LEBANON OIL SPILL
July 2006 - July 2007

Report compiled by
Green Line Association
July 2007
On July 12, 2006 Israel declared war on Lebanon. On July 13 and 15, 2006 Israeli Air Forces bombed the tanks at the Jiyeh power plant, located along the coastline, 30 km South of Beirut.

The repeated attacks on the fuel tanks at the Jiyeh power plant resulted in a release of over 15,000 tons of heavy fuel oil into the sea, making it the largest oil spill ever in the eastern Mediterranean Sea, while a fire burnt about 5,500 tons for more than three weeks releasing smog of dioxins and noxious chemicals into the atmosphere.

The spill spread north along the Lebanese and Syrian coast, severely contaminating 120 km of Lebanon’s shoreline, including many unique, rare, and sensitive coastal habitat areas, and oiling the ancient harbor at Byblos – a World Heritage Site. Some of the oil burned and sank to the seabed. The month-long war and subsequent air and sea blockade imposed by Israel severely limited oil spill cleanup efforts, and subsequent response efforts were mostly ineffective. Less than 10% of the spilled oil was ultimately recovered.

On the one-year memorial of the Israeli Aggression on Lebanon which had devastating impacts on human lives, infrastructure and the environment including the major oil spill off Lebanon’s coast; Green Line harshly criticized Israel and the international community for ignoring the many substantive environmental and legal issues still unresolved regarding the environmental damage.

Green Line calls both the International Community and the Lebanese Government to exert all efforts to pressure Israel and the U.S. Government to pay compensation for all the damages caused by its aggression.

Green Line also calls upon the Lebanese Government to initiate an immediate environmental recovery action plan which includes among others the set up of Emergency Response commissions capable of handling such disasters.

**Action taken by Green Line**

Green Line Association volunteers and a number of environmental activists formed an oil spill working group to tackle the oil spill disaster and were among the first to be on the ground. Assessment operations and documentation of the damage (Annex 1) were initiated on July 17, 2006 covering the Lebanese coast from Beirut, northwards. As a result maps of the polluted Lebanese coasts and details regarding the extent of pollution for each coastal area were developed (Annex 2). Besides the assessment operations, Green Line elaborated cleanup plans and conducted scientific and economic research on the impact of the oil spill.
and the cost of the damage caused. As a result, facts sheets on the oil spill, clean up methods and social, environmental and economic impacts were developed (Annex 3). The cleanup operation started on the 11th of August, four days before the cessation of hostilities was declared. It aimed at creating a ‘snowball effect’ by triggering public reaction and catalyzing awareness for the whole oil spill problem along the Lebanese coast. It was not meant to clean the whole coast or even Beirut coast as this exceeds the capacities of NGOs and their mandate. Taking into consideration expertise, equipments needed as well as financial considerations, the Oil Spill working group decided to start cleaning-up Ramlet el-Baida’s coast, which is the only sandy public beach left in Beirut. The work was hindered by the bureaucratic procedures and several barriers put by the authorities. After one week of work, Green Line ended its operations leaving the removal of the collected waste to the Ministry of Environment upon its request.

Based on an agreement between IUCN Commission on Environmental, Economic, and Social Policy (CEESP), Green Line and IUCN WESCANA, Green Line contracted Dr. Richard Steiner an expert on oil spills. During his stay, August 14-25, 2006, he conducted a rapid assessment of the oil spill (Annex 4.a). This assessment included a preliminary assessment of the spill, a natural resource damage assessment (Annex 4.b), as well as claims for compensation from the Israeli government and oil spill response advice to the Ministry of Environment. Dr. Steiner’s work was very useful in laying the foundations for the future oil spill response work; his report was the basis for UNDP’s report on the oil spill. On a personal level, Dr. Steiner requested Israel to pay 1 billion dollars compensation to Lebanon for the short and long term damage caused by the oil spill.

In July 2007, Green Line and IUCN CEESP contracted Dr. Richard Steiner to conduct a second assessment one year after the occurrence of the spill.

As for the Media work, several press conferences were organized by Green Line’s volunteers and press releases were continuously distributed to the media (Annex 5).

Finally, Green Line partners in the Netherlands managed to mobilize funds to conduct a legal assessment regarding the legal responsibility for this spill. This legal report prepares the way for further in-depth legal work that needs to be done to ensure that Israel bears full responsibility with its partners.
Annex 1

Assessment of the Oil Spill along the Lebanese Coastline
ASSESSMENT OF THE OIL SPILL ALONG THE LEBANESE COASTLINE

Oil Spill Working Group
Green Line Association
August 2006
I. INTRODUCTION
On July 12, 2006 Israel declared war on Lebanon. On July 13 and 15, 2006 Israeli forces bombed the tanks at the Jiyyeh power plant, located along the coastline, 30 km South of Beirut.

As a result of the two attacks, two tanks at Jiyyeh caused a 15,000 ton-heavy-fuel-oil spill into the Mediterranean Sea, while a fire burnt around 5,500 tons for more than three weeks releasing a smog of dioxins and noxious chemicals into the atmosphere.

The oil spill caused tremendous negative environmental, social and economical both on the short term and long term. It damaged marine ecosystems, destroyed fishermen’s livelihoods and rendered coastal areas lifeless. The type of oil released, heavy fuel oil, is among the most difficult to combat. Its viscous nature leads to prolonged persistence in the marine environment, such oils have the potential to cause widespread contamination of sensitive environmental and economic resources. The marine ecosystem will thus take years to rehabilitate.

Green Line Association volunteers and a number of environmental activists formed an oil spill working group to follow on this issue and where among the first to be on the ground. Assessment operations and documentation of the damage started on the 17th of July covering the Lebanese coast from Beirut, northwards. As a result maps of the polluted Lebanese coasts and details of each coastal area magnitude of pollution were developed.

Other than the assessment operations, Green Line also started working on cleanup plans, and conducted scientific and economic research of the oil spill to determine the cost of the damage and how to minimize its impact as much as possible. Green Line has also been communicating with related local and international stakeholders any coordinating any work on this issue.

This report is the result of the assessment work conducted on the ground.

II. METHODOLOGY
The systematic on-ground assessment of the oil spill started on Sunday the 6th of August, 2006 and lasted till Saturday the 12th of August, 2006. The area covered was from Beirut to Arida in the North. Maps of 1:20,000 of the Lebanese coastline were used during the assessment. The outcrops in the landform were used as indicators to locate the sites in the maps. The oil in the water was observed in the middle of the water and in the waves. In addition, on shore measurements were recorded such as (a) the width of the oil covering the sandy and the gravel shores, (b) the height of the oil stuck on rocks along the rocky beaches, (c) the length of the polluted shore and (d) the depth of the oil in the sand. Two (variables) were taken into consideration while measuring the depth of the oil in the sand: the surface thickness of the oil in the sand (ST) and the depth of the layers of oil in the sand (DL). The
equipment used onsite by the oil spill assessment team was composed of a measuring stick and a meter. Personal Protective Equipment (PPEs) such as gloves and masks were used by the team members to ensure their safety.

III. RESULTS
The assessment revealed that the oil has spread depending on the habitat type where the records of the oil pollution, whether in water or on shore, were different from sandy to gravel to rocky habitats.

In the assessed sandy habitats, the oil patches in water were prevalent in waves and/or in middle of the water. The maximum width of the oil on the sand was 25m recorded at Ramlet El-Baida. The maximum surface thickness of the oil in the sand was 10cm and the maximum depth of layers of oil in the sand was 35cm, both recorded at Ramlet El-Baida.

As for the assessed gravel habitats, the oil patches in water were prevalent in waves and/or in middle of the water. The maximum width of the oil on the gravel was 8m recorded at Al-Sawari Batroun.

In the assessed rocky habitats, the oil patches in water were prevalent in the middle of the water. The maximum height of oil on rocks was 7m recorded at Beaachta.

The assessment has shown that the most affected areas by the oil spill are Ramlet El-Baida and Rawche in Beirut, Tabarja and the Mina in Jbeil.

The following table provides the measurements and the observations of the on-ground assessment of the oil spill:
<table>
<thead>
<tr>
<th>Location</th>
<th>Habitat Type</th>
<th>Presence of Oil in Water</th>
<th>Presence of Oil on Shore</th>
<th>Observed Biota</th>
<th>Other Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramlet El-Baida/Beirut</td>
<td>Sandy</td>
<td>- Big patches of oil in water</td>
<td></td>
<td>Not applicable for sand</td>
<td>- Garbage/plastic bottles covered with oil along the shore</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Waves full of oil</td>
<td></td>
<td>- Dead fish covered with oil on sand</td>
<td>- Distinctive smell of oil</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Max 25m Min 7.5m (on the sand)</td>
<td>- Dead crabs covered with oil on sand</td>
<td>- Sewage pipeline going into the sea and getting mixed with oil in water</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.2km</td>
<td>- Living crabs covered with oil</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Max ST 10cm Min ST 2cm</td>
<td>Not applicable for sand</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Max DL 35cm Min DL 6cm</td>
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<td></td>
<td></td>
<td>Max ST</td>
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<td>Min ST 2cm</td>
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<td></td>
<td>Max DL</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Min DL 6cm</td>
<td></td>
</tr>
<tr>
<td>Between Ramlet El-Baida and Movenpick (site1)/Beirut</td>
<td>Gravel</td>
<td>- Big patches of oil in water</td>
<td>Max 6m Min 3m (on the gravel)</td>
<td>Not applicable for gravel</td>
<td>- Small tomato growing in water ponds on gravel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Waves full of oil</td>
<td>350m</td>
<td>Not applicable for gravel</td>
<td>- Distinctive smell of fuel and sewage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Sewage pipeline going into the sea and getting mixed with oil in water</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Between Ramlet El-Baida and Movenpick (site2)/Beirut</td>
<td>Gravel + Rocky</td>
<td>- Big patches of oil in water</td>
<td>Max 6m Min 3m (on the gravel)</td>
<td>Not applicable for gravel and rocks</td>
<td>- Yachts stuck in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Waves full of oil</td>
<td>Not available</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Not</td>
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<td></td>
<td>Max 2m</td>
<td>None</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Movenpick</td>
<td>Rocky</td>
<td>Big oil spill</td>
<td>Not</td>
<td>Not</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Not</td>
<td>Not</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Max 2m</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Type</td>
<td>Observations</td>
<td>Distance</td>
<td>Depth</td>
<td>Oil Type</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------------</td>
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<td>---------------------------</td>
</tr>
<tr>
<td>(site 1)/Beirut</td>
<td></td>
<td>in Marina/Yacht Port applicable for rocks</td>
<td></td>
<td></td>
<td>Oil starting to emulsify with sea water - Oil on dock</td>
</tr>
<tr>
<td>Movenpick (site 2)/Beirut</td>
<td>Sandy</td>
<td>Small patches of oil in water - Waves full of oil</td>
<td>Max 6m Min 3m</td>
<td>200m</td>
<td>ST 4cm D L 20cm</td>
</tr>
<tr>
<td>Sporting Beach/Beirut</td>
<td>Rocky</td>
<td>Water full of oil next to rocks - Small bay-like area full of oil</td>
<td>Not applicable for rocks</td>
<td>Not available</td>
<td>Not applicable for sand</td>
</tr>
<tr>
<td>Military Beach/Beirut</td>
<td>Sandy + Rocky</td>
<td>Small patches of oil in middle of water</td>
<td>Max 6m Min 3m</td>
<td>50m (whole sandy beach)</td>
<td>Not applicable for sand</td>
</tr>
<tr>
<td>Long Beach/Beirut</td>
<td>Rocky</td>
<td>Small bay-like area full of oil</td>
<td>Not applicable for rocks</td>
<td>Not available</td>
<td>Not applicable for rocks</td>
</tr>
<tr>
<td>Near Rawche Rock/Beirut</td>
<td>Rocky + Gravel</td>
<td>Big oil spill along the gravel beach (10m wide in water)</td>
<td>2m (on gravel)</td>
<td>Not available</td>
<td>Not applicable for rocks and gravel</td>
</tr>
<tr>
<td>Fishermen's</td>
<td>Rocky</td>
<td>Small</td>
<td>Not</td>
<td>Not</td>
<td>Not</td>
</tr>
</tbody>
</table>
|                   |          |                                                                                  | available | applicable for rocks | available | Dead fish on
|                   |          |                                                                                  | None      | None  | None                      |
|                   |          |                                                                                  | None      | None  | None                      |

- Oil
- Oil starting to emulsify with sea water
- Oil on dock
- Oil on beach tents
- Oil on ground
- Oil on rocks
- Alive fish in water in canals
- Dead crab on rocks
<table>
<thead>
<tr>
<th>Bay in Delye/Beirut</th>
<th>rocky-like area full of oil - No waves</th>
<th>applicable for rocks</th>
<th>available</th>
<th>applicable for rocks</th>
<th>available</th>
<th>surface of water</th>
<th>boats soaked and stuck in oil - Boats can not be moved - Oil on the boats</th>
</tr>
</thead>
<tbody>
<tr>
<td>La Marina/Dbaye</td>
<td>Rocky</td>
<td>Black spots in middle of water; could be oil patches</td>
<td>Not applicable for rocks</td>
<td>No oil on rocks</td>
<td>Not applicable for rocks</td>
<td>No oil on rocks</td>
<td>None</td>
</tr>
<tr>
<td>Dbaye Port</td>
<td>Sandy + Rocky</td>
<td>Oil patches in middle of water</td>
<td>No visible oil on sand</td>
<td>No visible oil on rocks</td>
<td>No visible oil on sand</td>
<td>No visible oil on rocks</td>
<td>None</td>
</tr>
<tr>
<td>Aquamarina Port/Fishermen's Bay at Tabarja</td>
<td>Rocky</td>
<td>Small waves full of oil</td>
<td>3.5m on boats' entry path (paved)</td>
<td>Not available</td>
<td>Not applicable for rocks</td>
<td>1m</td>
<td>- Dead crabs - Living crabs covered with oil on rocks</td>
</tr>
<tr>
<td>St. Paul Beach/Tabarja</td>
<td>Rocky + Gravel</td>
<td>No visible oil patches in water</td>
<td>Max 7.5m Min 6m (on gravel)</td>
<td>800m</td>
<td>Not applicable for rocks and gravel</td>
<td>Not available</td>
<td>None</td>
</tr>
<tr>
<td>Cyan Beach/after Zouk Power Plant</td>
<td>Rocky</td>
<td>No visible oil patches in water</td>
<td>Not applicable for rocks</td>
<td>Not available</td>
<td>Not applicable for rocks</td>
<td>0.5m</td>
<td>None</td>
</tr>
<tr>
<td>Location</td>
<td>Type</td>
<td>Condition of Water</td>
<td>Oil on Rocks</td>
<td>Oil on Gravel</td>
<td>Oil on Sand</td>
<td>Crabs</td>
<td>Additional Notes</td>
</tr>
<tr>
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</tr>
</tbody>
</table>
| **After Cyan Beach to the North**| Rocky + Gravel | No visible oil patches in water    | Not applicable for rocks            | Not available                     | Not applicable                     | Green algae covered with oil     | - Some rocks covered with oil  
|                                  |            |                                     |                                     |                                   |                                    |                               | - Plastic bottles covered with oil                                               |
| **Bora Bora Beach/ Nahr El-Kalb**| Sandy      | - No visible oil patches in water  | No oil on sand                      | No visible oil layers in sand     | No visible oil layers in sand      | A lot of green algae covered with oil on the sand | - Oil on a few rocks  
|                                  |            | - Grey waves, suspected from algae |                                     |                                    |                                    |                               | - Plastic bottles covered with oil on sand  
|                                  | Sandy + Rocky | No visible oil in water            | Not available                       | No visible oil layers in sand     | 0.3m                               | Living clean crabs               | - No visible signs of oil in sand                                                |
| **Aquadiva**                     | Sandy + Rocky | No visible oil in water            | Not available                       | No visible oil layers in sand     |                                    |                               | A shallow layer of oil on surface of sand                                         |
| **Ghazir Beach Facing Casino du Liban** | Rocky | Big oil patches in middle of water, spreading very far into the sea | Max 3m Min 0.5m (on rocks on shore) | Not applicable for rocks          | Not applicable                     | Living crabs covered with oil     | - Oil on rocks  
|                                  |            |                                     | 700m                                |                                    |                                    |                               | - Plastic bottles covered with oil                                               |
| **Bware Mina**                   | Rocky + Gravel | - Oil patches in middle of water  | Max 3m Min 1m (on gravel)           | Not applicable for rocks and gravel |                                    | None                          | - Oil on rocks  
<p>|                                  |            | - Small oil patches at shore       | 70m                                 |                                    |                                    |                               | - Local men from “Bware” with the help of municipality cleaned gravel with nets and buckets and threw the waste outside “Bware” |</p>
<table>
<thead>
<tr>
<th>Location</th>
<th>Terrain</th>
<th>Observations</th>
<th>Depth</th>
<th>Clean-up Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle of Bware</td>
<td>Rocky</td>
<td>Settled oil in shallow water</td>
<td>Not available</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 1m Min 0.5m</td>
<td></td>
<td>Oil on rocks</td>
</tr>
<tr>
<td>End of Bware</td>
<td>Rocky + Gravel</td>
<td>Big oil patch in water</td>
<td>Max 1.5m Min 0.5m (on gravel)</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 1.5m Min 0.5m</td>
<td></td>
<td>- Emulsified oil in water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Oil color is chocolate brown</td>
<td></td>
<td>- Oil on rocks</td>
</tr>
<tr>
<td>Before Mina Jbeil</td>
<td>Gravel</td>
<td>Oil patches in water</td>
<td>Max 3m Min 0.5m</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 3m Min 0.5m</td>
<td></td>
<td>- Oil on rocks in water</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Oil on rocks on shore</td>
<td></td>
<td>- Emulsified oil in water; brown on color</td>
</tr>
<tr>
<td>Mina Jbeil</td>
<td>Rocky + Gravel</td>
<td>- Water in bay all covered with oil - No waves</td>
<td>Not applicable for rocks</td>
<td>- Dead fish covered with oil - Dead crabs covered with oil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 3m Min 0.5m</td>
<td></td>
<td>- Small clean up procedure in the bay using a truck and a pump; equipment from Ministry of Environment, Municipality of Jbeil and Zouk Power Plant - Removal of oily gravel and stacking it into two big piles on clean gravel - Thick oil in</td>
</tr>
<tr>
<td>Location</td>
<td>Type</td>
<td>Condition</td>
<td>Max</td>
<td>Min</td>
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</tr>
<tr>
<td>El-Midan (facing orange house) / Jbeil</td>
<td>Gravel</td>
<td>Oil patches in water</td>
<td>2m</td>
<td>0.5m</td>
</tr>
<tr>
<td>Near Camp Amcheit / Amcheit</td>
<td>Rocky</td>
<td>Oil patches in water</td>
<td>3m</td>
<td>0.3m</td>
</tr>
<tr>
<td>Mina Amcheit</td>
<td>Rocky</td>
<td>Small patches of oil in water</td>
<td>Not available</td>
<td>Not</td>
</tr>
<tr>
<td>Beachta, Wata Youssef</td>
<td>Rocky</td>
<td>No visible oil in water</td>
<td>Not available</td>
<td>Not</td>
</tr>
<tr>
<td>Berbara</td>
<td>Rocky</td>
<td>Patches of oil in water</td>
<td>Not available</td>
<td>Not</td>
</tr>
<tr>
<td>Madfoun</td>
<td>Gravel</td>
<td>No visible tips of waves</td>
<td>Not available</td>
<td>Not</td>
</tr>
<tr>
<td>Location</td>
<td>Type</td>
<td>Condition of Water</td>
<td>Availability</td>
<td>Applicability for Gravel</td>
</tr>
<tr>
<td>--------------------------------</td>
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</tr>
<tr>
<td>near Bonita Bay</td>
<td>Rocky</td>
<td>No visible oil in water</td>
<td>Not available</td>
<td>Not applicable for rocks</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>Fad’ous</td>
<td>Sandy + Gravel</td>
<td>No visible oil in water</td>
<td>8m on sand (due to high waves)</td>
<td>Not applicable for sand and gravel</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Al-Sawari/ Batroun</td>
<td>Rocky</td>
<td>No visible oil patches in water</td>
<td>Not available</td>
<td>Not applicable for rocks</td>
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<tr>
<td></td>
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<tr>
<td>Near Center for Marine Sciences, Ministry of Agriculture/ Batroun</td>
<td>Rocky</td>
<td>- Oil patches in water near rocks on shore - Oil solidified in water (20 to 30 cm)</td>
<td>Not available</td>
<td>Not applicable for rocks</td>
</tr>
<tr>
<td>End of Batroun</td>
<td>Rocky</td>
<td>- Oil patches in water near rocks on shore - Oil solidified in water (20 to 30 cm)</td>
<td>Not available</td>
<td>Not applicable for rocks</td>
</tr>
<tr>
<td>Location</td>
<td>Type</td>
<td>Depth of Oil in Water</td>
<td>Max Depth (m)</td>
<td>Min Depth (m)</td>
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<tr>
<td>--------------------------------</td>
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</tr>
<tr>
<td>Sala’ta Factory/ Kubba</td>
<td>Rocky + Gravel</td>
<td>No visible oil patches in water</td>
<td>3m (on gravel)</td>
<td>Not available</td>
</tr>
<tr>
<td>Ras El-Kala’a/ Anfe</td>
<td>Rocky</td>
<td>No visible oil patches in water</td>
<td>Not applicable for rocks</td>
<td>Not available</td>
</tr>
<tr>
<td>Before Mina, near the canon/ Tripoli</td>
<td>Rocky</td>
<td>Oil patches in water near shore</td>
<td>Max 2m Min 0.5m (on gravel)</td>
<td>1km</td>
</tr>
<tr>
<td>Before Mina, near ‘Istirahat Al-Bahr/ Tripoli</td>
<td>Rocky + Gravel</td>
<td>No visible oil patches in water</td>
<td>Max 2m Min 0.5m (on gravel)</td>
<td>Max 2m Min 0.5m (on gravel)</td>
</tr>
<tr>
<td>Mina, facing Balha Ice-cream/ Tripoli</td>
<td>Rocky</td>
<td>No visible oil in water</td>
<td>Not applicable for rocks</td>
<td>Not available</td>
</tr>
<tr>
<td>Ras El-Sakher/ Tripoli</td>
<td>Rocky + Gravel</td>
<td>Small patches of oil in water</td>
<td>Max 2m Min 0.5m (on gravel)</td>
<td>Not available</td>
</tr>
<tr>
<td>Al-Abde, end of Al-Barid Camp/Abde</td>
<td>Rocky</td>
<td>No visible oil patches in water</td>
<td>Not applicable for rocks</td>
<td>Not available</td>
</tr>
<tr>
<td>Al-Arida</td>
<td>Gravel</td>
<td>No visible patches of oil in water</td>
<td>0.5m</td>
<td>Not available</td>
</tr>
</tbody>
</table>
Annex 3

Fact Sheets
The Cause of the Spill
On July 12, 2006, Israel declared war on Lebanon. On July 13 and 15, 2006, Israeli forces bombed Jiyeh power plant, located along the coastline, 30 km South of Beirut, causing a major oil spill. As a result of the two attacks, two tanks at Jiyeh caused a 15,000 ton-heavy-fuel-oil spill into the Mediterranean Sea, while a fire burnt for more than three weeks releasing a smog of dioxins and noxious chemicals into the atmosphere.

