

## Part 3 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

### 3.1 Legal and Institutional Frameworks

#### 3.1.1 Environmental Legislation

The Ministry of Environment (MOE) was first established in May 1981 aiming at controlling all forms of pollution, the deforestation and forest fires, solid waste disposal, protection of fauna and flora and urbanization. In April 1993, MOE issued the Law 216, marking a significant step forward in the management of environmental affairs. Moreover, MOE drafted, in 22 September 2000, an EIA outline, which is still a draft decree under revision by a committee composed of representatives from related ministries and agencies. Until recently, various EIA systems were adopted to comply with the requirements of different international agencies (e.g., World Bank, etc.). The present EIA has been carried out with reference to the "Review Checklist for EIA Reports" which was once used as an EIA guideline of MoE. *Source: The Study of Environmental friendly Integrated Transportation Plan for Greater TRIPOLI, JICA and CDR, 2001*

#### 3.1.2 Institutional Framework

Two ministries play an important role in the framework of the tourism development plan, namely the Ministry of Tourism (MoT) and the Ministry of Environment (MoE). Table 3.1.1 summarizes the responsibilities of these institutions and other major institutions in Lebanon.

**Table 3.1.1 Responsibilities and Authorities of Key Institutions in Lebanon**

Institution	Water Resources	Urban Planning /Zoning	Standards and Legislation	Bio-diversity	Waste Water Discharge	Tourism	Cultural Heritage
Ministry of Tourism		√	√	√		√	√
Ministry of Environment	√	√	√	√	√	√	√
Council for Development and Reconstruction	√	√			√		
Directorate General of Antiquities						v	√
Ministry of Agriculture			√	√	√		
Ministry of Housing and Cooperatives		√			√		
Ministry of Energy and Water	√		√	√	√		
Ministry of Industry and Petroleum		√	√		√		
Ministry of Interior and Municipalities						√	√
Ministry of Public Health	√		√	√	√		
Ministry of Public Works and Transport	√	√	√		√		
Union of Municipalities	√	√		√	√	√	√
Municipality	√	√		√	√	√	√

Source: JICA Study Team

### 3.2 Projects Requiring EIA

The natural environment and social conditions in the Bekka Valley and the Bcharre Highlands

were surveyed in Phase II Study. The proposed programs and projects were 13 for Bekka and six for Bcharre. Tow projects each in the Bekka and the Bcharre were selected for the feasibility studies. The components of these projects were evaluated carefully in consideration of the natural environment and social conditions in the Bekka and the Bcharre. Finally following projects tow in the Bcharre were selected for the EIA.

B1 Qadisha Cedars Management Project (QCPMC), and  
B3 Crown Villages Destination Project.

### 3.3 Environmental Impact Assessment

#### 3.3.1 Project Description

The tourism development plan focuses primarily on the Qadisha valley and the villages at their rim. The Bcharre project components are summarized in Table 3.3.1.

**Table 3.3.1 Project Components**

Package 1: B1 Qadisha Cedars Management Project (QCPMC)		
Project Name	Component	Description
P.1.1: Participatory site management planning	Minimum tourist facilities in Qadisha valley (a few lavatories; 4-5 bowls each)	The provision of minimum infrastructure demands in the valley would encourage tourist hiking tours.
	One visitor center including a museum for Qadisha valley and local heritage	The museum would educate the tourist and introduce him to the spiritual and ecological aspects of the valley.
	Two information Kiosks at the valley gates	The kiosks would provide the tourist with information of all activities and sites that they could access. These information are provided by explicative brochures.
P.1.2: Local shareholding company establishment	One company establishment	Economic activities, others
P.1.3: Qadisha Cedars Management Authority	One authority establishment	Environmental conservation, others
Package 2: B3 Crown Villages Upgrading		
P.2.1: Bcharre town beautification	Tourist street and plaza in the central Bcharre	It will focus on the town basic facilities including; lightning, plaza renovation and extension, open cafes, craft and souvenir shops.
P.2.2: Gibran house renovation and visitor information	Renovation of house interior	Improvement of the surroundings of Gibran House with the provision of interpretive information
P.2.3: Gateway viewpoint	Viewpoints including bypass roads	View points with a parking lot showing panoramic views of the Valley with interpretive boards would be a point of interest for the tourists.
P.2.4: Interpretive signage on key streets, routes for pedestrians	Approximately 100 signs	Signage will help in making the traffic more organized and will pinpoint important sites.
P.2.5: Sewage treatment facilities	Water treatment facilities	This includes a treatment plant and collection networks for Hadchit and Bcharre villages.
P. 2.6: Culvert linking animals from Horsh Ehden to Qadisha valley	One culvert construction	This culvert would enable animals to cross safely from the Ehden Reserve into the Qadisha valley and extend their natural environment.

Source: JICA Study Team

### 3.3.2 Baseline Conditions

#### (1) Endangered Species

Following five endangered species were reported in Bcharre qaza (Photo 3.1).

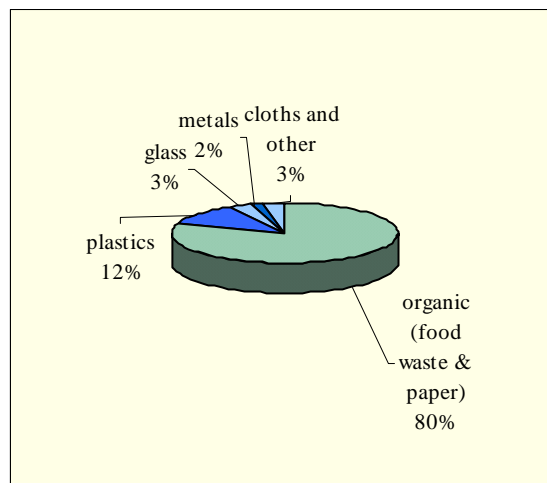
*Carlina involucrate libanotica* in Hachit, and

*Potentilla libanotica*, *Arenaria libanotica*, *Iris Cedreti* and *Astragalus pinetorum* in Bcharre.

#### (2) Solid Wastes

##### 1) Current situation

In Lebanon, each person generates a quantity of solid waste varying between 600 and 1000 grams per day. In the Bcharre qaza, the daily amount of wastes generated varies from 40 tons in summer to about 16 tons in winter. Twenty three villages are present in the Bcharre qaza. Solid wastes in these villages are generated mainly from houses, schools, shops, restaurants, slaughterhouses and few small industries and clinics. Solid wastes in Bcharre qaza is constituted of 80% organic and 20% inorganic wastes. This composition is further illustrated in Figure 3.3.1. Solid wastes in Bcharre and neighboring villages are currently being collected by the municipalities. Solid wastes are being disposed on sides of the valleys or dumped outside the qaza in other areas of the North.



Source: JICA Study Team

**Figure 3.3.1. Typical Waste Composition in Bcharre Qaza**

#### 2) Existing solid waste management plan

A company specialized in building material recovery facilities for the recycling of municipal solid waste, Cedar Environmental is working on implementing a solid waste management plan for the qaza of Bcharre. Of the 23 villages in the Bcharre qaza 17 have already confirmed the willingness to participate in the project. The site for the solid waste management center including sorting, composting and storage is in Tourza.

