related initiatives)
    - facilitation of participatory planning workshops (including skills to manage conflicts in resource use and skills to assist developing negotiated solutions)
    - participatory monitoring and evaluation (with an emphasis on impact evaluation)

- Availability of **financial resources to support the participatory implementation process** (e.g. to support the organisation of some social actors, to hold meetings, to help in writing project proposals, etc.)
- Willingness of donors to set up a **Fund for the Implementation of the National Biodiversity Strategy and Action Plan in Palestine** - with flexible end utilisation balanced by rigorous criteria for approval of proposals and disbursement of financial resources.

National Biodiversity Strategy and Action Plan for Palestine

(BSAPP)

Part II:

PRIORITY INITIATIVES– PROJECT PROFILES

Part II. Priority Initiatives–Project Profiles

Based on the objectives and action plans of the BSAPP, a list of twelve priority initiatives and projects were elaborated by the Technical Working Group, Project Task Force and the Steering Committee, in consultation with the national and international institutions, including government, NGOs, academic and research institutions. These project profiles are presented in the following pages.

Table 5: Priority Initiatives (projects) for BSAPP

Name of project
1. Development and Management of a Palestinian Protected Areas System
2. Development of Management Plans/Structures in Designated Protected Areas based on Biodiversity Surveys and Inventories
3. Protecting and Using Traditional Indigenous Knowledge and Property Rights for Biological Diversity
4. Implementation of Biosafety Measures on Biotechnology in Palestine
5. Habitat Restoration (including rangelands, forests, sacred groves and integrated agro-ecosystems)
6. Collaborative Management of Biodiversity
7. Combating Desertification and Coping with the Adverse Effects of Climate Change
8. Elaborating and Enforcing a National Legislation/Legal Frameworks on Biodiversity
9. Establishing a Biodiversity Information and Social Education Centre
10. Promotion of Eco-tourism/Economical Aspects of Biodiversity
11. Coastal Zone Management in Gaza and the Dead Sea
12. Establishment of a Gene Bank in Palestine

1 Development and Management of a Palestinian Protected Areas System

Project Synopsis

Goal

Developing a representative system of protected areas in Palestine and setting up collaborative management agreements– as necessary– to assure their sustainability

Objective 1.

To develop management capacity for protected areas in Palestine.

Outputs

- An appropriate national agency or commission to co-ordinate the protected areas network in Palestine.
- A set of legislation, policies and regulations relevant for protected areas in Palestine (linked with Project 8, see below).
- Government staff and local stakeholders conversant with relevant issues and capable of collaborating for the effective management of protected areas.
- Sufficient financial resources dedicated to establishing the system of protected areas.

Activities

- PEnA and collaborating partners appoint a Working Group to carry out a study on the need, possible structure and feasibility of a national agency in charge of co-ordinating protected areas in Palestine.
- On the basis of the study result, the agency is set up and its staff is provided– as needed– with relevant training opportunities. The same opportunities are also offered to key protected area stakeholders in Palestine.
- The agency works in close collaboration with the Working Group/Unit in charge of project 8 to assure that relevant legislation, policy and regulations are developed and set into force.
- The agency develops and assures its own budget in support of developing the system of protected areas.

Objective 2.

To collect and manage the data and information required for developing a representative system of protected areas.

Outputs

- Appropriate ecological, social and environmental criteria and standards for a network of protected areas covering every biome represented in Palestine.
- A data bank and digitised GIS maps of existing and proposed protected areas in Palestine.
- A work plan for the establishment of the protected area network.
- Feasibility studies for the establishment and operation of each proposed protected area.

- Guidelines to establish collaborative management settings for protected areas in Palestine, on the basis of existing international guidelines, and including issues of participatory definition, negotiation of management agreements and "learning by doing" processes.
- Guidelines to establish a special category of "community protected areas" in Palestine to cover such areas as marine seasonal fishing sanctuaries, traditional rangeland enclosures (mahmiyyas), and in situ genetic reserves for improvement of agro-biodiversity.

Activities

- The agency in charge develops criteria and standards for a network of protected areas in Palestine.
- The agency in charge refines the selection of suitable sites starting with those proposed on the side, and are shown in Map(1).
- The agency in charge commissions participatory field studies and surveys of ecological, social, and economic aspects of proposed protected areas, including identifying key stakeholders for each site.
- For each site, the agency in charge organises meetings and workshops with local stakeholders to explore the opportunities, constraints and feasibility of its establishment, together with collaborative management agreements and institutions.
- The agency in charge collates the obtained information– including an update of data of Israeli and Jordanian origin– into a data bank, including digitised GIS maps of existing and proposed protected areas in Palestine.
- The agency in charge analyses the available literature and experiences– including lessons learned in protected areas from other countries– and develops Palestine-specific guidelines to establish collaborative management settings for protected areas– including the special category of community protected areas.

Objective 3.

To establish and manage effectively a system of protected areas in Palestine.

Outputs

- A body of relevant legislation, policy and regulations on protected areas promulgated and enforced.
- A network of at least one formal and one community protected area in each of the Palestinian biomes enjoying the on-going support of the agency in charge.
- Collaborative management agreements and institutions for each established protected area.
- A body of relevant knowledge and skills developed in a "learning by doing" mode while managing the protected areas, compiled with the support of the relevant co-ordinating agency.

Activities

- The agency in charge of co-ordinating the protected areas supports the relevant bodies and institutions to promulgate and enforce the relevant legislation, policy and regulations.

- The agency supports the process of negotiating and implementing collaborative management agreements in each protected area in the network, including a thorough search for economic and social incentives for local stakeholders.
- The agency maintains an active communication flow with and among the Palestinian protected areas, encouraging their "learning by doing" and the on-going monitoring and documentation of lessons learned.
- The agency provides on-going support, as needed, to the collaborative management institutions in each protected area.
- The agency formalises, as needed, the establishment of the network of protected areas in Palestine (e.g. by official promulgation, a public information campaign, etc.).

Duration

Five years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$	Year 5 US$
Staff					
Field Surveyors (5 Experts)	$65,000	$0	$0	$0	$0
Project Manager	$26,000	$26,000	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500	$19,500	$19,500
Support Staff (2)	$13,000	$13,000	$13,000	$13,000	$13,000
Driver	$6,500	$6,500	$6,500	$6,500	$6,500
Guards (12 Persons)	$62,400	$62,400	$62,400	$62,400	$62,400
Equipment					
Office Equipment	$35,000	$15,000	$10,000	$10,000	$10,000
Xerox Machine	$5,000	$5,000	$0	$0	$0
Furniture	$20,000	$15,000	$5,000	$5,000	$5,000
Car	$35,000	$35,000	$35,000	$0	$0
Stationary	$10,000	$5,000	$5,000	$5,000	$5,000
Field Equipment & Construction Work	$350,000	$75,000	$50,000	$30,000	$20,000
Training and Capacity Building					
Technical Training	$30,000	$20,000	$20,000	$20,000	$20,000

Management & Financial Training	$20,000	$10,000	$10,000	$5,000	$5,000
Community Training & Public Awareness	$100,000	$50,000	$25,000	$20,000	$20,000
Running expenses & Maintenance	$30,000	$30,000	$30,000	$30,000	$30,000
Sub-Total	$827,400	$387,400	$317,400	$252,400	$242,400
Total					**$ 2,027,000**

Table 6: Estimated Budget Breakdown for project 1

Proposed Partners

The Palestinian Authority (PEnA, Ministry of Agriculture), Palestinian NGOs, IUCN - The World Conservation Union, local stakeholders in all protected areas and surroundings, Donors/Funding Agencies (to be identified).

Proposed Protected Areas and National Parks in Palestine

Wadi Kareitoun

Wadi Al-Qilt

Al-Fashkha Spring

Um Al-Reehan

Wadi Al-Quf

Wadi Al-Baddan

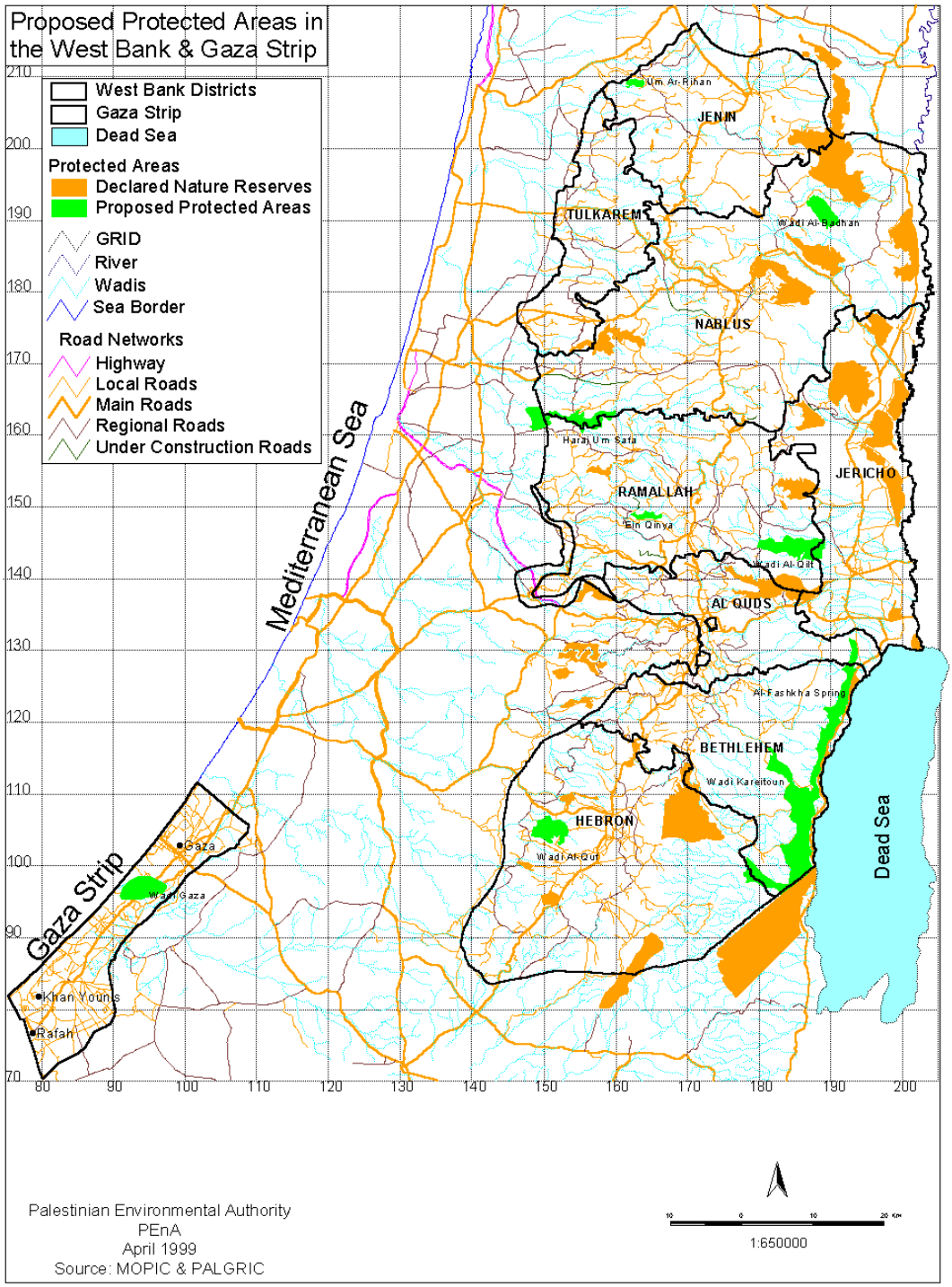
Qeenya Spring

Haraj Um Safa

Wadi Gaza

(Note: these proposed protected areas are shown in the map below.)

Map 1: Proposed Protected Areas in West Bank & Gaza Strip.



2. Development of Management Plans/Structures in Designated Protected Areas based on Biodiversity Surveys and Inventories

Project Synopsis

Goal

Appropriate management of biodiversity resources in Palestine's on the basis of an accurate and reliable biodiversity database.

Objective 1

Design and carry out the quantitative surveys and monitoring required for the sustainable management of Palestine's biodiversity.

Outputs

- Guidelines on Assessment and Monitoring of Biodiversity.
- Report of Palestine Biodiversity Baseline Survey.
- Computer-stored biodiversity database.
- Trained and experienced personnel in biodiversity assessment and monitoring (both government staff and local residents).

Activities

- PEnA and collaborating partners appoint a Biodiversity and Species Working Group to develop the guidelines of a comprehensive biodiversity baseline survey, focussing on areas of application, survey techniques and methods of data analysis and reporting
- The Working Group develops a survey and monitoring plan— including key indicator species, monitoring frequency and specific responsibilities— for periodic re-assessment of the state of biodiversity resources and comparison with the baseline survey results.
- The Working Group identifies the needed personnel (government staff and local residents) and provides them with training opportunities as “biodiversity technicians”.
- The Working Group and the trained “biodiversity technicians” carry out the Biodiversity Baseline Survey, develop the relevant reports, and — at the specified monitoring intervals— re-assess the state of biodiversity.
- The Working Group provides to store and maintain the biodiversity data in a national database system readily accessible to user groups (linkage with Project 9: Biodiversity Information and Social Education Centre)

Objective 2

On the basis of quantitative biodiversity data, develop species management plans for endangered species, economically important species, migratory species and key indicator species.

Outputs

- Documentation of endangered species, economically important species, migratory species and key indicator species in Palestine.
- Special assessment reports for a sub-set of “focus species” from the lists developed

- Active exchanges of information with relevant international networks on biodiversity and the focus species.
- Management plans for all the identified focus species.
- Baseline and monitoring reports (with lessons learnt in management) for all the focus species.

Activities

- The Biodiversity and Species Working Group— in collaboration with the biodiversity technicians and the relevant local communities— identifies the Palestinian plant and animal species that deserve/require specific management attention (e.g. because they are endangered, economically important, migratory and/or key indicator).
- The Working Group— in collaboration with the biodiversity technicians and the relevant local communities— compiles the baseline survey information for the identified species and information from all surrounding countries. It then selects a sub-set of "focus species" to manage with particular attention.
- The Working Group establishes information linkages with the relevant IUCN Species Survival Commission Specialist Groups and other technical networks
- The Working Group— in collaboration with relevant stakeholders — prepares, reviews and adopts species management plans
- The responsible bodies begin implementing and monitoring the species management plans.
- The Working Group supports the development of legislation, policy and regulations in support of the management plans (Link with Project 8: Elaborating and Enforcing a National Legislation/Legal Frameworks on Biodiversity)

Duration

Three years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$
Staff			
Project Manager	$ 26,000	$ 26,000	$ 26,000
Assistant Manager	$ 19,500	$ 19,500	$ 19,500
Short-term Consultant	$ 30,000	$ 15,000	$ 15,000
Technical Staff (5 Persons)	$ 60,000	$ 60,000	$ 60,000
Support Staff (3)	$ 19,500	$ 19,500	$ 19,500
Driver	$6,500	$6,500	$6,500
Equipment			
4-WD	$ 35,000	$ 0	$ 0
Office Equipment	$ 40,000	$ 10,000	$ 5,000

Field Equipment	$ 35,000	$ 10,000	$ 10,000
Maintenance	$30,000	$35,000	$40,000
Training			
Regional/International Training	$ 35,000	$ 35,000	$ 35,000
Local Training	$ 20,000	$ 15,000	$ 10,000
Awareness, Conferences, Workshops	$ 30,000	$ 30,000	$ 30,000
Study tours, Visits	$ 20,000	$ 15,000	$ 15,000
Operational Costs			
Extension material	$ 40,000	$ 20,000	$ 20,000
Communication Unit	$ 20,000	$ 20,000	$ 20,000
Reporting / Evaluation			
Reporting and Publication	$ 25,000	$ 15,000	$ 15,000
Project Monitoring/evaluation	$15,000	$15,000	$15,000
Sub-Total	**$ 506,500**	**$ 366,500**	**$ 361,500**
Total			**$1,234,500**

Table 7: Estimated Budget Breakdown for Project 2

Proposed Partners

The Palestinian Authority (PEnA, Ministry of Agriculture), Palestinian NGOs, Local Communities, International Conservation Organisations, Donor/Funding Agency (to be identified).

3. Protecting and Using Traditional Indigenous Knowledge and Property Rights for Biological Diversity

Project Synopsis

Goal

To understand, respect and apply the Indigenous Natural Resource Management Systems still existing in Palestine for the benefits of both local biodiversity and the Palestinian people.

Objective 1

To study and assess— in a participatory way— the indigenous natural resource management systems existing in Palestine.

Outputs

An encyclopedic databank that integrates both modern and indigenous knowledge in rangeland management.

Activities

- PEnA and collaborating partners appoint a Indigenous Management Systems Working Group to carry out an assessment of traditional knowledge, skills, technologies and institutions in the management of natural resources. The assessment makes use of techniques commonly utilised in participatory action research and participatory rural appraisal (PRA) studies. Particular emphasis is given on:
- Decision-making in nomadic pastoral societies on carrying capacity, population density, flock composition, estimation of seasonal rainfall and agricultural/livestock productivity, (high relevance for new "modern" rangeland classification schemes);
- Approaches and techniques for the protection and rehabilitation of rangelands (e.g. hema, mahjar, mahmiyya, qoroq, etc.);
- Decisions on migratory routes for rangeland protection and sustainable use (including patterns of interdependence of different natural resource use systems, such as pastoral nomadic, transhumant, settled grazing and farming);
- Uses of rangeland species of animals and plants (e.g., gum, vegetable dyes, herbal medicines);
- Systems of local ethnobotany *vis-a-vis* modern taxonomies
- Water harvesting techniques and coping strategies against drought and desertification in rangelands and watershed basins
- The Working Group compiles a report highlighting the relevance of indigenous systems for the management of natural resources in Palestine.

Objective 2

To diffuse and promote the utilisation of the acquired knowledge among policy makers, natural resource managers and other relevant stakeholders.

Outputs

- Palestinian natural resource managers and other stakeholders informed of the relevance of Indigenous Natural Resource Management Systems and assisted to incorporate their contributions to modern management practices.
- Indigenous Natural Resource Management Systems strengthened by direct and indirect

incentives

Activities

- The Working Group for this project organises and implements a social communication campaign (possibly including radio and TV programs, initiatives at religious gatherings, "cultural pride days" in schools, etc.(to diffuse the results of the assessment study of Indigenous Natural Resource Management Systems in Palestine.
- The Working Group promotes the strengthening of existing traditional resource management systems via direct incentives (e.g. financial support and credit, exchange visits) and indirect incentives (e.g. better recognition in society).
- The Working Group and other relevant authorities offer a number of incentives for the adoption of effective elements of traditional knowledge, skills, technologies and institutions into management practices in Palestine

Duration

Three years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$
Staff			
Project Manager	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500
Short-term Consultants	$20,000	$15,000	$0
Technical Staff (3)	$26,000	$26,000	$26,000
Support Staff	$13,000	$13,000	$13,000
Driver	$6,500	$6,500	$6,500
Equipment			
Office Equipment	$35,000	$15,000	$5,000
Field Equipment	$50,000	$25,000	$15,000
Training			
Regional Training	$35,000	$15,000	$10,000
Local Training	$25,000	$15,000	$10,000
Awareness, Workshops	$30,000	$30,000	$30,000
Study Tour	$10,000	$10,000	$10,000

Operational Costs			
Extension Material	$25,000	$10,000	$0
Communications	$10,000	$10,000	$10,000
Local Travel	$7,000	$7,000	$7,000
Reporting/Evaluation			
Reporting and Publications & Project Evaluation	$20,000	$15,000	$15,000
Sub-Total	**$358,000**	**$258,000**	**$203,000**
Total			**$819,000**

Table 8: Estimated Budget Breakdown for Project 3

Proposed Partners

The Palestinian Authority (MOA, PEnA, Ministry of Education and Higher Education), International and Palestinian NGOs, Traditional Elders, Local Communities, Donor/ Funding agencies (to be identified).

4. Implementation of Biosafety Measures on Biotechnology in Palestine

Project Synopsis

Goal

Ensuring safety in biotechnology development, application, exchange and transfer through international agreements on risk assessment and management.

Objective 1

To identify the potential contributions of Biotechnology in conserving biodiversity in Palestine.

Outputs

- A database on biotechnology in Palestine.
- A report on the potential contributions of Biotechnology to biodiversity conservation in Palestine.

Activities

- PEnA and collaborating partners appoint a Bio-safety Working Group to carry out a survey of centres of biotechnology in Palestine, including an analysis of their capacities and effective contributions in enhancing food security; rendering agricultural practices more sustainable; managing crops, pests and diseases; improving plant and animal breeding; supporting the rehabilitation of degraded ecosystems and landscapes; improving the storage of seed, plant material and DNA storage.
- The Working Group identifies the existing bio-technology expertise (individuals, firms, organisations, research institutions, etc.) and assesses the status of legislation concerning biotechnology production in Palestine
- On the basis of the carried out analyses, the Working Group compiles a report on the potential contributions of biotechnology to biodiversity conservation in Palestine.

Objective 2

To identify and manage the potential risks of biotechnology in Palestine.

Outputs

- Reports on the impacts of biotechnology in Palestine.
- Regulations/Guidelines on biotechnology safety procedures.
- Increased human capacity for biotechnology safety in Palestine.

Activities

- The Bio-Safety Working Group (in collaboration with existing biotechnology expertise in Palestine and abroad) carries out a study of the potential environmental, health, economic and social impact of biotechnology in Palestine including a special emphasis on biodiversity impact.
- The Bio-Safety Working Group and the authorities in charge (in collaboration with international or other expert bodies and on the basis of internationally agreed measures(compile and develop a framework of biotechnology safety principles for Palestine.

- The Bio-Safety Working Group (in collaboration with existing bio-technology expertise in Palestine and abroad and on the basis of the safety principle for Palestine (develops a set of biotechnology safety regulations (e.g. in the application of biotechnology in agriculture, environmental management, human health and animal husbandry) including controlling measures for the production and distribution (border control) of biological ex situ products.
- The Bio-Safety Working Group and the authorities in charge establish an on-going co-operation with competent international organisations to receive immediate assistance in cases of emergencies that may arise in conjunction with the use of biotechnology products.
- The Bio-Safety Working Group promotes and supports training programmes for government and non-governmental staff on the safe application of biotechnology and on the developed principles and regulations for Palestine.

Duration

Three years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$
Staff			
Project Manager	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500
Short-term Consultant	$30,000	$30,000	$20,000
Technical Staff (3)	$26,000	$26,000	$26,000
Support Staff	$6,500	$6,500	$6,500
Equipment			
Vehicle	$32,000	$0	$0
Office Equipment	$35,000	$20,000	$10,000
Field Equipment	$55,000	$25,000	$15,000
Training			
Regional / InternationalTraining	$30,000	$30,000	$30,000
Local Training	$25,000	$25,000	$25,000
Awareness, Conferences, Workshops	$40,000	$40,000	$40,000
Operational Costs			
Extension material	$20,000	$10,000	$10,000

Communication	$10,000	$10,000	$10,000
Reporting / Evaluation			
Reporting and Publication	$20,000	$20,000	$15,000
Project evaluation	$10,000	$10,000	$10,000
Sub-Total	$385,000	$298,000	$263,000
Total			**$946,000**

Table 9: Estimated Budget Breakdown for Project 4

Proposed Partners

Palestinian Authority including Ministry of Education, Ministry of Agriculture (MOA), Palestinian Environmental Authority (PEnA), all existing biotechnology centres in Palestine, formal and informal biotechnology experts, International biotechnology centres, Palestinian NGOs, Donor/ funding agencies, Local community including Farmers.

5. Habitat Restoration (including rangelands, forests, sacred groves and integrated agro-ecosystems)

Project Synopsis

Goal

To restore degraded habitats in Palestine including rangelands, forests and wetlands of particular biodiversity, socio-cultural (e.g. sacred groves) and/or economic significance.

Objective 1

To survey distinct habitats in Palestine, including their current ecological conditions and biodiversity, socio-cultural and/or economic significance.

Outputs

A report on existing environmental habitats in Palestine.

Activities

- PEnA and collaborating partners appoint a Habitat Working Group to carry out a study on different ecosystems in Palestine, including their conditions, uses, and socio-cultural and economic significance.
- The Working Group for this project analyses in particular the correlation between species diversity and the status of the identified habitats/ ecosystems (linking with project 2: Development of Management Plans/Structures in Designated Protected Areas based on Biodiversity Surveys and Inventories).

Objective 2

To restore and effectively manage natural ecosystems and habitats identified as having particular biodiversity and/or socio-cultural and economic significance in Palestine.

Outputs

Action plans developed and implemented to restore and manage at least five sites encompassing habitats/ecosystems of particular significance in Palestine (e.g. rangelands, natural and man-made forests, wetlands).

Activities

- In each identified habitat of particular significance, the Working Group supports a series of meetings by which the relevant stakeholders develop suitable plans for environmental restoration and management, also on the basis of incentives and conditions facilitated by the Working Group and other relevant Palestinian authorities (Linking with Project 6: Collaborative Management of Biodiversity; Project 7: Combating Desertification and Coping with the Adverse Effects of Climate Change; and Project 10: Promotion of Eco-tourism/Economical Aspects of Biodiversity).
- The relevant stakeholders in co-operation with the Working Group and other actors in the Palestinian society, implement the action plans beginning with a variety of restoration measures.

Duration

Five years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$	Year 5 US$
Staff					
Project Manager	$26,000	$26,000	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500	$19,500	$19,500
Short-term Consultants	$10,000	$10,000	$5,000	$5,000	$5,000
Technical Staff (2)	$26,000	$26,000	$26,000	$26,000	$26,000
Support Staff	$10,400	$10,400	$10,400	$10,400	$10,400
Driver	$6,500	$6,500	$6,500	$6,500	$6,500
Equipment					
4WD	$35,000	$35,000	$0	$0	$0
Office Equipment	$25,000	$15,000	$15,000	$10,000	$10,000
Field Equipment	$40,000	$20,000	$15,000	$10,000	$10,000
Training					
International Training	$30,000	$25,000	$20,000	$20,000	$20,000
Local Training	$25,000	$25,000	$20,000	$20,000	$0
Awareness, Workshops	$30,000	$30,000	$30,000	$30,000	$30,000
Study Tour	$15,000	$15,000	$15,000	$10,000	$10,000
Operational Costs					
Extension Material	$30,000	$15,000	$15,000	$15,000	$10,000
Local Travel	$10,000	$10,000	$10,000	$10,000	$10,000
Communications	$10,000	$10,000	$10,000	$10,000	$10,000
Running Expenses & Maintenance	$6,000	$7,000	$8,000	$9,000	$10,000
Reporting/Evaluation					

Reporting and Publications	$25,000	$25,000	$25,000	$25,000	$25,000
Project Evaluation	$15,000	$15,000	$15,000	$15,000	$15,000
Sub-Total	$394,400	$345,400	$291,400	$277,400	$253,400
Total					**$1,562,000**

Table 10: Estimated Budget Breakdown for Project 5

Proposed Partners

The Palestinian Authority (MOA, PEnA, Ministry of Education and Higher Education), International and Palestinian NGOs, Palestinian Businesses Donor/ Funding agencies, and local communities.

6. Collaborative Management of Biodiversity in Palestine

Project Synopsis

Goal

To ensure the effective and sustainable management of Palestine's biodiversity.

Objective 1

To identify and analyse a number of sites of biodiversity where stakeholders need to participate and assume responsibilities in the management of water, rangeland, forest, farmland, wildlife and fishery resources.

Outputs

Selected sites where it is found necessary and feasible to evolve pilot collaborative management agreements and institutions.

Activities

- PEnA and collaborating partners appoint a Working Group on Collaborative Management to select a number of sites and ecosystems whose effective management requires the contribution and responsabilisation of a variety of partners/ institutional actors/ stakeholders (Linkage with project 2: Development of Management Plans/Structures in Designated Protected Areas based on Biodiversity Surveys and Inventories and project 11: Coastal Zone Management in Gaza and the Dead Sea).
- The Working Group for this project promotes and supports a local participatory analysis of biodiversity resources in the selected sites, including an evaluation of their evolving trends. The analysis includes the identification of all main stakeholders for the natural resources under consideration, a discussion of the "acceptability" of the natural resources trends by all such stakeholders and a specification of the conditions and forms of support by which they all would be capable and willing to collaborate and assume management responsibilities.
- The Working Group reviews the feasibility of obtaining / providing the condition and forms of support required to develop effective collaborative management schemes in the selected sites.

Objective 2

To support the development of collaborative management agreements and institutions in at least six selected sites in Palestine (pilot collaborative management sites).

Outputs

Multi-stakeholder collaborative management agreements and institutions in at least six identified pilot sites.

Activities

- In each sleeted pilot site, the Working Group supports a series of meetings by which the stakeholders— with the support of a professional facilitator— identify a common vision for the future of the natural resources at stake. The visions are legitimised by a socio-culturally appropriate rituals and ceremony.

- In each sleeted pilot site, the stakeholders negotiate management agreements over the options and practices by which their agreed vision is approached. In the agreements, the stakeholders define a clear share of management functions, benefits and responsibilities among themselves (also on the basis of incentives and conditions facilitated by the technical working group).
- The stakeholders in each pilot site negotiate the establishment of one or more multi-stakeholder institutions (management boards, advisory councils, etc.) in charge of implementing and/or advising on the management of the natural resources at stake.

Objective 3

To develop human resources (government and NGO staff as well as private individuals) capable of promoting and facilitating collaborative management initiatives in Palestine.

Outputs

- Governmental and non-governmental personnel capable of assisting/ facilitating collaborative management processes.
- A set of lessons learned in developing collaborative management agreements and institutions, collated and summarised in an action-oriented publication (Collaborative Management in Palestine: Lessons Learned and Tools for Action).

Activities

- On the basis of the lessons learned in the pilot collaborative management sites and other relevant management environments (e.g. protected areas and habitats; see Projects 1: Development and Management of a Palestinian System of Protected Areas and 11. Coastal Zone Management for Gaza and the Dead Sea), the Working Group and various local stakeholders review the conditions and forms of support that facilitated the establishment of effective collaborative management initiatives.
- On the basis of identified lessons and needs, the Working Group promotes learning experiences (e.g. formal training, exchange visits, workshops) for government and non-governmental personnel willing to assist and facilitate collaborative management processes.
- The Working Group maintains an active information network among the pilot Collaborative Management sites and other relevant sites (e.g. protected areas) in Palestine to monitor and evaluate the agreements and institutions, distil and exchange lessons learned and promote— as needed— relevant changes in policy and practice.
- The Working Group commissions a summary of lessons learned into a publication (Collaborative Management in Palestine: Lessons Learned and Tools for Action) which is widely circulated in draft stage and finalised with the contributions of a variety of policy makers and field practitioners.

Duration

Four years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$
Staff				
Project Manager	$26,000	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500	$19,500

Short-term Consultant	$15,000	$15,000	$15,000	$0
Technical Staff	$26,000	$26,000	$26,000	$26,000
Support Staff	$10,400	$10,400	$10,400	$10,400
Driver	$6,500	$6,500	$6,500	$6,500
Equipment				
4-WD	$35,000	$3,500	$0	$0
Office Equipment	$25,000	$15,000	$10,000	$10,000
Field Equipment	$35,000	$25,000	$10,000	$10,000
Remote Sensing (GPS, GIS)	$55,000	$30,000	$20,000	$15,000
Training				
International Training	$35,000	$35,000	$20,000	$15,000
Local Training	$25,000	$25,000	$25,000	$25,000
Awareness, Conferences, Workshops	$30,000	$30,000	$30,000	$30,000
Study tours, Visits	$15,000	$15,000	$15,000	$15,000
Operational Costs				
Fencing	$25,000	$10,000	$0	$0
Terracing	$15,000	$15,000	$15,000	$15,000
Extension material	$20,000	$20,000	$10,000	$10,000
Communication	$10,000	$10,000	$10,000	$10,000
Reporting / Evaluation				
Reporting and Publication	$15,000	$15,000	$20,000	$20,000
Project evaluation	$15,000	$15,000	$15,000	$15,000
Running Expenses	$15,000	$15,000	$15,000	$15,000
Sub-Total	$473,400	$381,900	$318,400	$293,400
Total				**$1,467,100**

Table 11: Estimated Budget Breakdown for Project 6

Proposed Partners

The Palestinian Authority (PEnA, government agencies responsible for the natural resources at stake), Palestinian NGOs, Local Communities, International Conservation Organisations, Donor/Funding Agency (to be identified)

7. Combating Desertification and Coping with the Adverse Effects of Climate Change

Project Synopsis

Goal

To prevent land degradation and desertification in Palestine, and to reverse their trends, wherever possible. When such processes are related to climate change, to cope with them in the most effective way.