The Extent of Affected Area
South West to North East winds and water current pushed the oil spill northwards along the coast of Lebanon. The affected area within Lebanese borders spread through more than 100 km of rocky and sandy beaches, marinas, ports, fishermen harbors, and tourist resorts; extending from Jiyeh south of Beirut all the way up to the Syrian boarders (map available). The oil slick has entered Syrian waters and has contaminated the coastline-north of the Lebanese-Syrian border summing the area of contamination to 140 km in length and 15km in width. The spill can reach neighboring countries such as Cyprus, Turkey and Greece depending on water currents and weather conditions. 80 percent of the heavy oil remains on and off the East Mediterranean shoreline, while around 20 percent has evaporated.

The Impact of the Spill
The oil spill caused tremendous negative environmental, social and economical both on the short term and long term. It damaged marine ecosystems, destroyed fishermen’s livelihoods and rendered coastal areas lifeless. The type of oil released, heavy fuel oil, is among the most difficult to combat. Its viscous nature leads to prolonged persistence in the marine environment, such oils have the potential to cause widespread contamination of sensitive environmental and economic resources. The marine ecosystem will thus take years to rehabilitate. The plume caused from the burnt fuel will increased cancer cases, respiratory problems and other diseases. The total economical cost of this oil spill has been estimated to be more than 200 million dollars. What increases from the impact of this spill and makes the rehabilitation process harder, is the fact that after more than a month from the start of the incident no cleanup operations have started yet.

What Has Been Done So Far?
Green Line Association volunteers and a number of environmental activists formed an oil spill working group to follow on this issue and where among the first to be on the ground. Assessment operations and documentation of the damage started on the 17th of July covering the Lebanese coast from Beirut, northwards. As a result maps of the polluted Lebanese coasts
and details of each coastal area magnitude of pollution were developed. Other than the assessment operations, Green Line also started working on cleanup plans, and conducted scientific and economic research of the oil spill to determine the cost of the damage and how to minimize its impact as much as possible.

Green Line has also been communicating with related local and international stakeholders any coordinating any work on this issue. In this effect Green Line has contracted an expert from IUCN to come to Lebanon and produce an assessment and clean up plan.

Some of the stakeholders contacted include the Lebanese Ministry of Environment, REMPEC (Regional Marine Pollution Emergency Response Center Barcelona Convention to deal with oil and chemical spills and accidents), international NGOs and experts, and civil society around the World.

**Cleanup Efforts**

Official efforts for clean up through REMPEC, the Ministry of Environment and countries willing to provide assistance will not begin before ceasefire. The Oil Spill team at Green Line is determined to begin, despite siege and in the absence of security guarantees. The delay caused the highly viscous heavy fuel to solidify; it has emulsified with sea water, formed tar balls, lumps or emulsions, settled on the seabed and traveled further along the coast line. In this effect, Green Line has been coordinating with local NGOs, private sector and the Ministry of Environment to cleanup certain sensitive and highly impacted areas.

Nevertheless, without ceasefire a full-fledged clean up operation can not begin. This makes clean up efforts and costs of clean up greater and mobility of experts and essential equipment fairly impossible. The absence of a pre-spill contingency plan and a complete cleanup plan will hinder cleanup, as well as, the unavailability of sufficient and essential clean-up equipment will hinder the cleanup efforts.
Oil Spill Cleanup  
(July 2006)

**Introduction**

Oil spill cleanup begins with mechanical containment of spilled oil to prevent pollution from reaching other areas, oil is then recovered. The contaminated area is cleaned and polluted water, pebbles and sand are transported from the site for proper treatment. For every ton of fuel oil cleaned by chemicals, an additional 10 tons of hazardous waste is generated.

When containment and recovery are attempted it is important to select equipment that is suitable for the type of oil and the weather/sea conditions. Efforts should target the heaviest oil concentrations and areas where collection will reduce the likelihood of oil impacting sensitive resources and shorelines.

Coastal areas that are contaminated from an oil spill are never completely cleaned; the ecosystem takes several years to rehabilitate and may never return to its pre-spill state.

The difficulty of the cleanup depends on the type of fuel spilled, and the areas impacted. Heavy fuel oil is one of the hardest types of fuel to clean. If the spill is close or on-shore the cleanup becomes also much more difficult. Finally, the longer the oil remains in nature, the harder the cleanup will be. It is rare, even in ideal conditions, for more than a relatively small proportion (10-15%) of the spilled oil to be recovered.

**Mechanical Containment and Recovery:**

**Booms:** Are floating barriers placed around the oil to surround and isolate a slick, or to block the passage of a slick to vulnerable areas. Booms contain the oil so skimmers (see below) can collect it. Booms will not properly surround a spill in bad weather conditions, wind and high waves as may wash oil beneath or over the top of the boom or cause the release the contained oil.

**Skimmers:** can be boats, vacuum machines, and oil-absorbent plastic ropes that float across the top of the slick and skim spilled oil from the water's surface. The skimmer sucks or scoops the oil into a storage tank on the shore or nearby vessels so it can be removed. Skimmers may recover more water than oil.

**Synthetic sorbent materials:** Sorbents are insoluble materials or mixtures of materials used to recover liquids through the mechanism of absorption, or adsorption, or both. Sorbents are most often used to remove final traces of oil, or in areas that cannot be reached by skimmers. The characteristics of both sorbents and oil types must be considered when choosing sorbents for cleaning up oil spills. Sorbent can tolerate a limited amount of oil and when lifted can release oil that is trapped in its pores. Some natural organic sorbents(clay) cannot be used in windy conditions others (vermiculite) are dusty and maybe hazardous if inhaled.
**Chemical Treatment:**

**Dispersants:** Dispersants are chemicals sprayed to break up oil slick into its chemical constituents and speed natural biodegradation. Dispersants reduce oil slicks into small droplets of oil and increases their surface area. This stops oil and water from mixing and increases the exposure to natural evaporation and bacterial action.

Whether a dispersant is effective depends on the type of oil and the time between the spill and cleanup. The viscous nature of oil increases with evaporation and emulsification; this increases their resistance to dispersants. Dispersants generally have little effect on viscous oils and may stop being effective within an hour or two of the initial spill; they also are not effective on all locations. The time available before dispersant stops being effective depends upon factors such as sea state and temperature but is unlikely to be longer than a day or two.

**Most of the known clean-up chemical products are more toxic than the mineral oil itself.**

**Gelling agents:** These are solidifiers, chemicals that react with oil to form rubber-like solids. These chemicals are applied to the oil then mixed in by the force of high-pressure water streams. The gelled oil is removed from the water using nets, suction equipment, or skimmers.

The limitation in using gelling agents is the need for large quantities of the material almost as much as three times the volume of the spill. For large oil spills it is impractical to store, move, and apply such large quantities of material.

**Biological Treatment:**

These are introduced to the spill to hasten biodegradation. Bacteria and other microorganisms can break down most of the components of oil washed up along a shoreline into harmless substances such as fatty acids and carbon dioxide. This technique is limited to cleaning the shoreline. This type of treatment can be conducted at the end of the cleanup process on small spots of oil.

**Final Disposal:**

Extracted fuel and polluted sand are considered to be hazardous waste, and should be disposed of accordingly. This waste should be properly contained and should not be released into the environment. Recovery of part of the oil from this waste is possible, and some of the sands and pebbles can be cleaned and returned into the environment.

While some recommend the incineration of oil wastes and polluted sand, this process will produce dioxins especially that a lot of chlorine from the sea salt is contained in the collected waste. Dioxin is a known carcinogen and can disrupt the hormonal system.
The Impact of the Oil Spill

The Eastern Mediterranean basin has one of the most important ecosystems in the Mediterranean Sea. This oil spill has now impacted Lebanon but it is fast becoming a regional problem, endangering the Eastern Mediterranean basin as a whole. The impact of this oil spill has been growing in magnitude due to the fact that after more than a month (since the start of the spill) no cleanup operations have started yet.

Environmental Impact

The environmental impact of the oil spill on marine biodiversity is expected to be devastating. It is too early to assess what the long term impacts will be. From previous studies we know that at least six years are required to reach a balanced ecosystem. Oil spills affect marine life by either physical contamination or smothering, or by the bioaccumulation of the toxic components of oil in animal and plant tissues.

In general, all marine and coastal species in the spill area will be impacted. The main Mediterranean species that will be directly affected by the oil spill are:

- **Sea turtles:** The Eastern Mediterranean region is very important for sea turtle nesting, including the Green Turtle which is endangered in the Mediterranean. Oil spills can prevent adult sea turtles from surfacing to breath, and can trap baby sea turtles that start hatching in the end of July and try to reach deep water as fast as possible.
- **Bluefin Tuna:** During this time of the year, Bluefin Tuna are found in the Eastern Mediterranean. This commercially important specie is already exhausted by over fishing and like all the other tuna species they lay their eggs on the surface of the water. The oil spill will have serious consequences to its population size in the Mediterranean Sea.
- **Other fish species:** The Eastern Mediterranean has important fish spawning and nursery areas, especially on the rocky shallow waters in Northern Lebanon. Of the coast of Beirut, a very important area for shark spawning has been documented. The oil spill has already covered such areas, especially in Jbeil and Tabarja districts. Also, the longer the oil stays in the water, the more its toxic constituents will build up in fish tissues.
- Marine plants will also be heavily impacted by the oil spill, because the oil spill will block sun rays and oxygen absorption, which are needed for the plants survival.

Socio-Economic Impact

The economic cost of the oil spill requires long term monitoring of the different sectors impacted by the oil spill. The estimated cost for the cleanup is between 100 million and 200 million dollars. This cost depends on how thorough the cleanup is. However, the indirect cost of the oil spill on different sectors increases everyday and the current value is more than 250 million dollars.
The exact social impacts of the spill are also yet to be determined due to the war, which has greatly affected social life in Lebanon. Several unexpected social problems are expected to surface due to the oil spill. The main social impact will obviously be on local fishermen, who many of them have not been able to fish for the past month. Some fishermen have had their boats and gear damaged by the oil. The impact of the spill on fish resources will also reflect on the fishermen’s income.

Beach-based tourism is a major economic activity in Lebanon and constitutes a major part of the Lebanon’s gross domestic product (GDP). Many public and private beaches have been affected by the oil spill. Many private boats, ships or yachts, which were once used to transport tourists on water trips and to off land islands, currently lie idle in their ports. Other social groups that depend on the sea, such as seafood restaurants, will suffer from loss of livelihoods, consequent unemployment, poverty due to absence of compensation and the long term inability to use the coastal areas due to pollution.

Health Impacts
Oil has a direct effect on people through direct contact or inhalation of oil fumes. Short-term adverse effects can include nausea, headaches and dermatological problems in fishermen, residents living close to the affected areas and beach visitors. Long-term adverse effects of oil contact include cancer, pulmonary disease, skin diseases and hormonal disruptions. Fish coming from the quays and wharfs along the coast from Jieh to Heri-Chekka, as well as, plant crops and animal products from coastal farms close to the oil spill sites need to be tested for hydrocarbon content and other oil impurities before being declared safe for consumption.
Annex 4.a

Lebanon Oil Spill Assessment and Response
Lebanon Oil Spill Rapid Assessment and Response Mission

Final Report

September 11, 2006

Richard Steiner, Professor/ Consultant
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Photos: Green Line, August 15, 2006
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Green Line Association, Lebanon (IUCN member)

Disclaimer: the opinions expressed in this report are those of the author, and do not necessarily reflect those of the sponsoring organisations
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EXECUTIVE SUMMARY/RECOMMENDATIONS

Based on the Mission the following are recommendations to IUCN for priorities post the immediate response and assessment initiatives currently underway in Lebanon and suggestions for wider global oil spill response and assessment priorities:

1. Develop and approve a robust National Contingency Plan for Lebanon;
2. Develop an in-region oil spill response capability, with a response base, trained personnel, and equipment in Lebanon;
3. Conduct a Risk Assessment for future spills in eastern Mediterranean;
4. Implement a Phase II NRDA programme for 2007, with a public symposium toward the end of 2007 to present scientific results of the NRDA programme, and to conduct a scoping process for Restoration
5. Lebanon sign and ratify the tier-two and tier-three international spill compensation protocols – the International Oil Pollution Compensation (IOPC) Fund, and the Supplementary Fund, bringing spill liability coverage up to about $1.1 billion (USD);
6. Continue a comprehensive marine environmental monitoring programme / strategic environmental assessment (SEA) for the eastern Mediterranean;
7. Establishment of a Lebanon National Oil Spill Fund (based on a nominal tax on imported petroleum products) to be used to support all government activities with regard to spill prevention and response preparedness, etc. in the future. Many other nations have such funds, and it would greatly ease the financial burden of reprogramming funds in emergency response situations in the future.
8. Survey other coastal states globally to ascertain which still do not have a National Contingency Plan, which may be vulnerable to oil pollution disasters, and then assist those coastal states in the formulation of a NCP as soon as possible.
9. Consider amendments to the international pollution compensation regime that would allow the three-tiered funds to be available to cover wartime related spills or otherwise establish a $100 million USD fund to be made available on an emergency basis for other wartime related spills. As well, the international compensation regimes must be amended to cover all environmental injury in spills, not simply those limited injuries that may be amenable to direct Restoration initiatives as is currently the case.
Introduction

At the request of the Lebanese Ministry of Environment (MoE), the Secretariat of the World Conservation Union (IUCN), IUCN Commission on Environmental, Economic, and Social Policy (CEESP), and Green Line (Beirut), I travelled to Lebanon from Aug. 11-25, 2006 to conduct a rapid assessment of the oil spill and provide response assistance based on the following Terms of Reference.

General

IUCN in coordinates with other organisations (UNEP- OCHA- REMPEC- UNDP- EU) and the Ministry of Environment Lebanon is engaged in efforts and missions to assess and mitigate the environment impacts of the conflict. As part of this wider effort, IUCN is retaining a consultant to conduct a study in Lebanon to support the assessment of the environmental impacts of the recent oil spill and inputs will be focused around a Natural Resource Damage Assessment (NRDA) including any estimate of social and economic impact.

Specific

1. conduct a preliminary assessment of oil spill extent / severity;
2. advise Ministry of Environment (MoE) and others re: spill response;
3. develop and implement a Natural Resource Damage Assessment (NRDA) programme
4. develop conceptual approach to claims / compensation

I. Preliminary Assessment

Assessment

Along with members of Green Line and/or IUCN WESCANA, I travelled to many of the oiled shoreline segments, from south of Jiyeh to Palm Island in the north although travel was slowed significantly due to bombed bridges and roads, but still possible and necessary.

The estimated volume of 15,000 tons of heavy IFO 150 (number 6 fuel) spilled seems reasonable, but impossible to independently verify with existing information. Additionally, the other 55,000 tons in storage at the Jiyeh tank farm are thought to have burned, causing extensive atmospheric contamination in a plume reportedly reaching 60 km. In interviews we conducted in the
vicinity of Jiyyeh, this atmospheric plume caused some short-term respiratory symptoms among those people that were exposed. It was also evident that it rained small droplets of oil from the plume in a 5 km radius around the fire at Jiyyeh, further exposing residents to contamination. These splatters are still evident on the ground and property around Jiyyeh.

In the beach surveys conducted, I found shoreline oiling to be quite extensive – perhaps 120 km or so - and in places oil can be found up to 50 cm deep. Oiled sand beaches and rocky shorelines were surveyed, and some found to be extremely contaminated, others only moderately, and some only very lightly oiled or not at all.
Note: the entire 70,000 tons of fuel at Jiyyeh did not spill into the sea. It is estimated that 15,000 tons spilled and 55,000 burned.

Further, on-water observations together with observations from shore and on approach to Beirut airport on arrival showed that there was at that time considerable amounts of oil still floating offshore. Some slicks were extensive, but the thickness seemed limited.

It was also predictable that some oil would transport to the subsurface seabed, and we confirmed such upon examination in surf zones off sandy beaches where oil had combined with sand and sunk. Underwater video / still photography sponsored by Greenpeace clearly showed extensive sea bed oiling due to other transport mechanisms – evaporative weathering of surface slicks, with slicks then sinking in the warm, low-density sea water. Such slicks remain on the seabed, but it is unclear just how extensive is this component. These seabed slicks will likely re-surface at some point, and travel as large tar balls or slicks to contaminate other shorelines in the eastern Mediterranean basin.

On August 15, I asked the French Embassy in Beirut for support to conduct an aerial survey with their relief helicopters along the coast, to ascertain extent of remaining offshore oil, and to better guide what response options might be necessary. After several attempts by the French Ambassador as well as European Union to secure clearance from Israel for this flight, Israel refused to grant clearance at that time. Thus, I requested of the international support group to take up this issue at the Athens meeting on August 17.

**Overview of Lebanon’s coastal and marine ecosystem**

In order to assess potential impact of the spill, one needs at least a general understanding of the coastal and marine ecosystem in which the spill occurred. Available scientific literature on Lebanon’s coastal and marine ecosystem is sparse, and this overview does not constitute a comprehensive summary.

Lebanon’s coastal and marine ecosystem is characterized as Mediterranean with sub-tropical components. The shoreline extends 220 km, and is interspersed with 3 bays, 12 prominent headlands, limestone sea cliffs, and several small river deltas. Unusual coastal habitat types include rocky terraces covered with the mollusk Vermetes and calcareous algae (Vermetid terraces), coastal springs, and coastal dunes. The Vermetid terraces / coralline reefs are an important and unique feature of the eastern Mediterranean. These wave-resistant terraces host
a diverse ecosystem consisting of brown algae, calcareous algae, encrusting sponges, barnacles, scleractinian corals, bryozoans, bristle worms, nudibranchs, anemones, sea urchins, sea cucumbers, crabs, cuttlefish, various fish species, and sea turtles. The shoreline habitat of Lebanon is approximately 20% sandy beach, with the remainder being rock or gravel. The continental shelf is quite narrow, with the widest part at only 12 km in the north, and is intersected by several submarine canyons. Sea surface temperature varies between 16°C in winter and 30°C in summer. Tidal range is slight, averaging from 15 cm – 30 cm, with a maximum up to 50 cm.

The marine ecosystem is not particularly high in productivity, as it is nutrient-poor, has a narrow continental shelf, and summer wind patterns inhibit nutrient replenishment through upwelling. However, the marine system exhibits high biodiversity. One recent marine conservation assessment (AMWAJ 2003) concluded the following:

\[
\text{The Mediterranean is one of the richest seas for biodiversity in the world since it hosts 7.5% of the marine animal taxa and 18% of the world marine flora for an area covering only 0.7% of the world oceans. The Mediterranean infralittoral and deep flora and fauna are characterized by a high ratio of endemism.}
\]

Although Lebanon’s marine ecosystem is not particularly well studied, it is reported to host at least 1685 species of fauna, of which 50 are commercially important. Much of the marine biodiversity - 1250 species - is found in the plankton community (small plants and invertebrate organisms drifting in the water column). There are reportedly more than 300 Indo-Pacific marine species that have invaded the Mediterranean from the Red Sea subsequent to the opening of the Suez Canal in 1869. These invasive species now compete with Atlantic and Mediterranean species, and are believed to have significantly altered marine communities in the region.