### **(3) Wastewater**

#### **1) Current situation**

In the Bcharre town, around 15,000 residents are estimated during the summer season and 8,000 during the winter season. In Hadshit, around 5,000 persons stay in summer and 2,500 in winter. It is estimated that around 2,250m<sup>3</sup>/day and 750m<sup>3</sup>/day of municipal wastewater are being discharged as a maximum load from Bcharre and Hadshit respectively. No treatment for this wastewater currently exists. With respect to sewer networks, major villages above the valley have an old sewer network that leaks at several locations. Main sewer lines are discharging in nearby water channels leading to the Qadisha Valley. Septic tanks are more common in the Cedars and few residential areas of the villages where the houses are far from the network.

In Bcharre, around 70 % of the houses are connected to a sewage network, where two main sewer lines collecting the bulk of sewage and discharge it in the valley without treatment. The existing network in Bcharre is around 50 years old. Rain water, water for irrigation, and sewage are flowing in the same network. Lately, the principle networks outside the dense residence zone were constructed where sewers for wastewater and canals for irrigation and rain water were separated. In Hadshit, 80-90 % of the houses are connected to the sewer network. Repairs at the network are done when leakage is suspected. Houses that are not connected to the sewer lines depend on septic tanks. These tanks have no treatment functions, and their sewage is pumped by the owner each time it gets filled.

#### **2) Existing wastewater management plan**

A water and wastewater master plan focusing on sewer lines, pumping stations, wastewater treatment and drinking water supply system covering the Bcharre qaza was prepared by Bureau Technique pour le Developpement (BTD) and submitted to the Ministry of Hydraulic and Electric Resources in 1997. This project has not been implemented. The following are among proposals regarding the towns of Bcharre and Hadshit:

- Sewer lines connecting the Cedars and the Bcharre town, one pumping station and one waste water treatment plant;
- Sewer lines and one wastewater treatment plant connecting the neighborhoods of the village of Hadshit.

The Pontifical Mission, a non-governmental organization (NGO), has studied the area for funding wastewater management facilities. The following changes to the initial plan are proposed:

- One treatment plant to be designed for the Arz area since it would require a sewer line of 7 kms to reach the wastewater treatment plant making it more feasible economically and environmentally;
- Collection of the sewage by the two main lines in Bcharre in one horizontal line at the edge of the valley connected to the plant; and
- Connection of houses that lack connections with the sewer line in Bcharre.

**Endemic species of Bsharre Qaza**

***Arenaria libanotica***



Lives in rocky mountains  
Flowering: June-August

***Astragalus pinetorum***



Lives in the mountains  
Flowering: May-July

***Potentilla libanotica***



Lives in the mountains  
Flowering: June-August

**References:**

Mouterde P. 1983. Nouvelle Flore du Liban et de la Syrie: Tome III. Dar el-Machreq.  
Nehme M. 1980. Wild Flowers of Lebanon. CNRS. Lebanon.  
Tohme G. 2002. A Thousand and One Flowers of Lebanon. Lebanese University.

***Carlina involucrate libanotica***



Lives on the coast, the lower, and middle mountains  
Flowering: July-August

***Iris cedreti***



Lives on rocky grounds  
Flowering: May

Photo 3.1

### 3.3.3 Impact Assessment

This section focuses on assessing the potential impacts of the major activities proposed by the tourism development plan. Impacts affecting the Qadisha site and the surrounding physical, biological, and socio-economic environment will be assessed. Table 3.3.2 summarizes the potential types of impacts and their nature. Positive socio-economic impacts are also anticipated and will be discussed as well.

**Table 3.3.2 Summary of Potential Environmental Impacts**

Potential Impact	Construction	Operation
Natural and cultural heritage	-/0	-/+
Traffic	-	0/+
Air quality	-	0
Noise	-	0
Landscape and visual intrusion	-	+++
Waste generation	-	0
Water quality / supply	-	-/0/++
Health and Safety	-	+
Socio-economics	-	+++

+++	High positive impact	---	High negative impact
++	Moderate positive impact	--	Moderate negative impact
+	Low positive impact	-	Low negative impact
0	Neutral impact		

Source: JICA Study Team

#### (1) Impact on Natural and Cultural Heritage

Regarding endangered species, no impact is expected as none exists in the sites proposed for infrastructure.

#### Impacts of individual components

The strong linkages established between the projects formation and the environmental study allowed some flexibility provided in identifying the locations and types of the suggested infrastructure works. This approach has allowed the study team to undertake a selection process whereby environmental concerns were incorporated in the project design. The impacts of these infrastructure components have therefore been accounted for in the selection process and hence minimized. Out of the suggested components in the integrated tourism development plan, the impact on biodiversity has been assessed for the following proposed components.

#### 1) Lavatories in the Qadisha Valley

The lack of lavatories in the Qadisha valley has led to the use of the facilities in the convents, restaurants, at the hydrological station and more commonly in nature. Special awareness material will have to be developed to ensure the acceptance of this type of sanitation both by the tourists and the local communities.

## 2) Two information kiosks for visitors at the gate of the valley rim

Special caution should be given to safety issues, as cars crossing to stop at the kiosks (when coming from the opposite side) may pose a danger. Informative signage and marks on the road should warn drivers of the possibility of crossing.

## 3) Culvert for animals to link Qadisha Valley to Ehdén Reserve

Raising awareness to the role wild fauna play in maintaining ecological services is the baseline effort required to raise the interest of the local population in monitoring animal kills on roads. Furthermore, in order to maximize the efficiency of culverts, their construction should be accompanied by the proper measures to channel animals towards the culverts.

Culvert use by small- and medium-sized mammals was investigated along roads in Banff National Park, Alberta, Canada, during the winters of 1999 and 2000. The results of this study show, especially for mammals such as the near-to extinction squirrel, culverts may prove to be viable solutions for providing safe passages to wildlife. However, culverts may have an impact in that they will channel fauna to a given location and make it much more vulnerable to poaching and to hunting.

These measures are detailed in the Environmental Management Plan (EMP) section. In addition, the size of the culvert needs to be cautiously studied to ensure that desirable animals would use it. Hence instead of the construction of a new culvert, existing drainage culverts have been located, their suitability for animal crossing assessed and required rehabilitation work identified for avoiding the animal kills. In addition, alternatives means of safeguarding wildlife while crossing are proposed in the EMP.

## 4) Summary of impacts with individual components

Table 3.3.3 summarizes the information included in this section.

**Table 3.3.3 Summary of Impacts on Biodiversity**

Components	Major perturbation factors	Comments
<b>Construction Phase</b>		
Lavatories in the Qadisha Valley	Disturbance of soil structure and removal of associated flora.	The selection of the location of the toilets is critical in minimizing the impacts during construction. Sensitive areas should be avoided.
		The selection of types of toilets can help minimize impacts during construction by selecting ready to use, easily installed toilets.
		This is a direct impact resulting from the construction of the toilets. Although occurring on the short term, this kind of disruption is irreversible.
Visitor Center near Bqaa	Dust emissions Soil	Limited in space, and selected site will require

Kafra	excavation and associated flora	minimum construction activities.
Two information kiosks for visitor on the Gate of the Valley rim	Dust emissions Excavation of soils	Very limited impacts
Viewpoints including bypass roads	Excavation of soil and associated flora Disruption of habitat connectivity (in the case of bypasses)	The viewpoints will have limited effect on biodiversity The construction of bypass roads may permanently disrupt habitat connectivity therefore irreversibly impacting biodiversity both in terms of fauna and flora.
Culvert for animals to link Qadisha Valley to Ehden Reserve	Excavation of soil	Minimal effect on biodiversity in the direct vicinity of the culvert
<b>Operation Phase</b>		
Lavatories in the Qadisha Valley	Spillage of sewer material	Both might have direct impacts on the fauna, specifically on scavengers that might feed on feces and catch diseases.
Visitor Center near Bqaa Kafra	None	None
Two information kiosks for visitor on the Gate of the Valley rim	None	Need to make sure there is no trampling on the vegetation in the nearby areas
Viewpoints including bypass roads	Urban expansion	Bypass roads might encourage linear construction on their ridges, thus increasing the loss of vegetative areas and increasing the impermeability of the road to animal passage
Culvert for animals to link Qadisha Valley to Ehden Reserve	Transfer of unwanted species	Some animals that have not been present in the Valley for a long time might disturb the fragile equilibrium of the valley eco-system upon passage through the new culvert.