Objective 1

To understand the processes leading to land degradation and desertification in Palestine, and set up a system to monitor them in an on-going way.

Outputs

- A report analysing the phenomena of land degradation and desertification in Palestine and the natural and man-made processes at their roots (including(as applicable(climate change).
- A monitoring system in place to measure and assess land degradation and desertification phenomena in Palestine.

Activities

- PEnA and collaborating partners appoint a Land Degradation and Desertification Working Group composed of both expert professionals and farmers/ herders who maintain a daily relationship with land resources and their trends - to carry out an analysis of natural phenomena and human activities with a known adverse impact on land quality (e.g. diminished soil fertility, pollution, land degradation, desertification) in Palestine.
- The Working Group establishes a system to monitor land degradation and desertification phenomena, as well as the social, biological and climatic processes understood to be at their roots.

Objective 2

To harness all the available resources in the Palestinian society to combat and, wherever possible, reverse land degradation and desertification processes.

Outputs

- Workplans and agenda highlighting practical steps to combat desertification

Activities

- On the basis of the understanding of causes, processes and trends of land degradation and desertification in Palestine, the Working Group identifies the specific environments most in need of attention and action, and organises a series of meetings to discuss the issues at stake with all relevant stakeholders.
- On the basis of the discussions with the relevant stakeholders, the Working Group assists in developing at least three local plans to combat land degradation and desertification (likely including a variety of measures, from social communication campaigns to land rehabilitation efforts. For processes of land degradation and desertification caused by large-scale climatic change, the Working Group assist in developing plans to cope at best with the negative consequences. (Linking with

Project 6: Collaborative Management of Biodiversity and project 5: Habitat Restoration (including rangelands, forests, sacred groves and integrated agro-ecosystems).

- The Working Group promotes policies to mandate an environmental impact assessment study for all development plans in Palestine (e.g., in the realm of industry, agriculture, transportation) and ensure that precautionary measures and environmental standards are enforced and respected for the specific prevention of land degradation and desertification (Linking with project 8: Elaborating and Enforcing a National Legislation/Legal Frameworks on Biodiversity).

Duration

Four years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$
Staff				
Project Manager	$26,000	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500	$19,500
Short-term Consultants	$20,000	$20,000	$20,000	$20,000
Technical Staff (2)	$26,000	$26,000	$26,000	$26,000
Support Staff	$10,400	$10,400	$10,400	$10,400
Driver	$6,500	$6,500	$6,500	$6,500
Equipment				
4WD	$35,000	$35,000	$0	$0
Office Equipment	$35,000	$10,000	$10,000	$10,000
Field Equipment	$30,000	$30,000	$20,000	$15,000
Training				
International Training	$30,000	$30,000	$20,000	$20,000
Local Training	$25,000	$25,000	$20,000	$20,000
Awareness, Workshops	$30,000	$30,000	$30,000	$30,000
Study Tour	$15,000	$15,000	$10,000	$10,000
Operational Costs				
Extention Material	$15,000	$15,000	$10,000	$10,000
Communications	$7,000	$7,000	$7,000	$7,000

Local Travel	$7,000	$7,000	$7,000	$7,000
Reporting/Evaluation				
Reporting and Publications	$15,000	$15,000	$20,000	$20,000
Project Evaluation	$5,000	$5,000	$8,000	$10,000
Sub-Total	$357,400	$332,400	$270,400	$267,400
Total				**$1,227,600**

Table 12: Estimated Budget Breakdown for Project 7

Proposed Partners

The Palestinian Authority (Ministry of Agriculture, PEnA, Ministry of Local Government, Ministry of Industry and Trade, Water Authority, Ministry of Transport, Ministry of Education and Higher Education), Palestinian NGOs, Donor/ Funding Agencies, and Local Communities.

8. Elaborating and Enforcing a National Legislation / Legal Frameworks on Biodiversity

Project Synopsis

Goal

Ensuring an adequate and effective legal, policy and regulatory environment for the conservation, rehabilitation and sustainable use of biodiversity in Palestine.

Objective 1

To asses existing laws, policies and regulations for biodiversity and related natural resources, and develop new ones, as appropriate.

Outputs

- Assessment report of relevant existing laws, policies and regulations, including customary laws with gaps and specific needs clearly identified.
- Report on existing types of entitlements in biodiversity and natural resources management in Palestine.
- Drafts of legislation, policies and regulations governing biodiversity conservation, rehabilitation and sustainable use, on the basis on the identified gaps and needs with full consideration of customary law.
- Clear procedures for productive relationships among stakeholders in collaborative management settings.

Activities

- PEnA and collaborating partners set up a National Biodiversity Legal Committee to oversee the process and carrying out the tasks.
- The Committee reviews and assess the existing laws, policies and regulations related to biological diversity (Linkage with project 4: Implementation of Biosafety Measures on Biotechnology in Palestine).
- The Committee reviews and assesses existing laws, policies and regulations related to biological diversity (Linking with project 4. Implementation of Biosafety Measures on Biotechnology in Palestine).
- The Committee supervises the compilation of customary laws related to biological diversity by expert professionals in collaboration with relevant communities (Linking with Project 3: Protecting and Using Traditional Indigenous Knowledge and Property Rights for Biological Diversity).
- The Committee identifies legal and regulatory gaps and drafts relevant legislation and policies, including a clear legal basis for collaborative management settings and other urgently needed national programmes

Objective 2

To build capacities to co-ordinate, integrate and implement biodiversity-related laws, policies and regulations.

Outputs

- A body of legal professionals, legislators, government staff and private citizens fully conversant with the rules regulating biodiversity-related conservation and use in Palestine.
- Institutions with specific capacity and responsibility to apply and enforce biodiversity-related rules in Palestine.

Activities

- Training human resources (legal professionals, legislators, government staff and private citizens) in both customary and formal legal aspects of biodiversity
- Identifying and strengthening and/or developing institutions with the specific mandate to enforce biodiversity-related laws, polices and regulations.
- Monitoring some pilot implementation of the new laws, policies and regulations in a "learning by doing" mode, allowing the experience to feed back into and improve the draft rules.

Duration

Three years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$
Staff			
Project Manager	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500
Short-term Consultants	$15,000	$15,000	$15,000
Technical Staff (1)	$13,000	$13,000	$13,000
Support Staff	$10,400	$10,400	$10,400
Driver	$6,500	$6,500	$6,500
Equipment			
Office Equipment	$20,000	$10,000	$5,000
Training			
Regional/International Training	$25,000	$25,000	$25,000
Local Training	$25,000	$25,000	$25,000
Awareness, Workshops	$30,000	$30,000	$30,000
Operational Costs			
Communications	$10,000	$10,000	$10,000

Extension Material	$10,000	$10,000	$10,000
Local Travel	$7,000	$7,000	$7,000
Running Expenses	$10,000	$10,000	$10,000
Reporting/Evaluation			
Reporting and Publications	$25,000	$25,000	$35,000
Project Evaluation	$7,000	$7,000	$7,000
Sub-Total	$259,400	$249,400	$254,400
Total			**$763,200**

Table 13: Estimated Budget Breakdown for Project 8

Proposed partners

The Palestinian Authority (PEnA, MOA, Palestinian Legislative Council, Security and Court System, etc.), Palestinian and international NGOs, Donor/ Funding Agencies, and Local Communities.

9. Establishing a Biodiversity Information and Social Education Centre

Project Synopsis

Goal

Enhancing awareness of biodiversity issues and capacity to deal with them among key practitioners, stakeholders and the public at large in the Palestinian society.

Objective 1

To establish and manage a Biodiversity Information and Learning Centre (BILC) to serve as focal point for collecting and diffusing information and building capacity on biodiversity issues in the Palestinian society

Outputs

- A Biodiversity Information and Learning Centre, lightly staffed but well-linked with a variety of human and institutional resources– both professional and community-based– available in Palestine and abroad.
- A series of information and training activities provided by the BILC to match the needs of Palestinian society, including a national biodiversity GIS and specific learning programmes and modules for governmental staff and the public at large.

Activities

- PEnA identifies and appoints a small multi-disciplinary team in charge of developing and managing the BILC. The team will include professionals in biological as well as social and communication sciences.
- The team sets up the BILC on the basis of both an accurate assessment of needs (e.g. biodiversity learning needs of government employees at various levels) and a feasibility analysis (available human and financial resources).
- The BILC gathers and diffuses biodiversity information, on the basis of a social communication plan including community-based mutual learning workshops.
- The BILC collates biodiversity information and organises it in the form of accessible databases and a biodiversity GIS facility, as needed.
- The BILC develops and offers a variety of learning modules and programmes for both governmental and NGO staff and the public at large.
- The BILC collaborates with other institutions in Palestine (e.g. Universities and research centres as well as NGOs and community-based and private businesses) to promote biodiversity-related initiatives and projects (including profit-generating projects).
- The BILC actively seeks its own funding sources to continue providing its service beyond the initial funding period.

Duration

Four years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$
Staff				
Project Manager	$26,000	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500	$19,500
Short-term Consultants	$15,000	$15,000	$0	$0
Support Staff	$10,400	$10,400	$10,400	$10,400
Driver	$6,500	$6,500	$6,500	$6,500
Equipment				
4WD	$35,000	$35,000	$0	$0
Office Equipment	$25,000	$10,000	$10,000	$10,000
Field Equipment	$45,000	$10,000	$10,000	$10,000
Training				
Regional Training	$20,000	$20,000	$10,000	$10,000
Local Training	$25,000	$25,000	$25,000	$25,000
Awareness, Workshops	$30,000	$30,000	$30,000	$30,000
Study Tour	$7,000	$7,000	$7,000	$7,000
Operational Costs				
Communications	$10,000	$10,000	$10,000	$10,000
Local Travel	$7,000	$7,000	$7,000	$7,000
Extension Material	$15,000	$15,000	$10,000	$10,000
Reporting/Evaluation				
Reporting and Publications	$20,000	$20,000	$15,000	$15,000
Project Evaluation	$5,000	$5,000	$7,000	$10,000
Sub-Total	$321,400	$271,400	$203,400	$206,400
Total				**$1,002,600**

Table 14: Estimated Budget Breakdown for Project 9

Proposed partners

The Palestinian Authority (PEnA, MOA, Palestinian NGOs, farmers, Bedouins and fishing folks organisations; universities, women's groups).

10. Promotion of Eco-tourism/Economical Aspects of Biodiversity

Project synopsis

Goal

Promoting the conservation (preservation and sustainable use) of biodiversity in Palestine through appropriate and effective social and economic incentives.

Objective 1

To analyse the existing social and economic values of biodiversity as part of the traditional knowledge systems and practices of local communities, as well as the perception and practices of other relevant social actors in Palestine.

Outputs

A report on potential social and economic incentives for biodiversity conservation (including preservation and sustainable use) in Palestine.

Activities

- PEnA and collaborating partners appoint a Socio-economic Incentives Working Group to commission and supervise a participatory analysis of current sustainable and non-sustainable uses of biodiversity in Palestine (By whom? Under what conditions? With what perceived social and economic benefits? What values assigned to biodiversity vis-à-vis economic values? etc.).
- The Working Group reviews the results of the study and identifies a number of potential social and economic incentives for the conservation of biodiversity in Palestine. Such incentives are then illustrated in detail in a specific report.

Objective 2

Promoting social and economic incentives for the conservation of biodiversity in Palestine – with particular attention to sustainable use of medicinal plants, agro-biodiversity, eco-tourism and economic advantages of protected areas.

Outputs

In collaboration with a variety of national and international partners, action plans developed and implemented in several areas, including medicinal plants, agro-biodiversity, eco-tourism and economic initiatives related to protected areas in Palestine.

Activities

- The Working Group examines in detail the identified social and economic incentives for the conservation of biodiversity in Palestine and exchanges information and lessons learned with other countries in the region, in view of potential collaboration in specific regional activities.
- The Working Group (in collaboration with relevant authorities and stakeholders in Palestine(develops and implements specific action plans to provide socio-economic incentives to the conservation of biodiversity. Among other initiatives, it develops in detail the following lines of activity:
- Reviewing uses and properties of medicinal plants endogenous to Palestine and establishing

linkages between local stakeholders and medical industrial companies willing to co-operate to protect the plants in the wild and set up production units in controlled farming systems (linkage with Project 12: Establishment of a Gene Bank in Palestine);

- Assisting in setting up appropriate market infrastructure and providing technical support to farmers maintaining and enhancing agro-biodiversity in Palestine (linkage with Project 12: Establishment of a Gene Bank in Palestine);
- Assisting in developing a Palestinian eco-tourism industry (e.g. by providing technical and financial incentives to entrepreneurs), with accompanying public information campaign, linked activities in schools , etc.;
- Promoting economic initiatives linked with the existence of protected areas, e.g. establishment of tourism-related businesses, infrastructures, transport systems, etc. (linked with project 1: Development and Management of a Palestinian Protected Areas System).

Duration

Five years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$	Year 5 US$
Staff					
Project Manager	$26,000	$26,000	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500	$19,500	$19,500
Short-term Consultants	$15,000	$10,000	$10,000	$10,000	$10,000
Technical Staff (3)	$39,000	$39,000	$39,000	$39,000	$39,000
Support Staff	$10,400	$10,400	$10,400	$10,400	$10,400
Driver	$6,500	$6,500	$6,500	$6,500	$6,500
Equipment					
4WD	$35,000	$35,000	$0	$0	$0
Office Equipment	$30,000	$10,000	$5,000	$5,000	$5,000
Field Equipment	$30,000	$15,000	$15,000	$15,000	$15,000
Training					
Regional/ International Training	$20,000	$20,000	$10,000	$10,000	$10,000
Local Training	$25,000	$25,000	$25,000	$25,000	$25,000
Awareness, Workshops	$30,000	$30,000	$30,000	$30,000	$30,000
Study Tour	$10,000	$10,000	$10,000	$10,000	$10,000

Operational Costs					
Local Travel	$7,000	$7,000	$7,000	$7,000	$7,000
Extension Material	$15,000	$15,000	$10,000	$10,000	$10,000
Communications	$5,000	$5,000	$5,000	$5,000	$5,000
Restoration & Renovation	$100,000	$70,000	$60,000	$40,000	$30,000
Reporting/Evaluation					
Reporting and Publications	$15,000	$15,000	$15,000	$15,000	$15,000
Project Evaluation	$10,000	$10,000	$15,000	$15,000	$15,000
Sub-Total	$448,400	$378,400	$318,400	$298,400	$288,400
Total					**$1,732,000**

Table 15: Estimated Budget Breakdown for Project 10

Proposed Partners

The Palestinian Authority (PEnA, Ministry of Agriculture), other relevant authorities, International and Palestinian NGOs , Palestinian Farmers and entrepreneurs, Donor /Funding Agency (to be identified).

11. Coastal Zone Management in Gaza and the Dead Sea

Project Synopsis

Goal

Conserving biodiversity resources in the coastal zones of Gaza and the Dead Sea.

Objective 1

To develop effective plans and institutions for the management of biodiversity resources (including conserving habitats and using natural resources and species in a sustainable way) in the coastal zones of Palestine.

Outputs

Effective management plans and functioning management institutions for the coastal zones in: (a) Gaza and (b) the Dead Sea area.

Activities

- PEnA and collaborating partners appoint a Coastal Management Working Group to carry out an analysis of biodiversity resources in Gaza and the Dead Sea, including habitats and species (linkage with project 2: Development of Management Plans/Structures in Designated Protected Areas based on Biodiversity Surveys and Inventories). The analysis will include a review of applicable legislation, policy and regulations (Linkage with project 8: Developing and Implementing Legislation on Biodiversity in Palestine) as well as participatory review of existing stakeholders, threats to the coastal resources and biodiversity (e.g. liquid and solid waste pollution) and opportunities to manage the coastal resources and biodiversity in a sound way..

- The Working Group develops a social communication programme including meetings with stakeholders to discuss issues of biodiversity, local livelihood and development as well as indigenous and non-indigenous knowledge, skills, technology and institution (e.g. fishing, grazing, and farming methods) for the use and conservation of coastal zone resources (Linkage to project 3: Protecting and Using Traditional Indigenous Knowledge and Property Rights for Biological Diversity).

- The Working Group for this project calls for a series of meetings by which the relevant stakeholders negotiate management plans and develop management institutions for relevant sub-units of the coastal zones of Gaza and the Dead Sea. In the meetings, a variety of incentives and alternative livelihood options for local communities (e.g., ecotourism) are explored, together with ways to equitably share the costs and benefits of management plans and regulations among all relevant stakeholders (Linking with project 6: Collaborative Management of Biodiversity and project 10: Promotion of Eco-tourism/Economical Aspects of Biodiversity).

- The management plans and institutions are “legitimised” via culturally appropriate ceremonies and then implemented/ set into force.

- The management plans and institutions are supported in a “learning by doing” mode by the appointed Working Group and other competent authorities in Palestine.

Duration :

Five years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$	Year 5 US$
Staff					
Project Manager	$26,000	$26,000	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500	$19,500	$19,500
Short Term Consultant	$10,000	$10,000	$10,000	$10,000	$10,000
Technical Staff (2)	$26,000	$26,000	$26,000	$26,000	$26,000
Support Staff	$10,400	$10,400	$10,400	$10,400	$10,400
Driver	$6,500	$6,500	$6,500	$6,500	$6,500
Equipment					
4-WD	$35,000	$35,000	$0	$0	$0
Office Equipment	$25,000	$10,000	$5,000	$5,000	$5,000
Field Equipment	$20,000	$10,000	$5,000	$5,000	$5,000
Maintenance	$10,000	$10,000	$10,000	$15,000	$15,000
Training & Capacity Building					
International Training	$25,000	$20,000	$15,000	$15,000	$15,000
Local Training	$20,000	$20,000	$20,000	$15,000	$15,000
Field Equipment	$20,000	$15,000	$10,000	$5,000	$5,000
Public Awareness	$30,000	$30,000	$30,000	$30,000	$30,000
Operational Costs					
Communication	$10,000	$10,000	$10,000	$10,000	$10,000
Local Travel	$7,000	$7,000	$7,000	$7,000	$7,000
Extension Material	$10,000	$10,000	$10,000	$5,000	$5,000
Reporting / Evaluation					

Reporting and publication	$10,000	$10,000	$15,000	$20,000	$20,000
Project evaluation	$2,000	$3,000	$3,000	$5,000	$5,000
Sub-Total	$322,400	$288,400	$238,400	235,400	235,400
Total					**$1,320,000**

Table 16: Estimated Budget Breakdown for Project 11

Proposed Partners

The Palestinian Authority (PEnA, government agencies responsible for fisheries, agriculture, coastal infrastructure development), Palestinian NGOs, Local Coastal Communities, International Conservation Organisations, Donor/Funding Agency (to be identified).

12. Establishment of a Gene Bank in Palestine

Project Synopsis

Goal

Conserving via *Ex-Situ* techniques the seeds of wild species as well as cultivated crops and their wild relatives of Palestine.

Objective 1

Building a Gene Bank in Palestine.

Outputs

- A feasibility report and plan detailed on the establishment of a National Gene Bank for Palestine.
- A roster of biodiversity experts (both scientific and community –based) in Palestine.
- A Palestinian Gene Bank endowed with both wild and domesticated genetic resources.

Activities:

- PEnA and collaborating partners appoint a Gene Bank Working Group to carry out a feasibility study on the establishment of a National Gene Bank for Palestine. The study identifies a suitable location for the bank, as well as a detailed institutional, architectural and functional plan.
- The Working Group identify biodiversity experts (both scientific and community-based) in Palestine and enlist their knowledge and skills for the identification and collection of genetic material.
- The appointed authorities proceed to establish the Gene Bank, set in place the personnel and acquire/ restore/ reorganise the building, as appropriate.
- The appointed staff (with the help of the identified biodiversity experts (proceed to collect, catalogue and store the genetic material to be preserved.

Objective 2

Management and monitoring of the established Gene Bank.

Outputs

Management plans for the Gene Bank.

Activities:

The appointed staff (with the help of the identified biodiversity experts (develops a management plan for each section of the gene bank, including standard management principles, care for factors affecting seed germination and storage, regulations for seed exchange and bulking, and on-going co-ordination with other regional and international gene banks.

Duration

Four years.

Estimated Budget Break-Down

Item	Year 1 US$	Year 2 US$	Year 3 US$	Year 4 US$

Staff				
Project Manager	$26,000	$26,000	$26,000	$26,000
Assistant Manager	$19,500	$19,500	$19,500	$19,500
Short-term Consultant	$15,000	$15,000	$10,000	$10,000
Technical Staff (2)	$26,000	$26,000	$26,000	$26,000
Support Staff	$10,400	$10,400	$10,400	$10,400
Driver	$6,500	$6,500	$6,500	$6,500
Equipment				
Vehicle	$35,000	$35,000	$0	$0
Office Equipment	$35,000	$25,000	$15,000	$5,000
Field Equipment	$50,000	$30,000	$20,000	$20,000
Training				
Regional Training	$30,000	$30,000	$10,000	$10,000
Local Training	$20,000	$20,000	$20,000	$10,000
Awareness, Conferences, Workshops	$40,000	$30,000	$30,000	$30,000
Study tours, Visits	$15,000	$15,000	$15,000	$10,000
Operational Costs				
Extension material	$15,000	$15,000	$15,000	$15,000
Communication	$10,000	$10,000	$10,000	$10,000
Local Travel	$8,000	$8,000	$8,000	$8,000
Reporting / Evaluation				
Reporting and Publication	$25,000	$20,000	$25,000	$25,000
Project evaluation	$5,000	$5,000	$10,000	$10,000
Sub-Total	$391,400	$346,400	$276,400	$251,400
Total				**$1,265,600**

Table 17: Estimated Budget Breakdown for Project 12

Potential Partners

Relevant international experts, Local relevant experts, Palestinian Authority including Ministry of Planning and International Co-operation, Ministry of Agriculture, Palestinian Environmental Authority, Ministry of Education, and Local Municipalities, National and International Universities including Bethlehem University, Bir Zeit University, Al Najah University, Al Quds (Jerusalem) University and others, Palestinian NGOs, local communities and Donor/Funding Agency (to be identified).

National Biodiversity Strategy and Action Plan for Palestine

(BSAPP)

Part III:

SITUATION ANALYSIS

Part III: Situation Analysis

Physical characteristics of West Bank and Gaza

The topography

Despite its small geographical area, the West Bank is characterised by a great variation in topography (Map 7). This variation directly reflects on climate and the distribution and diversification of agricultural patterns, from irrigated agriculture in the Jordan Valley, the lowest area in the world, to rainfed farming in the mountains. The population distribution and centres of urbanisation are affected by the topography of the West Bank. The maximum concentration of built-up areas are found on the mountain ranges where climate is more suitable for human life than in the hot climate of the Jordan Valley. Furthermore, most of the West Bank rangelands are found on the arid Eastern Slopes.

The West Bank is divided into five major phytogeographical, geomorphologic and topographical parts: the Jordan Valley, Eastern Slopes, Central Highlands and the Semi-Coastal Region. The mountainous area of the West Bank serves as the main rainfall collection and replenishment area for the underground water aquifers. Many drainage and valley systems are spread in and among the above mentioned four parts

Gaza is located on the coast of the Mediterranean Sea, north of the Sinai Peninsula and southwest of Jerusalem, on a road that links Egypt with central Israel. Gaza Strip forms part of the coastal forshore plain bordering the hebron Mountains in the north-east, the Northern Negev desert in the south-east, and the Northern Sinai desert in the south. It is situated in the shadow of the Nile Delta and Northern Sinai. The curve in the coastal starting from El Arish towards north of Gaza. The topography of the coastal plain is determined by the exposure of Kurkar ridges. The age of these ridges increases from the coastline eastwards. In the north of the Gaza Strip there are four ridges: the coastal ridge (20 m MSL), the Gaza ridge (up to 50 m MSL), the El Muntar ridge (80 m MSL), and the Beit Hanun ridge (90 m MSL). The ridges are separated by deep depression (20-40 m MSL) with alluvial deposits. There is evidence that there are at least three to four younger Kurkar ridges on the continental shelf, parallel to the present coastal line and several kilometers offshore.

Kukar ridges of calcareous sandstone appear all along the coast positioned in a south-west-northerly direction parallel to the coast. The influence of these Kurkar ridges on sedimentation and erosion processes is however limited to local disruption of waves and currents.

Active Dunes

Active dunes can be found near the coast, especially in the southern part between Deir El Balah and Rafah. More inland (west of Khan Younis) are older dunes stabilized by vegetation penetrating an area 4-5 km inland. There is gradual transition from a sandy dune landscape towards the rolling loess plains of the North-western Negev. The sands and sandstones were covered by fine windblown dust materials originating from sources in the Southern Negev and Sinai desert. Loess deposition in areas with over 300 mm rainfall has been a continuous process at a rate of one meter in 10 000 years. Areas with a large accumulation of loess can be found 15 km south-west of the Gaza where these layers reach a thickness of eight meters.

The climate

West Bank

The geographical location of the West Bank between the 31°21` and 32°33` latitude and between 34°52` and 35°32` longitude, makes the area highly influenced by the Mediterranean climate. The Mediterranean climate is characterized by a long, hot, dry summer and short, cool, rainy winter. Rainfall is limited to the winter and spring months. It usually starts in the middle of October and continues up to the end of April. Snow and hail, although uncommon, may occur anywhere in the area especially to the west of and over the highlands (Rofe & Raffety, 1965).

Temperature:

The climate of Palestine as a whole, and the West Bank in particular, is of the Mediterranean type, marked by a mild, rain winter and a prolonged dry and hot summer. The annual amount of rainfall decreases from north to south. Temperatures, on the other hand, increase from north to south. In a west to east direction, annual rainfall and mean temperatures undergo similar but less regular changes. Also, there is a gradual decrease in the annual, monthly, and diurnal averages of relative humidity from north to south and from west to east throughout the whole area.

Annual temperature isotherm in the West Bank shows the lowest temperatures in the mountain region. The northern mountains at Nablus register an annual average temperature of 17.8°C, while the higher southern mountains in Hebron, register an annual average of 15.5°C.

Humidity

The mean annual relative humidity is 61% in Nablus, 69.6% in Tulkarm and 52% in Jericho. Relative humidity reaches its highest in winter, when the average humidity is 67.2% in Nablus, 73% in Tulkarm, and 68.5% in Jericho.

Evaporation is particularly high in summer, due to the rise in temperatures, intensive sunshine and the low humidity. The mean monthly evaporation rates from June to August are 215.1 mm/month in Hebron, 277.3 mm/month in Nablus and 284.9 mm/month in Jericho. Towards the coastal plain, the rate of evaporation decreases because of the year around exposure to the humid sea breeze. Evaporation rate is relatively low during the winter months when the solar radiation is lowest. The mean monthly evaporation rates from December to February are 55.1 mm/month in Nablus, 69.4 mm/month in Hebron and 70.9 mm/month in Jericho.

Gaza Strip

The Gaza Strip is located in a transitional zone between the arid desert climate of the Sinai Peninsula and the temperature and semi-humid Mediterranean climate along the coast. According to the Koppen system the Gaza Strip has a Mediterranean dry summer sub-tropical climate with mild winters.

Temperature

The average daily mean temperature ranges from 25 ^{0}C in summer to 13 ^{0}C in winter Average daily maximum temperatures range from 29 ^{0}C to 17 ^{0}C and minimum temperature from 21 ^{0}C to 9 ^{0}C in the summer and winter respectively.

Humidity

Daily relative humidity fluctuates between 65% in the daytime and 85% at night in the summer, and between 60% and 80% respectively, in winter.

Terrestrial Fauna

The wildlife of Palestine is composed of invertebrates, amphibians, reptiles, birds and mammals. The lowest diversity is found to be in amphibians, while the highest is estimated within invertebrates and other micro animals. Fauna in geographical Palestine consists of 67 families of birds of which 45 are of local breeds and, 33 families of mammals, 93 species and subspecies of reptiles (Ishtayia, 1995), and 6 different families of amphibians. Each wild type constitutes one important element of the balanced ecosystem. Palestinian wildlife is distributed throughout 16 zoo-geographical areas which indicate its variation (Atallah, 1987).

Large scale, unplanned human activities are having a severe impact on Palestinian biodiversity. Data on Palestinian wildlife and terrestrial fauna is lacking in many areas and it appears that many species are disappearing before they can be documented. A lack of human resources and capacity is hindering the management and conservation of Palestinian biodiversity. Many of the species appearing in the historical record are now extinct or threatened. The main factors that led to the animal extinction are both natural and human caused, However, human actions have recently greatly increased the rate of extinction to levels that the nature cannot compensate. For example, 73 species of mammals and 120 species of birds became extinct between the years of 1801 and 1950. This high rate of extinction threatens the dynamic balance, which the nature enjoys with unpredictable consequences (Omar & Odeh).

Invertebrates

To date there is no real scientific knowledge on the diversity of invertebrates in the Palestinian Territories. Little research has been conducted on the taxonomy, zoo-geography and ecology of these phyla. It is estimated that the number of invertebrate species in the Palestinian Territories is in excess of several thousand. These species are being impacted upon by large scale habitat destruction from settlements, forest cutting, overgrazing, unplanned urban development and mining and quarrying. Moreover, due to the importance of agriculture in the Palestinian economy, a large quantity of agro-chemicals is being used and this is expected to increase in the future. The agro-chemicals have major impacts on terrestrial invertebrates.

Threats and Impacts

As mentioned above this phylum is being impacted upon by extensive agriculture, forest cutting, overgrazing, unplanned urban development, settlements and other forms of habitat destruction. In addition, several species of terrestrial invertebrates are randomly destroyed by humans due to their natural features. The usage of pesticides, for example, against the insects reduces their numbers and thus their harmful attacks. Examples of harm invertebrates are: the Scorpions *Nebo hirochunticus* and *Buthus quinestriatur* and the Black Spider *Latrodectus trecimiguttatus*. However, it is felt that these impacts will affect only a small portion of this phylum and not lead to the extinction of many species.

Amphibians

Eight amphibian species have been recorded in the West Bank and Gaza. As with invertebrates, this information needs to be updated in terms of the current distribution and status. Amphibians in Palestine belong to two orders; (i) Caudata - Salamander*;* (ii) Salientta - Anura*;* six families: (i) Salamandridae; (ii) Bufonidae; (iii) Hylidae, (iv) Ranidae, (v) Discorglossidae, (vi) Pelobatidae*;* and six genera, five of which are important wetland species. Important species that exist in the West Bank and Gaza are the

Salamander *Salamandera maculosa* (endangered) and the Triton *Triton vittatus* (rare). Three species of frogs and toads exist in the West Bank and Gaza. Below, Table (18), outlines the threatened amphibian species in West Bank and Gaza.

Threats and Impacts

Almost all amphibians in Palestine are endangered due to intensive farming, degradation of wetland habitats in the Dead Sea basin, Gaza Strip and fresh and brackish springs, rivers and wadi systems. Recently many swamps have been drained causing a great reduction in the abundance of many local species, as indicated in Table (18). This phenomenon is very obvious in Gaza Strip where the drying of the main wadis and intensive use of remaining water resources has not given amphibians much chance to exist. Loss of amphibian species and diversity has led to an increase in the number of disease vector insects such as mosquitoes**.**

In addition to the loss of wetland habitat, a significant portion of the remaining wetlands are exposed to untreated sewage water from human settlements and industrial activities and vegetation cover loss. This impact is deemed severe and is threatening some amphibian species with extinction.

Table 18: Status of Amphibians in the West Bank and Gaza

Species	Status	Habitat
Bufo viridis	**Common/ Endangered**	**Terrestrial**
Rana ridibunda	**Endangered**	**Wetlands**
Hyla arborea savignyi	**Rare**	**Wetlands and Forests**
Triton vittatus	**Endangered**	**Wetlands**

Source: PEnA (Atrash, 1998)

Reptiles

Reptiles in Palestine are well distributed and show high diversity in species and habitats. The high diversity is due to the diverse bio-geographical, climatic, topographical and vegetation formations found throughout the PA. Recorded reptiles in Palestine include wetland, marine and desert species. Studies Of approximately 93 species of reptiles, six of them are aquatic and the rest are terrestrial (Werner, 1988; Ishtayia, 1995). They are presently represented by two orders, order Chelonia with turtles, and order Squamata, including lizards and snakes. One extinct species is the Nile Crocodile. This important predator used to inhabit the Jordan River and its western tributaries. Reptiles assume an important role in the ecosystem, as they are the main source of food for predators such as carnivores and local and migratory raptors (e.g., kestrels, buzzards and eagles).