The phytoplankton community off Lebanon is comprised of 227 species of dinoflagellates and some 151 species of diatoms. Benthic macroalgae (sea bed algae) include some 191 species, 29 of which are endemic to the Mediterranean. But again, overall productivity as measured by chlorophyll concentration is very low relative to other coastal seas. The zooplankton community consists of at least 747 species, and both the phytoplankton and zooplankton communities exhibit significant seasonal variation in species composition, distribution, and abundance. The benthic meiofauna community is dominated by calanoid
Benthic decapods (crab, shrimp, etc.) comprise important communities on rocky bottoms at 30-50 meters depth.

The cephalopod community (octopus, cuttlefish, squid, etc.) off Lebanon is not well studied, but the Eastern Mediterranean has at least 21 species, of which the most common off Lebanon are cuttlefish (sepia), Octopus vulgaris and Octopus macropus.

There are 357 known fish species in Lebanese waters, 59 of which are exotic to the region. Fish diversity is highly correlated with rocky bottom substrate and habitats with greater substrate complexity. Commercial fisheries land only about 6,000 tons/year, and are still mostly artesanal, using small boats near shore. Much is caught at night using lamplights. Although small in comparison to other coastal fisheries, Lebanon’s marine fisheries support some 30,000 fishermen and their dependents, and thus have socioeconomic importance to the nation.

Lebanon is not an area of high bird nesting abundance, due at least in part to over hunting and habitat degradation. But lying along a north-south migration corridor, some 300 bird species are known to migrate through the coastal zone.

Two sea turtle species – Loggerhead and Green – are known to nest on Lebanon’s beaches, and feed in coastal waters. There are perhaps 19 sandy beach segments along the coast that may be suitable for sea turtle nesting. Marine mammals found in Lebanese waters include common dolphin (the most common), striped dolphin, and bottlenose dolphin. Sperm whales have been sighted offshore on rare occasions, and the critically endangered Mediterranean monk seal has been seen on rare occasions, most recently at Palm Island Nature Reserve.

**Environmental Impact of spill**

The extent of ecological impact of the spill remains speculative at this point. The Lebanon offshore and coastal ecosystem may indeed not be one of the most productive marine systems by global standards – e.g. total annual fishery production is only about 6,000 tons (rather than hundreds of thousand of tons in some marine systems), etc. As well, it is widely recognized that the coastal environment of Lebanon was significantly degraded prior to the spill from chronic pollutant inputs, coastal development, sand removal, unsustainable fishing, debris, etc.
As far as I could determine, there were few large dead organisms washed up on beaches due to the spill. It could be that spill mortalities washed away offshore and/or sunk, or alternatively that there has not been a massive mortality of large animals. There was no need in this spill to field an animal rescue effort, as very few oiled and living animals were recovered. Another aspect that may limit ecological impact is the exposed nature of the coastline along which the spill traveled, making it more susceptible to physical breakdown due to turbulent mixing, as well as the warm temperatures of both water and air.

However, all this should not be taken to mean that ecological impact has been negligible. Whenever 15,000 tons of a highly toxic fluid is spilled into a coastal or marine ecosystem we should expect the damage to be extensive. That the ecosystem is known to have a high degree of endemism as well as high species diversity gives rise to concern that the relative impacts on individual populations/species may be higher than normal. That is, population-level impacts may have resulted. Much of the short-term, acute mortality may have gone undetected offshore due to the war and air/sea blockade. Further, spill ecological injury can often take time to manifest as sub-lethal, chronic effects. For instance, in the Exxon Valdez Oil Spill in Alaska, some fish population collapses did not occur until 3 years after the initial spill.

It is clear that much of the shoreline ecosystem that was contaminated was heavily impacted. The impact has clearly included significant mortality and impairment of the structure/function of the shoreline ecosystem. Of particular concern with shoreline oiling is the impact to Vermetid terraces/coralline reef communities. As well, there is a southward migration of birds expected along the coastal zone of Lebanon in September/October, and some of these can be expected to be exposed to the large amounts of oil remaining on the shoreline.

Sea turtles that are just now hatching may be exposed to residual oil on beaches as well as offshore waters. Such exposure may result in acute mortality and/or sub-lethal effects including such things as carcinogenesis, physiological and reproductive impairment, and so on.

Additionally, the seabed impact is significant, but also indeterminate as yet. All such impacts will be investigated in the NRDA programme (see below). It is a good sign that no large-scale mortality of large, “charismatic megafauna” (birds, dolphins, sea turtles, large fish, etc.) has yet been reported, but it is too early to draw too many conclusions about ecological impact until the Phase I NRDA programme is completed.
II. Spill Response Guidance

Limitations of response

Before traveling from Alaska to Beirut, I contacted the Oil Spill Response Limited (OSRL) base in Southampton, UK regarding potential response assets available from them. OSRL is one of the largest spill response organizations in the world. Their manager and staff discussed my request, and they informed me at the time that, while interested in helping in Lebanon, they were unable to assist for several reasons, primarily due to the hostilities still existing in-region, as well as no contract being offered.

Response to this spill was severely limited due to three unique and overwhelming factors:

1. **No Responsible Party (“RP”) response** – It is normal procedure in oil spills that the spiller or “responsible party” (oil company, ship owner, shore facility, pipeline owner, etc.) is required to mount an immediate response, including limiting additional oil outflow, at-sea containment, shoreline booming of sensitive habitats, oil recovery, beach cleanup, etc. In the LOS case however, the RP did not mount any response at all.

2. **Lack of Government Capacity** – again, in normal situations, if a RP does not mount a sufficient emergency spill response, the coastal state government will take on the response itself. The Government of Lebanon, with no National (oil spill) Contingency Plan, was almost entirely unprepared for this challenge. The government had apparently attempted several years ago to draft and approve a National Contingency Plan, but for reasons still unclear to me, this was never finalized. Thus, the government lacked an effective emergency response organizational structure, finances, equipment, and personnel to mount an effective spill response.

3. **Limited Access due to War and Blockade** – an obvious overarching reason for the lack of effective response to this spill was the 34-day war and continuing air and sea blockade off Lebanon’s coast. Even with the cessation of hostilities, the ongoing blockade prevents easy deployment of any significant response.
Thus, while it is generally not advisable to have a distant bureaucracy (U.N. or other) involved in emergency spill response, in this case it certainly provided significant support and filled a large gap and provided useful international resources.

However, it should be pointed out that even if Lebanon had the equipment, personnel, finances, command structure, and clear access to the water in place in July, it is highly likely that this spill could not have been contained or recovered effectively anyway. Experience with large marine oil spills shows that once oil is in the water, response efforts seldom collect over 10% of the spill volume. Thus, efforts by Lebanese officials to prevent additional outflow were paramount.

**Initial spill response**

An initial response was fielded at Chekka (near Tripoli) on private beaches through privately contracted resources (MOIG / Navy Group International in Beirut), and we were told that about 100 tons of contaminated material were removed from these areas over a 2-week period. Another response effort began August 15 in the Byblos (Jbeil) Harbor, by the Lebanese Army and MoE, which wrapped up about 1-week later with over 100 tons removed from the harbour (using booms and the Norwegian drum skimmer). Another beach cleanup began at Ramlet el-Baidal (in Beirut) and another on August 20 at Jbeil both by NGOs, but both were terminated initially due to waste storage and administrative issues with the government.

In one of my first meetings at the MoE, I recommended that the MoE consider contracting the spill response to a trained spill response contractor (such as OSRL in Southampton), utilizing local labor, etc., but the MoE seemed interested in coordinating the effort locally.

As a result of the many response difficulties referenced above, the Minister of Environment asked on August 21 that I prepare a preliminary emergency cleanup plan, which I developed and presented to the Minister later that same day. While there had been several plans presented before, including one by myself prior to the August 17 Athens meeting, the Minister needed an immediately operational plan for emergency cleanup. The hastily developed plan consisted of two phases, giving the Minister sufficient guidance with which he could order an immediate, expedited response. The two-phase plan was immediately approved by the Minister and it is summarized below.
Rapid Response – August 2006

Shoreline Response:

Response teams – 10 teams of 30 workers each, deployed to priority beaches to conduct pilot projects: 1. Jbeil; 2. Ramlet el Baidal; 3. Jiyyeh; 4. Mobile team (Palm Island, etc.). These teams were to include hired workers, civil society volunteers, municipalities, etc... As well, we suggested that the Lebanese Army response team under the command of Colonel Hashem be redeployed as soon as possible from Byblos to Delieh fishing harbor in Beirut (which has now occurred) for additional near shore, on-water recovery.

Equipment - recommended included shovels and rakes, PPE (gloves, raingear, masks, etc.), absorbent booms (20 x 500 m x 20 inch diameter per team); absorbent pads (2000 x 17 x 19 inch / team); buckets; heavy earthmoving equipment.

Waste transfer – truck / bobcat for each shoreline team, containers, polyethylene sheeting (for interim storage higher on beaches for later transfer); all other garbage to be removed as well.

It was also recommended that all locally available response assets be contracted and deployed as soon as possible. For instance, Navy Group International -Mediterranean Oil Industry Group (MOIG) contractor whom I met with on August 22, seems to be a competent, locally trained and equipped response contractor (who was employed at Chekka), and it is my recommendation that they be contracted to conduct aspects of the response as appropriate.

Shoreline / Offshore / Seabed Response:

Spill response should be expanded as soon as practicable to include rocky shoreline washing, additional sandy beach response, any offshore response still necessary, and seabed oil recovery (to the extent practicable).

Response teams – expanded to 500 personnel total – 15 shoreline teams of 20 each, 5 offshore teams of 20 each (as necessary and to be determined by offshore aerial and vessel surveys yet to be conducted.).

Equipment – 30 high-pressure hot water jet washing units; 4,000 meters of containment boom; 30 skimmers (of various kinds); landing craft / work boats for offshore teams; 20 onshore beach skimmers / rock cleaners; transfer pumps / power packs; storage bladders / containers for waste transfer.

Long-term disposal – contaminated product to be disposed of / reused in various industrial processes – cement factories, refineries, road construction, etc.; and otherwise incinerated with sufficient emission controls.

Seabed recovery – this would be a unique aspect of the spill response, but as the seabed oil appears largely congealed in large seabed surface mats rather than mixed with sediment, it seems possible to recover various amounts of this contamination. I recommend a full underwater survey of seabed oiling using Remotely Operated Vehicles (ROVs) towed from vessels and divers, and then testing of various recovery techniques for this contamination, including grappling systems dragged by boats, bottom trawls / dredges, diver assist / manual collection and placing into buoyed net bags for retrieval by surface vessels, etc.

As well, I recommended an Incident Command System (ICS) structure be established for the government’s spill response. This includes an Incident Commander, and four sub groups – Operations, Finance, Logistics, and Communications. This organizational recommendation was provided to the UNEP/OCHA/IMO and Danish experts coordination group on evening of August 21, reiterated the following day in their
recommendation to the Minister, and thereby approved. The Rapid Response now seems to be following according to plan.

**Note on offshore oil**

Upon approach to Beirut airport on August 14 it was clear that a significant amount of oil was still floating offshore in patchy surface slicks. These tended to disperse over the time I spent on-site, and I discussed this with the Minister and others. Our limited observations indicated that much of this floating oil may now be too dispersed / thin to lend to itself to effective containment / recovery, an observation I discussed with the Minister. More recent aerial observations by others concluded that there are now no recoverable concentrations of oil floating offshore. Thus, these observers felt that an offshore response may not be necessary.

It is still possible though that there are or will be surface concentrations of oil that could be recovered. There is a general tendency in the spill response community to wait for offshore oil to come ashore and collect it there. While this may be logistically easier, it is not always the best environmental protection strategy. Therefore, I recommend that any offshore slicks be assessed, and that an offshore containment / collection effort be mounted when oil can be corralled sufficiently to remove it from the environment. As well, some of the seabed oil patches can be expected to resurface as they weather and emulsify, and water temperature decreases (water density increases relative to the oil) over the winter. Thus, I feel the possibility of an offshore response effort should not be ruled out at this point. Further, there are still large amounts (+ 100 tons) of oil concentrated in several protected locations up the coast, e.g. Tabarja, Dahleih, etc. that require removal from the near shore sea surface before spreading again.

**III. Natural Resource Damage Assessment (NRDA) programme:**

**Proposed organization of Lebanon Oil Spill NRDA**

In response to the oil spill, it is essential to immediately implement an initial Natural Resource Damage Assessment (NRDA) program. This is a major spill (+15,000 tons), the potential for environmental injury is significant, and the environmental injury needs clear, credible documentation. An NRDA is essential for the following reasons:

1. to determine the extent and severity of ecological injury;
2. to fully inform the citizens of Lebanon and others, particularly those in affected areas, in a transparent and accurate manner, about the extent of ecological injury;
3. develop a basis for claims (to the extent that these become available); and
4. to guide a Restoration programme.

We convened an initial NRDA organizational meeting with in-region scientific community at the National Center for Marine Sciences (NCMS) in Batroun on August 14. Several copies of the NRDA&R manual I drafted for UNEP in 2004 were distributed broadly throughout Lebanon, and gave background and guidance with which to formulate the programme. We then organized a meeting the next day with NCMS, MoE, and other scientists to discuss the overall NRDA programme at the Ministry. I then visited the American University of Beirut (AUB) campus that afternoon, touring their analytical laboratory facilities – Environmental Core Laboratory and the Central Research Science Laboratory. Between AUB labs and the NCSR labs, there seems to be sufficient in-country analytical capability to do the laboratory analysis for total hydrocarbons / Polynuclear Aromatic Hydrocarbons (PAHs), etc.

On August 16, 2006, I proposed that the **Phase I LOS NRDA** be implemented with close coordination with MoE as follows:

**National Center for Marine Sciences / National Council for Scientific Research (NCMS / NCSR): Overall Responsibility for NRDA programme**

NCMS / NCSR should function as overall coordination of the Phase 1 NRDA program, that NCMS Director Gaby Khalaf be designated Chief Scientist, and that NCMS organize and contract with all Principal Investigators (P.I.s), both in-house and externally, for all Phase I NRDA scientific studies.

**A Memorandum of Agreement (MOA) should be developed between Lebanon’s Ministry of Environment (LMoE) and NCMS / NCSR stipulating the arrangements for conduct of the Phase I LOS NRDA program. Phase I LOS NRDA will commence as soon as possible (August 2006) and terminate by December 31, 2006 (thus, about 3 months). As Scientific Coordinator for the program, NCMS / NCSR will coordinate proposal solicitation and organization.**
Proposed Phase I NRDA Studies

Studies proposed for the Phase I LOS NRDA program will include the following:

1. **spill trajectory monitoring** – physical oceanographic modeling combined with satellite imagery and on-ground / sea observations.
2. **water and sediment contamination** – sampling of on-shore and offshore habitats for hydrocarbon contamination from the Jiyeh spill
3. **inter-tidal / shoreline ecology** – impacts on inter tidal flora / fauna – patella, periwinkles, mussels, oysters, algae, terrace environments, meiofauna, etc
4. **plankton** – phytoplankton and zooplankton impacts, including fish eggs and larvae (Bluefin tuna, etc.)
5. **subtidal benthic community** – sea urchins, sponges, etc.
6. **fisheries** – fish and cephalopod (octopus, cuttlefish, etc.) impacts
7. **birds** – potential impacts on shore and sea birds, direct oiling, nesting, etc.
8. **sea turtles** – potential impacts on turtles, including nesting success, hatchling survival, contamination of eggs / hatchlings, etc.
9. **marine mammals** – surveys of distribution and abundance of marine mammals - dolphins, etc.
10. **carcass collection and analysis** – all animal carcasses collected during the beach cleanup operations analyzed

I recommended that the MOA between the LMoE and NCMS/NCSR specify that funding be routed directly to NCMS/NCSR for the conduct of Phase I LOS NRDA, and that a report of all Phase I LOS NRDA results be provided on or before December 31, 2006. As part of the MOA, the NCMS shall develop a Phase II LOS NRDA plan / proposal for funding and implementation in 2007. An omnibus proposal for Phase I NRDA is in preparation by NCMS, and sampling began (for the fish study) on Aug. 22.

With regard to initial funding, I drafted an initial proposal from IUCN WESCANA RO for use of $100,000 from OPEC via UNEP/OCHA, half for emergency response, and half for the Phase I NRDA programme. Also, I participated in a meeting with UNDP staff, discussing the need for additional response and damage assessment funding.
After meeting with NCSR Secretary General Dr. Mouin Hamze on August 23, I recommended to the Minister of Environment that NCSR be designated overall authority of the NRDA programme for the following reasons:

1. NCSR is the statutorily designated government department for scientific research and coordination in Lebanon;
2. NCSR has very straightforward budgetary authority to expedite the scientific programme;
3. assigning this responsibility to NCSR will ease the burden on MoE so that MoE can focus on their top priority – spill response; and
4. the NCSR would dedicate one of their facilities (Juneih) specifically to the NRDA programme.

I then met with MoE Minister Sarraf about this, and he offered his conceptual support to this structural proposal.

**Lebanon Oil Spill Coordination Council (LOSCC)**

As well, I proposed on August 23 to the Minister of Environment and NCSR Secretary General that the Government of Lebanon form an intergovernmental Lebanon Oil Spill Coordination Council composed of 5 ministers, as follow:

- Minister of Environment
- Minister of Transport and Public Works
- Minister of Agriculture (Department of Fisheries)
- Minister of Health
- Secretary General of National Council of Scientific Research (NCSR)

As each of these governmental departments has authority and responsibility for certain aspects of this spill, this coordinating council was proposed as an information sharing body, meeting regularly. As envisioned, the LOSCC would be separate from, and not have authority over the spill response ICS structure managed directly by the MoE.
IV. Media Outreach

Though it was not part of the initial plan and in response to numerous requests by information hungry media, I conducted many media interviews during and after the mission to Lebanon, arranged either by Green Line and at direct media request with several Lebanese / local media interviews; many other interviews of opportunity with international media (French, German, Russian, U.K., U.S., Reuters, AP, etc.); an IUCN video documentary; and an Islam Online interview arranged by WESCAWA communications liaison.

It is to my confidence that this part brought great attention to the catastrophe and this will surely reflect on the support for the cleanup efforts.

IV. Claims / Compensation

The issue of claims / compensation is very problematic with this spill, as the international compensation regime (to which Lebanon is a party only to the tier-one Civil Liability Convention) does not cover spills caused by acts of war. There are other options available however. One is legal, through the International Criminal Court at The Hague, and the other is to seek a negotiated settlement for damages caused by the spill between parties. This would be accomplished via political and diplomatic channels, and would likely be the most expeditious and effective approach to just resolution of claims.

To substantiate claims, economic, public health, and environmental damages should be methodically assessed and valued. This should include such things as lost income to fishermen including lost catch, gear damage, vessel damage; damage to tourism businesses, and others. As well, all costs imposed on government response, cleanup, and damage assessment should be collected by government ministries. An assessment of public health impacts of the spill, including respiratory effects of the atmospheric plume, health impacts from direct contact with oil, and social / psychological impacts of the spill is also important. Environmental damages should be assessed by the NRDA programme recommended above. To the extent possible, the claims assessment should segregate oil spill impacts from war impacts.

Thus, on August 29, 2006, I sent a letter to Israeli Prime Minister Ehud Olmert (on my own behalf), requesting that the Israeli government establish a $1 billion (USD) Eastern Mediterranean Oil Spill (EMOS) Restoration Fund.

This Fund is proposed for use as follows to:
1. Reimburse costs of response, cleanup, damage assessment, etc.
2. Compensate businesses (fishing, tourism, etc.) for economic losses due to the spill
3. Develop and implement a comprehensive environmental Restoration programme for the eastern Mediterranean Sea.

VI. Restoration

One of the primary purposes of conducting a Natural Resource Damage Assessment is to develop and implement an environmental Restoration program [see NRDA&R Draft Manual, UNEP 2004]. Restoration is generally defined as any action that endeavors to restore to their pre-spill condition (or to the condition that would have existed had the pollution incident not occurred) any population injured, lost or injured as a result of the spill, or that replaces or substitutes for the injured resources, or that provides another positive environmental offset to the damage suffered. An ecosystem can be considered recovered when the populations of organisms are again present, healthy, productive, and at numbers and distributions that would have existed had the spill not occurred; there is a full complement of age classes; they are behaving normally; and people have the same opportunities for the use and enjoyment of natural resources as they would have had the spill not occurred.

Thus, the overall goal of a Restoration program is to return a damaged ecosystem to the same ecological state that would have existed had the pollution incident not occurred.

In general, Restoration measures should satisfy the following criteria:

- measures should be likely to accelerate significantly the natural process of recovery
- measures should seek to prevent further damage as a result of the incident
- measures should, as far as possible, not result in the degradation of other habitats or in adverse consequences for other natural or economic resources
- measures should be technically feasible
- costs of the measures should not be out of proportion to the extent and duration of the damage and the benefits likely to be achieved (that is, be cost-effective)
Based on the results of the NRDA program, potential options should be developed with which to restore, replace, or provide other environmental benefit to offset / mitigate the damage from the pollution event. The primary focus of a Restoration program is to assist in and enhance the full recovery of an injured ecosystem.

Except for the reimbursement of actual government expenses (including the costs of a NRDA program), it is generally accepted that governments should apply any and all monies recovered in pollution events toward the Restoration and recovery of the injured ecosystem.