Source: JICA Study Team

### **Prediction of impact magnitude**

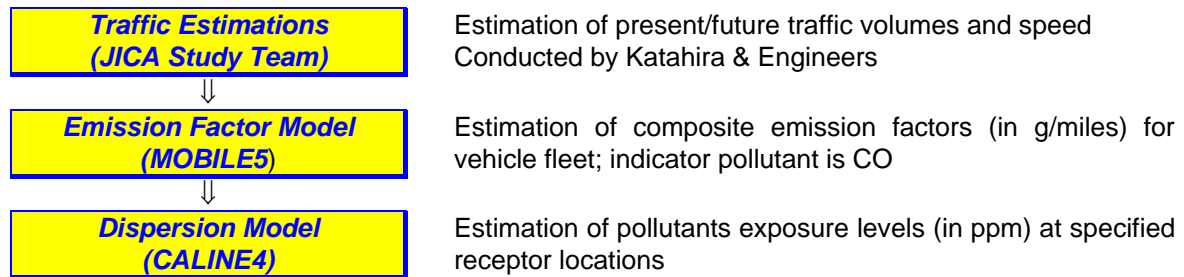
Given the lack of the detailed baseline data in terms of: 1) the population of endangered species of fauna; 2) carrying capacity of the study area; and 3) detailed survey of the study area, impact magnitude of the selected projects and the global impact on biodiversity of the increase in tourism could not be predicted. Nevertheless, some mitigation measures are recommended in the EMP in order to minimize these impacts and their magnitude.

## **(2) Air Quality Impact Assessment**

### **Air quality modeling methodology**

The general methodology to predict current and future concentrations of pollutants with or without project implementation is illustrated in Figure 3.3.2. The predictions of future traffic volumes (totally 1,100 vehicles per hour in the crossroads in high season) were made by the JICA Study Team.

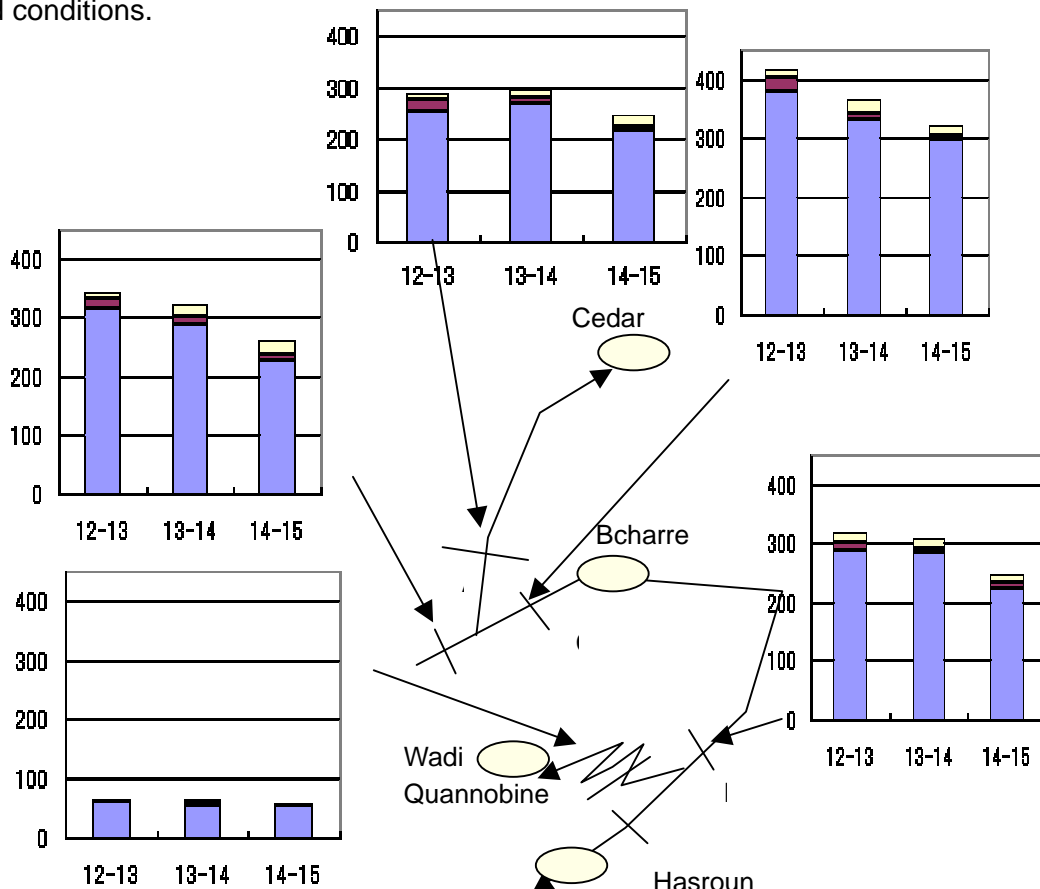




Source: JICA Study Team

**Figure 3.3.2 General Methodology for Air Quality Assessment**

The input variables needed to estimate the emission factors using MOBILE5 include mainly fleet age distribution, activity rates, vehicle mix, modal split, fraction of mileage traveled by each vehicle category, driving pattern, and fuel quality. These variables were obtained from the field measurements conducted by the JICA Study Team (Figure 3.3.3.) as well as from available data on vehicle characteristics of the Lebanese fleet (Dar Al Handasah, 1995). MOBILE5 calculates the emission factor for CO. CALINE requires the network geometry, meteorological data, receptor locations and activity level at each link to simulate the dispersion process. One major intersection in Bcharre was selected for the assessment in front of Hotel Sybat. The predicted concentrations of CO were calculated under different wind speed conditions.

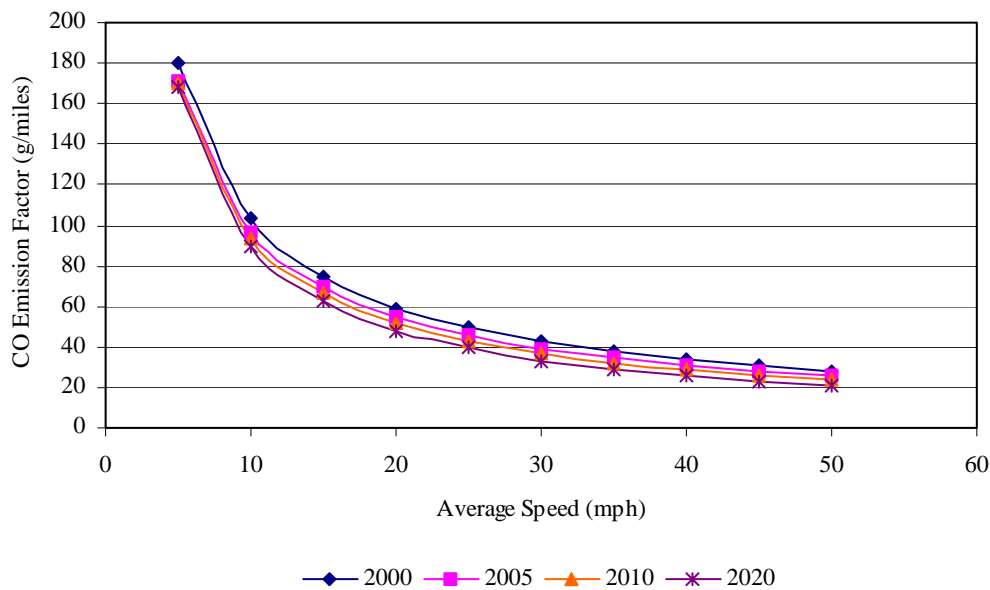


Horizontal Axis: hour Vertical Axis: Number of vehicle per hour  
 Traffic survey was done on 21 September 2003, Sunday  
 Source: JICA StudyTeam

