

REPORT ON THE MEASUREMENT & QUANTIFICATION OF THE ENVIRONMENTAL DAMAGE OF THE OIL SPILL ON LEBANON

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1. A 33-day conflict (hereinafter referred to as the “**Conflict of 2006**”) took place between Lebanon and Israel, between July 12 and August 14, 2006⁽¹⁾, and constituted an international armed conflict to which conventional and customary international humanitarian law and human rights law apply⁽²⁾. On July 13 and 15, 2006, the Israeli Air Force launched two air strikes which targeted and destroyed the oil storage tanks in the El-Jiyeh area, located 30 km south of Beirut, in the vicinity of an electric power plant. These attacks resulted in the burning of 55,000 tons of fuel oil⁽³⁾ and the release of approximately an additional 15,000 tons⁽⁴⁾ into the Mediterranean Sea causing a major oil spill (hereinafter referred to as the “**Oil Spill**”) that covered and contaminated 150 kilometers of coastline from El-Jiyeh and northward⁽⁵⁾ (i.e. two thirds of Lebanon’s coastline), mainly in Lebanon and beyond, in the Syrian Arab Republic⁽⁶⁾. Israel imposed a maritime blockade on Lebanon⁽⁷⁾ which made it impossible to take any measure to mitigate the damage for several weeks⁽⁸⁾, until September 2006⁽⁹⁾.
2. The United Nations General Assembly confirmed the above facts in the fourth Prefatory Paragraph of its Resolution 61/194 adopted on December 20, 2006 and devoted to the “Oil slick on Lebanese shores”⁽¹⁰⁾: It expressed its concern over the adverse implications of that event and

¹⁾ Some of the facts presented in this preliminary paragraph are taken from : Nasri Diab, Final Report - « Oil Slick on Lebanese Shores - United Nations General Assembly » dated June 30, 2011, UNDP Project # 00040893.

²⁾ United Nations Human Rights Council, *Report of the Commission of Inquiry on Lebanon pursuant to Human Rights Council resolution S-2/1*, November 23rd, 2006, A/HRC/3/2, No.11 and No.12.

³⁾ The oil contained in the tanks was heavy IFP – number 6 fuel (United Nations Environment Programme, *Lebanon – Post-Conflict Environmental Assessment*, 2007, p.134), and is said to have relatively low toxicity (World Bank, *Republic of Lebanon – Economic Assessment of Environmental Degradation Due to July 2006 Hostilities*, October 11, 2007, p.11).

⁴⁾ 15,000 m³ according to United Nations Development Programme, *Lebanon Rapid Environmental Assessment for Greening Recovery, Reconstruction and Reform - 2006*, Copyright 2007, p.xii. Between 10,000 and 15,000 tons according to United Nations Environment Programme, *Lebanon – Post-Conflict Environmental Assessment*, *op.cit.*, p.10 and p.134.

⁵⁾ “Approximately 150 km” according to United Nations Development Programme, *Rapid Environmental Assessment for Greening Recovery, Reconstruction and Reform - 2006*, *op.cit.*, p.4-6; “120 km or so” according to R. Steiner, *Lebanon Oil Spill Rapid Assessment and Response Mission - Final Report*, IUCN CESSP Green Line, September 11, 2006, p.1.

⁶⁾ See : The first Secretary-General Report to the General Assembly on this issue, distributed on October 24, 2007 (A/62/343) - especially paragraph 3; and also the latest Secretary-General Report to the General Assembly, distributed on October 23rd, 2013 (A/68/344) - especially paragraph 2.

⁷⁾ M.L. Tucker, “Mitigating Collateral Damage to the Natural Environment in Naval Warfare : An Examination of the Israeli Naval Blockade of 2006”, *Naval Law Review*, 2009, p.161.

⁸⁾ International Union for Conservation of Nature (IUCN), *Lebanon Oil Spill Rapid Assessment and Response Mission – Consultancy Report*, September 11, 2006, p.8 *in fine*.

⁹⁾ World Bank, *Republic of Lebanon – Economic Assessment of Environmental Degradation Due to July 2006 Hostilities*, *op.cit.*, p.12.

¹⁰⁾ Resolution A/RES/61/194, dated December 20, 2006.

declared that the oil slick “*heavily polluted the shores of Lebanon and consequently has serious implications for human health, biodiversity, fisheries ...*”(11). It called on Israel “*to assume responsibility for prompt and adequate compensation to the Government of Lebanon for the costs of repairing the environmental damage caused by the destruction*”(12).