**Direct vs. Indirect Restoration**

Under the general scientific approach to ecological restoration, there are two principal categories of activities, as follow:

*Direct Restoration / Reinstatement* – projects that aim to improve the rate of natural recovery through direct manipulation of the environment, e.g., replanting of mangroves or seaweed in injured areas, restocking injured fish populations, fish habitat improvement, removal of contaminated sediments, captive breeding programs to enhance wildlife populations, etc; and

*Indirect Restoration* – projects that protect natural recovery processes, e.g. redirecting hunting and fishing effort away from injured populations to aid recovery, reducing human disturbance around sensitive habitat areas, enhancing sustainable fishery management regimes, increased enforcement of laws and regulations, protected areas designation, reduction of pollution, acquisition of habitat, etc.

Direct Restoration of impacted populations and environments is often difficult, particularly in aquatic ecosystems, but any opportunity to do such should be explored and implemented as appropriate. Beyond such direct restoration opportunities as may be available, often the greatest Restoration opportunity in significant pollution events is from *Indirect Restoration* - the implementation of other environmental protections and enhancements as offsets and mitigation. The general concept with Indirect Restoration is to provide a net *environmental benefit* to the impacted ecosystem.

If for instance a coastal environment in which a pollution incident occurs was already significantly degraded prior to the spill, then an effective Restoration
program must take these pre-existing sources of degradation into account. In this case, reducing the chronic, point-source input of pollutants into a degraded coastal area would offer broad ecological and economic benefit, and perhaps be a cost-effective option for Restoration. Additional Indirect Restoration options include the designation and management of protected areas, implementing Coastal Zone Management Plans, habitat protection, acquisition of resources equivalent to those injured, and/or other efforts that enhance the sustainability of the coastal environment.

In general, all Restoration projects should contribute to a healthy, productive, and biologically diverse ecosystem. The Restoration program should assess what limitations may exist to the sustainability of the injured ecosystem and develop options to mitigate such limitations.

Restoration decisions should take into account the extent to which natural recovery is occurring, the priority of the resource both ecologically and economically, and the technical feasibility of the option. The Restoration program should be subjected to independent scientific review (as the NRDA program), government acceptance, and be responsive to the concerns and ideas of citizens.

**Restoration Plan**

Using results of the Phase I and II NRDA program, all Principal Investigators and the public should begin a Restoration planning effort as soon as possible (perhaps as part of a NRDA&R symposium at the end of 2007). This is essentially the "who, what, when, where, and why" of Restoration. The Restoration planning process generally requires broader input than the scientific input necessary for the NRDA program. The Restoration Plan should provide a reasonable balance between costs and potential benefits, be appropriately scaled, holistic and comprehensive, and employ an ecosystem approach. As such, the plan must take into account all ecological stressors in an injured ecosystem, not just those caused directly by the pollution incident. The Restoration Plan should monitor natural recovery, and seek to minimize further disturbance from human activity.

The Restoration Plan should be the principal document providing long-term guidance for restoring resources and services, and it may or may not list specific restoration projects.
If the plan is general in scope, then it should be implemented through annual work plans that describe in detail the projects to be supported for Restoration. The development of annual work plans should be competitive and subjected to thorough scientific review and deliberation by government authorities. Using the NRDA results, the Restoration Plan should identify each injured resource and resource service (human uses of natural resources), and then establish recovery objectives and strategies for each. These recovery objectives should state a clear, measurable, and achievable endpoint specific to each injured resource. An example might be: "populations of species ‘x’ will have recovered when they are again healthy and productive, exist at pre-spill abundances and distribution, and have pre-spill age / sex ratios.” In other injured resources, the best that can be hoped for may be “population stability or increase.” Restoration strategies to reach these specific objectives will provide the guidance for solicitation of project proposals.

Government Trustees of the Restoration program should publish an annual report of their program (available to the public), including a status of injured species / resources which categorize all resources in one of four categories as follow: not-recovering, recovering, recovered, or recovery-unknown. The status of injured species / resources list should be updated as new information becomes available. The annual report should also update the public on all Restoration projects and activities. Additional methods of disseminating information on the NRDA&R program to the public should be employed as appropriate - web site, regular public meetings with opportunity for public comment, etc.

**Potential Restoration Options for Lebanon**

Without presupposing what sort of Restoration options should be selected in Lebanon, some potential examples include the following:

**Direct Restoration:**

*Restocking of fisheries* through aquaculture and enhancement techniques to supply additional food resources for natural predators and additional resources for fishermen.

*Additional cleanup of contaminated sites* in the ecosystem, using bioremediation, mechanical removal, etc., of contaminants not otherwise removed during the spill response, and whose presence may impair the recovery of injured resources.
Enhancing sea turtle nesting success, via predator deterrence, nest site protection, etc.

*Indirect Restoration:*

*Improved / intensified management* of harvested fish and shellfish populations to prevent over fishing: existing fisheries could be restricted or redirected to other areas / stocks to enhance injured fish populations and the predators dependent upon them. Various restrictive management tools could be considered, including more restrictive catch limits, additional gear restrictions, time / area closures to fishing, fish size restrictions, fleet capacity reduction (vessel buyback) etc.

*Intensified management and protection* of sensitive species such as sea turtles, birds, marine mammals, etc. -- reducing human disturbance of sensitive habitats for priority species by restricting human access to sensitive habitats, implementing measures to reduce the incidental take of such species in fish nets, expanded buffers around sensitive habitats, etc.

*Increased enforcement* of fish & wildlife and environmental laws and regulations – the provision of funds for additional enforcement officers, vessels, aircraft, etc, to reduce illegal harvests, apprehend violators, increase awareness of fish and wildlife protection laws, etc.

*Reduce or eliminate introduced species* from the ecosystem, e.g. removal of rats and rabbits through trapping, establishing ballast water treatment systems, invasive species management programs, etc.

*Pollution abatement*- develop an initiative to reduce or eliminate point-source pollution into a spill impacted region. This should include a comprehensive analysis of point-source effluent discharge (e.g. from mills, power plants, refineries, sewage outfalls, fishing vessels, large ships, port facilities, etc.) in the region, as well as non point-source inputs.

On the basis of the comprehensive analysis and mapping of all pollutant inputs into the ecosystem, a detailed plan for the reduction of such deleterious inputs should be prepared with a necessary budget, timetables, and measurable outcomes. This project would be large, and thus may need funds outside the framework of the compensation conventions. It should be contracted to a credible environmental engineering firm, with a proven track record on such
large pollution abatement projects, and would likely take many years to fully implement.

Implementing sustainable management initiatives - in many cases, nations have already developed plans to enhance the sustainability of ecosystems, but have yet to implement these plans due to inadequate funding and/or governance structures. For example, Lebanon has a 2002 National Report of the Country of Lebanon for the Strategic Action Plan for the Conservation of Biological Diversity in the Mediterranean Region. This action plan identifies threats to marine biodiversity, and recommends possible interventions to mitigate such threats. There are other such efforts already on the shelf as well, such as the 2003 Thematic Activity for Marine Conservation Areas: Lebanon; and the 2001 Marine Turtle Nesting Activity Assessment on the Lebanon Coast. However, many of these national and regional management plans have yet to be implemented, and they provide an excellent general framework for the development of a long-term Restoration programme that would enhance the recovery and sustainability of an environment injured by a pollution event. In this way, a significant pollution event can become a catalyst for the implementation of such plans in the context of Restoration.

Habitat protection - protecting ecological habitat from other sources of degradation can be an extremely useful Restoration tool. Additional protections can be enacted for habitats injured by the pollution incident, or those uninjured but threatened by other injury, such as quarrying, mining, industrial development, etc. In nations with significant private or corporate ownership of resources, these resources or resource harvesting rights (logging rights, mineral rights, etc.) can be purchased and protected by a government in the context of a comprehensive Restoration program - coastal forests, wetlands, beaches, etc. Such publicly acquired protections are intended to assist overall recovery by minimizing further injury to habitats already injured, and/or to preventing additional injury within the general ecosystem. Such protections may protect water quality and reduce disturbance in particularly sensitive areas.

Designation of Protected Areas - on lands and waters already in public / government ownership, to be managed accordingly. This can include the designation of new marine protected areas, wildlife refuges / sanctuaries, no-take reserves, parks, etc., and/or the improvement of management in protected areas already in existence.

Debris cleanup and control – plastic and other persistent and harmful debris in an ecosystem should be cleaned up to the extent practicable. Such debris is well
known to affect many organisms, including birds, fish, mammals, and sea turtles. Also, a program to eliminate or reduce this source of degradation should be implemented – improved solid waste management, better collection facilities, an education program, etc.

**Economic alternatives for local fishermen** – if fishery resources are injured or contaminated by a pollution event, it may be possible to develop alternative resources which fishermen can harvest. For instance, if an offshore fishery is dominated by foreign vessels, a program to award a portion of the offshore fishery catch / quota to domestic fishermen could gradually phase out foreign fishing and contribute to the development and sustainability of a nation’s domestic fishery. Also, a fishery observer program for offshore foreign fisheries could be implemented (or expanded if it already exists) to provide additional enforcement of fishery regulations as well as to train coastal fishermen in offshore fishing technologies.

**Develop tourism / recreational alternatives** - to substitute for the loss in tourism and recreational opportunities – development of new parks and other tourist amenities along the beaches, etc.

**Develop an environmental education** program for children and adults to increase awareness of the importance of conservation and sustainable management, with particular emphasis on the injured ecosystem. This can include consideration for the construction of additional educational facilities and/or expanded funding for existing facilities / programs. It can also include specific educational objectives such as how boaters can reduce disturbance of sensitive species (marine mammals, sea turtles, seabirds, etc.).

**Recovery Monitoring and Restoration Science** - to the extent that effective management actions in an ecosystem are limited by lack of information, research is a legitimate exercise of the Restoration process. It is critical that such research projects be targeted specifically to gather information necessary for more effective management, and then applied in the improvement of management. An example of such research may be to better understand environmental pressures on fish populations so that harvest levels can be regulated more effectively. In addition to this sort of management research, there is also a need to monitor recovery and the effects of the restoration program. Governments should carefully consider the scale of their research and monitoring program post-settlement. In this regard, it is important to recognize that research and
monitoring do not contribute to environmental recovery *per se*, but rather through the management *application* of research results.

In a sense, the Jiyyeh spill should provide an opportunity to remedy many other problems that compromise the environmental integrity of the eastern Mediterranean Sea over and above pollution from the Jiyyeh spill. High on a restoration agenda should be the aggressive implementation of a comprehensive coastal pollution reduction initiative, including effective shore side solid waste management protocols, industrial outflow management, sewage treatment, etc. such that the overall health of the coastal ecosystem off Lebanon will be restored to a condition better than that which existed just prior to the spill. As well, and effective Coastal Zone Management (CZM) programme should be initiated. This would better site tourism facilities, shoreline protection, and urban development to protect ecologically important assets of Lebanon.

### VII. Other war / environmental issues

In considering the environmental impact of the war, it is necessary to keep the oil spill in context with all environmental issues in the region as a result of the war. Many of these are being identified / evaluated by the UNEP post conflict process. These include potential (yet to be confirmed) releases such as the following: hazardous material (ammonia) spills from bombing of the Liban milk plant in Baalbek; HFI spills from the bombed Maliban glass factory in Zahleh; petroleum product spills from the bombing of the Zahrani refinery in Al Junub; potential PCB spills (37 tons) from transformers at the Jiyyeh power plant; the 40,000 tons of kerosene that burned in the bombing of the tank farm at Beirut International Airport, the Safi El-Deen plastics factory bombing potentially releasing hazardous materials including ethylene glycol, vinyl chloride, chlorine, etc.; the bombing of the Army base at Rayak with unexploded ordinance and kerosene; bombed Sinno wood Industries potentially releasing formaldehyde; drinking water air contamination; some 22 bombed petrol stations releasing petrol, diesel, propane; household hazmat released in the bombed south Beirut suburbs and towns in the south; etc.
VIII. **Overall Recommendations**

In addition to the recommendations in the above interim report, other long-term recommendations will include the following:

- develop and approve a robust National Contingency Plan for Lebanon;
- develop an in-region oil spill response capability, with a response base, trained personnel, and equipment in Lebanon;
- conduct a Risk Assessment for future spills in eastern Mediterranean;
- implement a Phase II NRDA programme for 2007, with a public symposium toward the end of 2007 to present scientific results of the NRDA programme, and to conduct a scoping process for Restoration;
- Lebanon sign and ratify the tier-two and tier-three international spill compensation protocols – the International Oil Pollution Compensation (IOPC) Fund, and the Supplementary Fund, bringing spill liability coverage up to about $1.1 billion (USD);
- continue a comprehensive marine environmental monitoring programme / strategic environmental assessment (SEA) for the eastern Mediterranean;
- establishment of a Lebanon National Oil Spill Fund (based on a nominal tax on imported petroleum products) to be used to support all government activities with regard to spill prevention and response preparedness, etc. in the future. Many other nations have such funds, and it would greatly ease the financial burden of reprogramming funds in emergency response situations in the future.
- survey other coastal states globally to ascertain which still do not have a National Contingency Plan, which may be vulnerable to oil pollution disasters, and then assist those coastal states in the formulation of a NCP as soon as possible.
- consider amendments to the international pollution compensation regime that would allow the three-tiered funds to be available to cover wartime related spills or otherwise establish a $100 million USD fund to be made available on an emergency basis for other wartime related spills. As well, the international compensation regimes must be amended to cover all environmental injury in spills, not simply those limited injuries that may be amenable to direct Restoration initiatives as is currently the case.
ACKNOWLEDGEMENTS

Overall, despite the chaotic nature of the two week mission, it seems that the mission contributed significantly to the overall positive momentum now seen with the issue. I thank all those participating, especially the Honorable Minister of Environment Y.A. Sarraf, Green Line (in particular Ali Darwish), IUCN WESCANA (Simon Anstey, Hala Kilani, and Odeh Al Jayyousi), IUCN CEESP (Taghi Farvar, Wouter Veening, Steven Lovink, Clive Wicks, Sandra Kloff, Grazia Borrini-Feyerabend), IUCN Secretariat (Ibrahim Thiaw), UNEP/OCHA (Rene Nijenhuis), all the staff at the Ministry of Environment and Lebanese scientists at NCMS, NCSR, AUB and Balamand University; and the many other wonderful people with whom I had the opportunity to work with in Lebanon.
Appendix 4.b

Lebanon Oil Spill:
Phase I Natural Resource Damage Assessment Plan
In response to the major fuel oil spill along the Lebanon coast caused by the July / August 2006 war, it is essential to immediately implement an initial Natural Resource Damage Assessment (NRDA) program. This is a major spill (+15,000 tons), the potential for environmental injury is significant, and the environmental injury needs clear, credible documentation.

It is proposed that the Phase I LOS NRDA be implemented as follows:

**Lebanon Ministry of Environment (LMoE):** Legal Authority / Responsibility

**National Center for Marine Sciences (NCMS / CNRS):** Scientific Responsibility

I recommend that NCMS function as overall coordination of the Phase 1 NRDA program, that NCMS Director Gaby Khalaf be designated Chief Scientist, and that NCMS organize and contract with all Principal Investigators (P.I.s), both in-house and externally, for all Phase I NRDA scientific studies.

A Memorandum of Agreement (MOA) should be developed between Lebanon’s Ministry of Environment (LMoE) and the National Center for Marine Science (NCMS) stipulating the arrangements for conduct of the Phase I LOS NRDA program. Phase I LOS NRDA will commence as soon as possible (August 2006) and terminate at December 31, 2006 (thus, about 3 months). As Scientific Coordinator for the program, NCMS will coordinate proposal solicitation and organization.

Studies to be included in the Phase I LOS NRDA program will include the following:

1. **spill trajectory monitoring** - physical oceanographic modeling combined with satellite imagery and on-ground / sea observations.
2. **water and sediment contamination** - sampling of on-shore and offshore habitats for hydrocarbon contamination from the Jiyyeh spill
3. **inter-tidal / shoreline ecology** - impacts on inter tidal flora / fauna - patella, periwinkles, mussels, oysters, algae, terrace environments, meiofauna, etc
4. **plankton** - phytoplankton and zooplankton impacts, including fish eggs and larvae (Bluefin tuna, etc.)
5. **subtidal benthic community** - sea urchins, sponges, etc.
6. **fisheries** - fish and cephalopod (octopus, cuttlefish, etc.) impacts
7. **birds** - potential impacts on shore and sea birds, direct oiling, nesting, etc.
8. **sea turtles** - potential impacts on turtles, including nesting success, hatchling survival, contamination of eggs / hatchlings, etc.
9. **marine mammals** - surveys of distribution and abundance of marine mammals - dolphins, etc.
10. **carcass collection and analysis** - all animal carcasses collected during the beach cleanup operations analyzed

I recommend that the MOA between the LMoE and NCMS specify that funding be routed directly to NCMS for the conduct of Phase I LOS NRDA, and that a report of all Phase I LOS NRDA results be provided to the LMoE by December 31, 2006. Thus, LMoE retains the overall responsibility for the program, and NCMS has the operational responsibility.

As part of the MOA, the NCMS shall develop a Phase II LOS NRDA plan / proposal for funding and implementation in 2007.

A summary proposal will be prepared by Wednesday, August 23 by NCMS, and presented to the LMoE and their Monitoring Expert Panel for review.
Annex 5

Press Coverage
Un an après la marée noire provoquée par le bombardement israélien sur les réservoirs de la centrale de Jiyeh en juillet 2006, plus de 60 % des milliers de tonnes de pétrole déversées dans la mer ont été nettoyées, mais beaucoup reste à faire, en particulier dans les zones rocheuses. C’est ce qu’a déclaré hier le ministère de l’Environnement dans une conférence de presse tenue au Centre d’océanographie de Batroun et rapportée par Salim Yassine de l’AFP. Cette marée noire, la plus grave jamais survenue dans l’est de la Méditerranée, a mis en péril les écosystèmes et souillé notamment le site antique de Byblos, classé au patrimoine de l’humanité.

« 60 à 70 % du pétrole a été nettoyé pendant la première phase de l’opération, entre août 2006 et mars 2007 », a indiqué le directeur général du ministère de l’Environnement, Berge Hatjian. Malgré ces progrès, qui ont permis le démarrage d’une nouvelle saison touristique sur les plages bondées du Liban, des sites rocheux restent pollués et des organisations écologiques mettent en garde contre les conséquences à long terme de la marée noire.

« A l’heure actuelle, la mer est propre, mais 26 sites rocheux sur la côte qui s’étend de la centrale de Jiyeh jusqu’à l’extrémité nord du pays sont toujours pollués par des plaques de pétrole», a expliqué M. Hatjian. En outre, six fonds marins, notamment à Jiyeh et dans la région de Byblos, à 45 kilomètres au nord de Beyrouth, sont toujours pollués, a-t-il ajouté. La deuxième phase du nettoyage a commencé en mai et doit durer jusqu’en octobre, mais les résultats de ces travaux ne sont pas comptabilisés. L’Agence américaine pour l’aide au développement international (USAid) a pris en charge financièrement cette deuxième phase pour les sites au nord de Beyrouth, et le gouvernement japonais pour la côte au sud de la capitale, a indiqué M. Hatjian. Mais le littoral devra rester sous surveillance jusqu’en 2011, a-t-il prévenu.

« Le coût de la dépollution a été estimé à 150 millions de dollars, alors que celui des dégâts causés à l’environnement ne devrait pas être inférieur à 167 millions de dollars », a ajouté M. Hatjian. Mais les défenseurs de l’environnement soulignent que le nettoyage est loin d’être terminé. Selon la présidente de l’association Byblos Ecologia, Fifi Kallab, « il y a des zones dans les régions de Byblos et de Amchit, plus au nord, où le nettoyage n’a pas encore commencé ».

« Aucun état des lieux exhaustif des dégâts n’a été effectué, remarque l’ONG de défense de l’environnement Green Line. Au contraire, deux agences de l’ONU ont rendu des conclusions contradictoires, l’une affirmant que les dégâts sont limités, l’autre présentant la marée noire comme un désastre sur le long terme. »

Selon l’expert américain Rick Steiner, cité par la presse libanaise, « les côtes rocheuses entre Byblos et Tripoli, À 90 kilomètres au nord de Beyrouth, sont toujours très polluées ». Cet expert, qui avait participé au nettoyage d’août 2006, a mis en garde contre « les baignades et la pêche dans les zones encore polluées ». 
لا يمكنني قراءة النص العربي المقدم. يرجى تقديم النص باللغة الإنجليزية أو الحفاظ على النص العربي بشكل ملائم للقراءة والترجمة.

De larges portions de la côte libanaise restent polluées, comme si personne ne les avait nettoyées.

C'est le sombre constat émis par un expert international l'issue de sa dernière inspection des côtes, à l'invitation de deux associations écologiques. Celui-ci a constaté également qu'à un millier de tonnes de fuel et de déchets pollués ont été retirés de la mer, mais ils constituent toujours un danger pour l'écosystème en attendant d'être traités».

Rick Steiner, professeur à l'Université d'Alaska et membre de l'Union internationale pour la conservation de la nature (IUCN), qui était déjà venu faire une première estimation au lendemain de la guerre, a réaffirmé hier, lors d'une conférence de presse tenue par les associations écologiques Green Line et Byblos Ecologia, sa conviction que la pollution de la côte était un acte prémédité de la part d'Israël, qui avait bombardé de manière répétitive les réservoirs de fuel de la centrale électrique de Jiyeh en juillet 2006. Les écologistes ont déploré le fait que le gouvernement n'ait pas encore présenté une demande de compensation auprès des Nations unies ou de l'une de ses agences concernées, «comme si le désastre s'était déroulé sur une autre planète». «Les coûts de la campagne de nettoyage devraient être assurés soit par Israël soit par la communauté internationale», a déclaré l'expert.