The highest distribution of reptiles in Palestine is observed in the arid and semiarid Mediterranean and Saharo Arabian zones. Statistics show that approximately 47 per cent are located in northern Palestine and 39 per cent in the south. The remainders are dispersed throughout the country.

Threats and Impacts

Many reptilian species in Palestine are considered threatened or on the verge of extinction. This is due mainly to; intensive agricultural practices, overgrazing, vegetation cover loss, mistreatment of habitat, illegal trade, unplanned human development, transportation corridors and soil and habitat degradation.

Snakes and vipers have felt the largest impacts. The Palestinian Cobra and Vipers especially *Vipera palestina*, are under severe pressure due to direct killing by people, although they could play an important role in pest control of smaller rodents. Many reptiles are observed dead on roads and highways or killed as a result of mining such as the sand mining in Gaza Strip and its effect on the turtles inhabiting the beach. Several species became recently extinct as *Blanus stranch, Ripera lebetina*, *Crocodylus niloticus*, *Discoglossus nigriventir*, and several other species are endangered. Illegal trade in several species occurs including the; Dessert Monitor *Varanus griseus*, Spiny -tailed Lizard *Uromastix aegyptius microlepis*, Greek Tortoise *Testudo graeca and* Chameleon *Chameleo chameleo*. Three of these species are listed under CITES. Marine turtles are under threat from illegal trade, hunting and unsustainable fishing practices. One wetland species is highly endangered due to wetland degradation (i.e., draining for agriculture) is the Diamond Water Snake *Natrix tesselata*.

Source: PEnA

Photo 1: Bedouin Grazing

Source: PEnA

Photo 2: Wadi Gaza

Birds

Four hundred and seventy species of birds have been recorded lately in Palestine. Belonging to 206 genesis, 65 families and 21 orders. Of which 80 per cent are migratory birds; 50 per cent are waterfowl and 30 per cent are raptors (Paz, 1987). Many migratory raptors are globally threatened species such as the Lesser kestrel *Falco naumanni*, the summer visitor little Bustard *Tetrax tetrax* and the winter visitors, Corncrake *Crex crex* , Huobara Bustard *Chlamydotus undulata* and Spotted Eagle *Aquila*

clanga. The Bonnelli's Eagle *Hieraaetus fascitatus* is a globally threatened, resident species. The Dead Sea Sparrow *Passer moabticus* is a restricted species, indigenous to the Dead Sea Basin.

Source: PEnA

Photo 3: Birds in Wadi Gaza

Located as a land bridge between three continents, Palestine is an important migratory route for north Palearctic birds. Approximately 500 million birds pass through the Jordan Rift Valley each year. Many disperse to the wadis and plains of the West Bank and Gaza strip. Passerines and warblers prefer to migrate through the forests and dense vegetation cover of Palestine than to pass within the narrow corridor of the Jordan Valley. Some 200,000 Garganey *Anas qerquedula and A. crecca* (Photo (5)), 41,000 waders, mainly Little Stint *Calidris minuta*, *Avocet Recurvirostra avosetta* and *Sanderling Calidris alba*, and some 200 000 raptors, are recorded to pass along the Gaza Coastline, as well as some 26 500 specimens of herons and 20 000 terns are observed annually.

BirdLife International has defined 395 Important Bird Areas (IBAs) in the Middle East, 5 of, which are located in Palestine. Much of the data related to birds and their habitats in Palestine were compiled under the Israeli IBAs, therefore it is necessary to update the status and distribution of birds and their habitat in Palestine alone. Palestine is considered as one of the favourite countries for nature tourism and bird watching due to the diversity and different species occurrence in diverse sites.

Threats and Impacts

Birds and their habitats in Palestine are subject to a variety of threats and impacts. Namely; urban expansion and settlements, lack of land-use policies, illegal hunting, human persecution, degradation of vegetation cover and forest resources, degradation of habitat, including wetlands, steppe land and migratory grounds and routes, decrease in prey and food resources, lack of solid waste management, lack of tourism management and unsustainable agricultural practices (i.e., agro-chemicals). Some of Bird Species of a great interest in Palestine are listed in the IUCN red list, as indicated in Table (19).

Many species such as raptors and waterfowl are threatened due to habitat destruction in the Jordan valley and desert. Waterfowl visiting and inhabiting the Wadi Gaza wetland face severe impacts stemming from a lack of liquid waste management. In order to benefit from ecotourism and nature tourism, it is important that the proper management of important bird areas be initiated as soon as possible.

Table 19: **Some of the threatened bird species present in Palestine**

Scientific Name	English Name	Status
Aquila heliaca	Imperial Eagle	Rare
Chlamydotis undulata	Houbara Bustard	Vulnerable
Crex crex	Corn Crake	Rare
Falco naumanni	Lesser Kestrel	Rare
Haliaeetus albicilla	White-tailed Eagle	Vulnerable
Marmaronetta angustirostris	Marbled Teal	Vulnerable

Phalacrocorax pygmeus	Halietor Pygmeus	Rare
Tetrax tetrax	Little Bustard	Rare
Carduelis carduelis	Goldfinch	Threatened
Vanillas gregarius	Chellusia Gregaria	Rare

Source: IUCN, 1993.

Mammals

Currently there are 95 mammalian species in the West Bank and Gaza comprising 33 families, 28 of which are bat species. This number does not include marine mammals in Gaza Strip. Data related to the distribution, classification, and zoo-geography of mammals in Palestine needs to be updated.

The above-mentioned numbers of families and mammalian species shows relatively high diversity in comparison to other countries in Arabia. This fact is due to several features such as: geographical location between three continents, the high diversity in soil and climate elements. This in turn has helped species of different origins to settle and inhabit Palestine. The distribution of most mammals in Palestine depends on the distribution of their zoogeographic subregions. Seventy eight percent of Palestinian mammals that are described as widely distributed, exist mainly in the Mediterranean territory of Palestine.

Connecting three continents together and thus serving as a bridge between them many mammals have travelled naturally for thousand of years through this region. In Palestine as in the case of its neighbouring countries, it is into observe species from the same families, though different origins, competing for habitat and prey. For example, the European Badger *Meles meles* and the African Honey Badger *Millivora capensis*. Mammals of Palestine inhabit different and diverse habitats such mountainous, forests, steppe, marine wetland and even the lowest spot on Earth the Dead Sea Basin.

Still many higher mammals enjoy Palestine's diverse habitats, for example: Striped Hyena, Syrian Wolf *Canis lupus syriacus*, two different species of Gazelles *Gazella dorcas* and *G. arabica*, wild cats *Felis silvestris*, and *F. chaus*. The only mammal endemic in the Gaza Strip, on the other hand, is the Buxton's Jird *Meriones sacramenti*, originated from Saharo-Arabian desert belt, and found in the sand dunes of the southern coastal plains of the Negev and the Gaza Strip.

Source: PEnA

Photo 4: **The threatened Wolf *Canis lupus syriacus***.

Threats and Impacts

Mammals of Palestine suffer from a variety of threats. Almost all of the higher mammals are on the Red Data List as threatened, extinct or rare. Seven species of mammals have been extinct in Palestine, for example, the Cheetah *Acynonyx jupatus*, Syrian Brown Bear, *Ursus arctos syriacus*, Mesopotamian Fallow Deer *Dama mesopatomica*, and Roe Deer *Capreulus capreulus*. These species existed in Palestine less than 50 years ago. In addition wolfs and hyenas are hunted and persecuted by farmers and Bedouins concerned with their livestock. Nowadays, there are only 200 hyenas inhabiting Palestine.

Terrestrial Flora

The West Bank and Gaza contain 114 families of flora with 2,483 species (PIALES, 1996). The most dominant families are the Compositae with 96 genera and 260 species, Gramineae with 87 genera and 198 species, Leguminaceae with 62 genera and 268 species, Crucifera with 63 genera and 124 species, Labiatae which is famous as a medicinal plants, with 23 genera and 99 species, Lilaceae known for its beautiful flowers, with 23 genera and 97 species, *Trifolium* which is used as a forage plant contains 40 species, *Medicago* genus contains 22 species, and *Trigonella* genus, which contains 18 species (Breigheeth, 1995).

Located at the meeting point between Eurasia and Africa, especially in the eastern southern corner of the Mediterranean sea, Palestine has a unique topography and ecosystems which encountered endemic plants that do not exist in other places in the world. This helped the introduction of plants to coexist. Palestine is characterised by its unique variable ecosystems that encounter the different floral associations. The ecosystem in the West Bank is divided into four longitudinal belts as following:

- The Jordan valley which is dominated by *Atriplex halimus, Sarcopoterium spinosum, Ziziphus spina-christi, Suaeda asphaltica, Anabsis setifera, Zilla spinosa, Prosopis farcta,and Calotropis procera.*
- The Eastern Slopes Region which is dominated by *Sarcopoterium spinosum, Majorana syriaca, Artemisia herbalba, Erynguim creticum, Orchis anatolicus, Ranunculus asiaticusa, Lotus peregrinus, Ononis natrix, and Capris spinosa.*
- The Central High Lands which is dominated by *Quercus calliprinos, Ceratonia siliqua, Pistacia palestina, Pistacia lentiscus, Sareapterium spinsum, Prosopis farcta, Inula viscosa, Phragmites australis, Moricandia nitens, and Convonlvolus oleifolium.*
- The Semi-Coastal region, which is dominated by *Sporobolus arenarius, Euphorbia perelis, Senecio vernalis, Thymelae hirsutum, and Lupinus palastinus.*
- The Coastal Plain, on the other hand, constitutes the main ecosystem in Gaza Strip where the class *Salicornietea europaeae* is dominant and contains species like*: Suaeda splendens*, *Salsola soda*, *Aster tripolium*, *Atriplex hastata*, and others. Also, the beaches are covered with a vegetation association of the *Ipomea stolonifera-Salsola kali*, with species like: *Ipomea stolonifera, Agropyron junceum, Salsola kali, Euphorbia peplis* and *Silene succulenta*. On the steep dune cliffs, frontal dunes and mobile sands, new species occur on the littoral zone up to considerable distances inland. *Ammopila arenaria* and *Tamarix nilotica* are the major sand and dune-fixating species, well able to survive in drifting sand.

In addition, the four plant geographical elements that exist in variable patterns (Map (2)), form another source of classification for the distribution of flora in Palestine.

- The Mediterranean Territory covered with vegetation includes forests, *maquis, garigue* and *batha* (dwarf shrub formations) in which *Quercus calliprinos* and *Pistaca palaestina* are shown to be the dominant species. The local forests and maquis can be grouped as the Common Oak Forests, the Aleppo Pine Forests (*Pinus halepensis*), and the Carob and Mastic Pistacia Scrub Forests.
- The Irano-Turanian Territory (Oriental steppe) which covers the southern parts of the West Bank (Jerusalem desert, central Jordan Valley and adjacent steppes and rocky places facing the southern part of the Jordan Valley). This area is composed of different associations such as the *Zizyphetum loti* association, the *Retameto-Rhudetum* association and the *Artemision herba-alba* association in which *Zizyphus lotus, Retama raetum and Artemisia herba-alba* are the most common members of these associations respectively.
- The Saharo-Arabian Territory which expands from the Jerusalem desert to the south of Negev and dominant with *Zygophylletum dumosi* and *Suaedetum asphaltica*.
- The Sudanian Penetration Territory which expands over Wadi Araba, Dead Sea area and the south of Jordan Valley and dominant with some plant associations such as *Haloxyletea saliconici* (*Phoenix dactylifera*) and *Acacitea tortilis* (*Zizyphus spina-christi* and *Acacia tortilis*).
- Vascular plants in the Gaza Strip mainly belong to the Saharo-Arabian, Mediterranean, and Irano-Turanian phytogeographic regions. The main plant geographical element in Gaza Strip is the Coastal Zone on Sandy soils where the vegetation mainly consists of associations of the *Retamtalia raetami palaestinae, Zyziphus spina-christi, Hammadetum scopariae planicolum, Tamarix nilotica, Artemisia monosperma.*

The flora of Palestine includes 149 endemic species (6% of the total flora), of which 43% are found to be common, 27.5% are rare and 25.6% are very rare. Leguminaceae family for instance with its 268 species contains 21 endemics, while among 23 species of Iridaceae, eight are endemic (Zohary, 1962).

Half of Palestine's endemic species are restricted to the Mediterranean Territory, a third to the Irano-Turanian and only a sixth to the Saharo-Sindian territory. The Jordan Valley, with about 25 endemic species, is considered one of the main three centers of endemic species in Palestine including for example, 6 species of Tamarix.

The surveyed endemic species in the West Bank were estimated to be 51. Most of these endemics belong to the Compositae family that constitutes 21% of total endemics. Both Iridaceae and Boraginaceae contribute by 9.8% and Labiatae by 7.8% of the endemics. Around 12 species of the endemics were found to be very rare such as *Iris lorteti, Alkana galilaea, Cephalaria tenella, Erodium subintegrifoli, Iphiona marismortui* and *Phlomis platystegia* .

Source: PEnA

Photo 5*:* Flora in Palestine.

However, Endemic rare species exist mainly in the Dead Sea and lower Jordan Valley areas. In the West Bank, a total of 195 rare species are known to exist. Of these, only 127 species have been observed, where 78 rare species were located in Jerusalem wildereness, 57 species in Nablus highlands and 48 species in the Jerusalem highlands (Shmida, 1995).

Source: PEnA

Photo 6*:* Flowering Cactus

The vegetation of Palestine comprises a considerable number of types differing from each other. The vegetal cover deduces a variety of plant formations ranging from dense forests to thin patches of desert herbs. The presence of such a variable plant formation of trees, shrubs and herbs that survive in different environmental conditions, indicates the diverse genetic background that they possess. There exist 60 species of natural trees and 90 species of bushes distributed all over Palestine.

These plant communities and associations that inhabit Palestine can be grouped and briefed into the following vegetal landscapes: Coniferous Forests Deciduous, Broad-leaved Oak Forests, Evergreen Park-Maquis, Deciduous Steppe-Maquis and Steppe-Forests (*Pistachia atlantica, Crataegus azarolus*, and *Amygdalus communis*), Decicuous Thermophillous Scrub (Predominatly *Ziziphus lotus*), Halophytic Forests (*Tamarix spp.* and *Suaeda spp.*), Riparian Woods (*Salix spp., Populus spp*.), Savannah Forest (tropical trees: *Ziziphus spina-christi, Moringa aptera and Salvadora persica*), Mediterranean Batha and Garigue (*Cistus, Phlomis, Salvia*, and *Thymus*), Dwarf Shrub Steppes (*Artemisia herba-alba*, *Noea mucronata*, and *Helianthemum spp.),* Leaf and Stem Succulent Dwarf Shrub Formation (*Salsola spp. and Atriplex spp*) and Rush and Reed Vegetation .

Source: PEnA

Photo 7: ***Ceratonia Siliqua***

Protected areas in Palestine

The existing protected areas in the West Bank preserve and conserve important resources (biological, historical, archaeological, and cultural resources), yet they do not adequately conserve the biological diversity. Very little of the West Bank is designated for nature protection and in actuality many important ecosystems are wholly unprotected and under threat.

Currently, Israel declared 48 nature reserves in the West Bank, with a total area of almost 33,070 hectares (5.68% of the West Bank's area). These nature reserves are distributed mostly over the Eastern Slopes and the Jordan Valley of the West Bank. A substantial part of these areas overlap with the state-land, closed military areas and colonies in the West Bank (Map 3). Part of the protected areas in the West Bank were declared as parks or natural reserves during the British Mandate, while the others were declared as protected areas during the Israeli occupation. The selection was not based on scientific reasons but political ones.

Almost all the protected areas in the West Bank lie in the zone designated as Area C, where control continues to be under the exclusive authority of Israel. Of the 48 designated nature reserves, only 13 reserves are located in Area B, just 11.3% of the total area designated as nature reserves. These reserves are under the authority of the Palestinians. Authority for nature reserves and parks falls under the Ministry of Agriculture.

Recently, in Wye River Agreement (October, 1998), the Palestinian Authority has been informed that it will allocate an area/areas amounting to 3% from the 12% that should be transferred by the Israelis from area C to area B. This area is going to be designated as Green Areas and/or Nature Reserves. The Palestinians have further been informed that they will act according to the established scientific standards, and that there will be no changes in the status of these areas, without prejudice to the rights of the existing inhabitants in these areas including Bedouins; While these standards do not allow new construction in these areas, existing roads and buildings many be maintained. However, the Israelis will retain in these Green Areas / Nature Reserves the overriding security responsibility for the purpose of protecting Israelis, as indicated in the text of the memorandum.

The Palestinians have to utilize this area in the appropriate way so as to optimize the protection of the existing biological diversity in the area. Inventorying a design of a protected area according to the scientific standards and a management plan will be needed as an immediate priority.

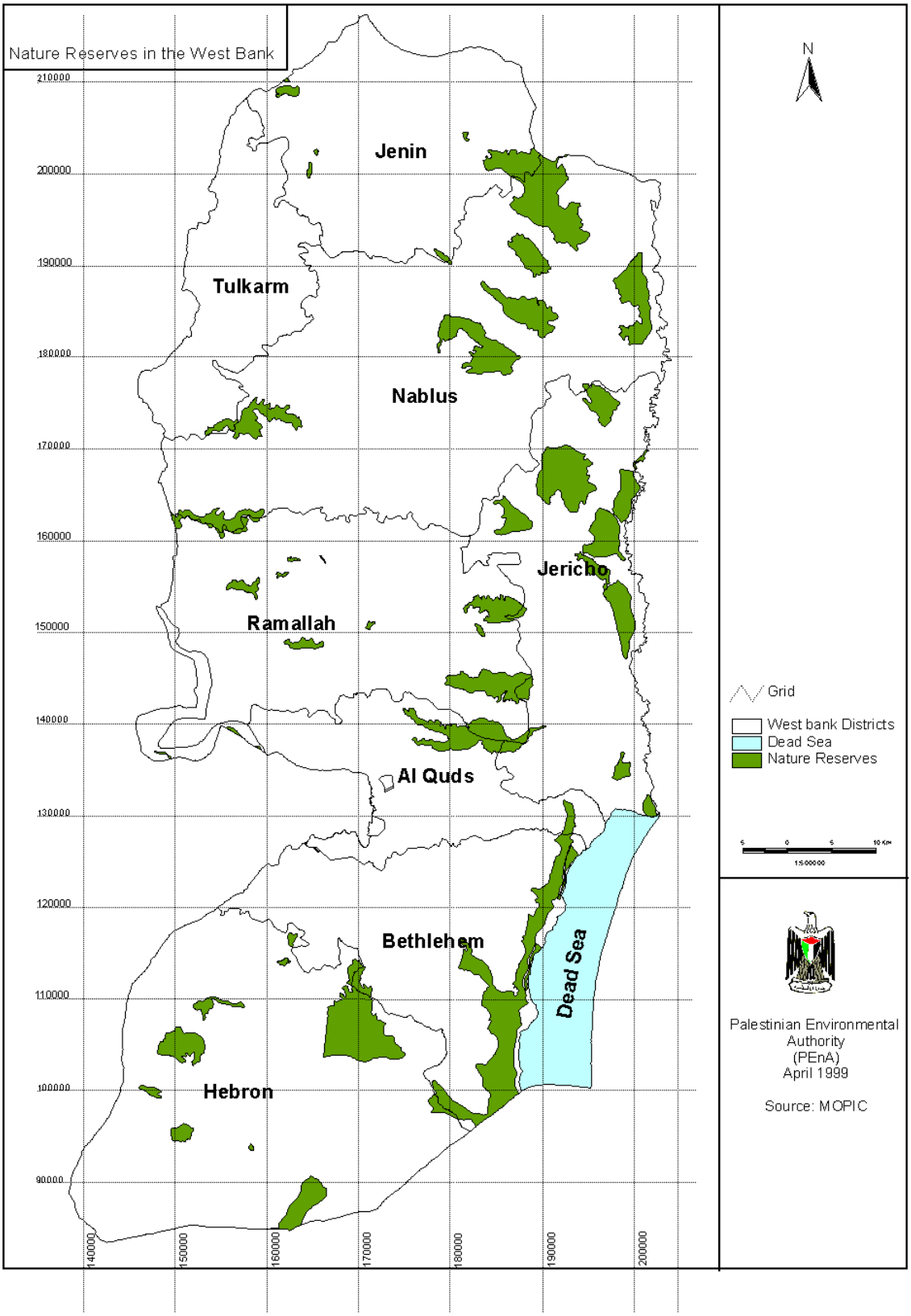
There is only one small zoo in the West Bank, in Qalqiliya, housing a few wild animals including birds, mammals, reptiles and crocodiles. Qalqiliya municipality is responsible for the management and protection of the zoo and its wildlife. Although this zoo is considered more for entertainment, but still, it can be an effective way for conserving wild animals.

There is no specific area that is declared as a protected area in Gaza Strip, but there are areas of nature conservation values. Few areas remain in the Gaza Strip in a pristine natural state. The coastal zone still contains small relics of nature conservation value. The outlet of the Wadi Gaza, the adjacent dunes and the bordering salt marshes are of a unique character. Dune formation processes by sand blown in form the seashore goes on in a rather undisturbed way, leading to natural vegetation succession, which extends some 300 meters inland.

The whole range of plant species belonging to the vegetation of tidemarks *(Ipomea stolonifera, Salsola Kali*) and the mobile littoral sand dunes (*Cypero conglumerati, Ammophiletum arenaria*) are found here. The salt marshes with a vegetation of the *Salicornietae europea* gradually shifts to a vegetation of fresh marshes, where reeds and cyperacea are dominant. The numerous *Tamarix* trees on the saline soils and in the mobile dunes are replaced land inward by the *Ficus sycomorus* trees.

The Wadi Gaza outlet is the only place where waterfowl and waders can be observed. Most common species are: Ruff, Black–winged stilt, black-tailed Godwit, Spur-winged Plover, Little Stint, Snipe, Redshank, Coot, Shoveler, Teal, Mallard, Water Rail, Black-headed Gull and Common Gull. A total of some 1250 dunums of salt marshes, mobile dunes and beaches together with some 2000 dunums of marshes and bordering vegetation can be regarded as areas of special botanical and faunal interest.

Map 2: Protected Areas in the West Bank, as declared by the Israeli Authorities.



The extensive desert-like areas in the south-western part of the Gaza Strip is the only remaining vast area, which is not used for agriculture or housing. The bare sands in the south-west, on the other hand, are the last extensive habitats of reptiles in the Gaza Strip. Here migratory Quail landing on the coastline of the Gaza Strip and the northern Sinai, can find relatively safe resting and foraging opportunities.

Threats and Impacts

- The pressure of population growth and the unorganised intensive building.
- The creeping of urban areas and cultivated lands towards the wilderness, range-lands and natural pastures in addition to land restrictions by Israel.
- The usage of many pollutants such as heavy metals, radioactive isotopes, and long lasting products such as chlorinated hydrocarbons, detergents, plastics, solid and industrial wastes, and pesticides.
- The impact of air pollutants such as the dust originated from quarries and stone cutting factories.
- The replacement of native vegetation, native forests and shrub lands with cultivated crops.
- The use of "modern" agricultural practices and the increased use of pesticides and fertilizers.

  Erosion of crop's genetic stock and agricultural production based upon fewer and fewer genotypes.
- The immigration of alien weed vegetation brought about by agriculture.
- The increase in sheep and goats number per area and overgrazing in natural grazing areas and rangelands.
- Land confiscation to build more Israeli colonies and military areas.
- Climatic change and its impacts on the existing wildlife and agriculture.
- Lack of experience and awareness among local communities, technicians and professionals.

Forests in the West Bank

Afforestation programs in the West Bank were first implemented during the British Mandate, and then the Jordanian Administration. In 1927, the first law for the protection and development of forests in Palestine were legislated by the British. About 230.6 hectares of mountainous and steep land in the West Bank were planted with *Cupressus spp.* and *Pinus spp.* At the same period forest rangers were appointed to implement the law enforcement on the site and all over Palestine. In early 1930s nurseries were established to distribute seedlings to local governments and people as part of a grand national afforestrataion scheme. In 1935 and at the British mandate period in Palestine only 90 hectares were afforested in Hebron and Nablus areas.

Afforestation continued during the Jordanian Administration and after that by the Israeli occupation authorities. In 1971, the total area of the human-made forests had reached to 3,361.6 hectares, planted mostly with *Pinus, Cupressus, Eucalyptus, and Acacia spp.*

Until 1971, the natural forests and nature reserves were distributed over different parts of the West Bank, occupying an area of 19,541 hectares, with the Jenin district featuring the largest area (18,637.1 hectares). The most prevalent trees were *Ceratonia siliqua, Pistacia palaestina, Rhamnus spp., Styrex officinalis, Crataegus azarolus, Arbatus andrachini, wild Pyrus and Prunus, and Olea europaea*. The

dominant shrubs and woody plants are *Sarcopoterium spinosum, Phlomis spp., Salavia spp., Organa syriaca, and Clematis cirrhosa.*

As of 1971, Israel stopped all forestry activities and closed forestry nurseries in most districts of the West Bank. The only nursery left functioning was Wadi Al-Quof Nursery in the Hebron district, but its potential was reduced to only ten thousand tree seedlings per year. Since then, both types of natural and human-made forests were exposed too much destruction perpetrated by both Israelis and Palestinians. Large areas of these forests have been confiscated by Israel and declared as closed military areas and military bases. Large numbers of trees have been uprooted to clear areas for the construction of Israeli colonies. Photo (8) and photo (9) show the destruction of Abu Ghnaim Mountain to the south of Jerusalem district. Palestinians also deplete many forested areas through wood-cutting used for fuel (either as biomass or for coal production). These activities, combined with natural destructive elements such as wind, snow, soil erosion, ageing, and accidental fires left dramatic scars on forests in the West Bank. They resulted in a vast reduction of the natural and human-made forested areas.

The Palestinian Ministry of Agriculture in 1995 estimated the area of the natural forest at 10,070 hectares and the human-made forest at 1,940 hectares (Breghieth, 1995) The difference in areas is referred to that the Ministry of Agriculture estimates are based on the 1971 forested areas and that they considered each forested area as forest whether it includes trees or not. Most of these forests are located on fertile soil types (Terra Rossas, Brown Rendzinas and Pale Rendzinas) and in areas, which enjoy favorable climatic conditions for agriculture.

Source: ARIJ, 1997

Photo 8: Abu Ghnaim Mountain, March 1997.

Source: ARIJ, 1997

Photo 9: **Abu Ghnaim Mountain, April 1997.**

Forests in Gaza Strip

In 1927, the Jabalia forest (approximately 2500 dunums) was planted with *Acacia cyanophylla*, *Eucalyptus spp.* and *Tamarix spp.*. Poor maintenance and destruction by the Israeli administration (security reasons) has resulted in a few remaining stands of *Eucalyptus* and *Acacia* not worth calling a forest. To fix the mobile sands and dunes, the exotic *Acacia cyanophylla* has been used extensively. However, the strong colonizing characteristics of this tree possess problems for adjacent agriculture as roots and new sprouts invade the fields.

The indigenous *Tamarix* stands in stabilized dune sands are often preserved by the farmers as windbreaks. Small *Tamarix* and *Eucalyptus* stands are exploited along the Wadi Gaza. Although Eucalyptus trees were planted about 30-40 years ago along the main routes between Gaza town, Khan Younis and Rafah, water shortage and saline groundwater gradually reduced the vitality of these trees.

Threats and impacts:

- Lack of land use management
- Lack of management of forest and range resources.
- Lack of management of tourists' activities.
- Lack of systematic research and monitoring.
- Inadequate clear management vision towards forest resources usage.
- Cutting of natural forests and vegetation for fuel and other house hold appliances
- Soil erosion and loss of soil natural environmental condition such as desertification.
- Encroachment of urban and agriculture over natural forest areas.
- Introduction of exotic species of forest species animal species.
- Transportation schemes and road buildings, affecting forest and tree abundance and natural distribution.
- Liquid and solid pollution in Forests.
- Air and atmospheric pollution and dust lift up from transportation and mining activities.
- Water over pumping from forests wadis, springs and watersheds.
- Illegal hunting in forests for key species.
- Introduction of exotic plant and animal species.
- Disappearance of faunal species important for forest balance and ecology.
- Manmade fires.

- Lack of human and financial recourses, and Inadequate law enforcement and legislation.

Agro-biodiversity

For many crops, Palestine is considered the main centre of diversity as well as the probable area of domestication. More crops and crop progenitors originated from the Near East (including Palestine) accompanied barley and wheat on their way. Some of them, for example, lentil, pea and chickpea were domesticated in the Near East. The present geographical distribution of a wild progenitor of emmer, durum, bread wheats Triticum dicoccoides, and barley coincides perfectly with the geographical limits of the Fertile Crescent generally and Palestine particularly. These crops together with domesticated sheep and goats were a basis of a farming system that evolved in Palestine in 7000 BC.

Additional crops, which are not included in the forgoing paragraph, have regional importance in human food production, for example, chickpea and faba bean or are other valuable components of human diet, e.g., olive, almond, pistachio, apple, pear, apricot, peach, hazelnut, grape, quince, fig, date palm, cucumber and melon. Palestine as part of the Near East center is an important center of genetic diversity for a wide range of crops. This is partly due to its very dissected ecosystems, with consequently an extremely wide range of agro-ecological conditions.

Drylands in general are most known for their within-species genetic diversity. The indigenous crops and food plants of the Near East are known for their resistance to disease and abiotic stresses, making them a valuable source of genetic material for germplasm enhancement upon which global food security depends. The conservation and sustainable use of agro-biodiversity and plant genetic resources require a totally different approach from protected areas for biodiversity at species level.

The Palestinian Territories can be divided into five agro-ecological zones as indicated in Table (20) / Map (4).

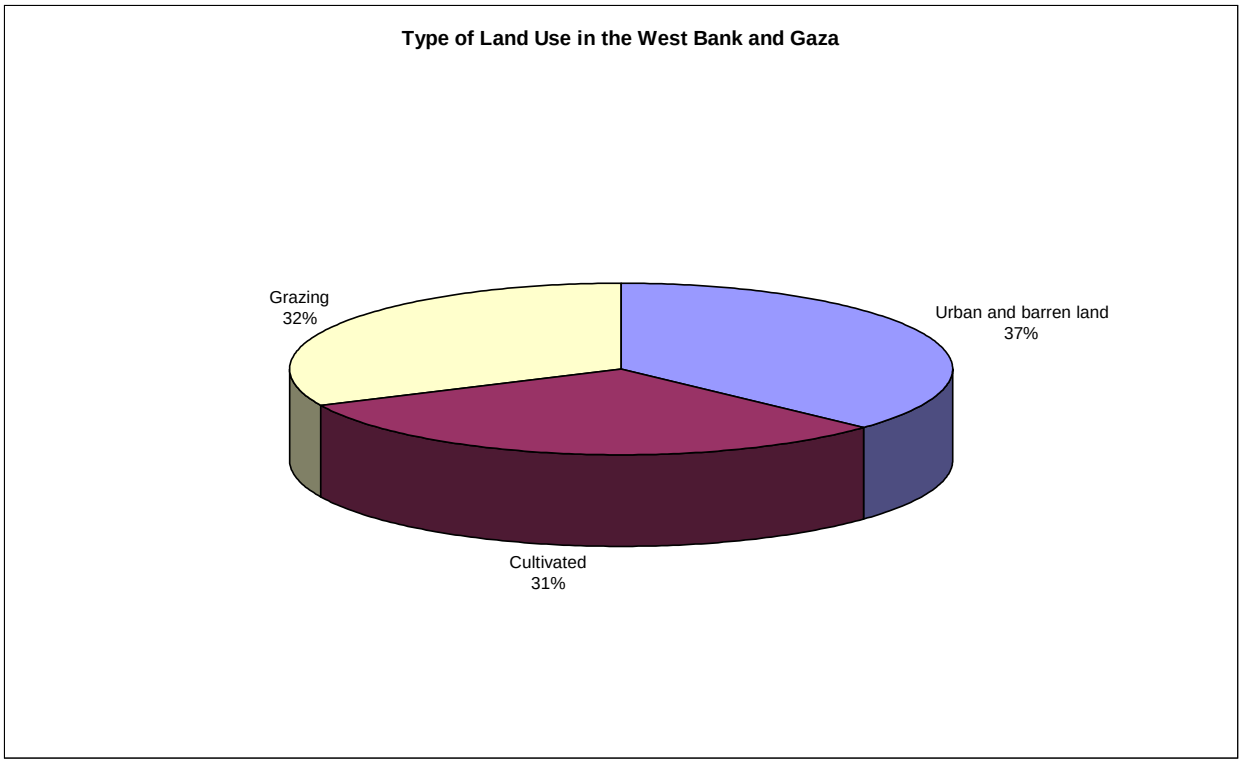
Table 20: **Agro-ecological Zones in Palestine.**

Zone	Area (km^2)	Description
A) West Bank		
Jordan valley	413	Low lying (-375 to -200m below sea level) region along the western bank of the Jordan river. A semi-tropical region with hot summers and warm winters. It is an arid region with an average annual rainfall of approximately 160 mm. The main agricultural activity in this area is irrigated vegetable production.
Eastern slopes	1594	Extend the length of the eastern edge of the West Bank (-200 to 800m). This semi-arid region is in the rain shadow of the central highlands with annual precipitation ranging from 200 mm in the south to 400 mm in the north. The main agricultural activity is animal grazing.
Semi-coastal region	470.5	The smallest of the West Bank's agro-ecological regions, it is located in the north west corner of the West Bank (100 to 400m). It is a productive agricultural area receiving 600 mm of annual precipitation. The main agricultural activities are

		field crop production and citrus trees.
Central highlands	3144.5	This highland area of the West Bank extends from Jenin in the north to Hebron in the south (400 to 1000m). It is the main catchment area for the West Bank aquifers with annual precipitation ranging from 500 to 800 mm. The main agricultural activity is fruit tree production (eg, olive trees).
Coastal region	365	This small strip of land is located along the coast of the Mediterranean Sea (0 to 100 m). Annual rainfall ranges from 200 mm in the south to 400 mm in the north. The main agricultural activities are irrigated vegetable and citrus tree production. Also horticulture production is prevalent.