3. A series of eight resolutions were adopted by the General Assembly, the latest on December 20, 2013 : Resolution 68/206(13), which is also entitled “Oil slick on Lebanese shores” and which is at the basis of the present (brief and analytical) Final Report (hereinafter referred to as “**the present Report**”). In the fifth Operational Paragraph of this Resolution, the General Assembly :

“Requests the Secretary-General to urge United Nations bodies and agencies and other relevant organizations involved in the initial assessment of the relevant environmental damage to undertake, within existing resources, a further study, building on the initial work of the World Bank presented through the report of the Secretary-General to the sixty-second session of the General Assembly (A/62/343), with a view to measuring and quantifying the environmental damage sustained by Lebanon and by neighbouring countries;”

4. The present Report synthesizes the seven following studies (hereinafter referred to as the “**Documents**”) undertaken by international and national organizations following the Oil Spill with a focus on measuring and quantifying the environmental damage sustained by Lebanon as a consequence thereof (chronological listing) :

(i)- Experts Working Group for Lebanon, *Lebanon Marine and Coastal Oil Pollution International Assistance Action Plan*, 25 August 2006.

(ii)- International Union for Conservation of Nature (IUCN), *Lebanon Oil Spill Rapid Assessment and Response Mission – Consultancy Report*, September 11, 2006.

(iii)- Conseil National de la Recherche Scientifique, *Results of the Scientific Researches Undertaken by the Council in relation with the consequences of the last Israeli aggression on Lebanon* (in Arabic), October 20, 2006.

(iv)- Food and Agriculture Organization of the United Nations, *Lebanon – Damage and Early Recovery Needs – Assessment of Agriculture, Fisheries and Forestry*, November 2006.

11) Resolution A/RES/61/194, Operational Paragraph 2.

12) Resolution A/RES/61/194, Operational Paragraph 3.

13) A/RES/68/206.

(v)- United Nations Development Programme, *Rapid Environmental Assessment for Greening Recovery, Reconstruction and Reform - 2006*, Copyright 2007.

(vi)- World Bank, *Republic of Lebanon – Economic Assessment of Environmental Degradation Due to July 2006 Hostilities*, October 11, 2007.

(vii)- United Nations Environment Programme, *Lebanon – Post-Conflict Environmental Assessment*, 2007.

The present Report is limited to the presentation of the Documents as published; unless otherwise expressly mentioned, no search for other documents was undertaken and no attempt was made to ensure that the Documents have not been updated or otherwise amended, nor has any research or investigation on-site or with third parties been made.

Some of the Documents contain assessment of damage sustained by Lebanon during the Conflict of 2006 which are unrelated to the Oil Spill. Hence, these damages will not be covered in the present Report.

A preliminary analysis of the legal basis for reparation is conducted in both Lebanese and international law in order to present *inter alia* the method of calculation of the quantum of the reparation.

5. Hence, the present Report comprises three sections:

- In **Section I**, the legal basis for reparation is analysed in both domestic (Lebanese) law and international law, with a view to presenting the methodology of responsibility, i.e. the conditions for the duty to repair and the calculation of the quantum of the reparation.
- In **Section II**, the results of the Documents related to the measurement and quantification of the environmental damage sustained by Lebanon due to the Oil Spill are synthetically presented and checked against the contents of Section I.
- In **Section III**, the revised direct, indirect and passive use value of the Oil Spill are presented and include calculations on the adjustment for global inflation and yearly compounded interest.

I. LEGAL BASIS FOR REPARATION

6. In Lebanese domestic law, the general system of civil responsibility⁽¹⁴⁾ and duty to compensate is laid down in the Lebanese Code of Obligations and Contracts (the “C.O.C.”), and is directly inspired from the French civil law as set in the Civil Code⁽¹⁵⁾ and detailed in the case law (“*jurisprudence*”) which justifies the references made in the present Report to French law solutions. A special law on the protection of the environment is also of interest although it merely refers to the C.O.C. in that respect. A presentation of domestic (Lebanese) law will first be made (A), followed by a comparative outlook with two international instruments (B), and a synthesis of the scope of the reparation (C).

A- Domestic (Lebanese) law

7. The principle of the duty to indemnify is set in Article 122 of the C.O.C. which provides that any wrongful act which causes prejudice to another person obliges the culprit to indemnify the aggrieved party (the “victim”). The extent and the nature of the reparation are detailed in Article 134⁽¹⁶⁾ *et seq.* of the C.O.C.

8. There is a widely admitted three-element equation which should be verified, so that the duty to compensate arises: a wrongful act, a prejudice, and a causal link (or causation) between the act and the prejudice in the absence of any partial or total exonerating factor⁽¹⁷⁾. Once the three-element equation is verified there remains to measure, evaluate and quantify the damage. The present Report will not dwell on this equation since the responsibility of Israel for the Oil Spill and its duty to indemnify Lebanon are not questioned and have been established in the above-mentioned UN General Assembly’s Resolution 61/194 adopted on

¹⁴) “Tort law” in Anglo-American law.