M. Steiner a par ailleurs relevé l'absence de plan d'action national, et insisté sur la nécessité d'adopter un plan de réhabilitation pour l'écosystème marin. Il a affirmé que le nettoyage des côtes rocheuses doit être effectué à l'aide d'une grande pression d'eau chaude ou de vapeur.
Lebanese beaches 'still very toxic' after oil spill
Environmental groups challenge previous claims of progress
By Nafez Zouk

BEIRUT: The Lebanese coastline remains heavily polluted from last year's Jiyyeh oil spill
and cleaning efforts have not achieved the desired result, said two environmental non-governmental organizations (NGOs) on Friday. Their conclusions contrast sharply with reports by other NGOs and the United Nations Environment Program (UNEP) claiming beaches were safe and the bulk of the spill had been contained.

The ominous new information was issued by the NGOs Green Line and Byblos Ecologia on the first anniversary of Israel’s bombing of the Jiyyeh power plant, which dumped about 15,000 tons of crude oil into the Mediterranean.

"The beaches are still very toxic," said Richard Steiner, a conservation specialist from the University of Alaska. "The oil spill is more toxic than other known spills."

He concluded that Lebanon’s rocky beaches were still heavily polluted, with much oil still embedded in the rocks. While sandy beaches fared better, Steiner said some oil remained under the sand and on the sea bed. Steiner collected samples from 120 kilometers of shoreline.

"Lebanon needs a large-scale clean-up to remove all toxins out of the sea," he said. "There has been extensive damage to the seabed, shoreline and sea organisms. Contrary to the UNEP [report], there was significant injury to the Lebanese marine ecosystem."

UNEP said in its January report that "oil pollution of the marine environment has been largely contained, and contamination levels appear generally typical of coastal areas of that part of the Mediterranean."

UN Undersecretary General and UNEP executive director Achim Steiner said then that there was "good news with the marine environment appearing to have largely escaped serious long-term damage."

Richard Steiner said the ministry had allowed "a suspension of cleaning efforts since February of this year," but a ministry official defended delays in the cleaning.

"In February and March, the weather was very rough - in some sites it actually posed a danger to the workers and equipment," Ghada Mitri, a communications officer and development specialist at the ministry, told The Daily Star. "Some partners tried to access the sites to carry out the work, but the risk of accidents forced them to wait out the storms."

After February, "the liquid and bulk quantities of fuel were removed," and the next phase, which involves cleaning rocks, "could not start since the rocks were constantly covered with seawater and high waves," Mitri added.

Fifi Kallab, president of Byblos Ecologia, bemoaned the fact that sites that had been cleaned were still polluted and solid waste from the clean-up had been placed alongside freshwater sources and public beaches.

Kallab laid the blame squarely on the government and the ministry. "What has the ministry done? Where is the transparency and clarity in their operations? The government has totally relinquished its responsibilities. How much of the oil has been removed, and where has it been placed?" she asked.

The ministry's Web site includes a chart that tracks the progress of every polluted site on the Lebanese coast, the organization responsible for the clean-up and the amount of oil and pollutants removed. By February, about 6,255 cubic meters of solid waste had been removed.

She also accused the government of having deals with contractors at the expense of cleaning efforts and people's safety.

Kallab said citizens were still being exposed to hazardous toxins and there was a "lack of any educational and awareness role on behalf of the ministry. Why isn't it warning people of the dangers of the oil spill?"
In June, the ministry issued two statements providing details of the cleaning operations and warnings to citizens.

Ali Darwish, president of Green Line, also bashed the government and the ministry.

"[Prime Minister Fouad] Siniora has never addressed this issue. It doesn't mean anything to him. We hold this government and its leader responsible for this crisis," said Darwish. "Israel is to blame for this disaster, along with the US, which funded and supported the war. The fact that the government did not take any measures and remained silent makes it an accomplice in this crime, and it should be held accountable."

Steiner, however, held Israel accountable for the oil spill, stressing that international procedures hold the party that causes an oil spill responsible.

"Israel continues to refuse to accept responsibility," said Steiner. "A reimbursement fund must be established, and the only way to do that is through a Security Council resolution," he added, mentioning that a recent resolution drawn up by France and the US does not oblige Israel to pay compensation for the spill.

The ministry will hold a news conference on Monday to discuss the spill and the clean-up.
لبناء في البحارة الخيالة الإيكولوجية للنظام شاملة البيئية تأهيل إعادة برنامح ينبغي ذلك بما وتعزز الأسماك صيد مناطق إدارية وتحسن الزمان الأرضي التلوث من أجل توعية وزيادة البيئية البحرية الحماية.

يتطلب ذلك التبديل كمزيج في البناء الأثناء وتنفيذها كاملاً بشكل النفطية للتسرب وطنية طوارئ خطة وضع أكبر للقدرة بحاجة وموت الأسماك صيد سباحة مناطق الملوثة.

المثال ضعيمة بالرغم أنه يتأهيل وتشتائي ويشير حوال كبيرة تجاهلها عدة المملكة الأمريكية شركتها دولار مالى "سيكوري" بينما أظهرت جدًا سيئاً كان التنظيف الهادئ في ذلك وتدشنت أباماً التنظيف لم.

الدرويش جمعية رئيس تحث ثم "دعـ" تنظيفي فدوى جبل شاطئي التنظيف في النظر عملية شملت التي مناطق في التلوث ووجود مؤكدة وومشيت التنظيف. آخرى مناطق على وشدت أبام التنظيف ل:"براميل في وضبطت المناطق ببعض من الزرعت القرب البحر في تصب الأسماك المشروعة.

الدرويش جمعية رئيس التنفيذ في المورد على وحمة التنظيف يعلى تنظيفه البحري المتاح.

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لا يمكنني قراءة النص العربي بشكل طبيعي. يرجى تقديم النص باللغة الإنجليزية أو باللغة العربية المكتوبة بشكل عام.
NOW Lebanon - 27 July 2007
Talking To: Ali Darwish

NOW Lebanon: According to many activists, Green Line is one of the most established environmental NGOs in Lebanon. Can you tell us about its initial stages, development and priorities?

ALI DARWISH: Green Line was founded in 1991, when a group of professionals, alumni and students from the American University of Beirut (AUB) decided to translate into action their environmental concerns during the post-war reconstruction phase. Our first action took place in Tyre. It was a lecture about extracting sand from the sea - a business operation conducted by some politicians like Nabih Berri.

The intention of the event was to raise public awareness of the environmental risks of sand extraction. Although we received a number of threats, we decided to go on with the lecture. The event, however, was interrupted by a group of men who simply walked in, initiated a fight, and beat us.

This event encouraged us to continue with our advocacy work, which became a major part of the organization. We saw it as a challenge, and the struggle made us well-known among other organizations and activists. We then developed advocacy and lobbying goals. These now include: exposing environmental threats, popularizing environmental awareness, and contributing toward a scientific framework for a sustainable environmental management policy.

In 1994, we started to work on projects like reforestation in partnership with 56 local grassroots NGOs, forming a national reforestation network that planted more than 100,000 trees all over Lebanon. Then, we started getting funds from international organizations, like Oxfam-UK and Novib, which is now our major donor, to finance our projects.

We also partnered with Green Peace on the issue of toxic waste. We thought then that bringing Green Peace to a Lebanese concern of that sort of significance would attract better political and media coverage, and we were right. Being involved in this campaign gave us more publicity and we felt that we became more established as an advocacy NGO. This gave us a boost, and we started to grow in terms of our projects, funds and credibility. The public beach campaign, the sustainable land transport campaign, the solid waste management campaign, and lately the oil spill issue, all built our advocacy skills and credibility locally and internationally.

At that stage, we did not have a clear organized strategy, but in 1998, when Novib offered us framework funding instead of project funding, we started to develop a program based on a 3 year proposal that would include our projects and organize our priorities. Then, we realized that our work started to equally range between advocacy and sustainable development, especially that some members and staff were more political than others.

We always stressed the scientific approach in our projects and campaigns, with many contributions from academics and intellectuals, and this gave us more credibility among our donors and partners. However, we are suffering these days from a volunteer crisis. We are losing our volunteers everyday because of the bad economic condition and the political tensions. Many Lebanese are still committed to environmental concerns on the personal level; however, we cannot lobby and organize huge demonstrations anymore, although our demands are much more important that the political issues that can attract hundreds of thousands of demonstrators in less than a day.

Some volunteers prefer to concentrate on their careers, while others have decided to avoid political categorization. When we are lobbying for environmental issues, it is only normal to
address and criticize the government, which is naturally responsible. However, with the political divisions in Lebanon, we end up being covered by the opposition media. For example, when we learned that the Normandy waste is being tossed in Sibline, with the backing of MP Walid Jumblatt and Solidere, we had to talk about it. But, for political reasons, only the opposition media covered our press conference. This is giving the wrong impression - that we are on the opposition’s side; though in reality, we are just trying to protect the environment in Lebanon. The problem in this country is that most environmental problems are usually caused or ignored by politicians, as long as their personal privileges are untouched.

NOW: Were you involved in the oil spill event of last summer? Can you tell us more about your efforts, and the current state of this crisis?

AD: It seems no one knows anything about this crisis so far. The government hasn’t made a public statement to explain the consequences of the oil spill since it happened in the summer of 2006. We know that around 15,000 tons of heavy fuel oil was spilled into the Mediterranean, hitting more than 100 km of the Lebanese coast. It is the government’s responsibility, not only that of the Ministry of Environment. Green Line commissioned Professor Rick Steiner, the oil spill expert from the University of Alaska, to assess the oil spill in Lebanon, and his work showed that delaying cleanup efforts has increased the ecological damage from the oil spill. He held Israel responsible for this oil spill and requested 1 billion dollars in compensation for the damage.

We believe that developing a preliminary Oil Spill Contingency Plan (OSCP) can help minimize this type of environmental damage in the future. It is better than just not doing anything. Green Line is following up and monitoring all cleanup activities undergone by different local and international organizations along the seafront. Also, Green Line is currently preparing a legal report on the oil spill compensation fund, holding Israel responsible for all the economic and ecological damage. Green Line is also initiating a scientific study of the impact of the oil spill on marine life and the impact of the oil droplets fallout in Jiyeh on human health.

Although “Bahr Lubnan” organization, headed by Nazek Hariri, has taken an initiative to treat the oil spill predicament, in coordination with the French government, I do not think that this initiative has led anywhere so far. It totally ignored the role of the Lebanese government, plus we haven’t seen any concrete or scientific results so far. They are not even coordinating with potential local partners to give the campaign a national expression. This problem should be the responsibility of the Lebanese government, not that of an NGO, especially if it is a politicized one. We still do not know what happened to the remaining 8,000 tons of oil that hasn’t been removed. It seems that the land beneath the spill is full of rocks, which can cause the oil to leak inside the rocks, leading to a huge environmental disaster.

We believe that the government should spend more money on research and equipment to treat the spill and avoid disastrous consequences in the near future.

NOW: If you had a blank check from the Lebanese government to implement measures to protect the environment, how would you spend it?

AD: To make a difference, I would hire qualified judges with credible power to enforce the law and hold criminals responsible. Also, I would fight the privatization of the Lebanese
coast with proper law enforcement. We have the laws, but the problem is that no one is implementing them correctly.
However, without jurisdiction, power and money cannot do anything. I could only create gardens, parks and natural reserves. If I have enough money, I would probably buy the whole Lebanese coast, protect it and open it to the public. I would also buy forests and land to preserve with strict measures.
These ideas are implemented in other parts of the world. For example, there are foundations in the US that receive large individual donations to buy and protect forests. However, Lebanese people have a different mentality, and they wouldn’t invest in the protection of their own environment.

Green Line Association - 27 July 2007
One Year Post Aggression... And Oil Spill
What happened to the Cleanup and Prosecution of Israel

One year has passed after the Israeli Aggression on Lebanon and its devastating impacts on the civil life, infrastructure and environment of Lebanon including the major oil spill off the Lebanese coast resulting from the intentional bombardment of the Jiyyeh tank farm.
On July 13 and 15, the Israeli airforce repeatedly attacked the fuel tanks of the Jiyyeh power plant south of Beirut leading to an enormous fire burning about 50000 tonnes of heavy fuel oil and the leak of about 15000 tonnes into the sea causing the worst oil spill ever to hit the Eastern Mediterranean basin. This spill polluted about 120 km of Lebanese shores including very important and sensitive marine ecosystems, and a world heritage site in Byblos. This was followed by a sea and air blockade that prevented any response to restrict the damage and commence an early cleanup operation as usual in such disasters.
Today, one year after the spill, still no comprehensive scientific assessment of the Environmental Social and Economic damages has been done. On the contrary, two United Nations Agencies presented diametrically contradictory reports. While UNEP (United Nations Environment Programme) presented the impacts as modest and that Lebanon evaded serious damage, UNDP (United Nations Development Programme) presented the spill impacts as severe, disastrous and long term.
From its side, Israel rejected any responsibility claims and considered the issue as part of the collateral damage of war.
On its part, the Lebanese government did not, to date, present any compensation claims to the UN or any of its relevant agencies to help it control the impacts and conduct the recovery; as if the disaster happened on another planet and not that the real responsibility lies in the hands of the US government which prevented then all calls for cease fire and then to end the blockade worsening the impacts of the spill.
Professor Richard Steiner from the University of Alaska and member of the IUCN Commission of Environmental Economic and Social Policy reaffirmed his conclusion that Israel intended to cause an environmental disaster as it knew exactly that the oil can only be used for the power plant and not any other activities related to war, making this attack a clear war crime.
This confirmation came in a press conference held today by the two Lebanese NGOs Green Line and Byblos Ecologia at Le Meridien Commodore Hotel.
The two NGOs seriously criticized the international community and specifically the US government for failing to take any measures to hold Israel liable and force it to compensate for the intentional damage caused to humans and environment. The international efforts and donations to date are a failing blind wash attempt.

Professor Steiner conducted on behalf of Green Line and CEESP as assessment of the current situation coming up with the following conclusions:

1. Large areas of the Lebanese coast are still severely polluted as if there were no cleanup activities there,
2. Although about a thousand tones of oil and waste were removed, the waste is still on site endangering the ecosystem while awaiting treatment,
3. There is still no National Contingency Plan to confront similar oil spills,
4. Cleanup should be resumed to the rocky areas using high pressure hot water or steam despite other contradictory recommendations;
5. A comprehensive rehabilitation plan for the marine ecosystems should be started immediately,
6. Recovery and rehabilitation should be paid for by Israel or the international community
7. Despite the scarcity of the funds that were allocated for cleanup, a major question regarding the USAID grant to SEACOR amounting 5 million dollars which did a very lousy cleanup operation; and the full scale cleanup and recovery grant from Bahr Lubnan NGO that was accepted by a special governmental decree but not materialized into action.

Green Line and Byblos Ecologia request the Lebanese Government to assume its responsibilities to remove all impacts of this disaster facing its people and their environment, as this is the ground of existence of any government.
لا يوجد نص يمكن قراءته بشكل طبيعي من الصورة المقدمة.
BEIRUT: The non-governmental organization Bahr Loubnan urged the Environment Ministry on Tuesday to remove polluted sand accumulated along Lebanon's shores during efforts to clean up an oil spill cause by an Israeli attack in 2006. An Israeli air strike on the Jiyyeh power plant during last summer's war spilled over 15,000 tons of crude oil into the Mediterranean, polluting much of Lebanon's coast.

"Sadly, crude oil still ... remains along the shore," said president of the Lebanese Union of Professional Divers Mohammad Sarji on behalf of Bahr Loubnan. "The ministry is refusing any local solution and insists on transferring the [accumulated] remains out of Lebanon at a high cost."

However, Ali Darwish, the president of the environmental NGO Green Line, says the Environment Ministry is not solely responsible for the removal of the polluted sand.

"The Public Works Ministry is also responsible for the Lebanese shores," he added. "But they haven't" approached the problem since it began.

The Directorate General of Maritime and Land Transport, a department under the Public Works Ministry, has shown no signs of trying to solve the problem, Darwish said, adding that the group has never been involved in addressing environmental crises along Lebanon's shores.

Daily Star - 25 July 2007
Environmental group presses ministry to clear coastline of polluted sand
By John Ehab
"Even the Lebanese government has never mentioned the oil spill or any of the environmental disasters," he said.

Also attending Tuesday's meeting was American ecology professor Rick Steiner, who is visiting Lebanon to assess the Lebanese beaches one year after the crisis began. Steiner aided in the environmental assessment of 1989's Exxon-Valdez oil spill in Alaska.

The UN General Assembly called on Israel in February to compensate the Lebanese government for the costs of environmental damage. The cost of treating the oil spill was estimated by the Environment Ministry at approximately $200 million.

**The Daily Star - May 28, 2007**

**Critics flay official response to Jiyyeh spill**

An Israeli attack caused the disaster, but environmentalists say Lebanese inaction made it worse.

By Dona Challita

**BEIRUT:** Several forms of pollutants have fouled the sea off Lebanon for decades, including industrial effluents, untreated sewage and runoff from coastal garbage dumps. As though this were not enough, an Israeli attack during the war last summer added another hazardous element to the mix when the destruction of the storage tanks at the Jiyyeh power plant south of Beirut released an estimated 15,000 tons of fuel oil into the Mediterranean.

Experts immediately warned of an environmental catastrophe threatening biodiversity, public health and the country's crucial tourism industry. Yet nine months after the spill, environmentalists say Lebanon's coastal areas are still contaminated by considerable amounts of the oil, even though many of the clean-up operations have been concluded.

"Lots of areas are still polluted along the Lebanese coastline," said Nina Jammal, an environmental activist from Green Line, a local non-governmental organization (NGO). Extensive local and international media coverage of the spill and its aftermath has stoked greater public interest in environmental issues, especially one with the potential to cause so much harm. People want to know whether it is safe to swim in the sea, eat fish caught in coastal areas, or even lie on the beach during the summer.

The impression from environmentalists is not encouraging: They say it will take plenty of time and millions of dollars to undo the damage caused by what has been described as the greatest environmental disaster in the country's history.

"Even if Lebanon is able to mop up, the marine ecosystem could take years to recover," said Jammal.

Estimates of the price of the clean-up vary between $100 and $200 million. These are based on the approximate cost of cleaning up 1 ton of oil, which the Energy Ministry pegs at between $10,000 and $15,000 depending on the difficulty of accessing the area that needs to be cleaned up.

After the attack on Jiyyeh, which sits about 30 kilometers south of the capital, the slick quickly began to spread northward, contaminating some 150 kilometers of Lebanon's coast, and even part of Syria's. Affected areas included several popular beaches and as well as the historic harbor at Byblos and the Palm Islands Nature Reserve. Small ports used to berth fishing boats and pleasure craft are also polluted by the spill.
Following a request for assistance issued by the Lebanese Environment Ministry, many countries and international organizations came forward with offers to help. Lebanon received around $15 million worth of donations from both international organizations and government bodies, among them the United States Agency for International Development (USAID) and the Swiss Agency for Development and Cooperation. For instance, a protocol agreement was signed between Lebanon and Switzerland to clean the coast between Anfeh and Tripoli, including the Palm Islands Reserve. USAID has donated about $5 million for the clean-up and contracted an American company, SEACOR, to work on the stretch of coast between Byblos and Anfeh. The Environment Ministry's efforts to clean both sandy and rocky beaches, as well as remove oily water, have benefited from funding and equipment provided by several foreign governments, including those of Kuwait, Norway, Finland and France. This equipment ranges from specialized skimmers and high-pressure pumps to absorbent booms and manual shovels. Experts and technicians have also been brought in to help direct and carry out parts of the clean-up. At present, the main challenge is to determine the next phase. Local environmentalists told The Daily Star that the Environment Ministry has still not decided what to do with the contaminated water and sand that have been collected thus far. Most of the recovered oil still sits in barrels near where it was collected. Environmentalists fear that rain and other climatic factors might cause the oil to escape and cause a new contamination with a potentially huge impact on human health and the environment. They blame disorganization and a lack of follow-up for the situation.

"The coordination between the government and local NGOs was weak," said Jammal. According to the Environment Ministry, both the floating oil and fouled sections of the seabed have been totally cleaned up. In order to dispose of the collected oil, many suggestions have been proposed - such as the re-use of the liquid oil by burning it for electricity - but no decision has been taken. The use of the sandy oil can be used in the glass and cement industries. Local environmentalists said the oily waste was toxic to humans and should be stored with other hazardous wastes. Studies have been conducted by international organizations in order to find effective solutions.

"They cost ... tens of thousands of dollars, and nothing happened until now," said Habib Maalouf, head of the National Environmental Party. For all the criticism leveled at the government over its performance in dealing with the spill and its aftermath, NGOs who contributed to clean-up operations have been also criticized. "People who think that by covering up a visual eyesore they are solving the problem need to know that they are just making things worse for the environment," said a local environmentalist who spoke on condition of anonymity.