Source: ARIJ GIS Database, 1998.

Of the Palestinian Territories 618,500 ha, approximately 228,845 ha (37 per cent) is urban and barren land, 197,920 ha (32 per cent) is rangeland, and 191,735 ha (31 per cent) is cultivated agriculture land



(PIALES, 1996a).

Cultivated Agriculture Land

In the West Bank, the agricultural land is highly fragmented as approximately 50 per cent of the farms are less than 2 ha and only 8 per cent of the farms are greater than 10 ha (PCBS, 1997). This fragmentation is partially the result of traditional land tenure practices and a high population growth. That is, after a farmers death, the farmland is traditionally split up among his sons.

Figure (3) / Figure (4) below show the cultivated area by crop type for Palestine in 1995/ 96.

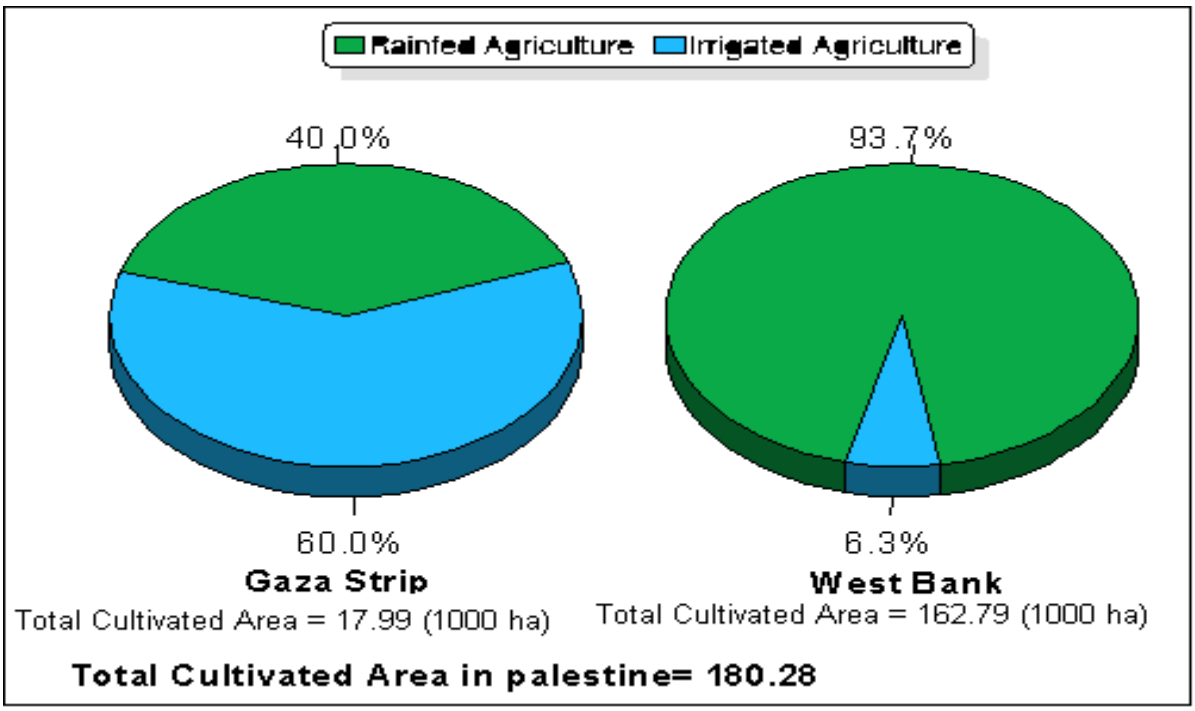


Figure 3: Areas of Different Cropping Patterns in Palestine, 1996

Source: ARIJ (BARU), 1998

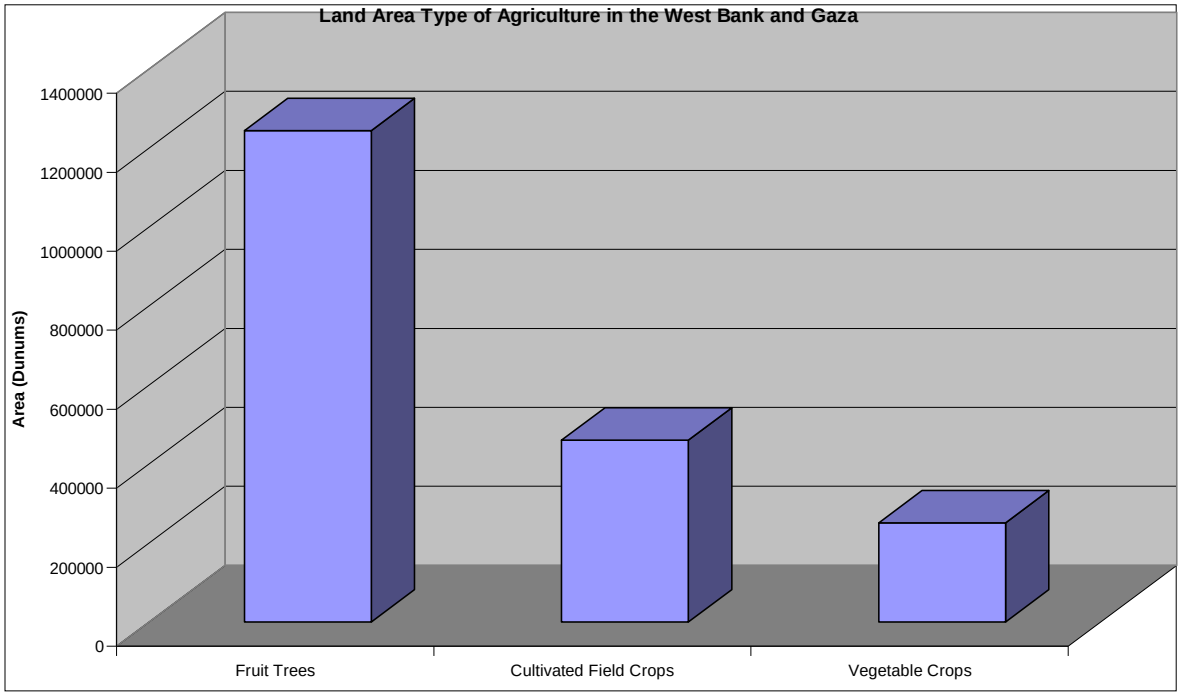


Figure 4: Land Area Types of Agriculture in Palestine, 1996

Source: PIALESa, 1996

Fruit trees, both irrigated and rainfed account for approximately 62.2 per cent of the Palestinian Territories cultivated area, field crops 26.3 per cent and vegetables the remaining 11.5 per cent.

There is significant variety within Palestine's agriculture production. Table (21) gives some representative examples of within species variety for agricultural crops.

Table 21: **Representative Agricultural Species Variety**

Crop	***Examples***
Olives	Sorri, local Nabali, Improved Nabali.
Grapes	Dabouki (most common), Zaini, Marrawi, Halawani, Shoyoukhi.
Almond	Auja, Mokhmali, Naba, Neobolis, and Bureh 81, Mokhmali, Auja, local almonds
Figs	Khdari, Khartmani, Swadi, Sultani.
Oranges	Shamoti, Joint, Valancia, Local or Baladi, French and Blood.
Wheat	Winter wheat (a durum wheat is the most common), local varieties like Nab al Jamal and hitieh.

Source: PEnA, 1998

Table (22) provides a partial list of baladi species to Palestine (i.e., indigenous). The list is intended to be indicative, not exhaustive.

Table 22: *Baladi* Species

Cereals		**Vegetables, Herbs and Spices**	
Hordeum vulgare	Barley	*Asparagus spp*	Asparagus
Tritium spp.	Wheat	*Allium spp*	Onion; Garlic; Leek
Aegilops spp.	Aegilops	*Brassica spp*	Cabbage, etc
Pulses		*Capparis spp*	Caper
Clcer arietinum	Chickpea	*Lachica sativa*	Lettuce
Lens esculenta	Lentil	**Forage Crops**	
Pisum salivum	Pea	*Agropyron spp*	Wheatgrasses
Vicia ervilia	Bitter vetch	*Agrostis spp*	Bentgrasses
Vicia faba	Broad bean / Faba bean	*Bromus inermis*	Brome grass
Root and Tuber Crops		*Dactylis glomerata*	Cocksfoot
Beta vulgaris	Beet	*Festuca arundinacea*	Fescue
Brassica rapa	Turnip	*Lolum spp*	Ryegrasses
Daucus carota	Carrot	*Medicago spp*	Alfaalfa/ Luccrne; Medics
Raphanus sativus	Radish	*Melilotus spp*	Clovers
Oil Crops		*Onobrychis viciifolia*	Sainfoin
Brassica napus	Canola	*Phalaris spp*	Phalaris
Carthamus tinctorius	Safflower	*Phleum pratense*	Timothy
Olea europea	Olive	*Sorghum halepense*	Johnson grass
Fruits and Nuts		*Trifolium*	Clovers
Cucumis melo	Melon	*Vicia spp*	Vetches
Cydonia oblinga	Quince	**Drugs, Medicinal Plants**	
Ficus carica	Fig	*Atopa belladonna*	Belladonna
Juglans regia	Walnut	*Digitalis purpurea*	Digitalis
Phoenix dactylifera	Date Palm	*Glycyrrhiza glabra*	Licorice
Pistacea vera	Pistachio	*Iiyoscyamus muticus*	Henbane
Prunus spp.	Plum, Apricot, Cherry	*Papaver somniferum*	Codine, morphine; Opium

	Almond		
Punica granatum	Pomegranate	*Platago psyllium*	Psyllium
Pyrus communis	Pear		
Vitis vinifera	Grape Vine		

Table (22) is adapted from GEF 1998, which in turn is based on J.R. Harlan (1975) *Crops and Man*. 2nd Edition. pp. 69-70. It is felt that there are several baladi species that local farmers simply classify as baladi. In addition, it is further felt that many of the baladi species are endangered, for example the Palestinian pistachio, certain baladi species of cucumber, wheat, barley, lentils and beans. Further research into the number of indigenous agriculture species and their status is needed.

Most agriculture in Palestine is rainfed and consist of a family-based mixed cropping system, with some vegetables, some field crops and fruit trees. Rainfed farming in the West Bank, for example, forms the largest cultivated area in the West Bank, making 92.7-95.8% of the total. Gaza Strip, on the other hand, is famous for its dates, olives and citrus.

However, The main crops still grown in Palestine, are the traditional field crops, like wheat, barley, and peas, and vegetables like okra, cucurbits, onions and watermelons, often together with the cultivation of tree crops like almonds and olives. The system is still based on a labor intensive, family-type of farm with a low level of inputs and technology and using mainly old, low-yielding but disease resistant varieties.

The individual property holding size has a great effect on agricultural production and the level of mechanization used. Surveys and studies done in the West Bank indicate that 75.1% of the rainfed cultivated lands are less than 2 hectares in size, while 50% of the irrigated lands are between 0.1 to 2 hectares. In Palestine, as well as, in many other developing countries, farmers play a central role in the conservation of germplasm, as they hold the bulk of genetic resources. Palestinian peasant farmers always retain some seed stock for security unless circumstances dictate otherwise. Thus, not only are crop species maintained in a dynamic state of evolution under conditions that are almost ideal in respect to sustaining original population structures, but also new variations are created. Framers in Palestine should, therefore, be encouraged to continue to maintain small holdings of seed stock as this would represent some form of in-situ conservation of germplasm across a broad range of agro-ecological conditions (ARIJ, West Bank Profile).

Threats and Impacts

The main issues effecting the agro-biodiversity of cultivated agriculture is the replacement of indigenous species (baladi species) with hybrid and High Yield Variety species (HYV). For example virtually all vegetables now grown in the Palestinian Territories are high bred or HYV species. In addition to the effect on biodiversity, the HYV generally require the use of chemical pesticides and fertilisers. The use of these is having significant effects on wildlife and ground water. For example, the thallium sulfate pesticide, which was once widely used in the West Bank, greatly affects the population of the winter raptors such as Sparrow-hawk (*Accipiter nisus*) which has disappeared many years ago. The population of the Wolf (*Canis lupus*) on the other hand, has been greatly decreased because of the continuous subjection to illegal poisoning by pesticides. It is likely that the wolf population will become extinct in the near future.

If one is to extend the issue of agro-biodiversity to that of food security. Some additional issues are:

- Agricultural land fragmentation due mainly to population growth of the Palestinian people and traditional land tenure practices.
- Water resources are scarce and of decreasing quality, most notably in Gaza.
- Loss of agriculture land to Settlement and by- pass road construction

Israeli government confiscated approximately 2.9 million dunums. More than 276 km of by –pass roads have been built in the West Bank since the signing of the Oslo II and further estimated 452 km are planned. They need to construct these roads on 1.092 million dunums, most of it in agriculture land in which the total number of uprooted trees in the West Bank is 37506 tree (since 1993 to July 1998) and the number of settlements in the West Bank is 144 and in Gaza is 20 settlement.

Agricultural practices. In the absence of a national government in Palestine between 1967 and 1995, a mix of economic and political considerations shaped Palestinian agricultural practices. In Irrigated agriculture, economic issues forced Palestinians to shift from fruit trees towards high cash value crops such as vegetables and recently flowers. For instance, the area planted by citrus in Gaza declined from 69,200 dunums in 1983 to 43,574 dunums in 1996 (Isaac, 1998). Palestinian farmers harnessed the new agricultural technologies and their production was competitive to that of Israel. In rainfed farming, Palestinians shifted from field crops to olive trees. These practices have increased the food security gap in the country and causing the loss and neglecting of certain important crops.

Agricultural Ponds

The first irrigation pond in the West Bank was constructed in the 1970 as a demonstration at the Jericho agricultural station with a capacity of 1,650 CM (Jericho Agricultural Station, 1994). The positive results achieved by this pond in increasing the productivity and improving the water use efficiency encouraged farmers to build these ponds and to use drip irrigation systems.

Soil irrigation ponds with plastic covers are most dominant in the Jericho district, with an average capacity of 3,403 CM/pond. Concrete irrigation ponds are less prominent and have a more limited capacity of just 300 CM/pond. A total of 45 concrete ponds and 186 soil ponds are located in the Jordan Valley. Of these, approximately 26 concrete ponds and 107 soil ponds are located in the Jericho district (Jericho Agricultural Station, 1994; Abed Al-Razaq & Abu Saleh, 1991).

Most of these ponds were established between the years 1970 and 1980. The rate pond construction in the Jericho district and Jordan Valley dropped in the 1980s (3.5 pond/year and 1990s (1.3 pond/year) compared to the 1970s average of 6.1 pond/year (Abed Al-Razaq & Abu Saleh, 1991). This is due to that in the 1981, the Israeli civil administration imposed constraints on building more ponds by requiring a license for each new irrigation pond. This license has been rarely granted. In addition to the high costs of construction and installation of an irrigation system using a pond. Most of the ponds in the Jordan Valley were designed and constructed by specialized engineers reflecting the awareness of the Palestinian farmers about the importance of applying this technique in a proper manner.

Irrigation ponds in the Jordan Valley get their water mainly from the springs. Agricultural wells are used as well, and occasionally they are fed from the Mekorot, which is used as the last resort when other sources become dry, especially in the Al-Auja area (Abed Al-Razaq & Abu Saleh, 1991).

Drip irrigation has been proven to increase water use efficiency by up to 90%. It is also known to increase agricultural productivity and solves the problems of water losses, which are often as high as 35% when traditional irrigation methods are used (especially furrow and contour furrow systems which use open canals) (Abd Al-Razaq & Abu Saleh, 1991). Also ,drip irrigation has increased the average

productivity of vegetable crops by 243%, citrus trees by 148% and banana trees by 125%. More than 50% of the total cultivated area in the Jericho district are irrigated using these ponds.

Agricultural ponds and drip irrigation have played an important role in production improvement through the following factors: allowing better control of irrigation process and thus crop management; improving water use efficiency and at the same time reducing the time and effort needed for irrigation; allowing the possibility of improving water quality by mixing the saline water coming from agricultural wells with less saline water coming from springs, and thus increasing the size of cultivated areas; improving the planted area production; enhancing the summer crops cultivation during winter season; and increasing the farmers income.

Increasing the number of irrigation ponds will be one of the factors in improving plant production in the Jericho district. Clearly this will involve alleviating the constraints on the installation of new ponds and finding sources of funding or credit for farmers.

Livestock and Rangeland

There are three main species of goats: baladi (local), Shami and hybrids (crosses between baladi and shami). Approximately 90 per cent a baladi species, 3 per cent Shami and the remainder hybrids. Similarly there are three main species of sheep: baladi, Assaf and hybrids. The baladi sheep account for approximately 95 per cent, the Assaf 4 per cent and hybrids 1 per cent. Again, there are three main species of cattle, baladi, Freisian and hybrids. Baladi species account for approximately 36 per cent, Freisian 64 per cent and hybrids less than 1 per cent (ARIJ, 1998).

The Eastern Slopes agro-ecological region makes up most of the PA's rangeland or grazing land. Of the 150,000 ha existing, 127,500 ha is closed to Palestinians as a result of Israeli Settlements or Military areas. Thus, 22,500 ha remain as open rangeland for the grazing of ruminants (ie, sheep and goats). The estimated carrying capacity of this area is 2,600 ruminants. (Le Houerou 1998) There are currently 150,000 ruminants in the area.

Source: PEnA

Photo 10: Eastern Slopes

To support a herd some 58 times larger than the lands carrying capacity, a large amount of commercial feed is used. Assuming that each ruminant requires 650 kg dry matter/ year (Le Houerou 1998) then 97,500 tonnes of dry matter per year (150,000 ruminants * 0.65t/ ruminant) are needed to feed the Palestinian herd. The rangeland supplies 1,700 tonnes (0.075 t/ ha * 22,500 ha) (Le Houerou 1998). This is less than 2 per cent of the feed requirements of the herd. The difference (i.e., 98 per cent of the feed requirements) is currently being made up with commercial feeds.

Marine and Freshwater Biodiversity

Physical environment

The marine biodiversity of the Palestinian Territories is limited to the Gaza Strip. As the name would suggest, the Gaza Strip is a strip of land wedged between the Mediterranean Sea (its western border), the semi-arid Negev desert to the east, Egypt's arid Sinai desert to the south and Israel's semi-humid coastal zone to the north. Gaza's Mediterranean coastline is approximately 40 km long and the strip's width varies from 6 to 13 km. In total the area is 365 km2.

The coastal shelf is 28 km wide in the south of Gaza (ie, to the 100 m depth line) and 14 km in the north. Beyond the 100 m depth line, the sea bottom drops quickly to a depth of 1,500 m. It is part of the Nile littoral system extending from the Nile Delta to the Bay of Haifa. Vast amounts of sediment are transported in an north easterly direction from the Nile Delta towards the Bay of Haifa. The longshore transport is estimated at 350,000 m^3 per year. There is a slight imbalance between longshore transport

and offshore transport resulting in the continuous, slight retreat of the coastal cliffs of Gaza (Witteveen and Boss, 1996).

The coastline is characterised by coastal cliffs (exposed Kurkar ridges) in the middle to northern section of Gaza and a sand dune system in the south. The coastline is dissected by three rivers: (i) Wadi Gaza in the center; (ii) Wadi Halib in the north; and (iii) Wadi Silka, now completely dry, in the south. The wadi's are seasonal rivers, naturally dry throughout the summer and flowing in the rainy, winter season (Euroconsult et al, 1994).

The marine environment of the eastern Mediterranean (Levantine basin) is characterised by an extreme oligotrophy, high salinity (39.5 g/l), high temperature (29 C) and high sediment transport. Extruding ridges in the sea (exposed Kurkar ridges) form the only hard stable substrate in the shore zone, suitable for colonisation of algae and weeds and are known to be a preferred habitat for several fish species and juvenile fish. The main source of nutrient inflow is the Nile River. The completion of the Aswan Dam in 1967 has denied the eastern Mediterranean an estimated 160,000 million tonnes of sediment per year, further reducing the productivity of the region (Witteveen and Boss, 1996).

Marine biodiversity

In general, the extreme oligotrophy, high salinity and high temperatures limit the flora and fauna in the eastern Mediterranean versus the western Mediterranean. For example dolphins are far more common in the western Mediterranean. And there are limited pelagic species of fish in the region (Witteveen and Boss, 1996).

The building of the Suez Canal in 1869 has led to the influx of an estimated 300 marine fauna species of Indo-Pacific origin. Some examples include the jellyfish *Rhopilema nomadica*, prawn species *Penaeus japonicus* and *P. monocerus* and the swimming crab *Charybdis longicollis* (Witteveen and Boss, 1996).

Two hundred and forty five bottom dwelling (macrobenthic) species have been identified in the coastal waters of Gaza up to a depth of 80 meters. Higher taxa include: MollIusca (66 species); Crustacea (61); and Polychaeta (50). Of the 245 identified species, 26 are of Indo-Pacific origin. Between the depths of 18 to 20 meters, the sandy bottom is characterised by the decapod crustaceans *Sicyonia carinata, Philocheras monocanthus, Diogenes pugilator* and *Spaeronassa mutabilis*. The sandy mud areas lying at approximately 35 to 50 meters are characterised by the Indo-Pacific stomatopod *Oratosquilla massavensis* and gastropod *Cerithium kochi*.

Macrobenthic species occuring between 50 and 80 meters depth include echinoderms *Brissopsis lyifera* and *Antedon mediterranea*, decapods *Parapenaeus longirostris, Macropipus pusillus, Galathea intermedia, Alpheus glaber* and ploychaete *Sabella pavonia*. At the muddy clay bottom of 80 meters, macrobenthic species include mollusca *Turritella communis, Nuclea sulcata,* polychaete *Sternaspis scutata* and octoral *Alcyonium palmatum*. Several decapodes are found at all depths (except along the shoreline). These include; *Charybdis longicollis, Myra fugax, Pontocaris cataphracta*, and *Processa nouveli nouveli* (Euroconsult et al, 1994).

The relatively low primary and secondary production levels Levantine basin is reflected in the low fish densities along the coast. Of the reported 540 Mediterranean fish species, 284 representing 108 families are reported in the Levantine basin. Seventy per cent are of Atlanto-Mediterranean origin; 13 per cent cosmopolitan (circumtropical); and 10 per cent of Red Sea origin. Twenty species can be regarded as endemic species. The main pelagic species of commercial importance is the sardine *Sardinella aurita* (Euroconsult et al, 1994). Table (23) outlines the commercially valuable species caught off the Gaza coast.

Table 23: **Commercially Valuable Fish Species.**

Scientific Name	English Name	Scientific Name	English Name
Scomber japonicus	**Chub mackerel**	***Pagellus erythrinus***	**Pandora**
Diplodus annularis	**Annular sea bream**	***Dasyatis centroura***	**Roughtailed stingray**
Trachurus mediterraneus	**Mediterranean horse mackerel**	***Mullus barbatus***	**Red mullet**
Solea vulgaris	**Common sole**	***Mobula mobular***	**Devil ray**
Scomberomorus commerson	**Narrow barred Spanish mackerel**	***Dicentrarchus labrax***	**Bass**
Carcharhinidae	**Shark**	***Euthynnus alletteratus***	**Little tunny**
Sardinella aurita	**Round sardinella**	***Sepia pharaonis***	**Cuttlefish**
Rhinobatos	**Guitar fish**	***Alepes djedaba***	**Shrimp scad**
Sphyaena viridensis	**Yellowmouth barracuda**	***Loligo duvaucel***	**Squid**
Balistidae	**Trigger fish**	***Hepiramphus far***	**Half beak**
Upensus moluccensis	**Gold band goat fish**	***Octapus valgris***	**Octopus**
Argyrosomus ragius	**Meagre**	***Caranx crysos***	**Blue runner**
Merluccius merluccis	**Hake**	***Postunus pelagicus***	**Blue swimming crab**
Siganus rivulatus	**Marbled spinefoot**	***Trachinotus ovatus***	**Pompano**
Pomatomus saltarix	**Bluefish**	***Penaeus japonicus***	**Kuruma shrimp**
Mugilidae	**Grey mullet**	***Dentex gibbosus***	**Pink dentex**
Epinephelus guaza	**Dusky grouper**	***Synodus saurus***	**Atlantic lizard fish**
Epinephelus alexandrinus	**Golden grouper**	***Diplodus sargus***	**White sea bream**
Hirundichthys rondeletii	**Blackwing flying fish**	***Diplodus cervinus***	**Zebra sea bream**

Source: CARE/ Ma'an Project, 1996

Fishery production

Prior to 1978, Gaza fishers were allowed to fish both off the coast of Gaza and the Sinai. Following the 1978 Camp David Peace Accord between Israel and Egypt, the area off the Sinai was forbidden and Gaza fishers were restricted to a small trapezoid shaped area off the coast of Gaza between Khan Younis and Gaza City and extending outwards 20 nautical miles. The outward limit was at one point reduced to 12 nautical miles and has recently been extended back to 20. The length (i.e., along the coastline) has recently been extended to roughly the length of Gaza (less a 1.5 nm buffer zone in the north and a 1 nm buffer zone in the south). An ocean area of approximately 1,200 km2 (CARE/ Ma'an, 1996).

Table 24: **Gaza Fish Production 1967 to 1996**

Year	Quantity (tonnes)	Year	Quantity (tonnes)
1967-78 (yearly average)	**4,000**		
1979	**941**	**1988**	**269**
1980	**1,300**	**1989**	**388**
1981	**1,045**	**1990**	**1,837**
1982	**835**	**1991**	**1,118**
1983	**1,650**	**1992**	**2,080**
1984	**605**	**1993**	**N/A.**
1985	**274**	**1994**	**1,500**
1986	**284**	**1995**	**N/A.**
1987	**341**	**1996**	**2,500**

Source: Adapted from CARE/ Ma'an Project, 1996

Table (24) indicates the various stages of the Gaza fishery. The large impact of the closing of the fishing grounds off the Sinai can be seen with the large drop in production after 1978. The next major decline, from 1984 to 1989 is thought to be the result of a further limiting of the area Palestinian fishers were allowed to fish by the Israelis. The next major jump from 1990 to 1993 is most likely the result of an increased level of effort (LOE). This period was the height of the intafada and marked by many long closures of the Israeli/ Gaza border. The result was that Palestinians who worked in Israel were forced to find alternative employment in Gaza and many returned to the fishery. The continuing relative high production from 1994 to present is due to the sustained higher LOE (due both to improved gear and sustained number of fishers).

Source: PEnA

Photo 11: Fishery Folks in Gaza

Marine Mammals and Reptiles

The Gaza Environment Profile (Euroconsult et al, 1994) identifies the sea turtle species *Caretta caretta* (Loggerhead turtle) and *Chelonia mydas* as existing in the coastal region of Gaza. The Coastal Zone Plan for Gaza (MOPIC, 1996) identifies two turtle nesting beaches in Gaza. Unfortunately these species and their eggs are under extreme pressure from hunting and collecting and there have been no reported sightings in at least two years. Other marine reptiles reported in Gaza include *Eretmochelys imbricata imbricata* and *Dermochelys coreacea*. Little is documented on the status of marine mammals in the Gaza area, other than that the status of the Monk seals, *Monachus monachus* remains unclear. (Euroconsult et al, 1994)

Marine Flora

Little information on the marine flora of the Gaza area is available. One study, by Dr Madi of the Islamic University in Gaza has begun a small study in this field. The study is ongoing and to date he has identified 10 species of marine algae: *Ulva, Enteromorpha, Codium, Ectocarpus, Dictyota, Laminaria, Sargassum, Colpumenia, Bactracospermum,* and *Cystoseria*.

Threats and Impacts

The main threats to marine biodiversity in Gaza is environmental pollution and habitat destruction. It is fair to say that there are no pristine areas left in Gaza, all habitats have been impacted upon. The sand from the dune ecosystems is heavily mined by the construction industry. Wadi Gaza is a stagnant liquid waste dump 9 months of the year, an estimated 42,000 m^3 of liquid waste is pumped into the sea daily and the beaches of the north are used as solid waste sites.

The above is the effect of approximately 1,000,000 people living in the 365 km2 area of Gaza. Consequently, the average population density of the Gaza Strip is approximately 2330 persons/km^2,

while the population densities in the refugee camps range from 29,000 to over 100,000 persons /km^2 (Euroconsult et al, 1994).

As mentioned above sea turtles have been hunted into near extinction and their nesting beaches (in the north) suffer greatly from sand mining and pollution.

In such a restricted area, there is great potential for over-fishing. In addition, a large portion of the catch are juveniles, fine mesh nets are used and there is reports of the use of poison fishing techniques. Thus the potential of over-fishing is real and must be monitored.

Water Resources in the West Bank

Palestine is one of the Middle Eastern countries that suffer from poor water accessibility. The major water resources available existing in the West Bank are the Jordan River and the West Bank Aquifer System. Palestinians are not allowed to use more than 15% of their groundwater and are denied access to the Jordan River

Surface Water Resources

The only permanent river, which can be identified as surface water in the West Bank is the Jordan river. It is 252 km long from its source near Banias to the Dead Sea passing through lake Tiberias, with a water shed area of about 17,665 km^2. It is an international basin where Palestine, Syria, Lebanon, Jordan and Israel are all riparians of this basin. 80% of this basin located in Jordan, Israel and Palestine. The natural flow of the river (in the absence of extraction) is estimated at roughly 1,476 MCM at the entrance to the Dead Sea (Map (5)).

The Jordan River water represents an important component in the water budget of the basin riparian countries. The Jordan River's water satisfies around 50% of Israel's and Jordan's demand. Lebanon and Syria are minor users, gaining 5% of their combined demands via the Jordan River. Israel is forbidding the Palestinians their share in the river. Under the Johnston Plan, the proposed West Ghour Canal would have supplied 150 MCM from the River to the West Bank, but plans were never carried out. Palestinians have no physical access to the river due to the military closure, which is imposed on the riverbank since 1967. In the peace process negotiations, Palestinians have to negotiate their share of the Jordan's water since 1967.

Runoff in the West Bank is estimated at 64 MCM/yr. (Al-Khatib, 1989, Abu Mayleh, 1991). This water is used by many Palestinians to meet their domestic needs especially in areas that have no distribution networks. Some farmers use small scale open ponds for irrigation purposes. Streams flowing from the central mountains toward the Jordan Valley contribute to the recharge of shallow aquifers, such as Wadi El- Qilt, Auja and Wadi El-Far'a. The flood flows in the West Bank are the Eastern and north-eastern flood wadis, with an average total annual flow rate of about 18.57 MCM/yr. and the western flood wadis with an average total annual flow rate of about 17.91 MCM/yr.