**Figure 3.3.3 Traffic Volume**

### **Prediction results**

Emission factor curve for CO as a function of average speed was obtained using MOBILE5 (Figure 3.3.4). It is noted that the emission factors decrease with time for the same average speed. This is attributed to the fact that MOBILE5 updates the vehicle fleet age distribution by assuming that vehicles older than 25 years, which are the most polluting ones, retire. Newer vehicles, which emit less, are assumed to accumulate more mileage than older ones. All values predicted are below the 9 ppm standard for CO. Impact on air quality is therefore not significant in the study area.

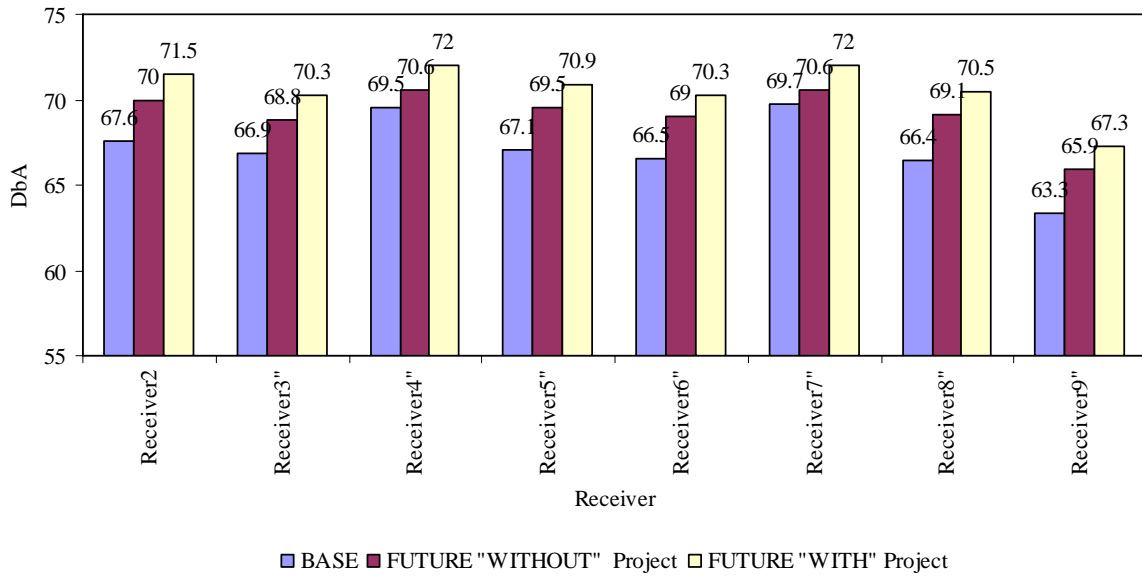


Source: JICA Study Team

**Figure 3.3.4 CO Emission Factor Variations with Average Speed**

### **(3) Noise Impact Assessment**

The traffic Noise Model developed by the Federal Highway Administration (FHWA) of the U.S.A was used to estimate the traffic noise levels. Estimated noise levels in 2013 vary between 67 and 72 dB(A) in front of Hotel Chbat (Figure 3.3.5). The impact on noise will not be significant as compared to international standards. The Federal Highway Administration (FHWA) has identified a range of sound levels acceptable to different areas, and established that the sound levels should be under 72 dB(A) in the developed land (Table 3.3.4).



**Figure 3.3.5 Predicted Noise Levels at Selected Receptors around the Intersection**

**Table 3.3.4 Summary of FHWA Noise Abatement Criteria**

<i>Leq(dBA)</i>	<i>Activity Category</i>	<i>Description of Category</i>
57 (exterior)	A	Land on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
67 (exterior)	B	Picnic areas, recreational areas, playgrounds, active sports areas, residences, hotels, schools, libraries, and hospitals
72 (exterior)	C	Developed land, properties and activities not included in categories A or B
—	D	Undeveloped land
52 (interior)	E	Residences, motels, hotels, schools, libraries, public meeting rooms, churches, auditoriums, and hospitals

Source: USEPA,1974;USDOT,1995

#### (4) Impact on Water Resources

The plants would serve a total population of approximately 15,000 and 5,000 for the villages of Bcharre and Hadshit, respectively, as a maximum load of sewage should be considered for the plant design. Design population for individual villages is specified in Table 3.3.5. The contribution to the total inflow of raw sewage from each village to the treatment plant is summarized in Table3.3.6.

**Table 3.3.5 Present and Projected Populations for the Bcharre and Hadshit Communities served by the Treatment Plants**

Municipality	Present	Year 2013*	Tourists No. (2003)**	Tourist No. (2013)**
Bcharre	5000-15000	5400-16200	175,000~250,000	375,000~536,000
Hadshit	2500-5000	2700-5400		

\*: Considering the average population growth 8/1000 per year (Ecodit, August 2003)

\*\* : JICA Study Team

Source: JICA Study Team

**Table 3.3.6 Contribution from each Village and Tourist Number to the Total Inflow of Raw Sewage to the Treatment Plant**

Municipality	Population		Tourists	
	Raw sewage (m <sup>3</sup> /Day), 2003	Raw sewage (m <sup>3</sup> /Day), 2013	Raw sewage * (m <sup>3</sup> /Day), 2003	Raw sewage* (m <sup>3</sup> /Day), 2013
Bcharre	750-2250	810-2430	70~100	155~220
Hadchit	375-750	405-810		

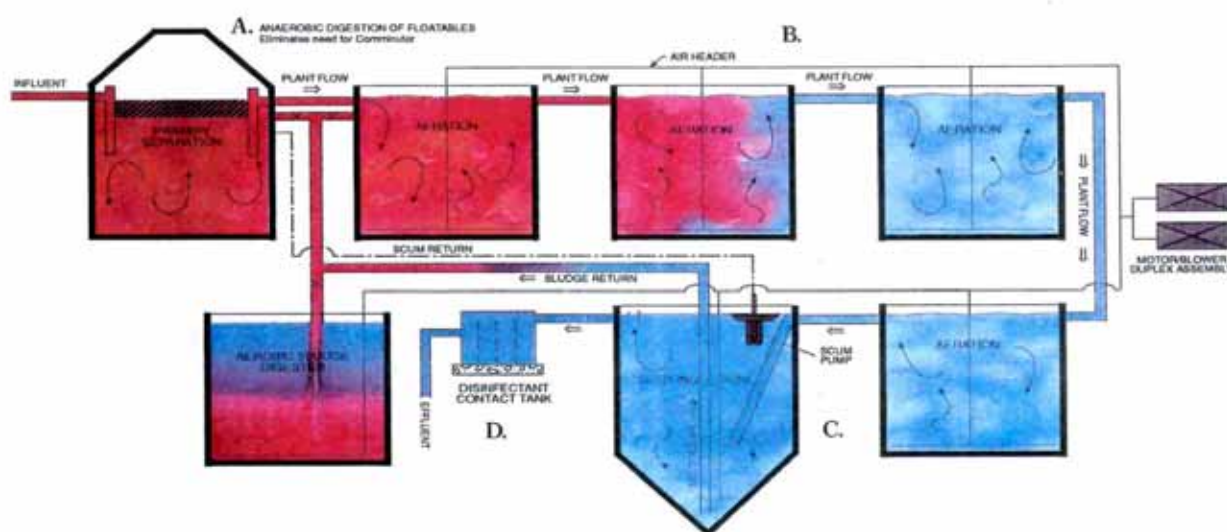
Note: Daily water consumption per capita is assumed to be 150Liters/day