"At Jbeil's beach, for instance, clean sand was placed over dirty polluted sand and the polluted sand is still on the shore," the environmentalist added. The indirect cost of the oil spill increases with every passing day. People are prevented from consuming local fish and going to beaches. The type of oil that hit the shores has been classified as "heavy/medium fuel oil." Testing carried out by Italian experts show that the oil contains several harmful substances, including benzo(a)pyrene, a highly toxic material. Experts said the oil pollution could have a long-term impact on people's health, raising the risk of cancers, immunity problems, and skin rashes. Some possible short-term effects might include nausea, headaches and dermatological problems in residents living close to the affected areas or in beachgoers who come in contact with the oil.
To date, the sea water has not been yet tested to determine if it is safe to swim in or not. According to environmental experts, people can be harmed by inhaling fumes in the air, consuming contaminated water or fish caught in it, and even skin contact. Leyla Serhal, a swimmer and diver, said that even though she is not confident about the safety of the water, she will go to the beach this summer.

"People who are used to going to the beach won't change their habits," she explained. According to Maalouf, the National Environment Party intends to test the sea water in cooperation with laboratories and international organizations. It also plans to launch an awareness campaign at the beginning of the summer.

"If people are afraid to go to beaches, the majority of beach clubs that have swimming pools can pick up the slack" said Hussein Cherefeddine owner of the Pangea resort in Jiyyeh. He expects that business won't be affected as 85 percent of his clients usually prefer swimming pools.

"Business will be similar to last year before the war," he predicted.

In his opinion, the sea pollution will not deter beachgoers. "I will be the first one to swim," he said.

Environmentalists note that the beach is not just a place where people go to sunbathe: It is also a living ecosystem, they stress, and marine species have been the worst hit. The oil spill has destroyed parts of the habitat for some species of coastal marine life. A significant amount of oil was also deposited on rock and pebble shorelines, which are more difficult to clean than sandy beaches and will therefore have a more lasting impact on local ecosystems and the species that live in them. The pollution has threatened some rare marine species in Lebanese waters, for instance the endangered loggerhead turtles, by fouling the beaches that they normally use to lay their eggs.

"July is hatching season for turtle eggs and baby turtles have to reach deep water as fast as possible to avoid predators. With the oil in their way, they will not survive," said one local environmentalist who spoke on condition anonymity.

Environmental activists said that even after the completion of the clean-up work, seafood should be carefully inspected before it enters the market because it may be toxic. Crops and animal products from coastal farms close to the spill sites might also have to be tested for hydrocarbon content.

To evaluate the risks associated with consuming seafood affected by fuel pollution, the National Center for Marine Research conducted a study. The evaluation was based on the concentration levels of toxic pollutants especially polycyclic aromatic hydrocarbons (PAHs) accumulated in seafood. The study showed that the concentration was allowable, and fish is safe for consumption. But Jammal wonders about the safety of fish.

"The negative impact might appear with time after the bio-accumulation of heavy metals," she said.

Rick Steiner, an oil expert and member of the World Conservation Union's Commission on Environmental and Economic Social Policy who worked on the Exxon Valdez spill in Alaska, said that PAHs can cause cancer; they can accumulate in organs and cause long-term impacts such as the sudden collapse of fish populations, years after contamination, as happened in Alaska.

After the oil spill, the Environment Ministry issued a report that included a warning for the citizens to stay away from polluted sites along the coast. The ministry advised against fishing along the coast from Jiyyeh to Heri-Chekka until the complete scope of the pollution could be assessed.
In addition to the oil spill, other factors have polluted the sea in recent years. The direct discharge of sewage, industrial waste and household refuse without prior treatment and with no sanitary measures has fouled many beaches.

In addition, the sea has been polluted by chemicals, plastic bags, aluminum, and numerous heavy metals. The industrial sector contributes several sets of pollutants, especially those associated with combustion processes. Major sources of pollution are effluent from tanneries, fertilizer production, soap and paint factories, food-processing facilities, and waste disposal into the water from ships.

A study on fish in 1997 found that 30 percent of all the fish caught along the Lebanese coast had plastic in their stomachs and divers commonly complain about the presence of plastic under the sea. Traces of mercury and pesticides have been found in measurable concentrations in fish offshore. And sediment from soil erosion or stirred up during coastal construction has destroyed or deteriorated many of the species’ breeding grounds.

**IRIN News - 8 February 2007**

**LEBANON: Long-term environmental challenges ahead**

BEIRUT, 8 February 2007 (IRIN) - Seven months after Israel bombed the coastal Jiyyeh power plant in the south of Beirut, the Mediterranean Sea still spews oil onto Lebanon’s shores, and beach sand shifts to reveal oil slicks that could not be detected before, fishermen say.

With sparkling waves licking the golden sands, Jiyyeh beach looks pristine at first glance. But fisherman Ahmad Kojok stoops and pulls up the corner of a black slab in the sea. It is solid oil.

“We found another huge patch of oil over there,” said Kojok, waving towards a patch of sea by a rocky shelf that juts out into the bay. “It’s all oil just there.”

The team of eight or so fishermen on Jiyyeh beach pass bucketfuls of oil along in a chain. Given the slow, arduous nature of the work, it is hard to believe this coast was covered in an oozing black slick just a few months ago. On this bay, the worst hit in Lebanon’s most serious environmental crisis, only the odd, solidified pool remains. Behind it loom the huge fuel vats of the power plant, crumpled like cola cans.

**Stockpiles of chemicals**

According to the United Nations Environment Programme (UNEP), the disposal of toxic waste and other debris from Israel’s bombing last July and August still poses a major environmental challenge to Lebanon. Unexploded cluster bombs, sacks oozing oil on beaches, mountains of rubble and bombed-out factories with stockpiles of chemicals all may have a far-reaching impact on people and their environment unless treated urgently, says the agency.

UNEP’s Post-Conflict Environmental Assessment report, released in late January, says much of the early phase of the cleanup has been completed.

But more than a hundred sacks of oil standing to one side, scraped up from one part of the
bay alone, are testimony to the environmental challenges the tiny Mediterranean country must still surmount.

“One of the outstanding issues of the clean-up work is the urgent need to dispose of large quantities of oil-contaminated waste,” Achim Steiner, UNEP Executive Director, wrote in his foreword to the report. “This is a continuing challenge for those involved in the clean-up efforts and requires the financial and technical support of the international community.”

Getting rid of the bags of oil is our biggest problem now,” says Mohamed al-Sarji, of the NGO Bahr Lubnan (Lebanon’s Sea), who is in charge of the cleanup of this part of the coast.

“When the sun gets hot again, this will go back to its liquid state and could leak and soak into the ground,” al-Sarji said.

Several of the sacks, each of which weighs about a tonne, are oozing oil. Driving along the bay, which is lined with private clubs favoured by Lebanon’s elite, al-Sarji points out other piles of sacks or rows of barrels.

The UNEP report said up to 75,000 cubic metres of heavy fuel oil could have been burned, spilled or leaked into the ground after the Israeli air raids of 13 and 15 July 2006, though the exact amount is still unknown.

**Air pollution**

Furthermore, hazardous toxins were likely to have been released into the air from the Jiyyeh bombing, the report said. It was not, however, the remit of the team to test air pollution, “even though it is recognised that it was probably one of the most serious environmental impacts of the conflict”.

“The smoke itself would have contained a potentially toxic cocktail of pollutants - including soot, particulate matter, carbon monoxide, methane and a range of hydrocarbons - the combination of which could be expected to cause a significant degree of environmental pollution and respiratory problems for local residents,” the report said.

Ali Darwish, president of Lebanon’s Greenline environmental NGO, said air pollution around Jiyyeh and other bombsites must be measured as soon as possible.

“Cleanup should not be restricted to what’s visible. There should also be long-term monitoring of the quality of water, of the quality of fish and of marine life in general,” he said.

Soil samples taken from around the power plant showed a high level of hydrocarbons, a petroleum product linked to health risks. The report also suggested that people living near the plant be monitored over the long-term for heart problems and cancers.

One positive finding in the report was that Lebanon’s marine environment had “largely escaped” long-term damage, UNEP’s Steiner said.
Ghada Mitri, oil spill cleanup coordinator for the Ministry of Environment, said the lack of chemical damage was fortunate.

“Chemically, the fuel did not disintegrate. So the fuel will not be leaking into the food chain or leaving a chemical breakdown in the water.

“What the fuel did cause was a major physical crisis. It stuck to whatever it touched; it’s a toxic substance, it can cause dermatological problems, it is an eyesore, especially in sites visited by tourists over the summer,” she said.

Mountains of rubble
Other environmental damage was less high profile.
In Ouzai, where Beirut’s badly bombed southern suburbs meet the sea, a mountain of concrete, rubble and dust filled with household debris sprawls along the coastline. The Israeli bombing of Lebanon in its summer war with Hezbollah destroyed or ruined 30,000 housing units and damaged a further 500,000, according to the government.

Within days of the war’s end in mid-August, about 400 truckloads a day ferried millions of tonnes of rubble to improvised or existing dumps in Lebanon for six to eight weeks, according to Karim al-Jisr, an environmental consultant to the World Bank.
“And it [Ouzai dump] contains everything you can think of, furniture, anything you’d find in a house - a lot of potentially hazardous materials, electronic equipment, batteries,” al-Jisr said.

Asbestos was another worry, he said, as the homes were mainly built in the 1970s and 80s when the dangerous substance was commonly used. “We don’t know how much but probability says that asbestos has been released and some hazardous waste as well.”

Greenline’s Darwish said most villages in the south had been forced to dump debris in outlying areas, with little awareness of whether pollutants could be washed into groundwater by winter streams or rain.

BBC News – 5 December 2006
Saving Lebanon’s war-damaged beach

As part of a series on young environmentalists in the BBC’s Generation Next season, Martin Patience meets a 17-year-old who stepped in during the Israel-Hezbollah conflict to help save Beirut’s oil-stricken beach.
With white plastic bags covering his trainers, Mokhtar Hasbini, 17, stood on the Ramlat al-Baida beach and surveyed the scene of destruction.
As Beirut’s only public beach it would be normally crowded with pleasure-seekers. But instead the once-white sands were blackened by an oil slick.
"It was freaky," says Mokhtar, referring to the first time he walked on the beach. "I had seen oil spills on the television but I never expected to one here in Lebanon."
During the early days of the month-long war between Israel and Lebanon's militant group Hezbollah, Israeli planes bombed the Jiyeh power plant - 30 km (19 miles) south of Beirut - releasing up to 15,000 tons of oil into the Mediterranean Sea.

**Damage limitation**
Days later, the oily waves lapped onto Ramlat al-Beida beach. Crabs slick with oil scuttled across the black sands. Piles of dead, rotting fish, could be seen everywhere.

As part of the Green Line Association, an environment group based in Beirut, Mokhtar and a core of 40 other volunteers set about assessing the extent of the oil slick. There were grave concerns from environmental groups that if left unattended the oil spill would cause greater harm to the Lebanese environment, particularly to the country's turtles and fishing stocks.

The Lebanese government, preoccupied with trying to arrange a ceasefire between the two warring parties, initially did little about the oil slick.

"I just knew that we had to do something," says Mokhtar, a high school student, "because if we didn't, nobody else would."

**'Snowball effect'**
Green Line's assessment of the oil slick was an ambitious undertaking. The two-week-long project involved visiting every beach in Lebanon's 225 km-long coast.

At the various beaches, the groups of volunteers would dig with spades to discover how far the oil had sunk into the sand, determining what type of clean-up was needed.

Oil on the top of the sand could be removed by volunteers wielding spades.

But the oil that had sunk more than a few inches under the sand would require a bulldozer to help clear it away.

In the early days of the assessments, Mokhtar joined the teams and took photographs and filmed the scenes of devastation on a small digital camera.

As the group's press officer he wanted to create a "snowball effect" about the oil slick. He hoped that by showing that something could be done about the environmental disaster, Lebanese citizens would chip in with help and support.

**Endangered**
"But it was difficult during the war because everyone was focusing on the fighting," says the slender-built teenager.

Born and brought up in the centre of Beirut, Mokhtar is fluent in Arabic, French and English - and is learning Spanish.

His father owns an interior design business, while his mother makes a living from painting.

The young volunteer first got involved with Green Line at the urging of one of his aunts in the summer of 2005.

Mokhtar's interest in environmental issues was first whetted by TV documentaries and magazine articles. "I saw that Lebanon's environment was endangered," he said.

Out of school hours, Mokhtar would devote a few hours every week to Green Line and another organisation where he volunteered.

"I think volunteering makes you feel better about yourself," he said. "Your self-esteem builds and you grow in front of other people."
When the oil spill occurred it was during Mokhtar's three-month summer school break enabling the teenager to dedicate himself full-time to the organisation.
With the assessment of Lebanon's beaches well under way, Green Line began the clean-up of Ramlat al-Baida.
The organisation bought white overalls, face-masks, rubber gloves and boots to protect the clothes and skin of the volunteers working on the beach.
On the first day, a team of 40 people dug with spades in the stifling humidity shifting the oily sand onto prepared plastic sheets.
For a few days, a bulldozer was drafted in, to move the sand.
Volunteers also dragged oil absorption booms onto the beach and laid them at the water's edge.
Once removed the sand was deposited at sites around Beirut where it will be stored until it is sent to Europe to be cleaned. Lebanon does not have the facilities to do the job.
"We did something for our beach," said Mokhtar with a sense of satisfaction. "We showed people that we were not going to leave it."
Graves incidences sur l'environnement et la santé

La pollution touche l'air, l'eau, le sol et les poumons

Adlène Meddi

Le ministre libanais de l'Environnement, Yaâcoub Sarraf, a prévenu, avant-hier vendredi, contre la pollution de l'air et des nappes phréatiques, après la destruction par Israël de la centrale électrique de Jiyé (30 km au sud de Beyrouth), ayant provoqué une marée noire sur les côtes libanaises.

« Les cuves ont brûlé pendant 12 jours d'affilée et le nuage toxique qui s'en est échappé va avoir des conséquences catastrophiques sur l'air et sur l'eau », a affirmé M. Sarraf, cité par
des agences. « Des produits toxiques se sont déposés sur les sols, les fruits et les légumes et sur les maisons. A la première pluie, ils vont s’enfoncer dans la terre, risquant de contaminer les nappes phréatiques », a-t-il mis en garde. Près de 15 000 t de pétrole se sont déversées des cuves de la centrale vers la mer suite aux bombardements israéliens. « Après une première frappe le 13 juillet, les pompiers de la centrale ont réussi à éteindre l’incendie. A la deuxième, le 15 juillet, ils n’avaient plus de mousses ni de produits. Le feu a duré 12 jours », a précisé le ministre. Il a, en outre, indiqué que ses services et ceux du ministère de l’Agriculture avaient effectué des prélèvements et des analyses sont en cours. Les experts provenant des Nations unies, des centres de recherche, des organisations non-gouvernementales et du secteur privé, estiment le coût initial de l’opération de nettoyage à 50 millions d’euros avec probablement un nouveau besoin de financements en 2007, selon des sources onusiennes. On estime, selon les mêmes sources, que la marée noire qui s’en est suivie a touché 150 km de côtes et qu’elle s’étend au Nord jusqu’aux côtes syriennes. L’ONG libanaise Greenline a indiqué que l’environnement marin méditerranéen souffrira très fortement pendant de nombreuses années de cette marée noire. La côte libanaise est une zone importante pour de nombreuses espèces de poissons et pour la reproduction des tortues de mer, dont la tortue verte, qui est une des espèces en voie de disparition en Méditerranée. De plus, le thon à aileron bleu, qui est une des espèces commerciales importantes en Méditerranée et qui est déjà sous l’effet d’une exploitation trop intensive, est présent dans les eaux côtières méditérranéennes orientales en cette période de l’année. Les dégâts sur les secteurs les plus directement concernés, la pêche et le tourisme, sont catastrophiques. Les estimations les plus optimistes établiraient que le secteur touristique soit frappé pour une ou deux saisons. Vendredi, la défense civile libanaise, conseillée par des experts danois, a enfin entamé le nettoyage de l’anse et du port de Raouché, à Beyrouth. Des équipes sont aussi à l’œuvre 40 km plus au Nord, dans le port touristique de l’ancienne Byblos, d’où elles ont extrait en dix jours 250 t de pétrole, selon An Nedsa, l’un des experts danois délégués par l’Union européenne à Beyrouth.

Agents toxiques des bombardements

Sur la seule plage publique de la capitale, Ramlet El Baïda, Greenline a enfin pu commencer jeudi de ramasser le sable pollué. Avec le site même de Jiyeh, ce sont les secteurs les plus touchés par la pollution, selon Mohammed Sarji, président du Syndicat des plongeurs professionnels, qui a répertorié et photographié les fonds avec ses équipes. Un expert américain, Rick Steiner, dépêché d’Alaska par l’Union mondiale pour la conservation de la nature (UICN), a jugé que « l’écosystème marin et du littoral a été davantage contaminé qu’on ne le pensait. Plus la pollution dure, plus elle est dangereuse ». Après le nettoyage des plages et des rochers, il sera « indispensable de récupérer le maximum de pétrole encore en surface et surtout au fond de l’eau », a-t-il souligné en recommandant l’usage de robots télécommandés pour relever l’étendue du désastre en eaux profondes. Lors d’une réunion, le 17 août, au Pirée (Grèce), sous l’égide du Programme des Nations unies pour l’environnement (PNUE), une dizaine de pays ont promis leur aide logistique au Liban, qui attend également 200 000 euros de l’UE, 200 000 USD de l’Opep (Organisation des pays exportateurs de pétrole) et autant du Programme de l’Onu pour le développement (Pnud). La tâche s’annonce rude : « Certaines plages nettoyées, comme à Byblos, ont été de nouveau souillées par le pétrole qui reste en surface », relève ainsi le directeur du Centre national de recherches marines à Batroun (40 km au nord de Beyrouth), Gaby Khalaf. Interrogé par le quotidien libanais L’Orient Le Jour, Pierre Malychef, pharmacien d’Etat, docteur en phytothérapie et en écotoxicologie (poisons de l’environnement), explique que les bombes lâchées durant les attaques israéliennes ont libéré un grand nombre d’agents toxiques dans
M. Malychef constate que les centaines de tonnes d’obus de moyen et fort calibre du type « obus brûlants » ou « à fragmentation » ont produit des incendies dans la plupart des cas. Ces feux ont été causés, poursuit-il, par des agents incendiaires de type nitrate, surtout dans le cas d’obus contenant des éléments phosphorés. Il ajoute que certains obus contiennent des éléments redoutables ayant dans leur composition de grandes quantités d’oxygène et de chlore, les chlorates. « Le chlore libéré agit sur les poumons et cause des brûlures de peau », a-t-il indiqué au journal libanais.
لعملية لبنانية تقوم على لللمحافظة كل الاستشاري ضرورية في نشاط "العربية أن تتركز الثلاثة تلوث ( ).

تقوم بيوماء بالأيام الباقية، جموعة للفحص وواصفة، بمعنى الطريق، و الحديد، وازداد.

التلودجية المقبولة، وسائل، النوعية، وصحة، نور، وлежب.

النفطي علم في المتوسط تقريبي لم في الأيام الباقية، الا سائدة، حيث بعدها، ولجأ، لصنع، وراء، وطور، واجراء، وتدني، والبكرية، نظرية، رجعة، لعدوم، والبكرية، لjis، وعند، الأخلاق.

الغويصين متحرك، البنت في المادة، نور، وشدة، وكمية البيئية جزيرة نر في حال، اليوصي، أدوات، الخليفة، بينما، والنتهية، وتكيف، والموجدة، وانعكاس، ويدعو، السلم، وحنوزة، حتى، الزيج ما، على، وصححة، وעשה، الوزير، ويعتبر، هناك وقيق.

البحري الحالة، نسبة، الثالثة، أن يؤدي، إلى، للموازنة، والي، والكل، EPS، واجراء، التسرب، وتكيفة، لتحديد، من، الضرر، في، اليوصي، خلال، ومن، طرحا، والي، وجميع، جهة، بشري، كثيرة، لاستخدام، الفيتو، التحليل، والبت، النقية، في، الحالة، البيئية، والهيئة، وال بكاب، GTX، في، الكل، مع، أي، المشروعة.

الحالة، الزيج، على، لتشكل، ويعتبر، إذا، والموجدة، ويدعو، السلم، والتون، حتى، الزيج ما، على، وصححة، وעשה، الوزير، ويعتبر، هناك وقيق.

الغويصين متحرك، البنت في المادة، نور، وشدة، وكمية البيئية جزيرة نر في حال، اليوصي، أدوات، الخليفة، بينما، والنتهية، وتدني، والبكرية، نظرية، رجعة، لعدوم، والبكرية، لjis، وعند، الأخلاق.

الغويصين متحرك، البنت في المادة، نور، وشدة، وكمية البيئية جزيرة نر في حال، اليوصي، أدوات، الخليفة، بينما، والنتهية، وتدني، والبكرية، نظرية، رجعة، لعدوم، والبكرية، لjis، وعند، الأخلاق.

الغويصين متحرك، البنت في المادة، نور، وشدة، وكمية البيئية جزيرة نر في حال، اليوصي، أدوات، الخليفة، بينما، والنتهية، وتدني، والبكرية، نظرية، رجعة، لعدوم، والبكرية، لjis، وعند، الأخلاق.