Groundwater resources

Groundwater Aquifer Systems

The main groundwater aquifer systems in the West Bank are described as follows Map (5).

A) Lower Cretaceous Aquifer Complex (Neocomian-Albian) which is represented in the West Bank by the Ramali Formation Aquifer (Kurnub Sandstone Aquifer) which is underlain by Wadi Maleh

Formation and is exposed in Wadi Maleh area at Ras Er Ramali, Wadi Far'a and Luhuf Jadir area. It is overlain by the Ajlun Series of the Cenomanian and Turonian ages (Late Upper Cretaceous). Nearly two-thirds of the West Bank area is covered by rocks of this series. The series consists of massive limestone that reaches 1,000 meters in thickness.

B) Upper Cretaceous Aquifer Complex, which constitutes the major aquifer in the region especially the upper part of the Ajlun series. This part of Ajlun series is widely exposed in Hebron, it is overlain in the north by a unit of chalky limestone and dolomite. This aquifer is divided into two systems, the first is the lower Cenomanian Aquifer System which is composed of the following geologic formations: Lower Beit Kahil Formation (Early Lower Cenomanian), Upper Beit Kahil Formation (Late Lower Cenomanian) and Yatta Formation (Lower Middle Cenomanian). The second aquifer system is the Upper Cenomanian - Turonian Aquifer System which is composed of the Hebron Formation (Upper Middle Cenomanian Aquifer), Bethlehem Formation (Upper Cenomanian Aquifer) and Jerusalem Formation (Upper Cenomanian- Turonian Aquifer).

C) Tertiary Aquifer System In the West Bank, the Tertiary Aquifer System is represented by two lithological units: the Jenin Subseries and the Beida Formation.This formation is of Senonian geologic age and known as Abu Dies formation. It constitutes the two aquifers: Jenin Subseries (Eocene Aquifer) and Beida Formation (Neogene Aquifer)

D) Quaternary Aquifer System

It is composed of the Lisan Formation, alluvial and gravel fans and the Nari Blanket (Lisan Formation (Pleistocene Aquifer) and Alluvial and Gravel Fans (Holocene)).

Groundwater Basins

Rainwater infiltrates to the water table forming the West Bank Aquifer System which is composed of dolomite and limestone rocks of the Lower Cenomanian and Turonian ages. The West Bank Aquifer System extends below the area of the West Bank. It is mostly recharged by rainfall from the mountains of the West Bank. The West Bank Aquifer System is divided into three main groundwater basins, each of which is subdivided into sub-basins. These basins are:

1. Western Groundwater Basin

It consists of two sub-basins, Nahr El-Auja El-Tamaseeh and Hebron Beer Shaba that drain the Lower and Upper Cenomanian aquifers with a total pumpage and spring discharge ranging from 380-400 MCM/yr. The storage capacity of this basin is about 360 MCM/yr.. Eighty percent of the recharge area of this basin is located within the West Bank while 80% of the storage area is located within the Israeli borders. The groundwater movement in this basin is westwards towards the coastal plain in the west. As part of this aquifer extends under Israel, it is considered as a shared basin between Israel and Palestinians. There are 35 springs within this basin with each having an average discharge of greater than 0.1 litre/sec in the West Bank.

2. Northeastern Groundwater Basin

This consists of the Nablus-Jenin basin, which drains the Eocene aquifer and the overlying Samarian basin, which drains the Eocene and Neogene aquifers. Its storage capacity is approximately 140 MCM/yr. Palestinians consume about 18% of its annual safe yield for both irrigation and domestic purposes from wells and springs in the Jenin district and East Nablus (Wadi El Far'a, Wadi El-Badan). The groundwater in this basin flows north and northeast towards Bisan natural outlets (springs) in Israel.

3. Eastern Groundwater Basin

This constitutes the eastern flank of the West Bank Aquifer. Its groundwater generally flows towards the east (Jordan Valley). The available potential resource of this basin is estimated by Tahal between 100 and 150 MCM/yr (Tahal, 1990; IPCRI, 1993). The Eastern Groundwater Basin is not exploited because of poor water quality. It needs extensive hydrogeological study to identify its potential resources, safe yield, hydrogeological characteristics, groundwater quality, and the flow pattern of each of the sub-basins. This basin supports over 79 large flowing springs of an average discharge greater than 0.1 liter/sec. These springs constitute around 90% of the total annual spring discharge in the West Bank.

In general, the total annual capacity of the ground aquifers is estimated at 600-650 MCM. The water in these aquifers flows in two main directions, east and west. The groundwater basins are recharged directly from rainfall on the outcropping geologic formations in the West Bank mountains (forming the phreatic portion), while the major storage areas are in confined portions.

Springs

There are 527 springs in the West Bank, of which 114 have a minimum discharge rate of 0.1 litre/sec. Most of these springs are located either east or west of the water divide and discharge water with the slopes towards east or west. There are 79 springs located east of the water divide, flowing towards the Jordan Valley and 35 springs which flow to the west of the water divide. Sixteen of the springs are used for domestic purposes while the rest are for agricultural use. The total annual discharge of the major springs ranges from 24 MCM/yr. in the 1978/79 hydrologic year, to 116 MCM/yr. in the 1991/92 hydrologic year. This data gives an average of 52 MCM/yr.

These springs can be classified according to their surface catchment areas as first the Eastern Basin Spring Systems which consists of Jerusalem Desert Spring System (E'in Gedi, E'in Fashkha, Um Eddaraj, Aytan, Artas, Sa'ir, E'in Fara, E'in Fawwar, E'in El-Qilt, E'in Es-Sultan and Far'a Springs). Second is the Western Basin Spring Systems which has 35 springs, of which 15 springs are used for domestic purposes such as Jerusalem spring system, Auja-Tamaseeh Spring and Nablus Spring System.

The society and economy of Palestine

Demographic outlook

The demographic outlook of any human population is a reflection of that society's political, economic and social circumstances, which, in turn, affect fertility, mortality and internal and external migration patterns.

The Palestinian society is considered one of the most demographically dynamic in the modern world. More than once, in the past 50 years, it has been subjected to large-scale involuntary demographic changes. These started at the time of the Jewish in-migration to Palestine at the beginning of the century, and continued to the declaration of the State of Israel in 1948 (with accompanying wars and

massacres) and to the 1967 war. Throughout this time, Palestinians were constrained to migrate in large numbers to different areas in the world.

The population of Palestine during the Ottoman rule (1914) was approximately 689,000. Out of this, individuals of Jewish descent constituted only the 8%. In 1922, the population increased to 757,182 out of which 11% were of Jewish descent.

After the 1948 war, the West Bank (WB) and the Gaza Strip (GS) began to be regarded as two demographically separate entities. Statistics show the population of the WB in 1922 at 257,500 and that of the Gaza Strip at 28,000. In 1931, WB population became 322,200 and that of the GS 48,000. These numbers make it clear that the GS population constituted less than 5% of the overall population, whereas the WB represented an important demographic concentration. In 1946, WB had an estimated population of 465,800 (one third of the overall population in Palestine) and GS population was at 71,400.

Another outcome of the 1948 war was the creation of 714,000 - 780,000 refugees, of which about 65% went to the WB and GS. This is a migration phenomenon of very large proportions, which created numerous social and economic problems and rendered GS one of the most densely populated areas in the world.

The population of the WB and GS continued to increase after the 1967 war in spite of Palestinian migration to other countries and the attempts of the Israeli authorities to get as many Palestinian as possible to leave their homeland.

The latest statistics indicate that the population of WB and GS in 1997was as follows:

- The population of the WB and GS, excluding Jerusalem areas annexed by Israel after 1967, was 2,596,617.
- 54% of the population live in urban areas, 15.9 % live in refugee camps and 30.1% live in rural areas.
- Male population was estimated at 1,318,804 and female population at 1,277,813. Gender ratio according to this is 97%.
- Number of Palestinian families in the WB and GS was estimated at 406,896, which means an average of 6.4 member per family.
- The population of Jerusalem as a district was 323,837, of which 163,330 are males and 160,507 females. The number of families was estimated at 59,622 family with an average of 5.4 member/ family.

Some of the main demographic characteristics of the Palestine may be summarised in the following:

1. The Palestinian population can be described as young, as youth under the age of 15 constitute 48%-50% of the overall population.
2. A low ratio of labour force in comparison to the total population; labour force is estimated at 21% of total population.
3. Restricted contribution of Palestinian women in organised labour force (9%)
4. Increasing cost of living accompanied with decreasing income levels.

Health

The health situation in the WB and GS is affected by social, economic and environmental variables such as income, social status, and availability of appropriate water resources, sewage and waste disposal facilities and habitation. The Palestinian society, as other third world countries, is characterised by a high fertility level and the widespread prevalence of several common diseases.

Data indicate a recent notable improvement in some health aspects such as a decrease in infant mortality, and an increase in overall life expectancy. Vaccination rates are also improving. The health infrastructure, however, seem to be deteriorating.

Health indicators

1. Infant mortality

Statistics indicate that infant mortality at 28/1000 live births in 1980. This ratio increased to 41 cases in 1992, then dropped again to 28 in 1996.

2. Life expectancy.

Life expectancy is estimated at 66-71.7 years. In 1992, life expectancy was estimated at 66 years according to data prepared by UNICEF. In 1996, the PCBS estimated female life expectancy at 71.7 - 73.5 and male life expectancy at 70 years.

3. Fertility

Birth rates in Palestine are considered one of the highest in the world, with 6.24 child per woman (7.44 in the GS and 5.61 in the WB). Estimated total births are 50 in 1000 in the GS, and 40 in 1000 in the WB.

4. Common diseases

In recent years it has been possible – because of vaccination - to almost eliminate several previously common diseases such as diphtheria, whooping cough, tetanus, and polio. Some of the remaining widespread diseases are hepatitis, smallpox, measles, brucellosis and mumps. The most widespread disease especially among children is diarrhea.

The health system

Management

The Palestinian Ministry of Health manages 178 primary health clinics in the WB and 29 clinics in GS. 210 clinics were managed by non-government organisations (NGOs) in 1992, which dropped to 128 clinics at present. NGOs, however, still manage a third of the total number of 1959 hospital beds. UNRWA also contributes to health services through its 22 medical clinics in the WB and 11 in the GS.

Employment in the Health Sector

There are 12 doctors per 10,000 inhabitants in the WB/GS, in comparison to 24/10,000 in Jordan and 28/10,000 in Israel. The ratio of nurses per inhabitants is 1/1400. 63.6% of those employed in the health sector work at non-governmental establishments. 30.7% of doctors, 40% of nurses and 56% of managers work in the government health sector.

Health care clinics employ 2265 employees (1316 in the WB and 949 in the GS), 16% of whom are doctors (in general and specialised practices) while 30% occupy administrative positions. The remaining are nurses, midwives and other employees.

Hospital bed availability

Statistics show a ratio of 1.1 hospital bed/1000 distributed over government and non-government sectors in addition to UNRWA. Government hospitals contain 61% of total hospital beds, while 37% of hospital beds are in private/non governmental hospitals and 2% in UNRWA hospitals.

Although the ratio of hospital beds per capita seems adequate, there are discrepancies in the geographic distribution of these beds. There are, for example, 2.5 hospital beds/1000 in the central area of the WB, in comparison to 0.4 hospital bed/1000 in the Hebron District.

Geographic distribution of medical services

Medical facilities are unevenly distributed amongst the different geographic areas. Almost 65% of houses in the Hebron District are located far from the nearest health centre versus 22% in other areas of the WB. Rural areas also suffer from a lack of health clinics; there are 277 villages inhabited by 14% of the population which do not have any medical clinics and 196 other communities inhabited by 9% the rural population lack even primary health services.

Education

Education in the WB and GS can be assessed at several levels:

Pre-school (kindergarten)

Although children under six (under compulsory school age) constitute a relatively high percentage of the population, not many of them attend pre-school. The number of children under six is estimated at half a million (22% of the population). In 1995/1996, 44,927 children attended pre-school and were distributed over 532 kindergarten with 1,460 teachers.

It is worthwhile to note here that 99% of kindergartens are owned by non-government, private or charitable organisations. Most of these kindergartens are located in cities and they house 29 to 40 children in each class.

Formal education

79.3% of schools are located in the WB. The GS has 20 % of the overall number of schools. The majority of schools in the WB are under government supervision, whereas UNRWA runs most of the schools in the GS.

There are currently 1,416 schools in the WB and GS, 1061 of these schools are governmental, 134 of which are located in the GS and 153 in the WB. 146 schools in the WB and 11 in the GS are non-governmental or private. 77.4% of schools include the compulsory levels of education, and 22.6% are for secondary levels (10 grade and higher). 711,775 students attended these schools in 1996/1997 with a 90% attendance level for compulsory grades dropping down to less than 50% in the secondary level.

Average teacher/student ratio is 1/31. Private schools however have a 1/19 ratio as opposed to UNRWA schools who have 1 teacher for every 38 students.

The infrastructure and facilities in these schools leave much to be desired. They lack several basic services such as continuous supply of water and electricity. More than 43% of schools lack at least one basic service or facility. Schools in general, expect some secondary level ones, also lack educational facilities such as libraries, laboratories, music rooms etc.

Table 25: Availability of services in schools, including kindergartens

Territory	Water			Electricity		Snack Bar	
	Available	Not Available	Partially Available	Available	Not Available	Available	Not Available
West Bank	1223	44	414	1340	341	759	922
Gaza Strip	318	1	12	316	5	274	47
Total	1541	45	416	1656	346	1033	969

Source: Hijjeh

As far as overcrowding is concerned, statistics show that the number of students in each class vary between 20 to 55 depending on the kind of school, the educational level of the class and the geographical location of the school. Average class occupancy is 36.8 student/class.

Higher education

Community colleges

There are 19 community colleges attended by 4110 students. These colleges employ 498 teachers, 63% of whom are on full time basis.

Universities

There are 11 universities in the WB and GS, including the Open University of Jerusalem, Palestine Polytechnic and the College of Education in Gaza. The number of university students reached 46176 in 1996/1997, 26553 of whom are male students and 19643 are female students. Administrative staff at Palestinian universities was estimated at 1108 in addition to 484 technicians. Teacher/ student ratios range between 1/68 (in Al Azhar University in Gaza) and 1/11 (in Palestine Polytechnic Institute). 47% of university teachers are Ph.D. holders, 41% MA degree holders, and 12% BA degree holders or less.

The economy

The Palestinian economic output is relatively small in comparison to that of its neighbours. This is a direct result of the political and social turmoil it went through in recent decades, whose most significant instances are the 1948 and 1967 wars. The account of Palestinian economic output was underwent some changes between 1948 and 1967, as the WB economic output was calculated together with the one of Jordan, and the GS economic output together with the one of Egypt, at the time suffering an economic stagnation. In this period, agriculture was the main contributor to the Gross Domestic Product (GDP).

After 1967, the Palestinian economy was made to become very dependent on the Israeli economy. This dependency is most apparent in external trade and labour markets. The result is a decrease in Palestinian GDP and trade volume.

Main economic characteristics

The GDP of WB and GS's is of great importance to the Palestinian people. Any decrease of such GDP means more dependency on the Israeli economy and increases the benefits that Israel achieves by using Palestinian labour. Israel's over-flooding the Palestinian markets with its own products has rendered the Palestinian economy dependent on political dynamics rather than on the normal laws of supply and demand.

Table 26: GDP distribution in the West Bank and Gaza Strip

Total Local Product	1970-1973	1974-1977	1978-1981	1982-1985
West Bank	272.7	381.8	494.2	537.3
Gaza Strip	137.8	166.7	208.3	187.1
West Bank & Gaza	410.5	548.5	702.5	724.4

Source: Hijjeh

From table 26, we notice an increase in the WB/GS's GDP by 76.5% during the periods of 1970-1973 and 1982-1985. When subdivided, this increase came to 97% in the WB and only 35% in the GS. This resulted in a drop in the GS's contribution to the Palestinian GDP from 33.6% in 1970-1972 to 25.8% during 1982-1985. The GDP percentages were therefore less than the GNP's, as its importance decreased as a source of income.

Table 27: Comparative ratios of the GDP and the GNP in the West Bank and Gaza.

Territory	1970-1973	1974-1977	1978-1981	1982-1985
West Bank	83.3	79.5	78.2	74.8
Gaza Strip	79.2	73.5	66.4	57.7
West Bank & Gaza	81.9	77.6	74.2	69.5

Source: Hijjeh

We notice from this table that the contribution of the GDP in the GNP dropped from 81.9% in 1970-1973 to 69.5% in 1982-1985. This drop was more moderate in the WB in comparison to the GS.

General indications of economic performance in 1996:

- The GNP experienced a drop of 2.9% in comparison to 1995.
- Per capita GNP dropped by 6.7% in comparison to 1995, and by 13% than what it was in 1993, 1994.
- A 62.8% drop during 1993-1996 in transfers especially from workers inside Israel as a result of a drop in the number of Palestinians working in Israel from 83 thousand workers in 1993 to 25 thousand in 1996.
- The GDP in 1996 was $3.2 billion registering a negative growth of 7.2% in fixed prices.
- Palestinian economy experienced a drop in its capacities to absorb local labour force.
- The WB contributes to 67.8% of the GDP, while the GS contributes to 32.2%.

- An increase in the marginalization of economic sectors that are capable of generating renewable income resources. The contribution of the agricultural sector to the GDP is 14% with an occasional increase to 17%, depending primarily on the olive season. The agricultural sector only absorbs 17% of the local labour force.
- Industry contributes less than 14% to the GDP and employs 17% of the overall local work force. Service and trade sectors contribute 62% to the GDP, whereas the construction sector contributes to approximately 10%.

Foreign trade

The Palestinian economy has depended almost completely on Israeli foreign trade, except in the few cases of direct trade (mostly agricultural) with Jordan and some European countries. Palestinian foreign trade was somehow restricted to Israel or through it. Palestinian imports from Israel or through it constituted 90% of its overall imports.

Israeli exports constituted 85% of Palestinian exports in 1992, most of which were internal contracts for the benefit of Israeli producers.

One prominent feature of Palestinian trade malfunction is the high import ratios to the GNP compared to exports. Imports contribute a yearly average of 44% to the GNP, whereas average export contribution to the GDP is almost 18%. Export to imports ratio during the period of 198-1991 was 39%; dropping from 54% in 1982 to 31% in 1988 and the rising again to 22% in 1991.

Table 28: Israeli Debt (Estimated in US Million (m) Dollars)

Year	Debt (US$ m)	Israel
1970	70	62
1975	212	249
1980	326	376
1985	336	523
1990	612	255

Source: Hijjeh

Foreign trade experienced a significant drop in 1996, which reached 10%, as the volume foreign trade dropped from $2658 million in 1995 to $2398 million in 1996. This drop was a result of a 14.2% decline in product and service exports, and another of 8.5% in product and service imports. Available data reveals a sharp drop of 51.3% in gross export value from approximately $1295 million in 1992 to $631 million in 1996.

This may be explained by the decline in the value of service exports as a result of the closure of the Israeli labour market. Service exports constituted 77% of the overall export value in 1992, this dropped to 50% in 1996. The value of product exports in 1996 reached almost $316 million, representing 9.9% of the GDP, 88% of which were directed to Israel and other markets through Israel. Direct product exports to Arab and other countries did not exceed $37.9 million.

Income

Both GDP and GNP have dropped in the past four years. One of the main reasons for this decline is the continuous and long closure periods. An analysis by the Palestinian Planing Centre in 1997 shows that the per capita share of the GDP witnessed continuous fluctuations during the period 1985-1996. It reached $2299 in 1995 compared to $1309 in 1996.

There are no official statistics on the number of people living under the poverty line. Estimate statistics and data indicate that elements contributing to the increase of poverty in the last few years include the continuous closures; the Gulf War and the expelling of Palestinians from Kuwait and other countries; the Intifada; and the absence of a national strategy for the eradication of poverty.

There are indications that poverty in the GS is more severe than that in the WB in spite of the existence, according to the report of the UN Special Coordinator, of severe poverty in the northern areas of the WB (the Jenin District) and in the southern villages of the District of Hebron. The Palestinian Central Bureau of Statistics (PCBS) conducted surveys on food expenditures in relation to overall expenditures as an indication of poverty (or standard of living). Such surveys indicated that 38.5% of WB families and 34% of GS families are considered on the border-line, with over 53% of their income spent on food. The survey also showed that the lowest income levels are in the southern areas of the WB, followed by the northern parts of the WB and the GS especially in the areas surrounding Gaza City.

Table (29) contains an average distribution of household monthly income in 1996 distributed according to expense groups, geographical areas and type of community.

Table 29: Average Distribution of Household Monthly Income in 1996

Issue/Territory	West Bank & Gaza	Gaza Strip	West Bank	Village	City	Camp
Food	41	37.1	39.5	38.7	38.6	38.7
Health	2.8	2.3	4	3.7	2.8	3.5
Education	3.3	3.5	3.5	3.6	2.9	3.5
Housing	13.2	14.3	12.4	13.2	13.7	13.3
Clothing	7.7	8.7	8.4	8.6	7.9	8.5
Transportation	9.1	10	12	11.3	9.1	10.8
Other	22.9	23.2	20.2	20.9	25	21.7
Total	100	99.1	100	100	100	100

Source: Hijjeh

Inflation

Israeli economy depended mostly on inflation policies. An inflation which was carried over to the Palestinian areas affecting its economy far more in view of the absence of appropriate programmes to contract inflation, or policies to regulate the average monthly income by inflation rates.

Table (30) contains inflation rates in the WB/GS and Israel between the years 1971-1991.

Table 30: Inflation Rates in the Palestinian Territories and Israel

Year	Gaza Strip	West Bank	Israel
1971	22	16	12
1975	54	43	39
1981	110	114	117
1985	338	321	305
1991	7	12	19

Source: Hijjeh

Labor force

Labor force in the WB/GS increased from 1127 thousand in 1968 to 282 thousand in 1988, 399 thousand in 1993, and 361 thousand in 1996, distributed on different economic sectors. In 1968, a third of this force was employed in agriculture until the deterioration of the agricultural sector led workers to leave their jobs and look for work inside Israel. The industrial sector absorbs only 16% of the labour force in spite of the increase in the number of industrial establishments and activities in the WB/GS. The construction sector absorbed almost 12% of the total work force in 1968, which increased to 25% in 1988.

In 1997, the labour force in the WB/GS reached 567 thousand, 80.6% of which (459 thousand) were distributed geographically as follows:

75.7% in the WB,

25.7% in the GS and

16.6% in Israel.

Table (31) indicates the distribution of the Palestinian labour force on the different economic sectors.

Table 31: Distribution of the Palestinian Labour Force (%)

Territory	Agriculture	Industry	Construction	Public Service	Total
Gaza Strip	9.3	15.2	9.8	65.1	100
West Bank	19.6	17.6	9.7	53.1	100
West Bank & Gaza Strip	16.4	16.9	9.7	57	100

Source: Hijjeh

Table 32: Distribution of the Palestinian Labor Force in the Different Crafts (%)

Year	Agriculture	Industry	Construction	Public Service	Total
1975	14	18	54	14	100

1987	14.5	18.1	45.6	21.8	100
1993	10.3	5.7	72.6	12	100
1995	10	14	50.6	25.3	100
1996	10.8	13.5	56.6	19.1	100
1997	11.7	15.8	54.9	14.6	100

Source: Hijjeh

Infrastructure

Infrastructure is of obvious large importance to economic development. Years of Israeli occupation left the infrastructure of the WB and GS in a deplorable situation. Estimated expenditures on infrastructure during 1967 to 1993 were $20 to $30 million, which is less that 1% of the GDP and much below the average of 4% usually spent on infrastructure in developing countries.

Communications

Communications were totally managed by the Israeli Bezek company until 1997. In January 1997, the Palestinian Telecommunications Company took over all communication services in the WB and GS excluding Jerusalem.

Until then, the communications sector could be said to be in a deteriorating state; the total number of phone lines was 80 thousand, that is an average of 3.3 telephone lines for each 100 people. This ratio is significantly below that one of neighbouring countries, as the following table indicates.

Table 33: Communication's Sector in Palestinian Territories and Surrounding Countries

Country/ Territories	Paved Roads (m/100 persons)	Phones (number/100 persons)	Number of homes connected to sanitary sewer system	Electricity (Kw/100 persons)
Jordan	170	7	100	25
Palestinian Territories	80	3.3	37.4	13.1
Israel	266	37.1	100	82
Syria	180	4.1	36	30

Source: Hijjeh

Energy

The total volume of electricity consumed in the WB is 890 MW/h. Electrical services reach 92.5% of the population. 97% of consumed electricity is generated through the Israeli Electrical Company. 14% of village inhabitants operate their own electric generators for limited hours. The Gaza Strip consumes

464 MW/h that are purchased from the Israeli Electrical Company. The average annual consumption of electricity per capita is approximately 13.1 kW/h, which is significantly less than that in neighbouring areas.

Water and waste water collection

Statistics indicate that up until June 1997, 86.3% of Palestinian households were connected to water networks (97.7% in the GS and 81.04% in the WB). The per capita average water consumption reaches $100m^3$ per year, which again is significantly lower than that in neighbouring countries. Per-capita water consumption in Israel, for example, reached $500m^3$, and in Jordan $140m^3$.

Most drinking water networks are old with of 40% to 50% water loss. 20% of houses are not connected to water networks, and more than 16% of Palestinian households suffer from water shortages.

As for wastewater collection, statistics show only 28.7% of WB residences and 42% of GS residences are connected to sewerage networks.

Economics of Biodiversity in Palestine

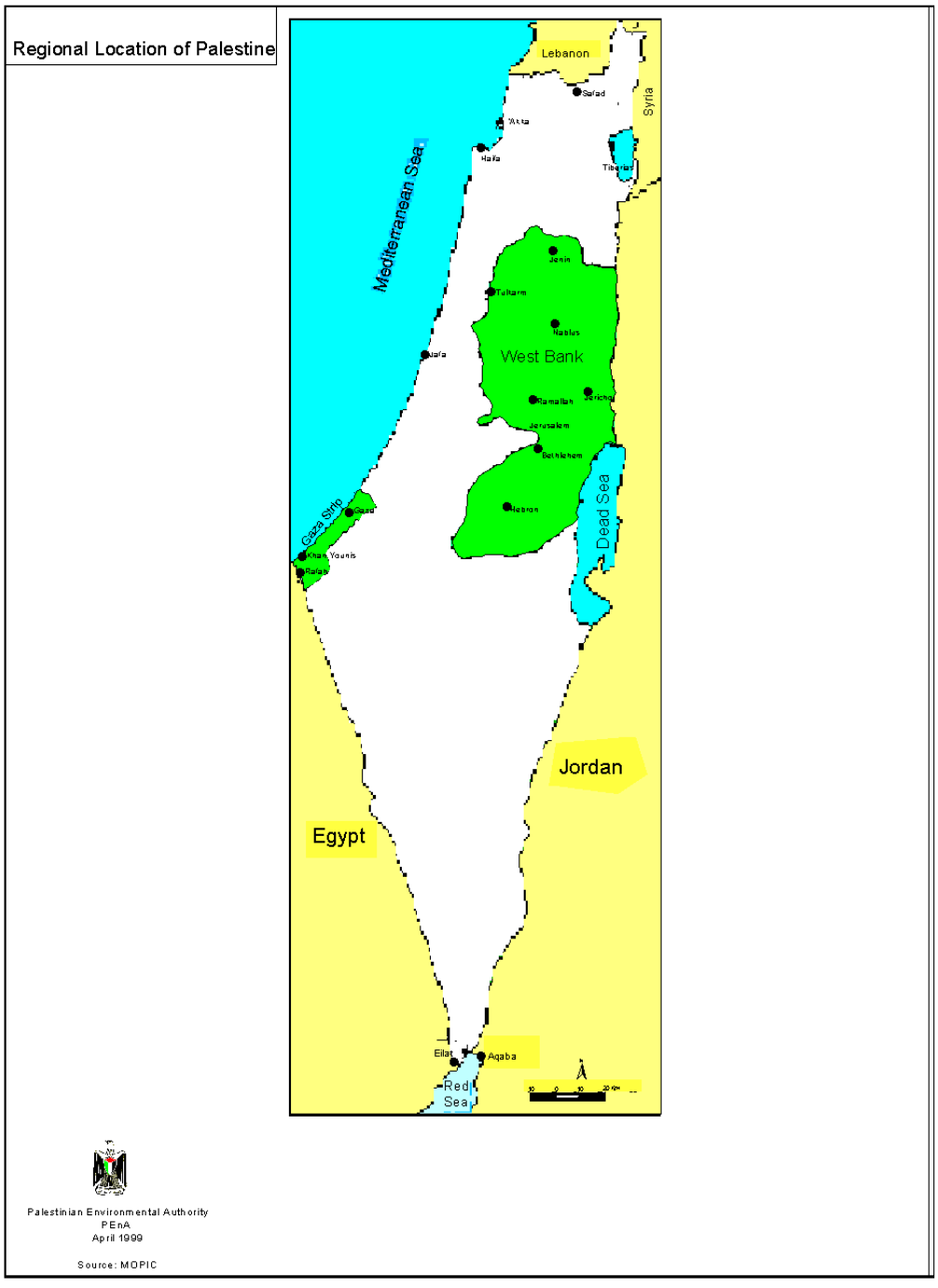
As part of the Fertile Crescent, Palestine is an important centre of genetic diversity for a wide range of crops such as wheat (emmer, durum, and bread wheat), lentils, peas and vetch that were domesticated in 10,000 years ago (Zohary and Hopf, 1988). Plants of this country are of greater importance to mankind than those of most other world regions. The life-sustaining crops of wheat, barley, vines, olives, onions and pulses all originated within the geographical land of Palestine. The wild ancestors of these crops, which now only occur in tiny remnants of natural vegetation, represent a vital resource for future crop breeding (Hepper, 1992). This is partly due to its very dissected ecosystems, with consequently an extremely wide range of agro-ecological conditions. It is also due to its geographical position at the crossroad between the three continents Map (4) and its unique climate and soil type Map (5), Map (6) & Map (7).

Much of the Palestinian life depends on the essential goods and services provided by the variety of genes, species, populations and ecosystems**.** Palestinians have used the natural resources of their country for various needs and uses of their daily life. Long time ago this land was very famous for its rich vegetal green cover. A visitor would have gazed across the different ecosystem noticing the oak, pine, olive, pistachio, acacia, figs, pomegranates, dates, the wild oleander bushes, the blaze springtime colour of poppies, yellow spiny broom, mallows, camomile, desert tulip, wild cyclamen, Everlasting, wild carrot, water lilies and natural gardens with buttercups and orchids. All formed a unique potential for sustainable utilisation.