\*: JICA Study Team

Source: JICA Study Team

### 1) Wastewater treatment plant

The ECOLO wastewater treatment plant is approved by USEPA and consists of multiple long life epoxy-coated basins that can be field erected. Figure 3.3.6 presents a flow diagram for the ECOLO wastewater treatment system. For such package treatment systems, the contractor should be selected on the basis of demonstrated capability to meet the standards. The overall impact on water resources will in this case be positive, with an expected improvement of the quality of the river water as compared to the baseline conditions.



Source: Ecolo System

**Figure 3.3.6 Flow Diagram of ECOLO Wastewater Treatment System**

## 2) Alternatives for number of treatment plants

The analysis of alternatives focuses here on the number of plants needed to serve Bcharre and Hadshit. The original plan of the JICA Study Team was one common wastewater treatment plant for the two villages of Hadshit and Bcharre. Some essential criteria were identified and evaluated in order to show the advantages and disadvantages of having one common plant or two separate plants for each village respectively, as shown in Table 3.3.7. It is recommended that two separate plants be constructed to serve the two villages primarily because the construction of the sewage network needed to connect both villages to the plant is technically challenging.

**Table 3.3.7 Analysis of Alternatives for Number of Treatment Plants needed to serve Bcharre and Hadshit**

<b>Criterion</b>	<b>Combined system</b>	<b>Separate system</b>
Topography	Very complex	Less complex
Sewage network	A network of at least 10kms connecting both plants is required	Requires only local network connecting the main sewer lines to the wastewater treatment plant
Cost effectiveness	High cost of the network connecting both plants	Reduces the cost of sewage network required between the two towns
Land requirement and expropriation	Larger space and more excavation works are required for the plant and the network	Less space and excavation works would be required
Water quality	High risk of contamination to the soil and groundwater would be imposed by the network	Limited risk of contamination due to extended pipe with limited threats would be caused
Bulk requirement	High risk of operational disturbances and negative consequences from a greater sewage bulk	Lower risk in case of operational disturbance

Source: JICA Study Team

## (5) Social Impact Assessment

The IEE in phase II had shown that significant negative social impacts would not be anticipated from the tourism development in the study area. Nevertheless, a closer analysis of the different projects proposed is provided here to ensure that significant negative impacts on the social environment would not occur.

### (1) Qadisha Cedars Planning and Management Program (QCPMC)

- Concerning the second objective of this project: to involve all stakeholders, i.e., Patriarchate, government, local communities in a formal structure to manage and link both areas, the negative impact may be the vagueness of the definition of local communities.
- Creation of an institutional structure for the purpose of site preservation and management that includes central government representatives and local actors may lead to infighting thus a paralysis of the program because of cultural and political factors.

- ❑ The increase of visitor length of stay and the geographical zone of their visit (surrounding villages) will positively impact Job creation, income generated by tourism and the development of Small Business/Handicraft/Agro products.

## **(2) Bcharre Tourism Development Council (BTDC) Strengthening**

- ❑ The Bcharre Committee for Tourism Development exists as an association with limited resources but more than 10 years of experience. It does not include all local stakeholders thus cannot increase its efficiency; the BTDC should not reproduce the same difficiencies.
- ❑ The lack of sufficient funds could paralyze BTDC.

### **(3) Combined Effect of All Projects**

The implementation of the project components will result in various socio-economic impacts, which are summarized below.

#### **1) Potential Positive Impacts**

The potential positive impacts expected to be associated with the implementation of the tourism development plan in Bcharre Highlands include the following:

- ❑ *Increase in the number of tourists and increase in their expenditures.* The area attracts an estimated value ranging from 30,000 to 50,000 visitors yearly. This number is expected to grow rapidly upon the implementation of the project. Moreover, there will be the potential to integrate Bcharre into a wider network of tourist itineraries including eco-tourism.
- ❑ *Creation of new employment opportunities.* Direct job creation will result from the employment of workers involved in the management of the project implementation, and execution of works (adaptive reuse, renovation of city center, infrastructure works, commercial spaces, parking). Indirect employment will occur as a result of the increase in the expenditure of tourists, and creation of new markets in the newly formed commercial spaces, hotels, and development of micro-credit activities.
- ❑ *Improvement in the quality of life of inhabitants.* Upgrading of the physical infrastructure such as solid waste management, water and wastewater networks, electrical connections, and beautification of public places will improve the quality of life for inhabitants of the area and the city, as well as improve the value of land and the value of assets.
- ❑ *Support to local economic development, cultural tourism, private sector participation and communication.*
- ❑ *Enhancement of functional and visitor diversity to the area through the introduction/improvement of cultural and educational centers (such as Gibran Museum) as well as thematic tourist itineraries.* This will result in an increase in the local productivity and ensure survival of near extinct trades (handicrafts, artisanal works).
- ❑ *Reviving of certain agriculture-based products* and empowerment of the production of local women that are involved in handicrafts, sewing, and wood making.

#### **2) Potential Negative Impacts**

The potential negative socio-economic impacts expected to be associated with the implementation of the project during the construction and the operation phases include the following:

- ❑ Disturbances to residents during rehabilitation, renovation, and infrastructure works.

- Disruption of daily activities as a result of construction works.
- Lack of Parking spaces.

Knowing that the crown villages are built on the edge of the Valley resulting in a very narrow urban planning with limited open spaces is essential in understanding why parking spaces is now a social problem. With the advent of tourism development, the influx of tourists will dramatically increase this shortage creating social problems of the fluidity of circulation as well as its safety, which in turn may create a local backlash against tourist development programs. Also the main objective of tourist development in the region would be rendered more difficult: conservation of the Valley and the forest on one hand and the prolonging of tourists stay in the villages on the other hand.

### 3.4 Environmental Management Plan

The IEE in Phase II had shown that significant negative impacts would not be anticipated from the tourism development in the study area. Nevertheless, an Environmental Mitigation Plan has been worked out to ensure that significant negative impacts on the environment would not occur.

#### Environmental Mitigation Plan

Mitigation measures are proposed at the two main stages of the plan: design (Table 3.4.1) and construction (Table 3.4.2). The tables also include the implementing and responsible agencies/parties in the cost allocation. The cost during the design and construction phases will be part of the cost allocated for the implementation of the project. During the operation phase, the elements of the mitigation plan will become the responsibility of the municipalities and the newly created promotion and conservation committee (QCPMP). Most mitigation measures at the operation phase are an integral part of routine activities that should be undertaken by the municipalities. As such, the cost of the mitigation plan during the operation phase is not directly related to the proposed project.