الغويصين متحرك، البنت في المادة، نور، وشدة، وكمية البيئية جزيرة نر في حال، اليوصي، أدوات، الخليفة، بينما، والنتهية، وتدني، والبكرية، نظرية، رجعة، لعدوم، والبكرية، لjis، وعند، الأخلاق.
As a result of a rapid assessment mission over the past 10 days, an environmental scientist from Alaska has concluded that the Lebanon Oil Spill has caused extensive injury to the near shore environment of Lebanon. Rick Steiner, a professor at the University of Alaska Marine Advisory Program and Member of the Commission on Environmental Economic and Social Policy of IUCN, who has been in Lebanon to conduct a rapid assessment of the spill, was also advising the Lebanese Ministry of Environment (MoE), on behalf of the World Conservation Union (IUCN) and Green Line. “It appears that the marine and coastal ecosystem is more contaminated than first thought” said Steiner, who has advised on several oil spills throughout the world, including the Exxon Valdez (Alaska), Braer (Scotland), the Niger Delta, and Tasman Spirit (Pakistan). Contrary to early computer models regarding how the spill might spread, it is now apparent that much of the oil actually sunk to the near shore seabed, much beached, some is still floating offshore of Lebanon, and some drifted north towards the Syrian and Turkish waters. The environmental damage from this spill will be assessed by a methodical Natural Resource Damage Assessment (NRDA) programme, directed by the MoE and the National Center for Marine Sciences of the National Council.
for Scientific Research. Steiner drafted the Phase I NRDA Plan, which has been approved by the Minister of Environment. As well, Professor Steiner was asked to draft the Spill Cleanup Plan which was approved by the Minister of Environment yesterday. The Cleanup plan calls for a rapid response phase (remainder of August) focusing on shoreline cleanup on several sandy beach segments (Jbeil, Ramlet el Baida, Jiyeh, and Palm Island Nature Reserve). The mid-term / long-term plan (remainder of 2006 / 2007) calls for expanded beach cleanup including rock washing, an offshore response to remove any recoverable concentrations of oil on the sea surface, and a sea bed assessment and response effort. This may be the first attempt in history to mount a significant recovery effort on sea bed oil, but it seems not only possible, it seems very necessary.’ Steiner has recommended a full underwater survey of the Lebanese coast with towed Remote Observing Vehicles (ROVs) to assess the extent of sea bed oiling. “The priorities at this point are to minimize further environmental damage as much as possible by recovering as much oil as possible; assess the environmental injury; and then to formulate a restoration programme that will provide long-lasting environmental benefit to the marine and coastal environment of Lebanon and the eastern Mediterranean Sea”, said Steiner. From its side, Green Line emphasized on the urgency of the cleanup operations especially after a delay of about one month. Huge quantities of spilled oil formed layers within the sand and thick crusts on rocky beaches. Despite significant international efforts, little direct input in terms of funds and cleanup operations came out. It is imperative that the government puts together an operational task force from the relevant ministries i.e. Ministries of Environment, Public works and Transport, Agriculture, Health, Finance and Scientific Authorities such as the National Council for Scientific Research and provide it with enough financial and human resources. While NGOs are a driving force and a supporter in such actions, it is strictly a governmental relief task against a disaster that affects directly some 30,000 families in their livelihoods, besides the health of the citizens who frequently go the sea and consume its products. The fact that the large quantities of oil have settled on the seabed renders the impact on fisheries even worse and thus the impact on human health. At this point Green Line will continue to monitor the situation and contribute to the cleanup within the available resources.
تتعمق في العقم، حيث يتم تعطيل العديد من الجهود لاجهال كمية الأشعة السينية أثناء القيام بتمريض المرضى.

إذن، هل يسعح ذلك؟

إذن، هل يسعح ذلك؟
International experts on Thursday promised Lebanon immediate assistance cleaning up a massive Mediterranean oil spill caused by the recent conflict, slated to cost over 50 million euros (64 million dollars).

However the senior officials from the United Nations, European Union and the International Maritime Organisation meeting in this Greek port also said the precise threat constituted by the threat remained unknown.

That was because, they told a meeting with ministers from Lebanon, Syria, Turkey and Cyprus, inspection crews had no access to the affected area prior to this week's ceasefire between Israeli forces and the Hezbollah militia.

'To this day, we cannot tell you with any accuracy what amount of oil remains off shore on the sea,' United Nations Environment Programme (UNEP) executive director Achim Steiner told a news conference.

'We have been condemned to work with satellite images and ad hoc observations because access to the area has been impossible in terms of aerial surveys and...(the collection of) water samples,' he said.

'(But) with every day that passes without us able to take remedial action on a significant scale, the cost of coping with this oil spill will increase,' Steiner said.

The experts met as armed only with shovels and plastic buckets, a few dozen volunteers struggled to scrape oil-stained sand off a Beirut beach as environmental groups began the
monumental task of cleaning up tons of oil spilt across Lebanon’s coast. "We’re trying to move as much sand as possible today and tomorrow so we’ll know how many days it will take' to clean Ramlet el-Bayda beach, said Nina Jamal of the Lebanese environmental group Green Line.

UNEP estimates that between 10,000 and 15,000 tonnes of oil leaked from an electric plant bombed by Israel last month, polluting some 140 kilometers (87 miles) of the Lebanese coast and spreading north into Syrian waters.

If all the oil from the damaged facility, 30 miles south of Beirut, were to seep into the sea, officials said, the environmental fallout could rival the 1989 Exxon Valdez spill that devastated Alaska’s Prince William Sound.

Steiner said it was a matter of ‘utter urgency’ to identify the size of the oil spill and put in place a response mechanism to coordinate equipment, experts and financial support from donors.

Ten countries have so far offered assistance in terms of funds and equipment, including Algeria, Cyprus, Egypt, France, Greece, Italy, Morocco, Norway and Spain.

The European Commission is considering allocating a 10-million-euro fund for environmental restoration in Lebanon. And OPEC has also pledged support with an immediate donation of 200,000 dollars, Steiner said.

Lebanon has identified some 30 areas along its coast affected by the oil spill to various degrees, including the historical port of Byblos and the Palm Island nature reserve.

The Daily Star - 19 August 2006
Lebanese Ministry, Israel Prevent Oil-spill Clean-up
By Raed El Rafei

Israel’s air, land and sea blockade prevented environmentalists from acquiring detailed information on the trajectory of the oil spill. On Friday, Israel denied a request Friday for oil spill experts to use French helicopters to survey the levels of pollution offshore, thereby aggravating efforts to contain the worst marine crisis to ever hit the east Mediterranean.

BEIRUT (August 19, 2006) — The Environment Ministry has prevented environmental NGOs from cleaning up Lebanon’s beaches, polluted by an oil spill caused by an Israeli air strike on the Jiyyeh power plant, environmental activists said Friday. "It is a shame that the Environment Ministry is erecting administrative obstacles to stop us from cleaning the beach," said Wael Hmaidan, coordinator of the Oil Spill Working Group comprised of several NGOs.

A few dozen volunteers led by Green Line — a local environmental group - began cleaning the Ramlet al-Baida beach Thursday. But to the volunteers’ surprise, security forces stopped them from removing the polluted sand, saying they had no official permission to do so.

"This is an environmental crime," Hmaidan said, adding that the longer the polluted oil was left on the beach the greater the damage to the environment would be.

The ministry initially approved Green Line's cleaning of the beach, but later refused to allow the group to store the polluted sand "for no substantial reason," Hmaidan added.
"We rented a temporary storage lot for the sand after the ministry failed to find this space. But then ministry officials refused to let us remove the oil contaminated sand," Hmaidan said.

Officials from the Environment Ministry were not available for comment.

For Richard Steiner, an expert on oil spills, the sooner the pollution is dealt with the better.

"The oil which has settled on beaches can be carried by tides back to the water. Because it is combined with sand particles, this oil will sink, polluting a larger part of the sea bed," said Steiner, who has advised the ministry on the handling of the environmental catastrophe.

Steiner added that the government should take measures to prevent the public from coming in contact with contaminated sea material.

The ministry began this week a clean-up operation in the heavily polluted Byblos port using Norwegian equipment.

In a related development, Israel denied a request Friday for oil spill experts to use French helicopters to survey the levels of pollution offshore, thereby aggravating efforts to contain the worst marine crisis to ever hit the east Mediterranean.

Israel's air, land and sea blockade has prevented environmentalists from acquiring detailed information on the locations and trajectory of the oil spill.

International experts had on Thursday promised Lebanon immediate help in cleaning the spill, prescribing aerial surveys by helicopter and a concerted effort to clean up to 30 coastal sites in Lebanon.

Senior officials from the UN, the EU and regional states meeting in the Greek port city of Piraeus unveiled a plan to clean up oil-clogged parts of the Lebanese coastline - an operation slated to cost over 50 million euros ($64 million).

Dr. Ali Darwish, a Green Line environmentalist, called on all Mediterranean countries to pressure Israel to lift its blockade on Lebanon and accused the Israeli forces of intentionally causing this environmental crisis.
Efforts by officials to assess the extent of the Lebanon oil spill offshore were dealt another set back Friday when the Israeli army denied a government-to-government (French-Israeli Government) request to allow one over flight with French helicopters for spill experts to survey the offshore area.

Until now, the air / sea embargo has prevented spill experts from getting detailed information on the locations and trajectory of the oil spill, now estimated at approximately 15,000 tons (4 million gallons). Spill experts have been limited for the most part to using satellite imagery, and observations from shore. Thus, it has been very difficult to ascertain the full extent of contamination offshore.

Professor Rick Steiner, a professor at the University of Alaska in the U.S. who is been in Beirut advising the Ministry of Environment, IUCN, and Green Line on the spill, had requested use of French helicopters flying relief missions from Cyprus for the spill reconnaissance mission. The French Embassy requested permission from the Israeli army for the spill overflight mission, and today Colonel Luc. Batigne of the French Embassy informed Professor Steiner that the answer was “No.” “Colonel Batigne told me today at noon that their ambassador had tried, as well as another European Union official, but that the Israeli army will not permit any flights along the Lebanese coast, either north or south” Steiner said.

"It is very unfortunate that we could not get approval for this urgently necessary mission” said Steiner. “We need to get out over the water to survey the exact extent of the oil now, so that we can decide what offshore response assets may be appropriate. Until we do, it’s a lot of guess work.”

Steiner, who has worked on many oil spills around the world, including the Exxon Valdez in Alaska, the Tasman Spirit in Pakistan, and the Braer in Scotland, had asked to survey the area from Jiyeh, where the spill originated, offshore 30 km, and north to the Syrian border. "This is the normal method of surveying all oil spills, everywhere in the world. Until we get out over the sea, we are guessing what went where. I am very thankful for the offer of cooperation from the French military to support this mission, but very disappointed that the Israeli army will not permit us to fly", said Steiner. He went on to say that "this is no way to treat a small planet.

BEIRUT: Since the Israeli bombardment started a month ago, Mustafa Asmar, a 43-year-old fisherman, has not been out to sea. Although the cease-fire went into effect on Monday, Asmar is still out of work because more than 300 tons of heavy fuel oil pollutes the small Delieh port where he docks his boats with other fishermen.
"I hope the oil will be cleaned as soon as possible so I can go back to the sea," Asmar said, adding that during the war it was too dangerous to work because of the sea blockade.

Activists and volunteers from Green Line, an environmental NGO, said Tuesday that they would start clean-up operations on the Ramlet al-Baida beach on Thursday.

"It is imperative that clean-up operations start immediately," said Wael Hmaidan, a Green Line member, during a press conference in Delieh.

"The more we wait before cleaning the pollution, the greater the damage," he said, adding that the oil has already settled deeper into the sand or had been absorbed by the rocks, posing a serious threat on the marine ecosystem.

Between 10,000 and 15,000 tons of oil was released into the sea after Israeli warplanes hit the Jiyeh power plant on July 15, contaminating more than 100 kilometers of Lebanese and Syrian coast in what has been described as the biggest environmental catastrophe to hit the eastern Mediterranean.

Green Line activists will use absorbent booms to pump up the polluted seawater and sand and deliver them to the Environment Ministry.

Dr. Ali Darwish, a Green Line member, said that the ministry needed to provide adequate spaces to store the collected oil.

Darwish called on the international community to pressure Israel to pay for the clean-up, at an estimated cost of more than $100 million.

Darwish also urged the ministry to put into effect a long-term plan to handle the effects of the spill on the environment, stressing that the impact will be "serious on the marine ecosystem but also on fishermen and tourism." The Environment Ministry is still working on a comprehensive clean-up plan, said spokesperson Ghada Mitri.

"The ministry has received sophisticated material including skimmers and large booms from Norway a few days ago and they are being tested in Jbeil today," Mitri said. The ministry is looking into how to handle the collected oil. One option is to treat and reuse it; others are to store it or have it disposed of.

L'Orient Le Jour - 16 Août 2006
Marée noire - Green Line annonce sa propre campagne à Ramlet el-Baida dès demain
Première opération de nettoyage du port de Jbeil

Le cessez-le-feu a été décrété, le Liban peut commencer à régler les problèmes résultant de la guerre, notamment la marée noire causée par le bombardement israélien de la centrale de Jiyeh aux premiers jours du conflit. Hier, sous les directives du ministère de l’Environnement et du commandant en chef de l’armée, des experts danois dépêchés au Liban par l’Union européenne (UE) ont entrepris, avec l’aide de l’armée, de la Défense civile et de la
municipalité de Jbeil, de commencer le nettoyage d’un des sites les plus pollués sur la côte libanaise, le port de Byblos. Il s’agissait en fait de tester l’efficacité du matériel de nettoyage envoyé par la Norvège et le Koweït sur le cas particulier de la pollution au Liban, avant de lancer une opération de plus grande envergure. Ce matériel consiste principalement en des pompes spécialement conçues pour l’extraction du fuel de l’eau (ce qui est actuellement la priorité), de barres flottantes pour isoler la nappe et de tissus absorbants, ainsi que de dispersants chimiques pour le nettoyage des résidus.

Pour sa part, l’association écologique Green Line, notamment deux de ses membres, Waël Hmaidane et Ali Darwiche, ont tenu une conférence de presse près d’un autre port pollué, celui de Raouché, où les bateaux des pêcheurs sont immobilisés depuis un mois dans une énorme flaque de fuel qui a couvert l’eau de mer. L’association a annoncé qu’elle commencerait jeudi une opération de nettoyage de la plage de Ramlet el-Baida. M. Hmaidane a demandé au ministère d’assurer un endroit de stockage pour le sable pollué qui sera retiré de la plage. Il a indiqué qu’entre-temps, ce sable sera stocké d’une manière sûre à Ramlet el-Baida même.

Interrogée par L'Orient-Le Jour sur cette question, Ghada Mitri, responsable de communication concernant ce dossier au ministère de l’Environnement, a assuré que la coordination est continue avec les ONG qui travaillent sur le terrain, mais recommandé que quiconque veut participer aux opérations de nettoyage doit rester en contact avec le ministère afin d’éviter le double emploi. Elle a indiqué en outre que le ministère cherchait actuellement un endroit qui servira de site pour le stockage, le traitement et l’évacuation des différentes matières qui résulteront de l’opération nationale de nettoyage, et qui requièrent chacune une approche différente.

Durant la conférence de presse, M. Darwiche a demandé au ministère de l’Environnement de procéder au plus vite à la mise en place d’un plan de nettoyage de la côte, et à la communauté internationale d’envisager de faire pression sur Israël pour l’obtention d’indemnités, notamment pour les pêcheurs. Commentant l’opération qui avait lieu à Jbeil le même jour, il a espéré que les équipes ne tarderaient pas à venir régler le problème aigu du port de Ramlet el-Baida également.

Sur un autre plan, l’Organisation maritime internationale (OMI) et le Programme des Nations unies pour l’environnement (PNUE) organiseront demain au Pirée, le port d’Athènes, une rencontre internationale pour faire face à la marée noire en Méditerranée orientale suite au conflit au Liban.

Reunion regionale au Pirée

La réunion convoquée par le secrétaire général de l’OMI, EfthymiosMitropoulos, et le directeur exécutif du PNUE, Achim Steiner, rassemblera également le commissaire européen à l’Environnement Stavros Dimas, des représentants de Chypre, du Liban, de Syrie et de Turquie, a ajouté hier un communiqué du ministère grec de la Marine marchande.

« L’objectif de la rencontre est de s’accorder sur une stratégie commune pour faire face à la pollution et pour réfléchir sur les actions de prévention en vue d’une éventuelle extension de la marée noire », a ajouté le texte. Les experts examineront également les aspects
économiques des moyens à mettre en place « dès que les conditions dans la région le permettront ».

L’OMI et le PNUE « suivent la situation de près » grâce au Centre régional des Nations unies contre la pollution en Méditerranée (Rempec), administré en commun par les deux organisations. Le PNUE avait exprimé le 29 juillet ses « sérieuses inquiétudes » quant à la situation environnementale sur la côte libanaise, où près de 15 000 tonnes de mazout se sont déversées dans la mer, polluant quelque 150 kilomètres de côte.
وصل أسود قبالة جيزة، الذي يظهر بشكل وردي، لزيادة العدد بسرعة. هذه العملية مفيدة إذا تم استخدامها في الحماية قبالة الشاطئ. وتكون هذه العملية مفيدة إذا تم استخدامها في الحماية قبالة الشاطئ.

تتطلب تطبيقات الدراسات الأقتصادية الأخرى أيضاً تدوينات الأخبار ووسائط "في الظرف تسمح بذل الكمية المطلوبة". هذه العملية مفيدة إذا تم استخدامها في الحماية قبالة الشاطئ.

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Green Line Association - 15 August 2006
Green Line: Cleanup Operations must start now
As long as the oil remains in the environment, the damage to marine life and human health will continue to increase tremendously. At the small fishermen port in Delieh, Beirut, Green Line experts voiced their concern during a press conference announcing the start of the oil spill clean up operations.

After exactly one month after the spill occurrence, no cleanup operations have started yet, as evident in the fishermen port of Delieh. Consequently, the oil has settled deeper into the sand, has been absorbed by the rocks, scattered further into the sea, and settled on the seabed. The longer the oil remains in the environment, the more it will disintegrate into its constituents, entering marine ecosystems, and bio-accumulating into live tissues. All of this increases the danger of this oil spill, and sets it as one of the most dangerous oil spills in the history of the Mediterranean, comparable to the infamous Exxon-Valdez oil spill in Alaska in 1989.

The speakers at the press conference were Wael Hmaidan, the Green Line Oil Spill Working Group Coordinator, and Ali Darwish, a Green Line member. Ali Darwish presented Green Line’s position regarding the oil spill. On the other hand, Wael Hmaidan summarized the assessment and cleanup processes that needed to be carried out.

Green Line began conducting assessments of the oil spill, two days after the Jiyeh power plant was hit. Through the assessments, base maps of the polluted Lebanese coasts were produced, as well as details of the magnitude of pollution of each coastal area. Other than the assessment operations, Green Line is also working on cleanup plans and scientific and economic research of the oil spill in order to determine the real cost of the damage and how to minimize its impact to the best extent possible.

Green Line demands that the cleanup operations be carried out as soon and as fast as possible. Green Line also puts the primary responsibility of this spill on Israel, and urges the international community to impose all pressure on it to pay the cost of this crime and other crimes against humanity.

Notes to editor:
(*) The Israeli air raid on July 15th, on the Jiyeh power plant, 30km south of Beirut, resulted in the biggest environmental disaster ever to hit the eastern Mediterranean Sea. Around 15,000 tons of heavy fuel oil was released into the sea, causing the contamination of more than 100km of Lebanese coast North of Jiyeh. The Syrian coastline around the port city of Tartus has also been hit, while oil slicks continue on moving slowly towards Turkey, Cyprus or Greece, depending on wind and current conditions.
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Spills of War
The bombing of a Lebanese power plant sparks an ecological catastrophe in the Mediterranean.
Christopher Morraf

For the past four weeks a mass of black sludge composed of between 15,000 and 35,000 tons of medium/heavy grade oil has been creeping unhampered up the Mediterranean coast of Lebanon. International environmental groups are calling the mid-July destruction of Beirut's Jiyyeh Power Plant -- and the massive oil spill that resulted -- one of the worst environmental crises in the region's history.

On July 13, Israeli bombs destroyed the plant -- 20 miles south of Beirut -- setting fire to five fuel tanks and sending thousands of gallons of oil into the Eastern Mediterranean. The Lebanese Ministry of Environment estimates the total spill could rival the Exxon Valdez catastrophe of 1989. In addition to the oil, the burning tanks sent black clouds of toxic smoke into the sky over Beirut that were visible from as far as 30 miles away.

By the start of August, the oil spill had already polluted more than 90 miles of the Lebanese coastline -- destroying Beirut's once pristine beaches in the process. On August 2, satellite images revealed that the slick had reached the Syrian coastline and is spreading north. “We have never seen a spill like this in the history of Lebanon,” the country's environment minister, Yacoub al-Sarraf, told Al-Jazeera.

Lebanese officials report cleanup will cost as much as $200 million -- money the country does not have. And that's the good news. They warn that the marine ecosystem may never fully recover. The Lebanese coastal waters are important nesting grounds for the endangered green sea turtle and during the summer months, the Eastern Mediterranean is home to spawning bluefin tuna. The spill is also proving disastrous for local economies -- a majority of which subsist on fishing.

Adding insult to injury, the continuing Israeli bombardment and a weeks-long sea blockade have made it nearly impossible for agencies to fully address the situation or begin proper containment procedures.