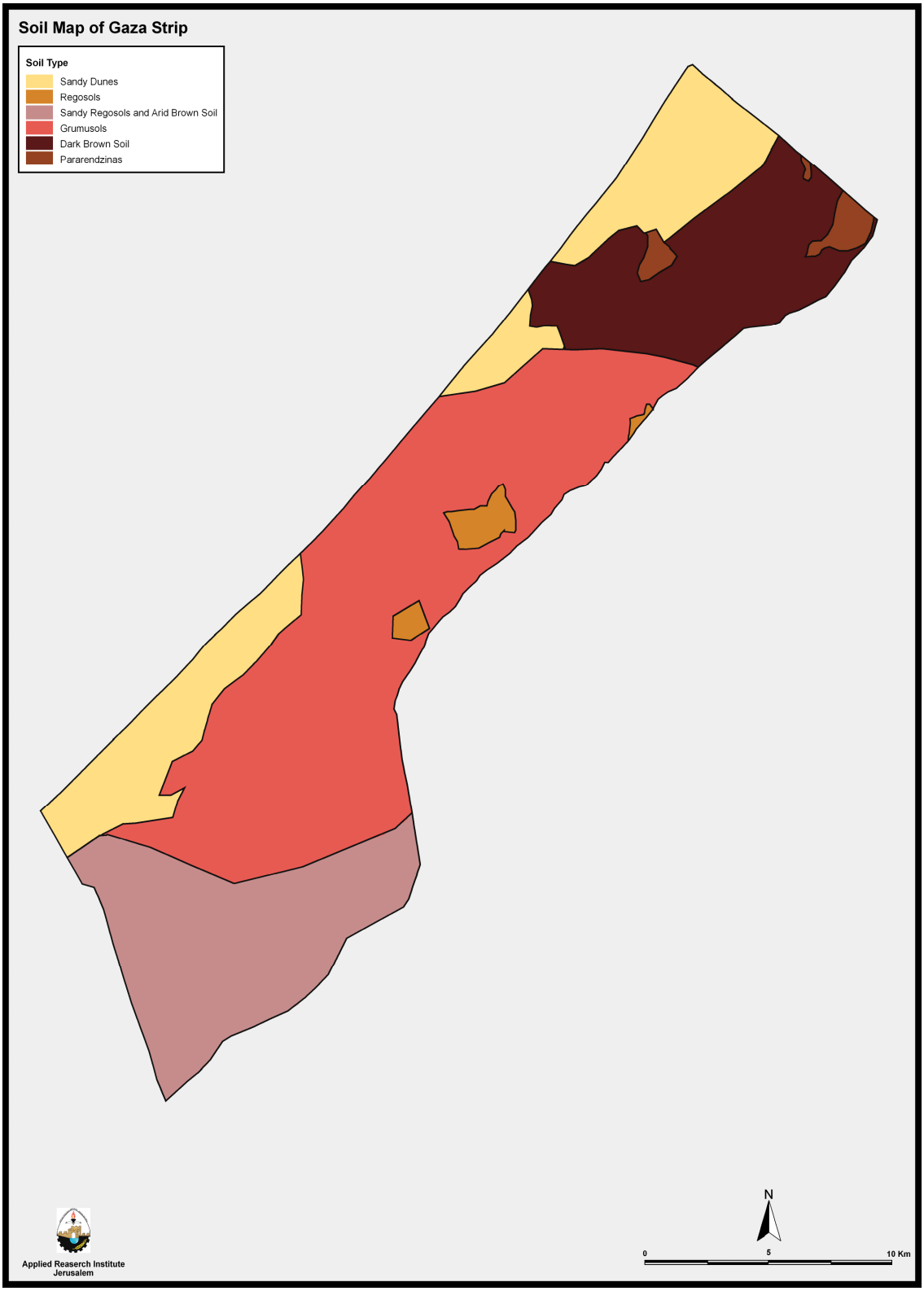
Nomadic Palestinians roamed all over the country with their sheep and goats. Women used horns of gazelles for wool weaving, wood from forests were used for ship building of the famous Phoenician ships that travelled all over the Mediterranean region. In addition, this part of the Middle East supports the unique eastern parts of the River Jordan with its natural resources such as fish, wood, vegetables, fruits and medicinal plants and other forest products.

The natural ecosystems in Palestine provide support for human activities in agriculture, animal husbandry, forestry, traditional and pharmaceutical health products, tourism, and many others. These systems are essential also for their aesthetic and intrinsic value, the stabilising effect of the ecosystems and the protection of overall environmental quality. Sustainability of agricultural production and

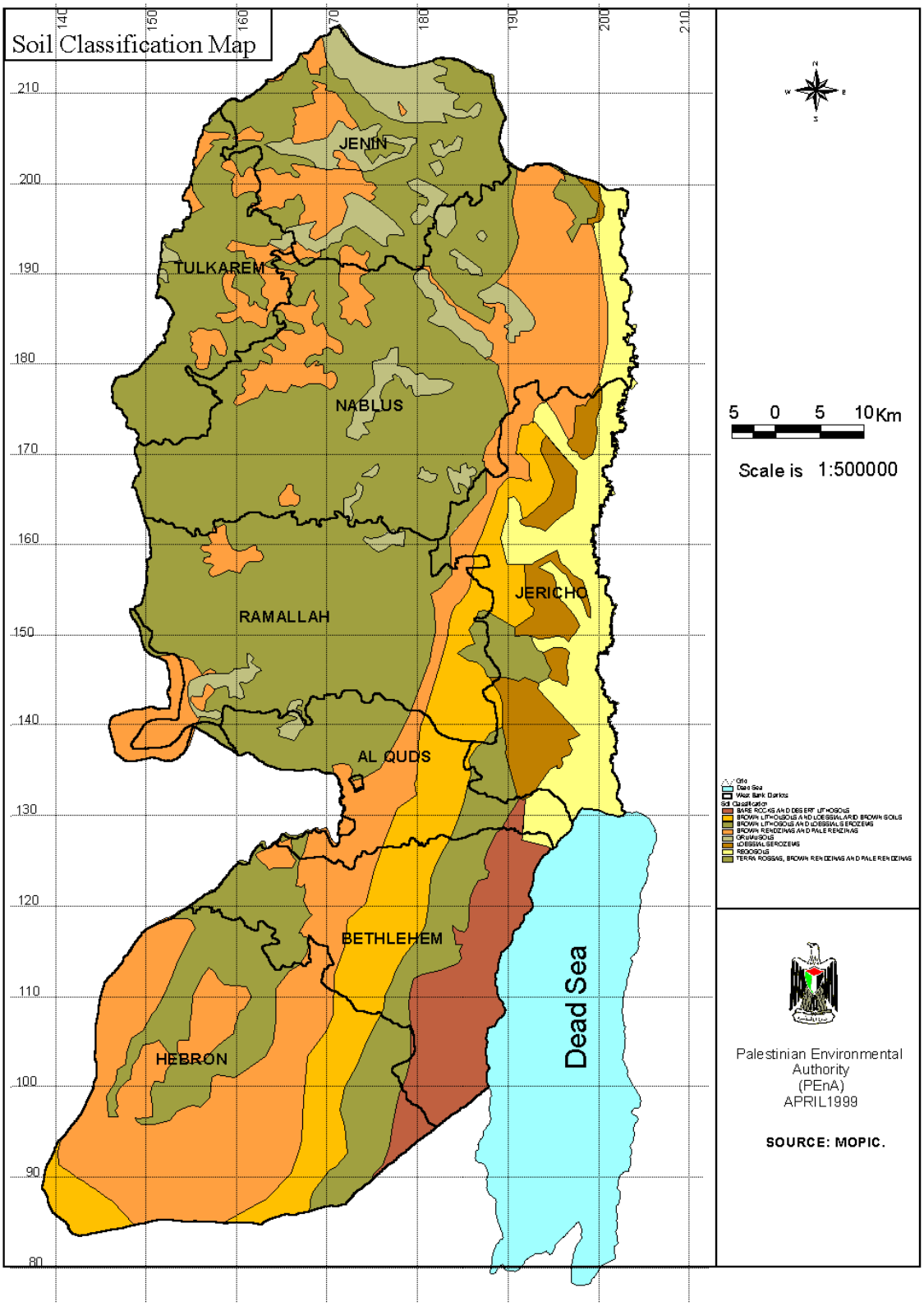
Map 3: Geographical Location of Palestine



Map 4: Soil Types in Gaza Strip



Map 5: Soil Types in the West Bank



environmental balance depends on the status of a diverse natural biota composed of an estimated 2,483 species of plants according to old and recent surveys respectively, 470 species of birds, 95 species of mammals, 7 species of amphibians, and 93 species of reptile that inhabit Palestine, (ARIJ, 1995); (Ishtayia, 1995); (Shmida, 1995); (Al Atrash, 1998).

The political turmoil that affected Palestine in recent history, had a profound impact on Palestinian economy. Since 1967, Israel succeeded in turning the West Bank and Gaza Strip into a reservoir of cheap labour and consumers for their products. Making the economy of Palestine a dependent economy was no great challenge for them. After the signing of agreements between Palestinians and Israelis, some expected that the economic outlook of the Palestinian Territories would have improved. Instead, the economical situation deteriorated, and the per-capita GDP dropped from US $1,800 in 1991 to US $800 in the first half of 1996. Comparatively, the per-capita GDP in Israel reached $ 16,000 under the same level of prices. A serious deterioration of the Palestinian environment and natural resources has been among the consequences of such economic deterioration.

The Palestinian economy is still dominated by agriculture, which contributes almost 17% to the Palestinian GDP (Palestine Economic Pulse, 1997). With the initiation of the current peace negotiations with Israel, Palestinians began assuming increasing administrative responsibilities and sovereignty of the civil aspects of the Palestinian life. A Palestinian National Authority has emerged which is attempting to improve living conditions, rehabilitate the infrastructure and economy, and work towards the sustainable development of Palestine.

The trend has been towards creating local jobs, developing the industrial, agricultural, and tourist sectors, and hiring local people in the public service sector.

Benefits of biodiversity

Sustainable use of biodiversity is considered a perquisite for sustainable social and economic development; it ensures the continuing provision of goods and services from ecosystems and their components. The Palestinian land has several diverse ecosystems, which have favoured the country with rich cultural and natural resources.

An economic valuation of biodiversity provides one way of taking practical decisions on where conservation action is most needed, and a variety of conservation techniques that have to be developed both In situ and Ex situ. The wildlife and the cultivated species of agriculture are directly contributing and supporting the main income of people in the West Bank and Gaza Strip.

The economical value of several biological products could be categorised as follows:

Food plants

Different parts of useful plants are used by the Palestinians as direct food which includes: food cereals and pulses, root and tubers, oil, fruits and nuts, vegetables, herb, spices, drugs and medicinal plants. Some plants are used for their stems and leaves such as *Diplotaxis acris, Rumex roseum, Chenipodium spp., Eryngium creticum, Malva rotundifolia, Lactuca cretica, Cichorium punilum* and others. Some other plants are used for their fruits such as *Rubus sanctus, Crataegus spp., Pyrus syriaca, Prunus ursina, Prosopis farcta, Ceratonia siliqua, Zizyphus spp., Arbatus andrachne* and others. Other useful plants are used as raw material for industrial issues or as forages, fiber plants, and other miscellaneous purposes such as *Pistacia palestina, Cistus creticus* and *Pinus halepensis* that are used for producing gums and resins. (Barkoudah, 1995; ARIJ, 1997).

Medicinal plants

The West Bank and Gaza Strip are rich with plants that have different medicinal values, such as herbs, perfumes and dye plants. Medicinal plants were and are used by Palestinians according to traditional ways. Special people called "Al A'atarin" used to collecting medicinal plants from Bedouins and villagers who pick them in the wilderness and sell their useful parts to the public. Medicinal plants contain powerful natural chemical constituents and at the same time they are cheaper than those artificially synthesised. The products of these plants can be used in drugs, industrial food manufacturing, or other industries. The most popularly used medicinal plants in Palestine are: *Crocus spp., Colchicium spp., Cyclamen spp., Lilium spp., Scilla spp., Rhus coriaria, Calotropis procera, Indula viscosa, Achillea santolina, Artemisia herba-alba, Matricaria chamomilla, Citrullus colocynthis, Avena sativa, Thymus bovei, Salvia fruticosa, Teucrium polium, Trigonella foenumgercum, Rosa canina***,** etc. On the other hand, some plants are used as perfumes and dyes such as *Achillea aleppica, Achillea santolina, Artemisia monosperma, Anchusa strigosa, Arnebi decumbens, Echuim spp., Isatis lusitanica, Rubia tenuifolia, Reseda luteola*, etc. Unfortunately, the over-exploitation of medicinal plants is eroding genetic resources in Palestine.

Forest plants

Forests in Palestine produce timber, used mainly as an energy source (fuel). The major benefit of forests in Palestine is the microclimate they induce, the filtering of air pollutants generated from urban areas, the retention of water in the ground and the fixing the mobile sand, dunes and soils. Recreation and eco-tourism can also transform forest areas into major sources of economic revenues. *Cupressus spp., Quercus spp., Acacia spp. and Pinus spp. and Acacia cyanophylla, Eucalyptus spp.* and *Tamarix spp*. are the major forested economic plants in the West Bank and Gaza Strip respectively (ARIJ, GIS Unit).

The beauty of wild flora in the West Bank and Gaza Strip gives a significant ornamental importance to the area. Although ornamental plants are usually cultivated, they remain a significant part of trade in wild plants. The major families used as ornamental plants are the Rananculaceae, Iridaceae, and Papaveraceae.

Forest and range resources in Palestine

Twenty seven percent of the total area of Palestine (6207km^2) composed of forests and rangelands. Both areas differ and maintain divers eco-systems, climate, topography and biological resources. The most dominant either cultivated or wild exiting trees are oak, pine, ceratonia, pistacia, cypress, wild olives, almonds and pears. Areas such as the Jordan Valley and Gaza Strip are covered with tropical forest trees such as *Ziziphus, Tamarix, Hale-xylon, Accacia* and others, which have special capability to tolerate temperatures and salinity and the ability to stabilise soils and sand dunes.

Records show that due to confiscation of Palestinian lands for Israeli settlements and over population in Palestine forest and rangeland usage in Palestine have changed over the last fifty years. There has been an increase in wood collection for wood usage in different industries. Local people were very much dependent on forest resources in Palestine, although in present times there are less resources and less people are using such resources for different livelihood aspects.

In recent years, for example, high pressure on plant collection for Oregano was seen, while medicinal plant collection is decreasing in the past several decades.

The main usage of forest and rangeland products in Palestine can be summarised as follows:

- Fuel production from natural wood of pistachio and oak trees.

- Food from fruits and leaves of oak, pistachio, summaq, Carob and others.
- Medicinal usage of oak fruits, pistachio, oregano, mint, phangnalon and others.
- Production of light drinks such as mint, Carob and others.
- Broom and other household production.
- Filters from *Eurocaria* and *Rebudia*.
- Fertilisers for farming and nurseries from forest tree leaves.
- As decorative plants in gardens and houses.
- Souvenirs and other touristic industries from oak, pistachio, pine, cypresses.
- In paints and glue.
- Gums and honey production.
- Tools in agriculture (genetic resources for fruit trees).
- Recreational purposes.

Agricultural production

The agricultural sector, including plant and animal production, forestry, and range lands, plays a major role in the economic growth of Palestine and the livelihood of its people. However, the production of this sector has declined since the Israeli occupation of the West Bank and Gaza Strip in 1967. Such decline is a reflection of the confiscation of land and water rights by Israeli occupation authorities, restrictions imposed on the flow of the agricultural products and the continual decrease in the facilities of agricultural services.

These agricultural sectors play a major role in the economic growth of the West Bank and Gaza Strip and the livelihood of the local people. The total farmed areas, including vegetable, fruit, ornament and field crops and forages in Palestine in the 1995/96 were 1807.9 thousand dunum 90.0% in the West Bank and 10.0% in Gaza Strip. While the number of livestock heads was 17,800 cattle and 744,000 sheep and goats.

Agriculture in the West Bank is divided into rainfed and irrigated farming. Rainfed farming forms the largest cultivated area in the West Bank, making 92.7-95.8% of the total cultivated land. The major sector of plant production in Palestine is the cultivation of fruit trees. Olive trees (30% of total fruit production), grapevines (16.9% of total fruit production), almonds (2.4% of total fruit production), figs (3.6% of the total fruit production and more than 50 varieties) and citrus (26.4% of total fruit production) are the major planted types of fruit trees in the West Bank. They occupy 90% of the total fruit trees area and produce 79% of the total fruit production. The remaining 10% of the fruit tree area is devoted to different other types of rainfed fruit trees, including apple, pear, plum, apricot, peach, quince, pomegranate, walnut, pistachio, peackly pear, and irrigated fruit trees including bananas, guava, avocado, loquat, date palm and kiwi.

Field crops and forages sectors occupy the largest cultivated land after fruit trees. The total area of field crops was about 44.1 thousand hectares and produced 11.1% of total plant production of the West Bank in 1995/96 growing season. The planted field crops and forages in the West Bank may be classified into cereals (Wheat contributes 36.7% of the total field crops production, barley and sorghum), legumes (lentils and chickpeas) and medicinal, spice (cummin, nigalla, anise, fenugreek, dill and carawya with an average productivity of 580 kg/ hectares), stimulant (Tobaccos) and oily crops (sesame, safflower,

sunflower, and peanuts). Seeds are used to feed birds and poultry at the home farms, while the red-yellow ray flowers with the flowering heads are used to give the yellow colour for cooked rice.

The contribution of vegetable crops, on the other hand, to the total plant production is high reaching to 42.0%. In the 1995/96-growing season, the total area of vegetable crops was approximately 14.5 thousand hectares with a total production of 256.4 thousand tons. More than 30 different vegetable crops are planted in the West Bank. This richness in crop diversity combined with the variety of possibilities of planting dates greatly improved the production of this sector.

Irrigated Vegetables make about 41.3% (6,007.2 hectares) of the vegetables area, and contribute 81% (207.7 tons) to the total vegetable production. Different systems are used in the cultivation of vegetables in the West Bank mainly: vegetables in open irrigated fields, vegetable crops under low plastic tunnels, vegetables under high plastic tunnels and Vegetables under plastic houses. Although rain-fed vegetables occupy the largest area of the total planted vegetables (58.7%), its production contributes only 19.0% to the total vegetable production.

Agriculture in Gaza Strip, on the other hand, is the most important economic sector. The agricultural sector uses half of the available 365 km^2 of the Gaza Strip. The total agricultural area covered 179.9 km^2 in 1996, increasing afterwards with a peak to 198 km and slightly decreasing to 179.4 Km^2 over the past ten years. Traditionally, agriculture was based on citrus growing and rain-fed agriculture. Fifty years ago, the Gaza Strip (especially the central and southern part) was famous for its dates and olives. Some remnants of previous date palm groves can still be found, between Deir el Balah and Khan Younis. Now, only an estimated 20000 trees remain.

The main crops still grown, are the traditional field crops, like wheat, barley, and peas, and vegetables like okra, cucurbits, onions and watermelons, often together with the cultivation of fruit trees like olives and almonds. Most fruit trees (other than citrus) are rainfed and cover some 34 km^2. Of the fruit trees, only guava and part of the olives are irrigated. Rainfed fruit trees, include almonds and grapes was reduced to half of the previous area (now 18.4 and 6.9 km^2 respectively)

Digging of new wells enabled the planting of citrus in most of the eastern parts of the Gaza Strip. During the sixties and early seventies, the area under citrus was at its peak. About half of the agricultural area was covered with citrus plantations (48% in 1968). Citrus exports to the former east block countries (which had friendly relations with Egypt in that period) were booming, as well as exports to Jordan.

However, in the past decade, vegetables have become the principal agricultural products in the Gaza Strip, in terms of investment, production value and employment. Irrigated vegetable production using modern technology and high input levels expanded after the onset of the Israeli occupation in 1967, when access to the Israeli market provided good export opportunities for horticultural products. Mainly vegetables like tomato, cucumber and some other crops are grown, including various types of flowers (gladiolus, carnation and others). Strawberries, potatoes, carrots and a range of other vegetables including eggplants, cabbage, cauliflower, spinach, onion, garlic, peas, melons are cultivated in the open fields.

Thus the economic benefits from plant production in Palestine depends on the total area of plant production of fruits, vegetables and field crops which constitute 62.2%, 11.5% and 26.3%, respectively. It is observed that irrigated farming is dominating in Gaza Strip, which occupies 60% of total cultivated area, while irrigated farming in the West Bank does not exceed 6.3% of the West Bank total area.

Agricultural sector forms about 13.6% of the Palestinian gross domestic product (GDP). Different types of plant production in Palestine were 71.6 million US dollars and 265 million US dollars from the

livestock production. The agricultural sector was employed about 17% of the total Palestinian work force. The distribution of benefits is indicated in Table (34).

Table 34: **Percentage of Benefits of Plant Production in Palestine.**

Type of Plant production	Percentage of benefit
Fruits	58.1%
Vegetables	32.5%
Field crops	9.4%
Total	100%

Source: Ministry of Agriculture statistical data, 1996.

Livestock production

Animal production in Palestine is composed of Cattle, Sheep and Goat, Poultry, Fisheries and Apiculture.

Sheep and Goats

In 1994, the total goat number reached 214,903 heads, around 90% of that were local breed, 3% were Shami goats and the rest were of hybrid breeds. The total number of sheep, on the other hand, has increased significantly since 1980. The number of sheep, on the other hand, reached 371,481 in 1994. The prominent breed is the local sheep with (95.2%) followed by the Assaf breed (4.2%) and about 0.8% is of hybrid breeds (crossing between the local and Assaf breed).

It is estimated that 5.9% of the total number of inseminated sheep in the West Bank are controlled by hormones. Most of the sheep and goats are milked manually with only 0.5% milked by machines. The estimated meat production in 1994 was about 7 thousand tons and 260 tons of sheep meat and 8 thousand tons and 150 tons of goat meat in the West Bank and Gaza Strip respectively (PARC & Arab Though Forum, No.6, 1993; Hijjeh, 1998).

Cattle

In 1994, the number of cattle of different breeds, sex, and stage of growth has reached 11,753 heads. The local breed makes only 35.8% of the total heads while the Freisian breed makes 64%. The daily average of milk production varies between 22.5 kg for the Freisian cows, 15.2 kg for hybrid cows (local and Freisian breeds) and 6.3 kg for the local cows.

The insemination methods used in the West Bank are bot the natural method (62%) and the artificial method (38%). Of the total amount of milk produced in the West Bank, 64% is processed and 36% is consumed fresh. The processed milk is distributed as follows: 52% for white cheese, 29% for yogurt, 18% for sour cream, and 1% as dry yoghurt (PARC & Arab Though Forum, No.2, 1994).

Meat production of seep and goats and cattle increased from 10.2 thousand ton in 1967/68 to 45 thousand ton in 1987/88 in the West Bank and from 1.7 thousand tons to 83 thousand tons in Gaza Strip in 1967/68 and 1987/88 respectively. The total meat production in 1994 was estimated about 19388 tons of sheep, goats, and cattle in the West Bank and 835 ton in the Gaza Strip. The total amount of produced milk in 1993/94, on the other hand, was estimated about 70 708 tons in the West Bank and 17 000 tons in Gaza Strip (Hijjeh, 1998).

Poultry

The poultry sector in the West Bank includes the laying and broiler chickens. Broiler chicken is the dominating type of poultry. In 1994, the total number of poultry was 18.28 million chicken distributed over 4,241 farms. It was estimated that the amount of produced eggs in the West Bank was 276.6 million eggs in 1993/94. In Gaza Strip, on the other hand, the estimated number of eggs was 150 million eggs in 1993/94. The amount of poultry meat in same year (1994) was about 29 058 tons in the West Bank and 17000 in Gaza Strip.

Apiculture production

The total number of hives in 1994 was 20,356, producing around 240 tons of honey in Palestine. Of total hives, 20,356 hives are wooden and 3,257 are traditionally made of clay. The average annual production of honey per hive for different types showed that the Italian type produces about 17 kg followed by other types produces 14 kg, the hybrid type with 12.8 kg and the lowest is the local with 7.7 kg (PARC & Arab Thought Forum, No.3, 1994). In 1996, the amount of honey was estimated about 121 ton in Gaza Strip and 184 tons in the West Bank.

Fisheries

Fisheries in Palestine are mainly concentrated in Gaza Strip. Fish production of the country depends on marine catch from the Mediterranean coast. Until late 1970s, fish catches made up about 30% of the total animal production in the Strip, the average annual catches being 4000 tons. Total catches by Gaza fishermen in the 1995/96 was estimated about 9425 thousand dollar. The main marine catch is composed of Grouper, Shrimp, Cuttle, Squid, Sardines, Lokhos, Sea bass, Sultan Ibrahim, Sea bream, Mullet which interns depends on season, political situation. The percentage of the total production of fish catches is indicated in Table (35). The two sources of fishing in Gaza Strip are the Pelagic and bottom fish. Fishing types are include:

Light fishing for Sardines, Mackerel and flying fish

Trawler fishing for different types of fish and prawns

Net fishing from coast side by small boats

Fish is partly sold at the domestic markets of the Gaza Strip. Israel is the major export market with an export of 13 tons (1990) and 14.5 tons (1994).

Table 35: **The Percentage of Total Production of Fish Catches in Gaza Strip.**

Type of fish and fishing	% of catch of total production
Net fishing (sardines, bass etc.)	75%
Deep see fishing (loqus, sultan Ibrahim)	15%
Other types of fishing(prawns and other fish)	10%

Source: Khodary, 1998

Sources of marine catch are: migratory from Red Sea an indigenous for Mediterranean Sea. Fishing in Gaza strip is hindered by complicated and bureaucratic restrains from Israeli Authorities. In Gaza Strip, fishing takes place in four fishing communities: Gaza coast, Dir El-Balah, Khan Younis and Rafah.

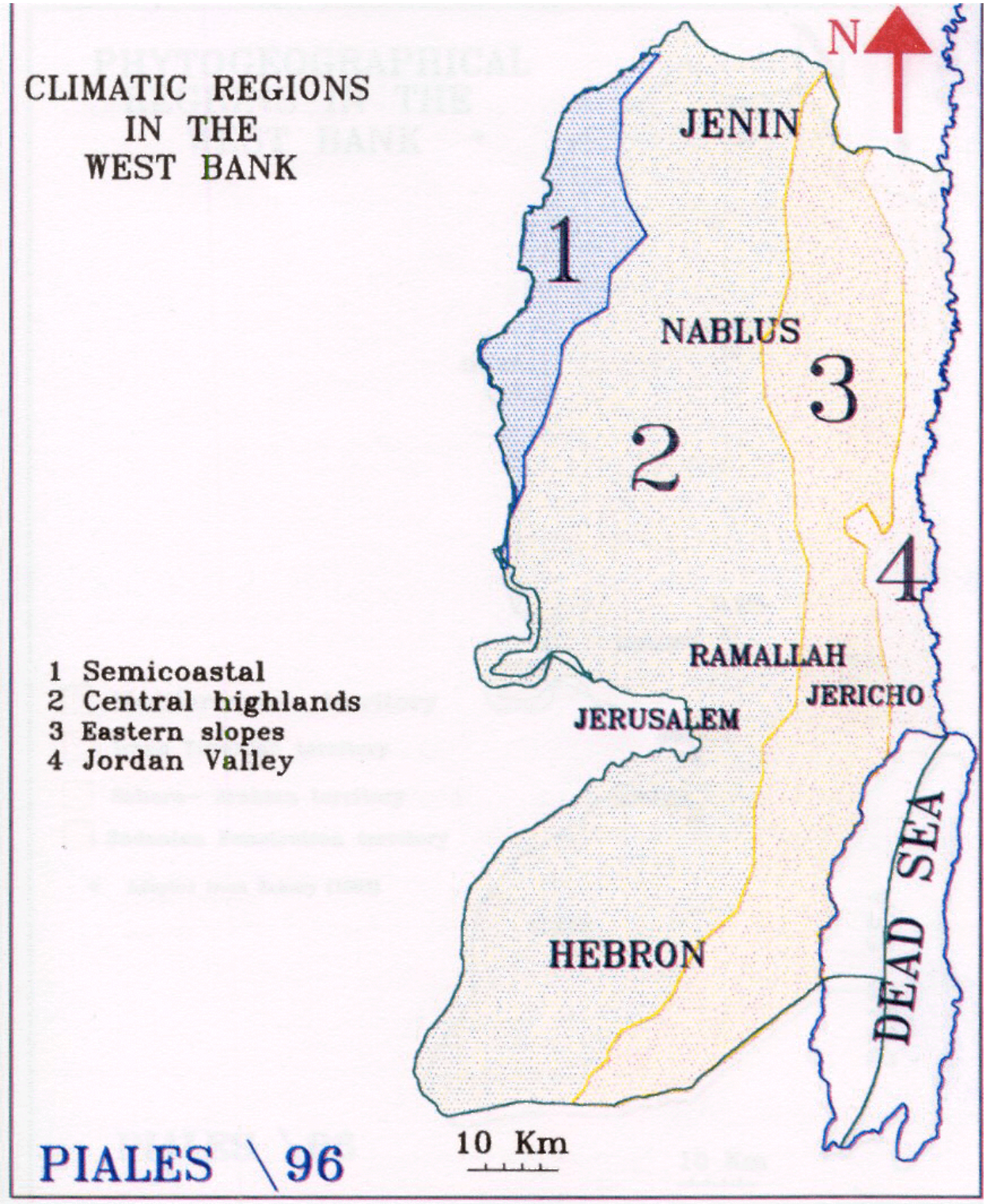
Fishing is an essential part of Palestinian culture especially in Gaza Strip. Unfortunately, this sector is dramatically declining, fishermen are abandoning such profession and heading toward other sectors of production. In total there are 318 fishing units, engaging a maximum crew of 2646 fishermen.

Thus, the economical benefit from animal production is totally depending on the total animal production which is estimated to be 235.6 million US dollars, this includes meat, dairy, egg, honey, fisheries and wool respectively (58%, 27.5%, 12.1%, 1.1%, 1.2% ando.15%). The highest production was in meat industry in the Mediterranean and Irano Turanian ecosystems of West Bank and Gaza Strip.

Threats to Biodiversity in Palestine

Nature creates a balance within itself by adapting the environmental changes that happen for one reason or another. But, if there were drastic changes in the ecosystem disciplines, nature cannot return to the same balance, and thus resulting in a loss of biodiversity and its rooting habitats. Ecosystem changes, which can be a result of a wide array of complex factors, can greatly reduce the number of species, and lead to desertification, one of alarming key issues in the West Bank and Gaza Strip. As a result of the pressures imposed on the wildlife in Palestine, this important source has lost many of its species and many are threatened to be extinct. Pressures on wildlife could be as a result of human activities such as urbanization, land confiscation to build more Israeli colonies and military areas, and agricultural and industrial activities. The changes in the ecosystem in Palestine could be attributed to the following factors:

Map 6: Agro-ecological Zones and Rainfall in the West Bank



Succession of Civilizations

Throughout the history of Palestine, humans have contributed most to the damage of the sensitive balance of nature systems. Each civilization that inhabited this area fought over land and has exploited the natural resources found here. Old Testament references indicate that the cutting of forests in Palestine began centuries ago, a practice which has continued ever since with varying degrees of intensity. Canaanites, Hebrews, Romans, Byzantines, Arabs, Crusaders, Mamluks, Turks, British mandate and Israeli occupation have all played their role. Thousands of forested trees have been cut to provide cleared areas for construction or build railways, or burning for fuel. Many species have been hunted to extinction. For example, most of the trees in the West Bank were uprooted by the Turks for building railways, constructing buildings and exporting wood; and later by Israelis for building colonies and by-pass roads. These human activities have contributed greatly to desertification of the land and loss of species, all accelerating the changes in related ecosystems.

The destruction of the vegetative cover by human was a slow and selective process, which depends both on human's ability to overcome natural obstacles and on the tools of destruction at disposal. Damage was done to habitats in four ways: cutting of wood for industry and fuel; grazing by goats and sheep; clearing of forest areas for agriculture; and forest fires, whether planned or accidental. As a result, many animals disappeared from the land, which they were once plentiful. The ostrich, cheetah, lion (the last ones killed 800 years ago during the Crusaders), Syrian bear, crocodiles, and several kinds of deer are all casualties to human encroachment.

Wood was used not only for timber and the manufacture of agricultural tools, but also for domestic and commercial fuel, i.e., charcoal production. This involved extremely heavy damage to forests. Until the last decade, charcoal was extensively used. The environs of Jerusalem and Hebron which were the centers of charcoal production and marketing, have been completely denuded of forest vegetation.

The adjacent loessial plains and the interdune depressions for the older kurkar ridges in Gaza Strip, for example, were mainly used for rainfed agriculture and grazing. Especially during eras of great prosperity (e.g. Philistine, Hellenistic and Mamluk / Ottoman) man has changed the natural habitats considerably through the cultivation of crops and grazing of cattle. With the growing importance of Gaza City and Khan Younis during the Ottoman period (1250-1914) the growing sedentary population expanded their agricultural activities even further. Large date palm groves were planted, next to vegetable gardens and fruit orchards. The dune landscape was mainly used for collecting firewood, plants and fruits, grazing and for hunting.

The outcome of man's activities on vegetation through the ages can be summed up as follows:

- Destruction of natural vegetation occupying large stretches of alluvial soils in the coastal plain and the intermountain valleys. These low-lying areas have been under more or less continuous cultivation since very ancient times.
- Destruction of the primary vegetation through cultivation, followed by abondonment of the cultivated area, often resulted in reoccupation of the area by a secondary climax vegetation.
- The immigration of alien weed vegetation brought about by agriculture. Over 400 species of the local flora are obligatory or facultative weeds, a great part of which may be assumed to have their origin outside Palestine.

- Changes in composition. Most of the prevalent plant communities, including those of the desert, have lost certain associates as the result of ever-recurring uprooting, burning, cutting, and over-grazing.
- Change in dominance. Even in such communities where primary composition was not affected, frequency and dominance of the respective associates have altered greatly as a result of excessive use of certain plants by man.
- Range extension. Many plant commodities have expanded considerably beyond their former range of distribution and spread over contiguous areas cleared of vegetation by man.