**Table 3.4.1 Summary of Proposed Elements of the Mitigation Plan during the Design Phase**

<i>Impact</i>	<i>Mitigation measure</i>	<i>Responsibility</i>	<i>Cost</i>
Traffic	<ul style="list-style-type: none"> <li>• Development of re-routing schemes</li> <li>• Assessment of projected increase in traffic vs. congestion and change in circulation patterns</li> </ul>	Consultant	Included in final design
Air quality	<ul style="list-style-type: none"> <li>• Definition of existing standards and regulations</li> <li>• Assessment of vehicle-induced emissions vs. traffic increase and change in circulation patterns</li> </ul>	Consultant	Included in final design
Noise level	<ul style="list-style-type: none"> <li>• Definition of existing standards, regulations</li> <li>• Assessment of vehicle noise emissions vs. traffic increase and change in circulation patterns</li> </ul>	Consultant	Included in final design
Land scape and visual intrusion	<ul style="list-style-type: none"> <li>• Documentation of existing conditions</li> <li>• Blending color(s) of paint</li> <li>• Blending exterior construction material</li> <li>• Blending architectural features</li> <li>• Selecting design that integrates in the local scenery</li> </ul>	Consultant	Included in final design
Waste generation	<ul style="list-style-type: none"> <li>• Locate nearby disposal sites and secure permit for waste disposal</li> <li>• Explore waste material recycling or re-use</li> </ul>	Consultant	Included in final

	<ul style="list-style-type: none"> <li>Assessment of projected increase in solid waste generation</li> <li>Assessment of projected increase in wastewater generation</li> <li>Selection of adequate supplier for wastewater treatment plants</li> <li>Follow-up of solid waste management plan</li> </ul>		design
Health and safety	<ul style="list-style-type: none"> <li>Develop and/or review and update general health and safety plans</li> <li>Enforce CDR health and safety guidelines on all contractors</li> </ul>	CDR/Consultant	Included in final design
Archaeological-cultural heritage	<ul style="list-style-type: none"> <li>Develop rehabilitation/construction monitoring plans</li> <li>Follow Archaeological Chance Find Procedures</li> </ul>	CDR/DGA/Municipality/Consultant	Included in final design
Socio-economics	<ul style="list-style-type: none"> <li>Eliminate or minimize land acquisition and population resettlement</li> <li>Ensure community participation</li> <li>Develop proper compensation and resettlement plans, if needed</li> <li>Avoid stringent fast track plan to remove any establishment not conforming with zoning regulations</li> </ul>	Consultant	Included in final design

Source: JICA Study Team

**Table 3.4.2 Summary of Proposed Elements of the Mitigation Plan during the Construction Phase**

<i>Impact</i>	<i>Mitigation measure</i>	<i>Responsibility</i>	<i>Cost</i>
Traffic	<ul style="list-style-type: none"> <li>Public communication</li> <li>Implementation of re-routing schemes</li> <li>Extended construction hours</li> <li>Provision of clear and adequate signing at least 500 meters around construction sites</li> <li>Adopting clear delineation and channeling measures at least 500 meters around construction sites</li> <li>Limiting movement of heavy machinery to off-peak hours</li> <li>Providing prior notification about work and heavy equipment movement schedule</li> <li>Re-opening roads adjacent to construction sites as early as possible, even before final readiness of the site</li> <li>Provide close coordination with local traffic control departments in each city</li> </ul>	QCPMP Consultant Contractor	Included in construction
Air quality	<ul style="list-style-type: none"> <li>Spraying of long term stockpiles with chemical bonding agents</li> <li>On-site mixing in enclosed or shielded areas</li> <li>Proper unloading operations</li> <li>Water damping of stockpiles when necessary (dry conditions)</li> <li>Sealing of completed earthworks</li> <li>Providing re-vegetation as soon as possible</li> <li>Keep hauling routes free of dust and regularly cleaned</li> <li>Maintenance and repair of construction machinery</li> </ul>	QCPMP Consultant Contractor	Included in construction
Noise level	<ul style="list-style-type: none"> <li>Construction of site enclosure</li> <li>Control of timing of noise emissions</li> <li>Informing the local people when noisy activities are planned</li> <li>Proper road maintenance</li> <li>Enforcement of speed limits</li> <li>Employ low noise machinery, or machinery with noise shielding and/or sound absorption materials (e.g. on-site power generator enclosure)</li> <li>Maintain low traffic speeds on-site with proper enforcement</li> <li>Proper maintenance of equipment and machinery</li> </ul>	QCPMP Consultant Contractor	Included in construction
Landscape and visual intrusion	<ul style="list-style-type: none"> <li>Preserve existing vegetation when feasible</li> <li>Blending color(s) of paint</li> <li>Blending exterior construction material</li> <li>Blending architectural features</li> </ul>	QCPMP Consultant Contractor	Included in construction



<i>Impact</i>	<i>Mitigation measure</i>	<i>Responsibility</i>	<i>Cost</i>
	<ul style="list-style-type: none"> <li>Implementing appropriate landscaping</li> <li>Confirming to area building codes</li> </ul>		
Waste generation	<ul style="list-style-type: none"> <li>Waste transport and disposal at designated disposal sites</li> <li>Implement solid waste management plans</li> </ul>	QCPMP Consultant Contractor Municipality	Included in-construction
Water quality supply	<ul style="list-style-type: none"> <li>Proper surface and ground drainage</li> <li>Decrease water usage during the construction phase</li> <li>Minimize soil exposure time during the construction phase</li> <li>Minimize chemical usage (lubricants, solvents, petroleum products) and use non-toxic biodegradable products</li> </ul>	CDR Consultant Contractor	Included in construction
Health and safety	<ul style="list-style-type: none"> <li>Install proper warning signs</li> <li>Provide protective clothing and equipment</li> <li>Create buffer zones around construction zones, when possible</li> <li>Follow CDR's written procedures stipulated in the developed health and safety guidelines</li> </ul>	CDR Consultant Contractor	Included in construction
Archaeological and cultural heritage	<ul style="list-style-type: none"> <li>Avoiding the use of harsh abrasives and toxic chemicals</li> <li>Encouraging the use of biodegradable, water-based (instead of solvent based), non flammable, fire resistant, non sparking, and breathable materials for rehabilitation works</li> <li>Implementation of Archaeological Chance Find Procedures, if needed</li> <li>Covering abraded areas with low impact temporary installations like wooden platforms</li> <li>Controlling vegetation growth using appropriate biocides after mechanical removal</li> <li>Fixing of loose stone parts by gluing with appropriate resins, injections, insertion of steel and fiberglass bars and clamps</li> <li>Cleaning areas in need of consolidation by mechanical or chemical methods</li> </ul>	QCPMP Consultant Contractor DGA	Included in construction
Socio-economics	<ul style="list-style-type: none"> <li>Ensure community participation</li> </ul>	QCPMP Consultant, Contractor	Included in-construction

QCPM; Qadisha Cedars Planning and Management Program

Source: JICA Study Team

### 3.5 Zoning Map of Land Use

#### 3.5.1 Objectives of the Work

The JICA Study Team prepared this work for:

- Presentation of the reference map for land use in the Bcharre by subjects regarding the tourism development:
  - To summarize existing planning for land use for the study area, and
  - to propose areas for development and areas for control in the tourism development in the future based on the existing studies;

The map would be referred to by the local tourism organization for internal purposes regarding the tourism development activities in the study area. The Study Team does not expect that the map shall be authorized legally.