Experts complain that until the bombs stop falling, little can be done to stem the flow of oil. A coalition jointly led by the United Nations Environment Programme (UNEP) and its Office for the Coordination of Humanitarian Affairs (OCHA) hopes that will happen long enough to allow a full assessment of the situation.

Paul Mifsud, coordinator of UNEP's Mediterranean Action Plan (MAP), called the situation an environmental catastrophe. “Hostilities must cease to guarantee immediate safe access to the affected area,” he said. Indeed, a number of countries remain on standby, ready to supply experts and equipment once it is safe to do so. On the ground, a group of Lebanese environmentalists -- including The Union of Professional Divers and the Green Line Association -- along with local emergency personnel have managed to extinguish the burning tanks and begin a preliminary assessment, but progress has been slow going.

“Heavy bombing over the weekend made the two main roads to the spill impassable,” says Wael Hmaiden, the coordinator of the oil spill team for Green Line Association. “We were forced to temporarily halt assessment operations.”

Requests for assistance from the Lebanese government have been forwarded through UNEP to the Regional Marine Pollution Emergency Response Centre for the Mediterranean
REMPEC -- a U.N.-administered action center based in Malta. But REMPEC has been equally stymied. “We currently don’t have access to the area because of the conflict,” says REMPEC spokesperson Luisa Colasimone. “We need at least a cease-fire to obtain security clearance to send an assessment team to the ground.”

The group warns that each passing day without action only compounds the potential damage.

“There is a serious risk of remobilization of part of the oil floating along the Lebanese shorelines ... taking into consideration that no action could be taken so far to clean up,” REMPEC said in a statement. The group warned that without immediate action, Cyprus, Turkey, Greece and Israel are all in danger of being affected by the spill.

REMPEC says it has received pledges of assistance from members of the Convention for the Protection of the Mediterranean Sea Against Pollution (known as the Barcelona Convention) – of which Israel is a member. As a ratifying party of the 1976 Convention, Israel has pledged to “take all appropriate measures to prevent, abate, combat, and eliminate pollution of the Mediterranean Sea area.”

But so far it has made no attempt to address the spill or allow safe passage to the site. Green Line’s Hmaiden is not surprised by Israel’s lack of response. “Israel is part of the Barcelona Convention, but I think they don't want to shed light on this environmental disaster since they are directly responsible for it,” he says. Hmaiden argues that the Jiyyeh plant was not even a legitimate target since Hezbollah fighters were nowhere near the site and do not rely on the power it generates. “We don’t believe that there was any reason for Israel to target the fuel tanks of the electrical power plant,” he says.

Colasimone says REMPEC has not heard from Israel’s Ministry of the Environment either. “So far 11 out of the 22 contracting parties to the Convention have reacted to our request for assistance. We have not received any information from [Israel].”

Calls to the Israeli Ministry of the Environment on August 9 were forwarded to a voicemail in the Ministry's International Relations Division.

In the meantime, Hmaiden says his people will continue working with local Lebanese officials to do all they can to mitigate the damage. “We have been going along the coast in cars to take measurements, document impacted areas, take samples and do some mapping,” he says. “We are hoping to start cleanup operations in some sensitive areas on our own.”

Countrywide, the United Nations lists five other Lebanese refinery and fuel storage sites that have been destroyed and pose environmental risk. Additionally, as of August 5, at least 22 fuel stations had been reported as destroyed and other damaged industrial sites are potentially leaking ammonia, hydrofluoric acid, formaldehyde, and toxic chemicals used in the manufacture of plastics from the damaged Sai El-Deen facility.

Since the outbreak of war in the region, much debate has focused on questions of proportionate response and of Israel’s commitment to minimizing civilian casualties when waging attacks. But environmental destruction constitutes another kind of collateral damage.

In the end, it’s likely the ecological impact of the Israeli assault of Lebanon will extend well beyond the borders of one small Mediterranean country, and persist long after the bombs stop falling.

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L’Orient Le Jour - 7 Août 2006
Catastrophe, avertit un écologiste
Des volontaires sondent les plages polluées, entre le fuel et les poissons morts par centaines
Par Suzanne Baaklini

Il y a un mois à peine, la plage de Ramlet el-Baïda grouillait de baigneurs et de touristes. Aujourd’hui, tout cela semble être un lointain souvenir, avec le sable recouvert de noir, et l’odeur de fuel se mêlant aux relents de poissons pourris, dont les cadavres jonchent désormais les plages par centaines. Une belle plage vouée à la désolation, comme le reste de la côte libanaise, depuis que l’aviation israélienne a bombardé les réservoirs de fuel de Jiyeh, et que l’énorme nappe de pétrole s’est étendue jusqu’au Nord, et puis aujourd’hui jusqu’en Syrie. Les opérations de nettoyage n’ont pas encore commencé, vu la situation sécuritaire qui ne fait que se dégrader. Mais des volontaires d’ONG écologiques se trouvaient hier sur le sable pour faire des estimations de l’étendue des dégâts, avant de communiquer leurs résultats au ministère de l’Environnement (qui avait déjà lancé des opérations pareilles sur d’autres sites). Ravina Zinati, de Green Line, et Thomas Kukovec, d’une ONG autrichienne appelée « Resistance for Peace », armés d’un bâton et portant des gants de protection, sondaient le sable en profondeur à l’endroit souillé par le fuel. « Nous creusons pour voir combien est profonde la contamination par le fuel, afin de savoir jusqu’à quel point le nettoyage sera difficile », indique Thomas. Il nous montre des couches bien distinctes dans le sable : celle polluée par le fuel et, plus bas, le sable propre. Mais la vue de ce sable encore immaculé n’est pas nécessairement une bonne nouvelle. « Il y a d’autres couches souillées en dessous, qui ont été fortement absorbées par le sable », explique Ravina. En gros, une profondeur de 30 à 40 cm déjà. « Et c’est pire dans les ports, comme Raouché et Jbeil, où la nappe a 40 cm de profondeur. Elle est si épaisse en cet espace confiné que l’eau ne semble même plus liquide et que les canots sont immobilisés », ajoute Thomas. « Pour nettoyer tout ça, il faudra enlever le sable, le remplacer ou le traiter autant que possible, poursuit Ravina. Mais c’est du sable de mer, ce n’est pas facile. » Les volontaires, qui devront visiter autant que possible tous les autres sites, de Jiyeh jusqu’au Nord, essayent également d’estimer la distance contaminée sur la plage, pour conclure qu’elle va de 7 à 25 mètres, selon les vagues. Waël Hmaïdane, militant à Green Line et coordinateur de la campagne sur la marée noire dans laquelle plusieurs ONG participent, se désole du retard dans le début des travaux, qui ne fait qu’aggraver la catastrophe, l’une des plus importantes qu’ait connue la Méditerranée. « Voilà pourquoi nous demandons un cessez-le-feu immédiat, parce qu’il n’est pas évident de risquer la vie de 500 à mille personnes qui participeront aux opérations, sachant qu’Israël n’a épargné ni ambulances ni convois humanitaires, et pourrait s’attaquer à des volontaires », explique-t-il. Il rappelle que le problème est régional, et qu’avec la vitesse de vent actuelle, le pétrole pourrait atteindre la Turquie et la Grèce cette semaine. « Le délai dans le début des travaux aura des conséquences dramatiques, poursuit M. Hmaïdane. Plus on tarde, plus le fuel sera fixé aux rochers, absorbé par le sable, et, au large. Il aura tendance à s’épaissir puis à couler au fond, affectant entre autres les grottes sous-marines qui sont primordiales pour la vie marine. » Et ce n’est pas tout : selon des calculs préliminaires effectués par les ONG, le coût total de l’opération de nettoyage, de réparation des dégâts et de l’impact économique s’élèvera à plus de 200 millions de dollars. « Or l’impact sur les créatures marines aura déjà été désastreux, dit-il. C’était la pire période pour une telle catastrophe. Sur les plages de sable, les tortues de mer, notamment les tortues vertes, menacées mondialement, ont déjà pondu. En présence du fuel, les bébés tortues n’ont aucune chance. Nos plages rocheuses, d’un autre côté, sont des sites importants pour la reproduction de poissons, d’où le fait que les saisons prochaines seront affectées. Enfin, le thon bleu, une espèce très prisée en
Méditerranée, se trouve en cette période de l’année sur nos côtes. Sa population sera gravement touchée. M. Hmaïdane indique que les ONG collaborent étroitement avec le ministère de l’Environnement, et qu’ils sont tous convaincus que les opérations doivent commencer tant bien que mal, mais qu’il y a une insuffisance au niveau des experts, sachant que des équipements sont arrivés du Koweit. « Quand nous aurons dépassé cette étape difficile, nous devrons discuter de la mise au point d’un plan d’urgence que nous avions déjà réclamé au gouvernement en 2003, suite à une fuite de pétrole, ajoute l’écologiste. Mais les autorités croyaient pouvoir compter en toute circonstance sur l’aide apportée dans le cadre de la convention de Barcelone. Personne n’avait prévu cela. »M. Hmaïdane n’a pas de mots assez durs contre l’agression israélienne. « Quel besoin avaient-ils de bombarder les réserves de Jiyeh, ont-elles quoi que ce soit à voir avec le Hezbollah ? lance-t-il. C’est un crime écologique. En tant qu’associations écologistes, nous devons intenter un procès contre Israël devant une cour mondiale quand ce sera possible. Mais il y a des priorités. » Sachant que, vu la période de l’année et le courant sud-nord, les côtes israéliennes ne seront même pas touchées directement par la marée causée par leur armée. Mais cela ne veut pas dire que les conséquences sur le bassin méditerranéen ne seront pas perceptibles par tous.

Casualties of War: Lebanon’s Trees, Air, and Sea
by Hassan M. Fattah

JIYEH, Lebanon, July 28 — As Israel continues the bombing campaign that has turned parts of Lebanon into rubble, environmentalists are warning of widespread and lasting damage.
Spilled and burning oil, along with forest fires, toxic waste flows and growing garbage heaps have gone from nuisances to threats to people and wildlife, they say, marring a country traditionally known for its clean air and scenic greenery. Many of Lebanon’s once pristine beaches and much of its coastline have been coated with a thick sludge that threatens marine life.
As smoke billowed overhead on Friday, turning day into dusk, Ali Saeed, a resident, recounted how war has changed this small industrial town about 15 miles south of Beirut.
Most people have left, he said. It is virtually impossible to drive on the roads, and almost everyone hides behind sealed windows.
“There’s nowhere to run,” Mr. Saeed said, showing off the black speckles on his skin that have turned everything white here into gray. “It’s dripping fuel from the sky.”
A large oil spill and fire caused by Israeli bombing have sent an oil slick traveling up the coast of Lebanon to Syria, threatening to become the worst environmental disaster in the country’s history and engulfing this town in smoke.
“The escalating Israeli attacks on Lebanon did not only kill its civilians and destroy its infrastructure, but they are also annihilating its environment,” warned Green Line, a Lebanese environmental group, in a statement issued Thursday. “This is one of the worst environmental crises in Lebanese history.”
The most significant damage has come from airstrikes on an oil storage depot at the edge of Jiyeh on July 13 and 15. Oil spewed into the Mediterranean Sea and a fire erupted that has been burning ever since.
Four of the plant’s six oil storage containers have burned completely, spilling at least 10,000 tons of thick fuel oil into the sea initially, and possibly up to 15,000 more in the weeks since.
A fifth tank burst into flames on Thursday, residents said, adding to a smoke cloud that has spewed soot and debris miles away. The fire is so hot that it has melted rail cars into blobs and turned the sand below into glass.

Engineers are concerned that a sixth tank still untouched by the fire could soon explode, making the situation even graver.

The prevailing winds and currents have swept the oil northward up the coast of Lebanon, and on Friday it reached the coast of Syria, Environment Ministry officials said.

“You can’t swim in the water anymore, it’s all black,” Mr. Saeed said. “This is like the Exxon Valdez spill in America,” he said, speaking of the environmental damage caused when a tanker ran aground and spilled about 40,000 tons of oil into Prince William Sound in Alaska in 1989.

Lebanon’s coast is an important nesting ground for the green sea turtle, an endangered species, as well as a spawning ground for some Mediterranean fish. Turtle eggs begin hatching in July, but with the oil slick coating most of the area, baby turtles will have a far smaller chance of making it to deeper waters and surviving, environmentalists say. The oil slick is also threatening bluefin tuna that migrate to the eastern Mediterranean this time of year.

The Environment Ministry sent crews to various parts of the country this week to assess the damage and begin the cleanup, a spokeswoman said. But the oil slick has quickly proven beyond the government’s limited capacity to deal with the problem.

The ministry estimates cleanup alone will cost upwards of $200 million, a major sum in a country with a gross domestic product of around $21 billion, but experts warn the bill could run even higher.

Jordan has offered to send experts to provide technical assistance, and Kuwait has pledged to send material and equipment to help clean up the spill.

Brush fires in many parts of the country have been an equally pressing concern as they rage unabated. Firefighters and forestry workers cannot move around for fear of being targets, and resources are being used to help refugees.

“In Israel there are planes taking care of forest fires, but in Lebanon these fires are not being extinguished or even noticed because our priorities have shifted from the environment to relief and humanitarian work,” said Mounir Abou Ghanem, director general of the Association for Forest Development and Conservation in Beirut.

Much of the budget for environmental protection and development has been sacrificed for relief work, he said. The oil spills, he said, will eventually be cleaned up and solid waste will be collected and disposed of when the war is over, but the forests are irreplaceable.

“Who cares if a forest is on fire when there are people dying, others are being displaced and their houses or factories are on fire?” he said.

Water pollution has become an issue, too, said Karim el-Jisr, senior associate at Ecodit, a nongovernmental environmental association. Wastewater and freshwater canals are very close together and the many bombs that have hit roads and other infrastructure have damaged them. As a result, Mr. Jisr said, wastewater is contaminating the freshwater supply, especially in rural areas, causing further environmental degradation.

But experts warn that the real environmental impact of the war will not be clear until the fighting ends.

“This war will affect the soil and the air,” said Hala Ashour, the director of Green Line, the environmental group. “But it’s still too early to assess the actual damage because we have to analyze samples and that can’t be done before the war is over.”
In Jiyeh, Mr. Saeed and the few other remaining residents have begun learning to live with the pollution. Within the first few days of the oil fire, Mr. Saeed said, they wore masks to breathe; now, he said, they are used to it.
Maher Ali, 24, a fisherman, said: “When the winds blow north, it’s bearable, but when it blows east, it’s deadly. The soot lands on the food and furniture and makes everything dirty. You just can’t leave a glass of water sitting around. It’s no wonder most families have given up and left.”

**ABC News - 28 July 2006**
**Israeli attacks cause major oil spill**
By foreign affairs editor Peter Cave

Environmentalists say a huge oil spill caused by an Israeli air strike on a power station in southern Lebanon has caused one of the worst environmental crises in the country's history. The Green Line Association, an environmental non-government organisation in Beirut, says 15,000 tonnes of oil have spilled into the ocean following the bombing of the Jiyeh power plant, which serves the south of the country. It says the spill has affected 100 kilometres of coastline, including Beirut’s beaches. The association says the marine environment, including an endangered green turtle, and the country's future tourism prospects will suffer for years to come. The group has called for urgent help from other countries, claiming the Israeli attacks on Lebanon are killing not only civilians and destroying the country’s infrastructure but also annihilating the environment.

**Associated Press - 28 July 2006**
**Oil from bombed plant covers Lebanon shore**
By Scheherezade Faramarzi

A black coat of oil now covers the Lebanese capital's once-beautiful sandy Mediterranean shore, spilled from a power plant that was knocked down by Israeli warplanes two weeks ago. Fishermen say hundreds of oil-coated fish have been washed ashore in what is the country's worst ever environmental disaster. About 80 miles of Lebanon's shores had been affected by a spill of more than 110,000 barrels of oil from the Jiyeh plant, about 12 miles south of Beirut, the city's mayor, Abdel Monem Ariss, said Friday. The plant was in flames after it was hit in Israeli air raids, cutting electricity to many areas in the capital and south Lebanon.
"Depending on how the wind is blowing, I think many shores will be soiled with this oil spill," Ariss told The Associated Press.
A shipment of 10 trucks from Kuwait containing material and equipment was to arrive Friday night via Syria to help contain the spill, but crews cannot get to the shores to start cleanup work because of the hostilities, Ariss said.
"It's going to take a long time to clean it because most of our shores are rocky shores and when the oil sticks to the rock you have to scrub it (by hand)," he said.
Fishermen on Beirut's only sandy public beach of Ramlet al-Baida said the black slick appeared about 10 days ago. Some residents have said they had problems breathing.
Fisherman Salim Yazmanji, 32, said as many as 100 fish can wash up on every 30-foot stretch of the beach and that he had lost his livelihood.

"I have nothing but the sea," Yazmanji said. "If you take the sea from a fisherman, he will die, like the fish."

Ariss said it appeared other factors also contributed to the environmental disaster — a leak from an Egyptian commercial boat that was apparently hit by a Hezbollah missile off Beirut, another from an Israeli gunboat also hit by Hezbollah, as well as effluent from a cement factory in northern Lebanon that attacked by Israeli forces.

"It's a little bit more than speculation. There are targets we knew contained oil and spilled; they received direct hit, some of them burned," he said.

The Green Line Association, a Lebanese environmental group, said in a press release that four of the six fuel tanks at Jiyeh's power plant have burned completely, while the fifth, which is the main cause of the spill, is still burning. It said the Lebanese Environment Ministry was worried that the sixth tank, which is underground, will explode.

Ariss said if the spill is not contained soon it will spread to the rest of the Mediterranean.

"I think there will be more than Lebanon that is going to be involved in this oil spill," he said.

"I think the marine life has been heavily affected and will continue to be affected as long as the oil remains in the waters and on the shores," he added.

The marine environment includes the endangered green turtle.

Naharnet - 27 July 2006

Israeli Offensive Triggers 'Worst 'Environmental Crisis in Lebanese History'

Lebanon's greens launched an international appeal for help Thursday to combat an environmental crisis caused by a huge oil spill south of Beirut.

"The escalating Israeli attacks on Lebanon did not only kill its civilians and destroy its infrastructure, but it is also annihilating the environment," warned the Green Line Association, a Lebanese NGO.

It said an air strike two weeks ago on the Jiyeh power plant which serves southern Lebanon had resulted in a 15,000-ton oil spill.

"The power plant has six fuel tanks. Four of them have burnt completely, while the fifth one, which is also the main cause of the spill, is still burning," it warned.

The spill has hit more than 100 kilometers of the Lebanese coast from Jiyeh to Shekka, in the north, including Beirut's only sandy public beach of Ramlet al-Baida, said Green Line.

"This is definitely one of the worst environmental crises in Lebanese history," it said in a joint statement with other environmental groups.

The NGOs warned that the marine environment, including the endangered green turtle -- not to mention the future tourism prospects of Lebanon -- would "suffer tremendously for several years from this spill."

"This oil spill is bigger than what the local authorities can handle and urgent help is needed from outside," they said, while adding that Israel's sustained air strikes were endangering those involved in clean-up operations.

The environment ministry, which has received a pledge from Kuwait to share its expertise in ecological crises built up after the 1991 Gulf War, said a complete oil-clean cleanup would cost tens of millions of dollars.
While residents of the Beirut area have been advised to stay clear of the Mediterranean waters, officials said Wednesday the ancient Phoenician port of Byblos had also been polluted by the oil slick.

Fishing boats at the port in north Lebanon were surrounded by a large oil slick while nearby beaches were also covered by the sticky fluid, TV footage showed.

The pollution, which has killed fish and much of the marine life in the area, threatens a wider ecological catastrophe, Environment Minister Yacoub Sarraf has said.

Sarraf and residents said the slick was also caused by a leak from an Egyptian commercial boat which was hit by a missile off Beirut during the battles between Hizbullah and Israeli forces.

An Egyptian sailor was killed when the boat was apparently hit by a Hizbullah missile, as it sailed close to Israeli naval vessels.

Four Israeli sailors were also killed when their warship, which was patrolling Lebanese waters as part of a massive air and sea blockade, was hit in the attack.

"The black slick appeared about seven or eight days ago and is becoming thicker by the day," said Zalpha Sfeir, a resident of the picturesque resort town known for its Phoenician ruins and fish restaurants.

"It will take six months to clean up everything, when the boats which are off the coast will stop dumping all their toxic liquids," she said.

Officials in Syria issued a similar warning after a slick reached its shores.

"A black slick spread over 10 kilometers appeared yesterday (Wednesday) on the Syrian coast," said Hassan Murjan, environment official for the southern port of Tartous.

"It’s diesel from the electric power station or the boat that were attacked in Lebanon," he said, adding that tests were being done to determine where the oil came from.

The rocky nature of the coastline meant the pollution would have to be cleaned by hand "which will take some time," he said.
Annex 6

Photo Album
Volunteers - Assessment
Ramlet El-Bayda, August 2006

Impact on Marine Biodiversity
Ramlet El-Bayda, August 2006
Volunteers - Clean up Operations
Ramlet El-Rayda, August 2006.

Assessment of the Oil Spill at Enfeli by Professor Richard Steiner - August 2006
Press Conference organized by Green Line and Ryblos Ecologia for the One-Year Memorial of the Oil Spill (27/7/2007)

Professor Richard Steiner showing at a press conference (27/7/2007) the dead Sea Turtle he collected from the Palm Islands on 26/7/2007 - Cause of death: Oil spill