Population dynamics

The increase of population density on a fixed basis of land can be directly responsible for the loss of biodiversity, as each new person requires food, water, fuel, and other resources which are extracted from the natural environment. In many developing countries, including the West Bank and Gaza Strip, the need for natural resources already exceeds the availability, the result being human malnutrition and poverty, leading into a spiral environmental degradation.

Source: PEnA

Photo 12: Pollution and mismanagement of Natural Habitats in Palestine

In the West Bank and Gaza Strip, the current population growth places a high pressure on the natural ecosystems and biodiversity. The population growth rate in the West Bank is approximately 3.5%, and 3.8% in Gaza Strip, leading to fast increases in population size. The growing population will have no choice but to survive on the scarce resources available to them, causing a major threat to the small natural areas in the West Bank and Gaza Strip. Fast population growth is associated with fast conversion of land to agricultural uses, i.e. a heavy pressure on natural habitats. A good example is Bethlehem City. Bethlehem was known for its green environment and most houses were surrounded by

large gardens containing different varieties of herbs, shrubs and trees. Nowadays, only 17% of its territory is still covered with vegetation. This is the result of unregulated expansion of the built environment, the military areas and bases (closed to the local people), the Israeli colonies, and infrastructures such as by-pass roads.

Another example is Gaza strip, which is considered one of the most densely populated areas in the World. The most drastic changes occurred after 1948, and later in 1967, when a large influx of Palestinian refugees transformed the Strip into a very crowded place. This left deep traces on the landscape, natural resources and vegetation of the area. Today, hardly any natural undisturbed vegetation exists in the area (see the Gaza Profile). In addition, the high population density and intensive land use do not leave much opportunity for wildlife. Apart from rodents and small insectivorous mammals, such as hedgehog and shrews, wild mammals are hard to spot and may even be absent altogether. In the past, the Strip has always been a populated area, frequently crossed by caravans, armies and travellers. The hinterland of the Sinai and Negev was likely to account for wandering specimens of wildlife such as Dorcas Gazelles, Striped Hyena, and Wild Boars entering the Gaza Strip.

Pollution

Many pollutants are significantly damaging to wildlife, such as heavy metals, radioactive isotopes, and long lasting products such as chlorinated hydrocarbons, detergents, plastics, solid and industrial wastes, and pesticides. Non-biodegradable plastics are used in the West Bank and Gaza Strip, many of these materials end up as litter strewn throughout the urban and natural areas. The use of plastic in agriculture is wide spread in the Jordan valley, where farmers use plastic green houses and plastic sheeting to transpiration. Plastic is eaten by animals, where many grazing animals, such as sheep and goats, have been known to die while grazing. Heavy metals can readily poison plants, particularly when soils are highly acidic.

Air pollutants can significantly impact plant and wildlife, for example, one of the most problematic air pollutants is dust originated from quarries and stone cutting factories. Many quarries and stone cutting factories are located near agricultural land. Dust is accumulated at the plants and on soil clogging the pores of soil and leading to the death of plants. An example is the white dust covering the whole green land in Wadi Sa'ir in Hebron. Also, dense vehicular traffic causes high nitrogen oxides (NO_X) concentration, especially in the heavily populated urban centres. Increased motorization has an adverse impact on agriculture, vegetation, and animals specially that the disposed chemicals are very toxic to plants and animals. Industrial wastewater is another dangerous pollutant, for example the textile factories in Bethlehem dispose their industrial wastewater in cesspits that are frequently emptied onto olive planted areas, ending with coloured soils surrounding the roots of the trees.

Source: PEnA

Photo 13: Sewage flowing in wadis

Many of the non-biodegradable plastics end up as litter strewn throughout urban and natural areas. The development of irrigated agricultural activities, especially intensive protected cultivation, has resulted in

the extensive usage of plastic houses, plastic tunnels (low and high), soil fumigation and soil mulching. As a result, the annual amount of plastic solid wastes have increased. Plastic houses and high plastic tunnels are used most extensively in Tulkarm and Jenin districts, covering approximately 500 and 80 hectares respectively.

Low plastic tunnels and open irrigated vegetables are mainly dominant in the Jordan Valley, and covering areas of approximately 720 and 5,200 hectares respectively. The plastics used for soil mulching and low tunnels may only be used for one season, while plastics used for high tunnels and greenhouses may last 2-5 years. Accordingly, the total amount of agricultural plastic waste in the West Bank is estimated at 3,300 tons/year. Part of this waste is unrecoverable and remains in the soil, forming a physical barrier to the water movement. The remaining plastic waste is collected by farmers and burned at the farm side, causing serious air pollution. Plastics do not break down into dissolved elements, and thus are often eaten by animals. Many grazing animals, such as sheep and goats, have been known to die from eating plastic while grazing.

An ARIJ survey which surveyed 415 farmers in the Jordan Valley and the northern area of the West Bank, has shown that approximately 88% of the farmers with irrigated fields collect and burn the used plastic on the field, releasing huge amounts of smoke into the atmosphere. Six percent of the farmers bury their plastic wastes in the soil, causing soil pollution by changing the physical characteristics of the soil. One percent of the farmers collect and dispose of plastic at the edges of their farms, where it is often ingested by livestock and may cause death. The remaining 5% of the farmers collect the plastic pieces and dispose it at the dumping site.

Unsustainable agricultural practices

Agricultural practices can have an immediate impact on species decline and extinction. The first people to arrive in ancient geographical Palestine were hunters and gathers. 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 shrub land and were maintained with terracing and man made irrigation channels and drainage ditches.

Later, population pressures caused the expansion of cultivated land, reducing wildlands where large varieties of species exist. Food and market demands have encouraged the use of “modern” agricultural practices employing increased use of pesticides and fertilizers. Locally adapted varieties of landraces with higher yielding improved varieties are encouraged especially those sell at higher prices such as fruit trees and vegetables of intensive cultivation. With time, the genetic stock of crops eroded and agricultural production become based upon fewer and fewer genotypes. The evolving of mono-culture techniques has also a direct effect on wild species. Many useful genes have already been transferred from the crop wild gene pool to the cultivated species, especially those related to biotic and abiotic stress tolerance.

Pesticide Use

A total of 123 varieties of pesticides are currently used in the West Bank compared to 350 different types used in Israel and 334 in Jordan. Among these used in the West Bank, fourteen types have been banned or restricted by the World Health Organisation (WHO) for health and environmental reasons. Seven are among the "dirty dozen" such as DDT, Chlordane, Aldicarb, Lindane, Paraquat, Parathion and Pentachlorophenol. These are prohibited in farm use in most industrialized countries, but are still

commonly used in the West Bank, Gaza Strip and in many other developing countries (Gabbay, 1992 and Saleh et al., 1995).

Approximately 302.7 tons of pesticides including sulfur and 200 tons of methyl bromide were used by farmers for the agricultural pest control. In addition, 4 tons of other types of pesticides were used by different municipalities for public health purposes (ARIJ, 1994). In the Gaza Strip, 100 tons of pesticides are used per year. This also includes the banned pesticides (Ishtayia,1995).

The total area treated with pesticides is 38,734.4 hectares, of which 74.7% is under rainfed farming and 25.3% under irrigated farming. Despite that, irrigated farming accounts for approximately 56.5% of the total pesticide consumption.

The largest area treated with pesticide is found in the Nablus district and the Jordan Valley. It comprises approximately 69% of the total treated area. One third of the rainfed treated area is concentrated in the Hebron district, of which 77% is cultivated with trees.

Table (36) indicates that Nablus district is the largest consumer of pesticide for irrigated farming, of which 94.5% is used in open field vegetables. The Hebron district uses more than half of the total quantity of pesticides used in rainfed agriculture. Approximately 72% of the quantity used is sulfur.

The total quantity of pesticides used in irrigated agriculture in Israel is estimated to be 9,600 tons (Table 36) with an average of 40 kg/hectare. This average is more or less equivalent to that used in the West Bank which is 32 kg/hectare. The total quantity of pesticides used in Israel is high since the irrigated area is 27 times greater than the irrigated area in the West Bank.

Table 36: A Comparison between the West Bank, Israel and Jordan in the Quantity of Pesticides, Pesticide Wastes and Fertilisers

	Palestine		Israel	Jordan
	West Bank	Gaza Strip		
Irrigated area in hectares	10,159.3	13,950	240,000	76,950
Total quantity of pesticides used in irrigated area (tons).	371.1	201	9,600	------
Total quantity of pesticides used (tons) excluding methyl bromide.	302.7	182	-------	737
Methyl bromide(tons)	200	100	2,800	347
Fertilisers consumption (tons)	30,000	20,500	90,000	470,000
Number of pesticides used	123	--	350	334

Methyl Bromide

Methyl bromide is produced from the bromine found in natural mines and seawater. It is estimated that the Dead Sea contains approximately 1 billion tons of bromine, and supplies 73% of the world demand for bromine. Israel is the second major producer of methyl bromide in the world after the United Sates,

using 2,800 tons of methyl bromide per year mostly for agricultural purposes (Gabbay, 1994 and Clark, 1994).

Methyl bromide is used intensively by farmers involved with irrigated agriculture in the West Bank. It makes up 54% of the total amount of pesticides used in irrigated farming and 39.7% of the estimated total pesticides used in the West Bank. The district of Tulkarm was shown to be the largest user of methyl bromide in the West Bank, consuming around 150 tons per year. Farmers are not aware that through their actions, large quantities of methyl bromide are vented to the atmosphere, causing depletion of the ozone layer which protects the earth from the ultraviolet (UV) solar radiation. It is estimated that bromine from methyl bromide is 50 times more destructive to the ozone layer, atom for atom, than chlorine atoms in the Chlorofluorocarbons (CFCs). Increased UV light penetration increases the incidence of skin cancer, most common in people exposed to sunlight for extended periods, such as farmers. Methyl bromide is extremely toxic. If inhaled it can cause acute and chronic respiratory problems. It is also thought to be associated with incidences of skin burns, damage to the immune system, neurological disorder and even death (Clark, 1994; O'Brien, 1992).

Moreover, the earth's food chain, which relies on the support of sunlight in food production is also affected by changes in UV exposure. Increased intensity reduces plant production, and therefore threatens both human life whom depends on these plants for nutrition (Clark, 1994; Ishtayia, 1995).

The Montreal Protocol, an international agreement to phase out of ozone depleting substances, aimed to achieve a global phase-out of methyl bromide in 1995. Unfortunately, the regime gives the developing countries an additional 10 years to use this chemical. Producers and users of methyl bromide argue that a phase-out will be economically disastrous, ignoring the damage it will have on human health and on the environment. The Ministry of Environment in Israel appointed a task force in 1993 to study possible alternatives for this product in Israel. They issued a report in 1994 which includes recommendations and fast actions to eliminate the use of methyl bromide (Gabbay, 1994). Without deliberate action, methyl bromide will continue to be used until 2005 in the West Bank, adding more pollution to the environmental and human health.

A declaration calling for urgent funding and information on alternatives to methyl bromide which had been sponsored by several developing countries and supported by a number of Non-Governmental Organizations (including the Pesticides Action Network (PAN) North America regional center), was not introduced due to intense pressure by the representatives of Methyl bromide companies based in US, Israel and Japan. On the other hand, Israel and the Palestinians have agreed through the Oslo II Interim Agreement to cooperate in implementing internationally accepted principles and standards to protect the ozone layer.

Sulfur

Sulfur is considered the oldest effective pesticide still in use today. It is popular among farmers because of its low toxicity to humans. It is used widely as fungicide and sometimes as miticide. Sulfur is less toxic to humans than many conventional synthetic fungicides and miticides, although it is a strong irritant and direct contact with skin and eyes should be avoided (Safi, 1994; Olkowski, 1991).

Sulfur compounds are used mainly in the Hebron district, which consumes 50 tons per year. It is spread to control fungal diseases in grapes and rainfed vegetables such as tomato, snake cucumber, squash, cucumber, melon and muskmelon. The Ramallah district uses nine tons of sulfur while the Nablus district uses only seven tons, sprayed mainly on grapes.

Pesticide handling and usage

Farmers practicing irrigated agriculture in the Tulkarm, Jenin and Jericho districts lack knowledge of the safety precautions needed in the usage and handling of pesticides. They are the largest consumers of pesticides in the West Bank nd Gaza Strip. The use of concentrated solutions above the recommended dose and the inappropriate storage and disposal of pesticides are common problems among the surveyed farmers. Some farmers believe that they have developed immunity to pesticides and that there is no possibility of chronic effects after a long time of exposure to chemicals. This is because they have not seen any apparent effect from pesticides usage.

Many farmers attempt to increase their yield by increasing the amount of pesticides applied. They either increase the application frequency or apply pesticides dose above the recommended level. These practices reduce the effectiveness of pesticides as excessive amounts of pesticides cause damage to the beneficial microorganisms in the soil and reduce the natural enemies of the pests.

Farmers do not wear protective clothes and gear while spraying, leading to the exposure of lungs and skin to damaging chemicals. Spraying equipment is old and often leaks, often causing skin injuries upon contact. Excessive exposure is not restricted to those spraying the solution (often women and children), but affects others nearby as well. Pesticide-coated clothes enter the home and spread contamination to other family members since they are washed with the family laundry.

Pesticide labels may not contain appropriate instructions. If they do exist, they are typically written in Hebrew; a language that most farmers can not read. The case is different in Israel where pesticide containers are labelled with all necessary information.

Unused pesticides, empty pesticide containers and waste generated from pesticide industries are considered hazardous waste that poses a threat to the environment and the public health. This type of waste requires a special care in disposal so as to protect the soil, water resources and public health. In the West Bank, most of the pesticide wastes are generated in the farm from excess pesticide and empty containers. ARIJ study shows that 52% of the farmers dispose of the excess pesticide solution by pouring it onto the soil, and 90% dispose of the empty containers randomly in the farm or adjacent springs (Saleh, et al, 1995). A study to estimate the quantities of this type of toxic waste is needed. In addition, a program to raise awareness among farmers and agricultural engineers about hazardous effects of pesticides has to be initiated. In Israel, the generated toxic waste from pesticides is very high, amounted to 13,789 tons in the 1994.

Pesticide and wild life

Pesticides are potentially hazardous not only to human health, but also to other living beings. Damage to the ecosystem may itself lead to reduced agricultural production, decreased quality of the environment and also to economic losses in fields other than agriculture. The balance between the benefits of pesticide use and their negative side effects has to be evaluated in each agricultural setting and in each vector control program.

Pesticides were reported to cause a decline in the number of local birds and animals due to changes in agricultural practices in Palestine (Ishtayia, 1995). The increased use of pesticides negatively impacts the health of birds, wild and domestic animals by causing depression of cholinesterase and reduction of the oxidation reactions. Subjection to low levels of pesticides for a long period of time interferes the natural patterns of behaviour required for survival. For example, as a result of exposure to pesticides, falcons are laying eggs with thinner shells, which are easily broken during incubation. Nesting occurs

late in the season. The following paragraphs include some examples of local birds and animals affected by pesticides use:

Raptors

The use of Organochlorines including DDT at the end of the World War II had a detrimental effect on raptors, which are birds of prey feeding upon smaller animals. Raptors receive especially high dosages of these toxins because pesticides often accumulate in the bodies of smaller animals.

In 1950s, seeds coated with thallium sulfate were used to control rodents especially the Lernat vole (*Microtus guetheri*) and Tristram's jird (*Mus musculus*). Of the 39 species of raptors known in Palestine, 37 species have declined or been extinguished. The short-toed eagle (*Circaetus gallicus*) has survived due to his absence in the period of pesticide spraying in the winter and his dependency on reptiles as a source of food. This also was the case for the Hoppy (*Falco subbuteo*), which migrates in the winter and returns back in May for reproduction. Table (37) includes the bird species, which reproduce in the West Bank and have been affected from pesticide poisoning.

Table 37: **Rare and Distinct Raptor Species in Palestine**

Black kite	***Milvus migrans***
Griffon vulture	***Gyps fulvus***
long- leggedd buzzard	***Buteo rufinus***
Bonelli's eagle	***Hieraaetus fasciatus***
Egyptian vulture	***Neophron percnopterus***
Kestrel	***Falco tinnunculus***
Lesser kestrel	***Falco naumanni***
Lanner falcon	***Falco biarmicus***
Spotted eagle	**Aquila clanga**
Peregrine	**Falco peregrinus brookei**
Black eagle	***Aquila verreauxi***
White-tailed eagle	**Haliaeetus albicilla**
Bearded vulture	***Cypaetus barbatus***

Source: Ishtayia, 1995

The thallium sulfate pesticide, which was once widely used in the West Bank, greatly affects the population of the winter raptors such as Sparrow-hawk (*Accipiter nisus*). This species disappeared many years ago. The disappearance of certain raptors feeding on birds such as Sparrow-hawk had

resulted in an increase in the population of many birds such as Palm dove *Streptopelia senegalensis*, Yellow-vented bulbul (*Pycnonotus xanthopygos*), Syrian woodpecker (*Dendrocopus syriacus*), European black bird (*Turdus merula*) and Roller (*Coracias garrulus*).

Raptors feeding on insects such as Lesser kestrel and Scops owl (*Otus scopus*) have also been exposed to DDT and other insecticides that break down slowly. Banning the use of DDT and other chlorinated hydrocarbons helped in the revival of some raptor species. The Kestrel population has enjoyed an especially successful recovery.

Insect-feeding birds

Birds were poisoned from eating insects sprayed with insecticides, especially those species living near residential areas or fields. Table (38) shows which insect feeding birds in Palestine were most greatly affected.

Table 38: **Rare and Distinct Insect Feeding Bird Species in Palestine**

The swallow	***Hirundo rustica***
The red- rumped swallow	***Hirundo daurica***
The white throat	***Sylvia communis***
The rufous bush robin	***Cercotrichas galactotes***
The masked shrike	***Lanius nubicus***
The spotted flycatcher	***Muscicapa striata***
The roller	***Coracias garrulus***
The bee-eater	***Merops apiaster***
The Egyptian nightjar	***Caprimulgus aegypticus***

Source: Ishtayia,. 1995

Bats

Thousands of bats in Palestine have been injured by pesticide use. In the 1950s, the population of 28 species declined very rapidly because of pesticide consumption. Many insect-eating bats were poisoned, especially through ingestion of night butterflies, which had been sprayed with insecticides. This was especially true in the cultivated areas of middle and northern Palestine where farming is most intense.

At one time, fruit eating bats (*Rousetus aegyptiacus*) were considered to be pests. To control the damage, they were perceived to produce, caves were fumigated with Ethylene Dibromide or sprayed with Lindan to reduce the population. Later, it was observed that their impact on fruit crops was minimal, and the spraying was stopped. Some particularly resilient species such as *Rousetus aegyptiacus* and *Pipistrellus bodenheimeri*, have survived quite well.

Carnivorous mammals

Carnivorous mammals have been subjected to poisoning by pesticides as well. For example, the Jackels (*Canis aureus*) were thought to damage the plastic covers used for agriculture. For this reason, farmers used birds, which were poisoned with 1081-Fluoracitamid to kill the Jackels. This was common practice especially in the middle parts of Palestine, despite the fact that Jackels were protected under the Wild Animal Protection Law of 1954.

Many other species have been also affected such as the Wolf (*Canis lupus*), the Common Red Fox (*Vulpes vulpes*), the Egyptian Mongoose (*Herpestes ichneumon*), the Jungle Cat (*Felis chaus*) and the Wild Cat (*Felis sylvestris*). The populations of these species have recovered in past few years as their exposure to toxic chemicals has decreased. This is true for all of the species named above except for the wolf whose population remains low and continues to be subjected to illegal poisoning and destruction, as these animals are believed to attack the livestock. It is likely that the wolf population will become extinct in the near future (Ishtayia, 1995).

The problem of pest resistance

Expansion of farming and introduction of new varieties of crops have resulted in the appearance of many new pests. To combat these, a variety of new pesticides were introduced into the market. At first, pesticides were successful; later pests started to show resistance to these pesticides. At this point, farmers chose to increase the dose of pesticides to increase the effectiveness. Their objective was however not fulfilled.

Usually, the concentration of pesticides recommended on the pesticide label does not cause 100% mortality to the target pests. If only 90% of insects are killed, the remaining 10% will form the next generation. This concentration was not sufficiently high to kill the 10% that has developed a natural resistance to the chemicals. By continuous application of pesticides, the most resistant specimen will be selected for reproduction in a vicious cycle that renders pesticide use less and less effective.

Pests are able to acquire "cross resistance" which enables the resistant species to survive after exposure to a related pesticide. For example Lindan resistant mosquitoes are also resistant to Dieldrin. Cross-resistance resulted from a common detoxification system or from target-site insensitivity. Pests are also able to show "multiple resistance" in which pests become resistant to a variety of classes of pesticides. For example, insects resistant to DDT are also resistant to unrelated pyrethroides. Evidently insects can maintain resistance even if not sprayed for ten years or more since the residual inheritance persists in the genome causing a strain of insect to regain its resistance when the pesticide is reapplied. Insect population, such as the white fly, reappears very rapidly in the West Bank and becomes resistant to all kinds of pesticides.

Land Degradation and Desertification

Livestock is a very important source of income to Bedouins and farmers and plays a major role in the meat supply. The Bedouins, have problems grazing their sheep and goats. The creeping of urban areas and cultivated lands towards the wilderness, range-lands and natural pastures in addition to land restrictions by Israel have resulted in intensive grazing on limited areas of the West Bank and Gaza Strip. The number of sheep and goats per area has increased significantly. It is estimated that the number of goats and sheep has increased by over 25% since 1975 (ARIJ, 1995).

The signs of overgrazing in natural grazing areas and rangelands have started to appear, especially in areas where rainfall is limited. Unwanted plants now tend to dominate beneficial ones. The most clear example is the Eastern Slopes, where overgrazing is a very serious problem. The carrying capacity of this area is estimated at 35,000 heads of sheep and goats while currently, 200,000 heads and more are grazing in the area accessible for Palestinians.

Intensive grazing has resulted in a decrease in the biomass of green cover and the loss of biodiversity. With time, area of bare soils and rocks increases while soil fertility decreases, resulting in more wind and runoff erosions. The incidence of severe erosion encourages the appearance of drought climate and the desertification of lands.

Intensive grazing is highest in spring (during the flowering and fruiting stages) when it is the main feed source until crop residues become available after harvest in early summer. This lead to the reduction of seed regeneration of the most valuable species, therefore plant populations, species numbers, also the biomass of vegetation cover is severely reduced. This reduction in plant cover leads, in turn, to decreased infiltration and retention of rainwater into the ground and therefore increased soil erosion. Thus, the carrying capacity of the land is permanently downgraded.

Many grasses and forages have been depleted and nearly lost, especially in the case of species belonging to the Papilionaceae family (*Vicia spp., Vicia Palastinaea, and Trifolium spp.)* and Gramineae family (*Hordeum spp.*).

Hebron district is a good example where an intensive year round grazing is taking place especially in the wilderness area of the district (Eastern Slopes). This has resulted in the loss of many beneficial species of range plants, and the degradation of the vegetative biomass. The intensity of grazing has been especially high as only 15 % of the grazing area has been left open to herders after 1967. Species which are predominant in the eastern slopes are herb plant species and spiny bushes such as *Sarcopoterium spinosum* (thorny burnet), which are generally of low nutritional value and grazed only with difficulty by goats (photo). It's competitive plants disappear due to their high grazing. The remaining 85% of this wilderness is still off limits to Palestinians, as they are declared closed military areas by Israel. More information about this issue is introduced in chapter twelve.

Grazing in Gaza Strip is mainly practiced by cattle from nomadic Bedouins from Negev and Sinai earlier who frequented the area and settled periodically in the Gaza Strip. Camels from caravans passing in the narrow coastal zone might have led to some overgrazing at places and occasional destruction of dune vegetation.

Climatic Change

Changes in climatic patterns, is a crucial factor in reshaping ecology. These changes may magnify the pressure on wildlife in the region. There are several possible impacts of the climatic change on this area. The most powerful impact is on agriculture and desertification. These impacts have the greatest influence on the south-eastern parts of the West Bank that already have climatic stresses such as low amounts of the rainfall and high temperatures. There is however, botanical-archaeological evidence indicating, on the basis of changes in the distribution patterns of various woody plant species, that over the past 5,000 years the climate of Palestine has become gradually drier and warmer (Waisel, 1986). This may promote desertification and species loss leading to a reduction in the global biodiversity (Obasi, 1996; Pellow, 1996).

Political Conflict

Palestinians are unable to tackle the issue of biodiversity in politically-induced effects in the West Bank and Gaza Strip because of inequalities in the political situation and denied sovereignty over land and natural resources. Israel retains control over nearly 74% of the West Bank, an area, which remains occupied and essentially unavailable to the Palestinian community. On this area, expansion of Israeli colonies, roads, colonies infrastructure and military bases are depriving wildlife open areas needed for its conservation. The Israeli built-up areas slice through natural areas forever changing their character. Declared nature reserves and green areas are often used for expansion of Israeli colonies and other military activities. Forty percent of the West Bank and 85% of the Eastern Slopes continues to be a closed and declared as military zone. Such areas are off-limit to Palestinian Bedouins, shepherds and scientists who need to study the status of plants and animal life within the closed area. Palestinians cannot develop plans for protecting, managing and promoting diversity when the land is out of their control (Isaac, 1995).

Hunting and Destruction of Habitat

The nich concept implies that each animal plays a specific role in its environment. The role of species is important in maintaining the state of homeostasis that any healthy ecosystem enjoys. However, if the rate of extinction was low, the role the extinct species performed can be compensated by other species occupying similar niches. Many of the species appearing in the historical record are now extinct or threatened. The main factors that led to the animal extinction are both natural, accounting for 25% of extinction incidents, and human caused, accounting for 75% of extinction incidents (Ishtayia, 1995). However, human actions have recently greatly increased the rate of extinction to levels that the nature cannot compensate. For example, 73 species of mammals and 120 species of birds became extinct between the years of 1801 and 1950. This high rate of extinction threatens the dynamic balance, which the nature enjoys with unpredictable consequences. The major factors impacting Palestinian fauna are hunting and habitat destruction.

Hunting in Palestine was and still unsupervised. Laws concerning hunting were not available in Palestine especially during the Ottoman and the First World War periods. Although the British mandate institutionalized several laws to protect animals, these laws were not effective and improperly enforced. Israel legislated new law for wild states protection in 1955. This law demands “the protection and preservation of wild animals, the encouragement of their propagation, and their rescue from fires or other disasters of nature. Hunting protected animals is prohibited” (The Union for Environment Defense, 1993).

The Israeli law and the prohibition of using weapons in the West Bank and Gaza Strip helped in reducing hunting of wild animals. Hunting by nets and traps did not stop but continued at a less rate than before. Recently, and after the coming of the Palestinian Authority, hunters reappeared, especially in area A without taking any consideration to the damages they cause to the wild life. A prime example is the over-hunting of the Roe Deer in the West Bank.

During the last few centuries, and due to the intensive hunting, many vertebrates disappeared from Palestine (Table 39). The Tiger *Panthera Pardus nimr* is still living in Jerusalem desert and the Negev in a protective status (Ilani, 1979). Not only hunting, but also deforestation, desertification and overgrazing have prevented the deer from living in appropriate environments. Hunting has also caused the nearly extinction of the green and logger head turtles C*helonia mydas* and *Caretta caretta*. During the years 1920 and 1930, approximately 30,000 of these turtles were killed along the Mediterranean

beaches (Sela, 1979). In 1985, only 14 turtle nests were discovered on the Palestinian beach along the Mediterranean Sea.

Table 39: Extinct Vertebrates as a Result of the Intensive Hunting in Palestine.

Scientific Name	English Name	Status
Acinonyx jubatus	Cheetah	Extinct
Capreolus capreolus	Roe deer	Extinct
Dama mesopotamica persian	Fallow deer	Extinct
Equus hemionus hemionus	Syrian onager	Extinct
Oryx leucoryx	Arabian oryx	Extinct
Panthera pardus nimr	Arabian leoprad	Endangered
Struthio Camelous syriacus	Syrian ostrich	Extinct
Ursus arctus syraicus	Syrian brown bear	Extinct

Source: Ishtayia, 1995.

Birds, especially resident ones, were also substantially reduced. However, international protection of bird migration routes is nowadays high on the agenda 21 for nature conservation of many states. International cooperation and coordination of regional initiatives in this respect are also building up. Palestine, as part, plays a role as a stopover and migration route for large number of migratory birds, yet lacks legislation to protect wildlife.

Dolphins are regularly reported but are far less common than in the western Mediterranean Sea. hunting and egg collection of marine turtles, *Caretta caretta* and *Chelonia mydas* have brougth these species to the brink of extinction in these waters. The past status of the Monk Seal *Monachus monachus* remains unclear, but it might have had a more common appearance than nowadays, with only a very rare recording. Nile waterworks, motorized fishing and construction of harbours, breakwaters etc. are all fairly recent development affecting the coastal marine environment.

Exploitation of wildlife habitat by human, such as deforestation, drying of marches and oasis, and other similar acts, reduces the carrying capacity of the ecosystem, and renders it more vulnerable. Also, human exploitation of certain plant species, for food purpose as an example, may cause the extinction of these plants and the animals depending on that exploited species.

Reversing the trend towards biodiversity loss in Palestine

Main Forces Driving Biodiversity Loss

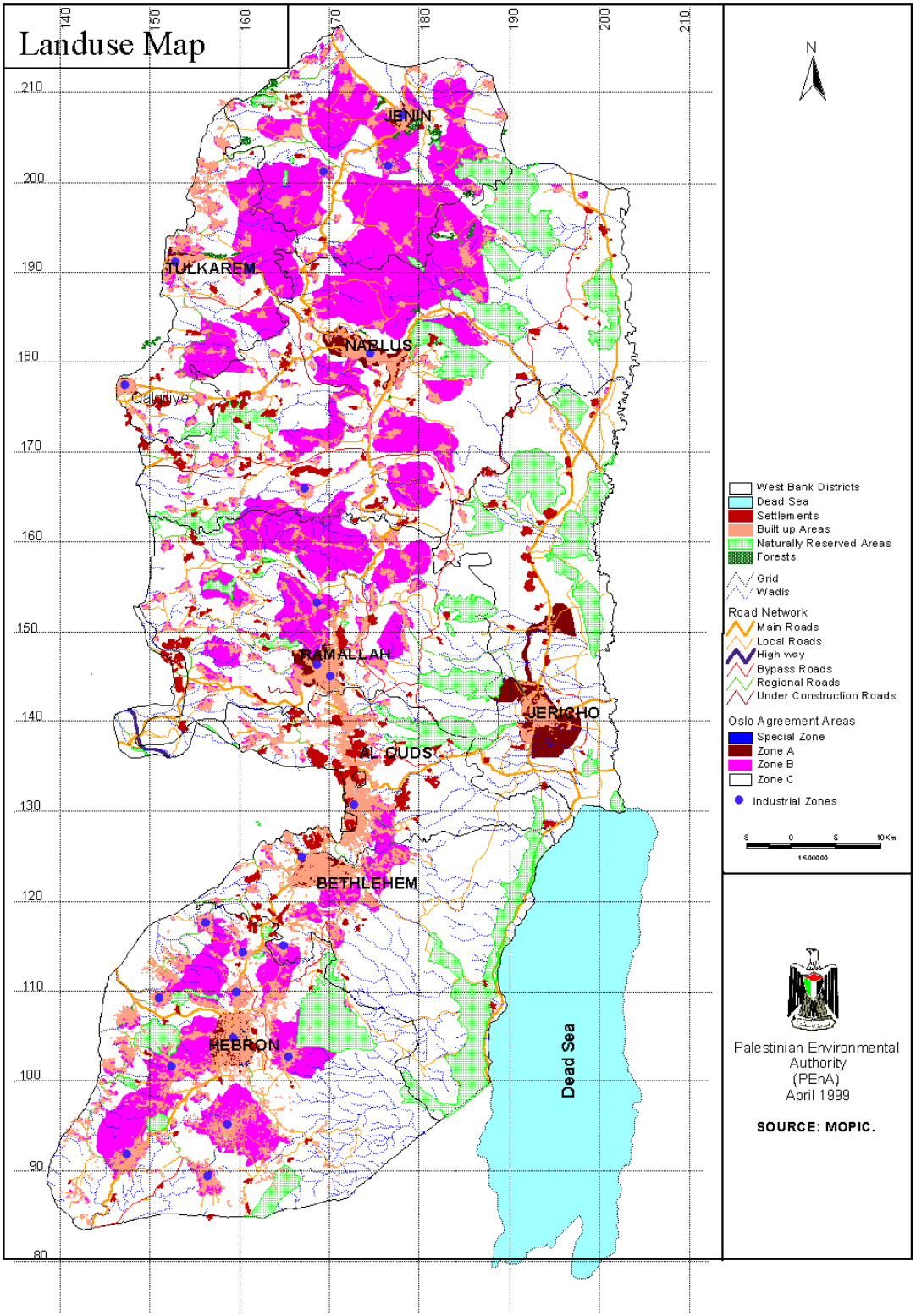
The three main factors driving biodiversity loss in Palestine are:

1. Habitat destruction;
2. Pollution; and
3. Illegal hunting and trade.

Habitat destruction comes from a broad range of sources including: unplanned urban expansion; unplanned forestry activities; settlements; overgrazing in dryland areas; wetland reclamation; and mining and quarrying. Different activities affect different habitats and thus different species, however the basic forces undelying all forms of habitat destruction are the constant increase in population density on a fixed amount of land and resources and the unplanned development.