### **3.5.2 Referred Materials**

The Study Team referred to the existing studies as listed below.

#### **A) Land use, planning**

- (1) Land Cover- Land Use Map of Lebanon: Technical Report, MoE, June 2003
- (2) Directive Planning and General Detailed System for the Cedars (ARZ) Estate – Qaza of Bcharre, Ministry of Transportation and Public Works, Directorate General for Urban Planning, Department of Studies – Department of Planning, 2002.
- (3) General Master and Detailed Plan for Qannoubine Valley First Investigation, Ministry of Public Works, Director General of Urban Planning, Department of Design, Feb.2002, 2003.
- (4) Map of Cedars Teleski prepared by Cedars Teleski Company

#### **B) Infrastructure, Facility**

- (5) Rehabilitation of Behsas-Kusa Cedar Road, CDR, March 1999
- (6) Master Plan for Wastewater Management, CDR, UNDP, WHO, Feb. 1982

#### **C) Base Map**

- (7) CARETE DU LIBAN (Scale=1/20,000), MINISTERE DE LA DEFENSE NATIONALE

### 3.5.3 Subjects of the Zoning

Zoning classification is summarized below.

Attribute	Color	Subject	Detail
Control	Yellow	Indigenous environment to be protected	<p><b>UNESCO World Heritage area, the Cedar forest zone, religious and cultural facilities (Monastery), The area to be controlled for landscape, etc</b></p> <p>The zone covers also;</p> <ul style="list-style-type: none"> <li>• 200-meter-buffer surrounding on the UNESCO World Heritage boundary,</li> <li>• 200-meter-buffer surrounding on Controlled area for Cedar forest,</li> <li>• 50-meter-buffer surrounding on the religious and cultural facilities, and</li> <li>• cliff areas in the valley.</li> </ul>
Control	green	Agricultural areas and woodland	<p><b>Field crops, Permanent crops, Woodland, Scrubland, Grassland, Urban sprawl on woodland and scrubland, etc.</b></p> <p>The zone covers also;</p> <p>Except areas of the yellow, pink, brown, red and blue colored zone.</p>
Development	Pink	Artificially changeable zone	<p><b>Urbanized areas, Industrial or Commercial areas, Non built-up artificial areas and Non-agricultural vegetated areas, etc.</b></p> <p>The zone covers also:</p> <p>Developed areas in the map of CARETE DU LIBAN (Scale=1/20,000)</p> <p>Proposed Bypass area by the CDR (the reference #5).</p>
Non-utilized	Brown	Non-utilizable zone	<p><b>Bare rocks, Bare soils, Cliffs</b></p> <p>The zone covers also:</p> <p>Just the bare rocks and soils, and cliffs.</p>
Line	Red	Road	Traverse roads and secondary roads for tourism.
Line	Blue	River	Main stream of the river and wadi.

Source: JICA Study Team

### 3.5.4 Map

The Zoning Map of Land Use is shown in the end of this volume. (Figure 3.5.1 Zoning Map of Land Use, source; JICA Study Team)

## **Annex 6.2**

### **1. Expenditure Items from “Niha Eco and Site Management Project”**

- Archaeological Site/Trail Hiking Fee
- Ecolodge Lodging
- Tent Fee
- Ecolodge Café Lunch
- Ecolodge Café Dinner
- Ecolodge Bekka Valley Wine Bar
- Niha Trails Mix (Agro-processing industry)
- Other agro products
- Rose spring festival fee
- Rose water
- Eco/Harvest Fee
- Environmental conference fee
- Children’s Summer Eco-Camp Fee
- Airport Transport Fee
- Eco-Library Internet Fee
- Winter Environmental Film Festival
- Niha Web Site Environmental Ads
- Sales at Eco-Lodge Shop

### **2. Expenditure Items from “Aanjar Site Management and Village Tourism Project”**

- Archaeological Site Entrance Fee
- Site Museum Shop Products

### **Annex 6.3**

#### **1. “Niha Eco and Site Management Project” (BK-6) – Bekaa Valley Virtual Museum**

Note that at this planning stage both revenues and expenses used in the analysis are preliminary in nature, and thus the result should be taken as indicative.

#### **1.1 Indicative Cash Flows for “Niha Eco and Site Management Project”**

(1) Case with “Costs of ecolodge with the tent site, and 10 % for the costs for water supply and sewerage” (US\$)

Year	Gross revenue	Expense		Net cash flow
		Initial investment	O&M and Program expenses	
2004	0	4,433	2,167	-6,600
2005	0	72,695	2,327	-75,022
2006	0	239,363	2,518	-241,881
2007	35,675	126,774	6,116	-97,215
2008	44,683		8,318	36,365
2009	46,695		7,741	38,953
2010	48,908		7,666	41,242
2011	51,337		7,943	43,395
2012	53,943		7,370	46,573
2013	57,571		7,599	49,972
2014	60,449		7,751	52,698
2015	63,472		7,906	55,566
2016	66,645		8,064	58,581
2017	69,977		8,225	61,752
2018	73,476		8,390	65,086

**Return on Investment (ROI) =3.7 %**

Note: Based on 10 years of revenue stream  
 Source: JICA Study Team

(2) Case with “Reduction of ecolodge capacity to eight rooms, and increased tent capacity (14 units)” (US\$)

Year	Gross revenue	Expense		Net cash flow
		Initial investment	O&M and Program expenses	
2004	0	3,000	2,167	-5,167
2005	0	49,200	2,327	-51,527
2006	0	162,000	2,518	-164,518
2007	35,675	85,800	6,116	-56,241
2008	44,683		8,318	36,365
2009	46,695		7,741	38,953
2010	48,908		7,666	41,242
2011	51,337		7,943	43,395
2012	53,943		7,370	46,573
2013	57,571		7,599	49,972
2014	60,449		7,751	52,698
2015	63,472		7,906	55,566
2016	66,645		8,064	58,581
2017	69,977		8,225	61,752
2018	73,476		8,390	65,086

**Return on Investment (ROI) =10.1 %**

Note: Based on 10 years of revenue stream  
 Source: JICA Study Team

## (3) Case with “All the accommodations by tents (22 units)” (US\$)

Year	Gross revenue	Expense		Net cash flow
		Initial investment	O&M and Program expenses	
2004	0	18,705	2,167	-20,872
2005	0	58,050	2,327	-60,377
2006	0	30,745	2,518	-33,263
2007	35,675		6,116	29,559
2008	44,683		8,318	36,365
2009	46,695		7,741	38,953
2010	48,908		7,666	41,242
2011	51,337		7,943	43,395
2012	53,943		7,370	46,573
2013	57,571		7,599	49,972
2014	60,449		7,751	52,698
2015	63,472		7,906	55,566
2016	66,645		8,064	58,581
2017	69,977		8,225	61,752
2018	73,476		8,390	65,086

**Return on Investment (ROI) =26.8%**

Note: Based on 10 years of revenue stream

Source: JICA Study Team

## 1.2 Indicative Cash Flows for “Aanjar Site Management and Village Tourism Project”

## (1) Case with all costs included (US\$)

Year	Gross revenue	Expense		Net cash flow
		Initial investment	O&M and Program expenses	
2004	0		32,305	-32,305
2005	0		27,130	-27,130
2006	0	288,150	41,730	-329,880
2007	170,128		57,039	113,089
2008	221,165		53,649	167,516
2009	238,668		53,265	185,403
2010	257,691		51,887	205,804
2011	278,372		54,014	224,358
2012	300,869		47,648	253,221
2013	325,348		44,789	280,559

**Return on Investment (ROI) =36.2%**

Note: Based on 10 years of revenue stream

Source: JICA Study Team

## Annex 11.2

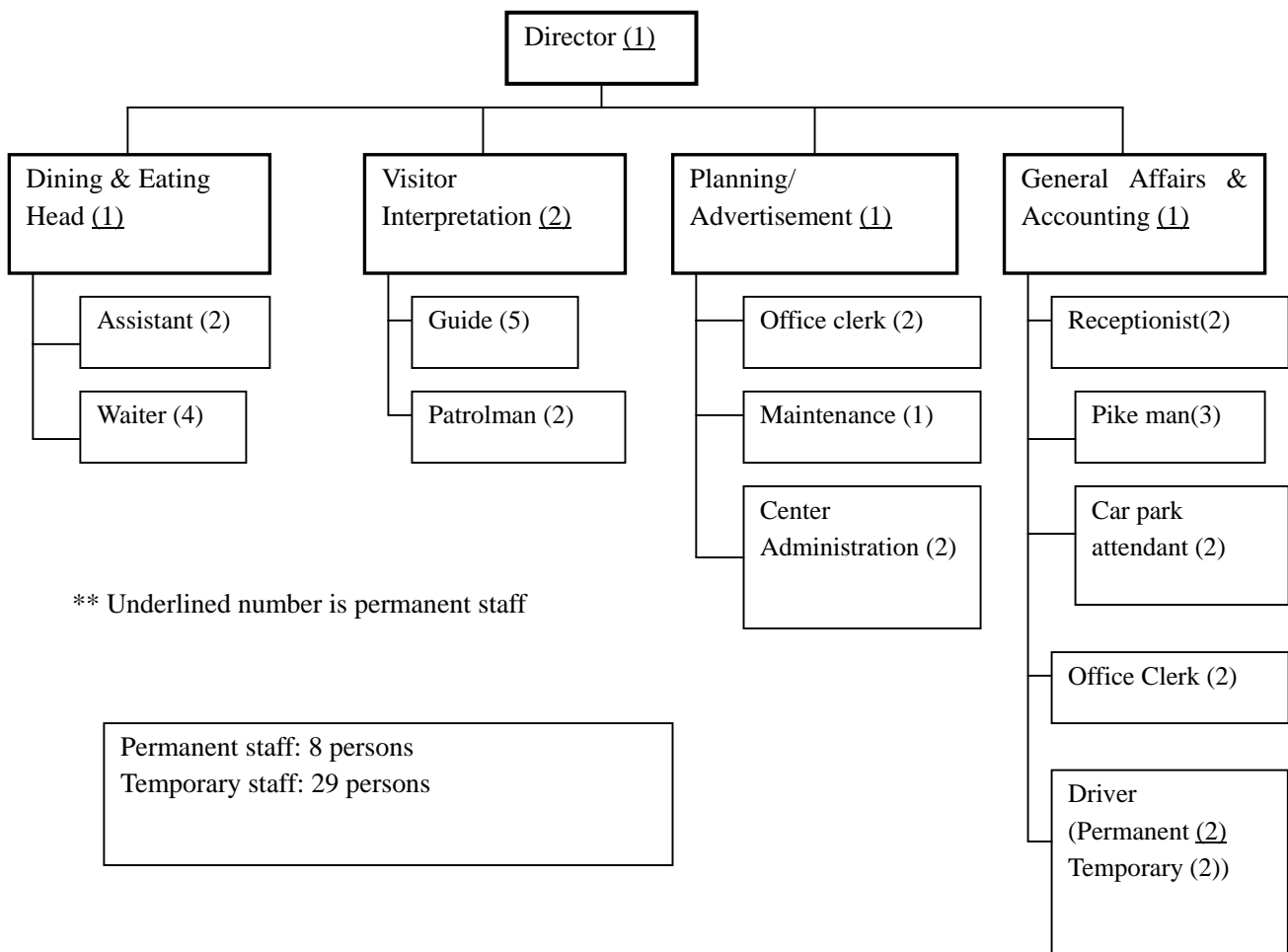
### 1. Expenditure Items from “Qadisha Cedars Planning and Management Program”

- Entrance Fee
- Fare for Parking and Transportation to the valley
- Sales at café
- Sales at site shop
- Rural gite lodging fees
- Religious conference fee
- Hotel rates

### 2. Expenditure Items from “Crown Village Destination Project”

- Sales at shop
- Sales at restaurant
- Sales of agro-processing products
- Museum entrance fee
- Hotel rates

### 3. Assumption of the visitor center in Qadisha Cedars management program (B 1):





#### 4. Assumption of “Rural Gite Lodging” in Qadisha Cedars Planning and Management Program.

The implementation of “Qadisha Cedars Planning and Management Program” would develop 10 rural gite lodgings. Approximately 30 temporary employees are assumed to be hired for the rural gite lodging.

#### 5. Assumption of “Crown Villages Destination Project”

- Gibran House & Visitor Information Kiosk: Guide & Pike man – four temporary staff
- Town Plaza: Café- 5 permanent staff  
10 temporary staff  
Gift shop- 5 permanent staff  
15 temporary staff
- Micro Industry Support: 20 permanent employees  
(Agro & Handicrafts) 60 temporary employees
- Gateway Viewpoint: Guide, etc- 2 temporary employees
- Farmers market & Craft Center: 1 permanent staff  
4 temporary employees

**Annex 11.3**

## 1. "Qadisha Cedars Planning and Management Program"(B1) – Bcharre Highlands

Note that at this planning stage both revenues and expenses used in the analysis are preliminary in nature, and thus the result should be taken as indicative.

## 1.1 Indicative Cash Flows for "Qadisha Cedars Planning and Management Program"

## (1) Case with all costs included (US\$)

Year	Gross revenue	Expense		Net cash flow
		Initial investment	O&M and Program expenses	
2004	0		26,600	-26,600
2005	0		16,600	-16,600
2006	0	788,000	39,600	-827,600
2007	482,027		38,300	443,727
2008	529,980		38,300	491,680
2009	582,727		40,800	541,927
2010	640,752		38,300	602,452
2011	704,577		63,300	641,277
2012	774,784		41,300	733,484
2013	852,013		38,300	813,713

**Return on Investment (ROI) =54.2%**

Note: Based on 10 years of revenue stream

Source: JICA Study Team

## 1.2 Indicative Cash Flows for "Crown Villages Destination Project"

## (1) Case with all costs included (US\$)

Year	Gross revenue	Expense		Net cash flow
		Initial investment	O&M and Program expenses	
2004	0		26,900	-26,900
2005	0	127,512	195,780	-323,292
2006	365,118	928,321	24,372	-587,576
2007	401,630	427,190	23,947	-49,507
2008	441,792		186,306	255,486
2009	485,971		184,889	301,082
2010	534,569		187,475	347,094
2011	588,025		185,067	402,958
2012	646,828		188,162	458,666
2013	711,511		185,263	526,248

**Return on Investment (ROI) =18.2%**

Note: Based on 10 years of revenue stream

Source: JICA Study Team

## **Annex 10.9**

### **Charts for Ski Area in depth Analysis**

Exhibit A 10.1 Map of Ski Resorts in the Middle East

Exhibit A 10.2 Map and Photos of the Cedars Areas –Existing Development-

Exhibit A 10.3 Map of the Cedars Heritage, Village and Ski Areas with Four Zones