The stabilisation of population is a long term goal of most societies, which goes hand in hand with socio-economic development and sound environmental management. These goals are all consistent with the conservation of biodiversity and will occur over the long term. They are not a direct concern of the National Biodiversity Strategy and Action Plan as such. A more direct concern is the poor planning of land uses. Zoning for urban, industrial, agricultural, recreational, protected areas and territories for other destination is urgently needed. The zoning should include effective mechanisms for enforcement. In fact, some good examples of land-use plans exist in the Psalestinian Territories, but their implementation and enforcement is poor.

Map 7: Land Use in the West Bank



There are three basic forms of pollution: (i) agro-chemicals; (ii) liquid waste; and (iii) solid waste. Agro-chemicals are heavily used in horticulture operations and increasingly in vegetable production. They are often misused and over used. This has led to decreasing groundwater quality and poisoning of birds and other herbivores.

Liquid waste is a severe problem in Gaza. An estimated 42,000 m^3 a day are pumped into wetlands and the ocean. The effects include the contamination of critical wetland habitats and unknown consequences on the marine life. In addition, the *wadis* of the West Bank are filled with liquid waste coming from a variety of sources, with a major impact on the water resources of the West Bank.

In many areas, solid waste is simply strewn about into the nearest vacant lot. In more severe cases it is dumped into critical ecosystems (wetlands and beach ecosystems). Unsanitary landfills have impacts on the groundwater and general health of surrounding areas.

Illegal trade and hunting is common in Palestine. Species effected by illegal trade include various desert reptiles and songbirds. Large mammals are vulnerable to hunting. In addition there are reports of farmers using poisons to kill wolfs and hyenas as a precautionary measure to protect their herds. This form of hunting is highly damaging as it is indiscriminate and kills many species besides the target animals. In addition, species such as scorpions and snakes are subject to indiscriminate killing, as people are generally very afraid of them.

Main needs

There are four main needs that Palestine must meet to embark in a successful strategy and action plan for biodiversity:

- Biodiversity information;
- Human resources trained in the biodiversity field;
- An effective legal framework for the conservation of biodiversity;
- The organisation and action of Palestinian society for the sound management of their land and natural resources.
- The gap in information is related to primary, scientific data on biodiversity in Palestine. Current reports are generally drafted from secondary sources, with informal field verification. It is believed that this method effectively captures the broad trends, but for monitoring purposes a more hard core scientific approach is needed.
- Primary information on the exact number of species, species populations and habitat is needed for all kingdoms (*Prokaryota, Protoctista, Fungi, Plantae* and *Animalia*). It is suggested that work begin with the large mammals and predators and work down through the food chain, as this will provide an indication of habitat health.
- The second need is the lack of trained natural scientists. There are very few taxonomists, zoologists, biologists (specifically marine biologists and wildlife biologists), oceanographers, conservation managers, etc. It is recognised that this gap will take time to fill, but interim steps are needed. For example, training courses for university professors, graduate students and government officials in species recognition, the latest techniques in scientific wildlife data collection etc.
- The third major gap is the lack of an environmental policy and legal framework on which all activities could be based. It is realised that this is the result of the current political situation. However, an environmental policy and legislation could be drafted incorporating biodiversity

concerns and implemented *de facto* before its *de jure* implementation. This is in fact the case with many international agreements. Countries sign them and act in the spirit of them long before they are passed into formal legislation.

All the above, however, will amount to little effects “on the ground” if the Palestinian people will not be themselves organised and will not themselves take action to conserve their natural resources and manage them in a sound way. This is not just a matter of “environmental education” or “awareness”. The traditional background of Palestinian people includes practices that signal a profound knowledge of local ecosystems, as well as of their opportunities and limitations to sustain human livelihoods. Such knowledge and practices should be recognised, re-vitalized and duly adapted to the changed conditions they have now to face. This can only happen with the full consent and participation of the local communities of Palestine – the Bedouins, the peasants, the fisher-folks, the merchants, the administrators and the government officials. At the same time, new opportunities can be provided to the people of Palestine to produce what they need with the least damage possible to their environment. Ultimately, it is only via a fair sharing of functions, benefits and responsibilities in the management of land and natural resources that the biodiversity of Palestine will have a chance to survive.

Legal Issues of Biodiversity

The legal system in Palestine is diverse, involving a variety of laws, from several sources that are at times integrated and at times in conflict. The system is a product and mix of all of Palestine's occupiers. Including Ottoman, British, Israeli, Jordanian (West Bank) and Egyptian (Gaza). Under the Oslo Agreements, based on the Protocol on Civil Issues, the Palestinian Authority has the ability to pass laws related to civil matters within areas designated A and B. Under this system, no laws on environment or resource management have been passed to date (Qubba’h, 1998).

The nearest thing that PA has to a constitution or legal framework at present, are the Oslo Agreements and the Palestinian Environmental Law currently being ratified and approved. The Israeli-Palestinian Interim Agreement (Oslo II) includes several issues related to environment. Specifically, Annex 3 "Protocol on Civil Issues" Appendix I, Article 12 Environmental Protection states:

Paragraph 14

"Israel and the Palestinian side shall co-operate in implementing principles and standards, which shall conform with internationally accepted principles and standards, concerning the protection or endangered species of wild fauna and flora, including restriction of trade, conservation of migratory species of wildlife and preservation of existing forests and nature reserves."

Paragraph 17:

Obliges both sides to promote public awareness on environmental issues.

Article 14

Paragraph 1:

Calls for the "formation, management, monitoring, protection and preservation of all forests (cultivated and non cultivated."

Paragraph 3

Commits the PA to "protect and preserve all forest in the West Bank and The Gaza Strip (… and to take…) all necessary action to ensure their protection and preservation from any harm…"

Paragraph 4

Includes the "right of planting new forest (…) for the protection of soil erosion and desertification and for the improvement of landscapes…"

Article 25 Nature Reserves, paragraph 5 & 6

"The two sides shall each take appropriate measures in order to protect Nature Reserves, Protected Natural Assets and species of animals, plants and flowers of special breeds…"

"Each side shall enforce, within the area under its responsibility, the regulations pertaining to hunting, and in particular the prohibition on hunting of protected and endangered species." (MOPIC, 1996)

What is interesting about the wording of the Oslo (2) Agreement is the repeated reference to internationally recognised standards. The PA is bound to implement the Agreement and thus the international standards should act as framework or base (Lex generali) for environmental law in Palestine.

Environmental Awareness

Basic education

Education is a crucial component of environmental awareness and indeed of sustainable development. The literacy rate in the Palestinian Territories is reported to be approximately 65 per cent, which places the Palestinian Territories in mid-range among developing nations (ARIJ 1997). There is a large gender variation within this figure due mainly to the lower literacy rate among women over 20 in the West Bank. However, the gap has closed significantly in the last 30 years with the male literacy rate doubling and the female growing by 8 fold during this period (ARIJ, 1997).

The education system in the PA consists of 4 levels and 3 systems. They are:

Pre-school, age 4 to 5;

Elementary education, grades 1 to 6;

Preparatory education, grades 7 to 9; and

Secondary education, grades 10 to 12. A nation wide exam is requited for graduation.

The 3 systems are the: (i) Government Schools, administered by the PA; (ii) Private Schools; and (iii) United Nations Relief and Works Agency (UNRWA) which provide services to refugee camp residents, mainly in the West Bank.

There are 14 universities in the Palestinian Territories including 12 in the West Bank (including East Jerusalem) and 2 in Gaza. Seven of which have environment-related courses.

Special activities

The first workshop that discussed the environmental issues in Palestine was the one held in Bethlehem University in 1987. This workshop had build the first steps for understanding and assessing our natural resources and inventorying the appropriate methods to protect the Palestinian environment. The workshop covered different issues such as the Palestinian ecosystems, topography and climate, pesticides and their effects, insect disease and the status of poultry in Palestine.

The Applied Research Institute-Jerusalem (ARIJ) held the first training course on biodiversity that discussed the issues, concepts and scientific approaches of biodiversity and its implementation in

Palestine. This course was in co-operation with the Ministry of Agriculture (MOA) and a number of Palestinian NGOs that work in the field of biodiversity, agro-biodiversity, range land management and conservation (ARIJ, 1998).

PEnA has made considerable progress in promoting biodiversity and general environmental awareness since the commencement of the BSAP project. To date they have:

In collaboration with the Ministry of Education, launched a pilot environmental awareness campaign targeting all levels of school in the Hebron district. The campaign uses computers and audio-visual equipment to give a general introduction to environmental issues including biodiversity. Preliminary feedback from teachers has been positive and it is hoped that the program can soon be expanded through the Palestinian Territories.

Produced a series of 4 colour posters with slogans on biodiversity. The posters include (i) birds; (ii) large mammals; (iii) important natural areas; and (iv) indigenous wildflowers. The posters have been disseminated throughout schools in the West Bank and will hopefully be distributed throughout Gaza once the current round of closures is lifted. They will then be sent to various government offices, NGOs and media institutions. In addition PEnA has produced brochures on PEnA and the BSAP project. These brochures have been also been widely distributed throughout the Palestinian Territories.

Produced a documentary film on biodiversity in the West Bank.

Undertaken several promotional and educational activities in collaboration with the environmental NGO Children for the Protection of Nature in Palestine (CPNP). Among these, the highest profile event has been the sponsorship of the First International Conference on Biodiversity and Educational Environment, held in Jericho and Beit Jala from 7 to 13 June 1998.

PEnA's Gaza office has also undertaken several environmental awareness activities. These are the; (i) production of a 3-part video on marine pollution, (ii) production of brochures of local distribution, (iii) production of children's storybook on environmental issues and (iv) 2 clean-up campaigns in the northern beach area and Wadi Gaza.

In April 1998 CPNP established the first and to this point only, Environmental Education Center in the Palestinian Territories. Consistent with CPNP's mandate, the center is targeted mainly at school children from the Palestine, Israel and the surrounding Arab region. In addition, links have been established with several schools in North America. The centre consists of:

Natural history museum, with a collection of over 2,500 specimens of animals including a large collection of birds, fossils, rocks, flora and a herbarium;

Inter-active Environmental Exhibit, on a large range of environmental issues. Including, water resources, migratory birds, indigenous flora and fauna and pollution control;

Computer Laboratory, which consists of a software package on bird migration;

Botanical garden, which has had a program of joint Palestinian/ Israeli children planting trees. The centre plans to expand the garden to include a larger variety of Mediterranean and Biblical trees, a pond for migratory and indigenous birds and an outdoor classroom.

Universities

There are nine universities in the Palestinian Territories including seven in the West Bank (including East Jerusalem) and two in Gaza. The universities focus on Bachelor level degrees with a limited number of Master's degrees available. Total student enrolment is approximately 18,000 (West Bank

only) with approximately 1,600 (West Bank only) students graduating each year. There are 19 Community Colleges in the Palestinian Territories with a total student enrolment of approximately 3,400 (West Bank only) and 12 Vocational Institutions with a student enrolment of approximately 2,300.

Of the nine universities, seven have courses related to environmental issues. The seven are: Al-Azhar University (Gaza), Bethlehem University, Hebron University, Islamic University of Gaza, Jerusalem Open University (nation wide), An-Najah National University (Nablus) and Al-Quds University (East Jerusalem).

The Islamic University of Gaza's Department of Environment and Earth Sciences offers a Bachelors level program. The first class of 11 students has just graduated. In all there are between 25 and 30 students in the program with 5 full time teachers (2 full professors, 3 assistant professors). Additional teaching resources are drawn from other departments. Courses cover a wide range of environmental issues including: solid waste management, waste water treatment, GIS/ remote sensing, energy sources, EIA, oceanography, micro-biology, hydro-geology and environmental chemistry.

Non Governmental Organizations

Below is a partial list of local NGOs that work broadly in the environment field. In addition there are several International NGOs and private sector consulting companies active in the environment industry in Palestine.

Applied Research Institute-Jerusalem (ARIJ)

Founded in 1990, ARIJ is a non-profit organisation dedicated to promoting sustainable development in the occupied Palestinian Territories and the self-reliance of the Palestinian people through greater control over their natural resources. The Institute works specifically to augment the local stock of scientific and technical knowledge and to introduce and devise more efficient methods of resource utilisation and conservation, improved practices, and appropriate technology.

The main objective of its BARU (Biodiversity and Agriculture Research Unit) is to carry out research in biodiversity, conservation and broader agricultural issues in Palestine such as environmental threats, which enhance the process of desertification, soil erosion, degradation of green cover, and endangerment and extinction of flora and fauna. Some of its major activities are the establishment of a Flora Data Base, Fauna Data Base, Herbarium, initiation of a Seed Bank, Agricultural Data Base, Plant Protection Data Base and Livestock Data Base.

Ma'an Development Centre

The Ma'an Development Centre is a Palestinian NGO established in 1990. The Centre's main activity is the design and implementation of training programs in various fields for both individuals and institutions, including community based or "grassroots" organisations. In addition, the Centre functions as an applied and basic research institute.

Ma'an is active in fishery. They are the partner executing agency for the Gaza Fishery Project (with CARE Canada). Activities include fish data collection, co-management and the development of an artificial reef (CARE/ Ma'an, 1996).

Palestinian Agriculture Relief Committee (PARC)

Focuses mainly on agricultural activities, including animal and plant production, agricultural management and training, land reclamation and veterinary services (PEnA, March 1998).

Technical Center for Agriculture Service (TCAS)

Works in the fields of agriculture extension, land reclamation, environmental awareness and women in development (PEnA, March 1998).

Al Towfiq Fisherman's Co-operative

The Al Towfiq co-op is the only co-op in the fishing sector. It has 187 members and 9 full time employees. A 9 member board is elected every 2 years and meets monthly as well as at the Annual General Meeting. The co-op is quite influential in fisheries related matters in Gaza and acts as the main voice for the fishermen (CARE/ Ma'an, 1996).

Fishermen's Association

Began in early 1996. It consists of an elected chairman who presides over an administrative committee. The administrative committee is made up of representatives of the 4 local units. The objective of the association is to work towards unification in the fishing sector and to sustain and develop the fishermen's financial, social and professional interests. This includes lobbying the PA for a health insurance scheme and other social benefits. The Association is also active outside the fishery including an initiative to establish a housing co-operative (CARE/ Ma'an, 1996).

Green Peace, Palestinian Society for the Protection of Nature and Palestinian Society for the Protection of Wild Life

Are few examples of the newly licensed non-governmental institutions to work in the environment/environment protection field.

Annex I. Acronyms and Abbreviations

ARIJ	Applied Research Institute - Jerusalem
ASIR	Arab Scientific Institute for Research and Transfer of Technology
BSAPP	National Biodiversity Strategy and Action Plan
°C	Degrees Celsius
CBD	Convention on Biological Diversity
CCD	Convention to Combat Desertification
CITES	Convention in International Trade in Endangered Species of Wild Fauna and Flora
CPNP	Children for the Protection of Nature in Palestine
DOF	Department of Fisheries
Dunum	A unit of area equal to 1/10 of a hectare (1000 m^2)
EIA	Environmental Impact Assessment
EPD	Environmental Protection Directorate
g/l	Grams per litre
GEF	Global Environment Facility
GIS	Geographic Information System
ha	Hectare
HYV	High Yield Variety
IBA	Important Bird Area
ICARDA	International Centre for Agricultural Research in the Dry Areas
IUCN	The World Conservation Union
km	Kilometre
LFA	Logical Framework Analysis
LOE	Level of Effort
m	Meters
MAB	Man and the Biosphere Programme
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOPIC	Ministry of Planning and International Co-operation
MOU	Memorandum of Understanding
NGO	Non-Governmental Organisation
nm	Nautical Miles
PA	Palestinian Authority
PARC	Palestinian Agriculture Relief Committee
PCBS	Palestinian Central Bureau of Statistics
PEnA	Palestinian Environmental Agency
PEPA	Palestinian Environmental Protection Agency
PIALES	Palestinian Institute for Arid Lands and Environmental Studies
PIES	Palestinian-Israeli Environmental Secretariat
PLO	Palestinian Liberation Organisation
PT	Palestinian Territories

RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat
SRMU	Sustainable Resource Management Unit
t	Metric tonne
TCAS	Technical Centre for Agriculture Service
TOR	Terms of Reference
TWG	Technical Working Group
UNCED	United Nations Conference on Environment and Development
UNDP/ PAPP	United Nations Development Programme/ Programme of Assistance to the Palestinian People
UNEP	United Nations Environment Program
UNESCO	United Nations Education Science and Cultural Organisation
UNRWA	United Nations Relief and Works Agency
US	United States
USA	United States of America
WRI	World Resource Institute
WWF	World Wide Fund for Nature (International) or World Wildlife Fund (USA and Canada)

Annex II: Articles 6 and 26

Article 6.

General Measures for Conservation and Sustainable Use

Each Contracting Party shall, in accordance with its particular conditions and capabilities:

(a) Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which shall reflect, *inter alia*, the measures set out in this Convention relevant to the Contracting Party concerned; and

(b) Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.

Article 26.

Reports

Each Contracting Party shall, at intervals to be determined by the Conference of the Parties, present to the Conference of the Parties, reports on measures which it has taken for the implementation of the provisions of this Convention and their effectiveness in meeting the objectives of this Convention

Annex III. Background to the BSAPP

Step 1 Getting Organised.

PEnA was selected as the national focal point and national executing agency. A Project Manager, team of environmental and agricultural specialist and support staff within PEnA were assigned to the project. A 12 member Steering Committee comprised of representatives from various government ministries, NGOs and universities was established on 20 November 1997. The role of the Steering Committee was to:

Advise and assist the Project Manager;

Review the reports of the Technical Working group; and

Act as a forum for discussion and achieving consensus on the main components of the BSAPP.

The Project Manager has been in regular contact with the Steering Committee, they have been invited to all workshops and have convened twice during the life of the project. It is anticipated that the Steering Committee will convene again in mid-November 1998 to discuss the draft BSAPP.

Table 40: BSAPP Methodology and Reporting

Planning Step	Reporting Process
1. Getting organised	**Relates to all reports**
2. Data gathering and assessment	**Country Study**
3. Option identification and analysis	**Situation Analysis**
4. National strategy	**National Strategy**
5. National action plan	**Action Plan**
6. BSAPP implementation	**Iterative process, monitoring and evaluation reports will loop back into**
7. BSAPP monitoring, evaluation and reporting	**National Biodiversity Strategy and Action Plan**

Source: Adapted from WRI et al, 1995 and GEF/ UNDP, 1998.

Wide representation on the Steering Committee was sought in order to maximise the input and viewpoints incorporated in the BSAPP. Moreover, as PEnA is intending to submit the BSAPP to the PA for approval and incorporation into national planning; it was felt that the more Ministries that have an opportunity for early input, the more quickly it will be adopted by the PA. The names, title and agency of the members of the Steering Committee are given below:

Table 41: Steering Committee Members and Agency

Steering Committee Member	Title and Agency
Dr Sufian Sultan	**Head, PEnA (Steering Committee Chair)**

Dr. Yousef Abu-Safia	**Head of Natural Resources Committee in the Palestinian Legislative Council & Current Minister of Environment.**
Mr Ali Shaath	**Deputy Minister, MOPIC**
Mr Sami Mussallam	**Director General, President's Office**
Dr Kamal Qubba'h	**Legal Advisor to President of PA**
Dr Jad Isaac	**Director General, ARIJ**
Mr Musa Abu-Gharbiah	**Director General, Palestinian Water Authority**
Mr Abdallah Abdallah	**Director, Palestinian Geographic Center**
Mr Adel Barageeth	**Director General Rangelands and Forestry, MOA**
Dr Adimar Es-Ghier	**Head of Department of Biology, Birzeit University**
Dr Jawad Wadi	**Administrative Vice Chancellor, Al-Azhar University**
Mr Ibrahim Jadallah	**Director General, Ministry of Tourism**

Step 2 Data Gathering and Assessment

Within the first month of the project six Palestinian consultants were contracted to produce background reports including recommendations on various aspects of biodiversity in Palestine. These six specialist along with the Project Manger are referred to as the Technical Working Group. The specialist, agency and subject matter are named below:

Table 42: Technical Working Group

Specialist and Agency	Subject Matter
Mr Imad Atrash, CPNP Coordinator	**Terrestrial biodiversity - fauna**
Mr Adel Breighieth, Director General Rangelands and Forestry, MOA	**Terrestrial biodiversity - flora**
Ms Nadia El Khodary, Consultant to PEnA, Dutch Environmental Planning Project	**Marine and freshwater biodiversity**
Dr Kamal Qubba'h, Legal Advisor to President	**Legal issues of biodiversity**
Dr Shahir Hijjeh, Al Quds Open University	**Socio-economic issues of biodiversity**
Mr Younis Sbeith, Conslutant to PEnA, ICARDA Agro-biodiversity project	**Agro-biodiversity**

Work began in earnest on 8 December 1997 with the first working group meeting. Below is the list of meetings and workshops that highlighted the progress of the BSAPP.

Table 43: BSAPP Meetings and Workshops

Meeting/ Workshop/ Agenda	Participants	Date

1St Instructional workshop/ 1st steering committee meeting. **Inception workshop – introduced participants to the BSAPP and provided TWG with TOR.**	**Steering Committee, TWG**	**8 Dec/ 97**
1St Planning team meeting. **Established time frame, reviewed Terrestrial – flora progress.**	**TWG, PEnA,**	**2 Jan/ 98**
2ND Planning team meeting. **Review timeframe, reviewed marine and freshwater, socio-economic and legal progress.**	**TWG**	**20 Jan/ 98**
3rd Planning team meeting. **Discuss preparatory steps and reports to be presented at the 1St national workshop.**	**TWG**	**21 Feb/ 98**
2ND Steering committee meeting. **Review of TWG workplan and reporting format.**	**Steering Committee, IUCN, Project Manager**	**24 Feb/98**
2ND Instructional workshop. **Discussed TWG recommendation responsibilities and format.**	**TWG**	**27 Feb/ 98**
1St National workshop. **Inform broadly the purpose of the BSAPP; identify potential conflicts between resource use and conservation; identify priority options for conservation; and to encourage discussion among stakeholders**	**PEnA, Government Officials, NGOs, Universities and other stakeholders**	**12 Mar/ 98**
1St Provincial workshop. **Inform broadly the purpose of the BSAPP; identify potential conflicts between resource use and conservation; identify priority options for conservation; and to encourage discussion among stakeholders**	**PEnA, District Government Officials, NGOs, Universities and other stakeholders**	**15 Apr/ 98**
2ND Provincial workshop. **Inform broadly the purpose of the BSAPP; identify potential conflicts between resource use and conservation; identify priority options for conservation; and to encourage discussion among stakeholders**	**PEnA, District Government Officials, NGOs, Universities and other stakeholders**	**30 Apr/ 98**
4Th Planning team meeting. **Reviewed TWG reports and discussed gaps.**	**TWG**	**28 May/ 98**
BSAPP Arab regional workshop. **Provide a forum for countries to exchange ideas, lessons learned and biodiversity planning experiences with GEF/ UNDP, UNEP and IUCN resource persons.**	**National Project Managers from PA, Yemen, Tunisia, Lebanon, Djibouti, Sudan, Jordan, Syria, Algeria and Oman.**	**11-13 June/ 98**
Task force inception workshop. **Establish task force workplan**	**Dr. Sultan, Task force**	**29 Sep/ 98**
Task force-drafting workshop. **Finalise draft BSAPP**	**Task force**	**21-24 Oct/ 98**

Final workshop. Finalise BSAPP	**Task force, TWG, Steering Committee**	**16 Nov/ 98**

Step 3, 4 and 5

In late September 1998, PEnA established a BSAPP Task Force comprised of the Project Manager, the TWG, ARIJ and 3 outside consultants. The Task Force's role was to finalise the TWG reports including recommendations and complete the draft BSAPP.

Step 6 and 7

The implementation and monitoring and evaluation will begin after the approval of the BSAPP.

ANNEX IV: Summary of the Twelve Projects

References

Abu Mayleh, Y. ***Israel Water Resources,*** unpublished paper introduced for the Egyptian Geographic Society in the proceedings for the third Arab Geographic Conference, p. 1-43, Cairo, 1991. (In Arabic).

Al-Khatib, N., ***Water Resources in the West Bank,*** Unpublished M.Sc. Thesis, Loughborough of Technology, UK, 1989.

Al-Razeq, Dr Omar Abed and Odeh Shehada. (1996) ***Palestinian Agriculture Economy 1967 - 1990.*** MA'AN Development Centre.

ARIJ. (1997) ***The Status of the Environment in the West Bank.*** Bethlehem, Palestine

ARIJ. (1998) ***Biodiversity Assessment Report.*** Unpublished Report to PEnA.

Atallah, I., ***The Mamals of the Eastern Mediterranean Regions, their Ecological, Systematic and Zoogeographical Relationships,*** Saugetierk Mitt, Munchen, 1977.

Atrash, Imad. (1998). ***TWG Report on Terrestrial Fauna Biodiversity.*** Unpublished report to PEnA.

Barkoudah, Y., ***Global Aspects of Biodiversity and Genetic Resources.*** Genetic Resources Training Course, WANA group, Amman, Jordan, 1995.

Bregheith, A. (1995). ***Forests of Palestine between 1950-1995.*** Directorate of Pasture and Forestry. Palestinian Ministry of Agriculture. West Bank.

Breighieth, Adel. (1998). ***TWG Report on Terrestrial Flora Biodiversity.*** Unpublished report to PEnA.

CARE/ Ma'an Project. (1996) ***Gaza Fisheries Report.***

CBD Secretariat website. (1998) (www.biodiv.org).

CPNP. (1998) ***Quarterly Magazine.***

El Khodary, Nadia. (1998). ***TWG Report on Marine and Freshwater Biodiversity.*** Unpublished report to PEnA.

Euroconsult, IWACO. (1994) ***Gaza Environmental Profile. Parts 1,2 and 3.*** MOPIC, EPD, Gaza Palestinian Territories.

Evans, M.I., (1995) ***Important Bird Areas in the Middle East; Birdlife Conservation Series No. 2.*** Birdlife International.

Gabbay, Sh., ***The Environment in Israel.*** National Report to the United Nation Conference on Environment and Development, Ministry of Environment. Israel, 1983.

GEF/ UNDP. (June 1998) ***Summary Report of the GEF/ UNDP Regional Workshop on Biodiversity Strategy and Action Plan (BSAPP) for the Arab States Region.*** Amman, Jordan.

Hepper, Nigel (1992). ***Illustrated Encyclopedia of Bible Plants.*** Text and Illustrations. United Kingdom.

Hijjeh, Shahir. (1998). ***TWG Report on the Economics of Biodiversity.*** Unpublished report to PEnA.

Ilani, G., ***Zoogeographical and Ecological Survey of the Carnivorous of Israel,*** Nature Reserve Authority, Jerusalem, 1979.

Ishtayia, M. et.al. (1995). ***The Protection of Palestinian Environment.*** The National Computer Center. Nablus. (In Arabic).

Issac, Jad (1998). ***Resource Scarcity and Food Security in Palestine.*** ARIJ. Palestine.

IUCN website. (1998) (www.iucn,org).

IUCN. (1996) ***The 1996 IUCN Red List of Threatened Animals.*** Gland Switzerland.

IUCN. World Conservation Monitoring Centre and UNDP. (1994) ***1993 United Nations List of National Parks and Protected Areas.*** Gland, Switzerland.

Le Houerou, Henry N., (March 1998) ***Restoring Biodiversity in the Eastern Slopes of Palestine: Suggestions for a Strategy.*** Consultant Report to PEnA.

MOPIC website. (1998) (nmopic.pna.net)

MOPIC. (1996) ***Coastal Zone Plan for Gaza.*** MOPIC, EPD, Gaza, Palestinian Territories.

O'Brien. M., ***Methyl Bromide: Time to Stop the Killing.*** Global Pesticide Campaigner. Vol.2, No.2,USA, 1992.

Obasi, G.O.P., ***The Atmosphere: Global Commons to Protect,*** A paper presented in **Our Planet**, Vol. 7. No. 6. P. 5, 1996.

Palestine Economic Pulse (1996). ***The Arab Economists Association.*** Vol.1 no.1. Ramallah. January.

PARC & Arab Though Forum. ***Final Report on Sheep and Goats herds Survey in the West Bank and Gaza Strip.*** Vol. 1, No.6, 1993.

Paz, Uzi (1986). ***Plants and Animals of the Land of Israel: An Illustrate Encyclopedia.*** Ministry of Defense / Society for Protection of Nature. Vol.7, P.182, P.205, P.223 and P.260. Israel.

PCBS. (1997) ***Agricultural Statistics 1996/ 97.*** Palestinian Central Bureau of Statistics. Ramallah, Palestinian Territories.

Pellow, Robin, ***The Global Biodiversity Assessment,*** A paper presented in **Our Planet Journal.** Cambridge University Press, Vol. 7, No. 5, p. 36, 1996.

PEnA. (1998) ***Palestinian Environmental Authority, Brochure.*** Hebron, Palestinian Territories.

PEnA. (July 1998) ***BSAPP for Palestinian Territories; The Second Palestinian Progress Report.*** Hebron, Palestinian Territories.

PEnA. (March 1998) ***BSAPP for Palestinian Territories; The First Palestinian Progress Report.*** Hebron, Palestinian Territories.

PIALES. (1996a). ***Combating Desertification in the Palestinian Jordan Valley: An Approach Towards Sustainable Development.*** Hebron, Palestinian Territories.

PIALES. (1996b) ***A Preliminary Investigation of Biodiversity in Palestine: Problems and Prospects.*** Hebron, Palestinian Territories.

Qubba'h, Kamal. (1998). ***TWG Report on the Legal Aspects of Biodiversity.*** Unpublished report to PEnA.

Safi, J. et al. ***Pest Control and Minimizing Pesticide Use,*** The Environmental Protection and Research Institute, Gaza, 1994. (In Arabic).

Sbeith, Younis. (1998). ***TWG Report on Agro-biodiversity.*** Unpublished report to PEnA.

Sela, Y., ***The Victory in the Struggle Over the Digging of Sand Came too Late for the Sea Turtles,*** Teva Va'aretz 21, Vol. 2, p. 58-63, 1979.

Shmida, Avi (1995). ***General References on Biodiversity and Theory of Ecological Richness, Especially Concerned with Arid and Mediterranean Ecosystems.*** The Hebrew University. Jerusalem.

Tahal, ***Israel Water Sector-Past Acheivements, Current Problems and Future Options,*** Report for the World Bank; Tahal Water Planning for Israel, Tel Aviv, 1990.

UNCCD website. (1998) (www.unccd.ch).

UNDP. (1998) ***Regional Conservation and Sustainable Use of Dryland Agro-biodiversity of the Palestinian Territories.*** Draft Project Document. East Jerusalem, Palestinian Territories.

Waisel, Y., G. Pollack and Y. Cohen (1982). ***Ecology of the Vegetation in Israel***. Tel Aviv University.

Werner, Y.L., ***Herpato Faunal Survey of Israel, (1950-1985), with Comments on Sinai and Jordan and Zoogeographical Heterogeity.*** In: Y. Yomtov and E., 1989.

Witteveen+Boss Consulting engineers. (1996) ***Environmental Impact Statement for the Gaza Sea Port.*** PNA, MOPIC, EPD, Gaza, Palestinian Territories.

WRI, UNEP, IUCN. (1995) ***National Biodiversity Planning; Guidelines Based on Early Experiences Around the World.*** Washington DC, USA, Nairobi, Kenya, Gland, Switzerland.

WWF website. (1998) (www.panda.org)

Zohary, Michael (1962). ***Plant Life of Palestine.*** The Ronal Press Company.