¹⁵) Article 1382 *et seq.* of the French Civil Code.

¹⁶) The original text of Article 134 of the C.O.C. drafted in French reads as follows :

“La réparation due à la victime d’un délit ou d’un quasi-délit doit correspondre, en principe, à l’intégralité du dommage qu’elle a subi.

Le dommage moral entre en ligne de compte aussi bien que le dommage matériel.

Les dommages indirects doivent être pris en considération, mais pourvu qu’ils se rattachent clairement au fait délictuel ou quasi-délictuel.

En principe, les dommages actuels, dès maintenant réalisés, entrent seuls en ligne de compte pour le calcul de la réparation.

Exceptionnellement, le juge peut prendre en considération les dommages futurs si, d’une part, leur réalisation est certaine et si, en outre, il possède les moyens d’en apprécier à l’avance l’importance exacte.”

¹⁷) In Lebanese law, see : A. al Naqib, *La théorie générale de la responsabilité du fait personnel – La faute et le dommage* (in Arabic), Editions Juridiques Sader, 1999, pp. 107-108; In French law, see : M. Bacache-Gibeili, *Les obligations - La responsabilité civile extracontractuelle (Traité de Droit Civil - Tome V - Sous la direction de Christian Larroumet)*, Economica, 2012, p.122 ; In English law, see : W. van Gerven, J. Lever, P. Larouche, *Tort Law*, Hart Publishing – Osgord and Portland, 2000, p.395.

December 20, 2006, and all subsequent resolution adopted in relation with this subject.

9. As mentioned in above Point 1 of the present Report, Israel has, immediately after its air strikes on the oil storage, imposed a maritime blockade on the Lebanese coast which made it impossible for Lebanon to take any measure to mitigate the damage during several weeks. The duty to mitigate the prejudice rests on the victim of the wrongful act, and this is a legal duty applicable both in domestic and in international law⁽¹⁸⁾ : The victim should take all the necessary measures to minimize the prejudice, otherwise it is not authorized to request the culprit to indemnify for this prejudice; it loses, partially or totally, its right to claim for indemnification⁽¹⁹⁾. By making it impossible for Lebanon to mitigate the damage, Israel not only compounded the losses, but also put itself in a legal position where it cannot oppose to Lebanon any defence based on the non-mitigation of the prejudice.

10. Article 134 of the C.O.C. provides that the person responsible for a wrongful act should indemnify the aggrieved party for the totality of the prejudice (*“l’intégralité du prejudice”*) sustained by the latter. This is considered as a fundamental and unifying principle of civil responsibility, and it applies for individual accidents as well as for collective disasters⁽²⁰⁾, and environmental damage is a collective damage by nature⁽²¹⁾. The totality of the prejudice means the restoration in full (*“restitution in integrum”*) as much as possible of the equilibrium destroyed by the wrongful act and returning the victim back to the situation in which it would have been had the wrongful act not occurred⁽²²⁾. For instance, one of the Documents analysed in the present Report, the *“Lebanon Oil Spill Rapid Assessment and Response Mission – Consultancy”* of the International Union for Conservation of Nature (IUCN), makes a full presentation first of the restoration mechanisms in general and then of the potential restoration options for Lebanon⁽²³⁾.

11. Pursuant to Article 134 of the C.O.C., both the moral and the material prejudice are taken into consideration, as well as the direct and indirect ones, provided the latter are clearly linked to the wrongful act. The calculation of the reparation is based on the prejudice existing at the time of the calculation, but future prejudice can also be taken into consideration if its occurrence is certain and if it is possible to estimate in advance its

¹⁸⁾ S. Reifegerste, *Pour une obligation de minimiser le dommage*, Presses Universitaires d’Aix-Marseille, 2002, No.67 *et seq.*

¹⁹⁾ S. Reifegerste, *Pour une obligation de minimiser le dommage*, *op.cit.*, No.583.

²⁰⁾ C. Lacroix, *La réparation des dommages en cas de catastrophe*, L.G.D.J., 2007, No.123.

²¹⁾ C. Lacroix, *La réparation des dommages en cas de catastrophe*, *op.cit.*, No.24.

²²⁾ Ph. Conte, “Responsabilité du fait d’autrui”, *Encyclopédie Dalloz – Civil*, T.IX, 1992, No.257.

²³⁾ International Union for Conservation of Nature (IUCN), *Lebanon Oil Spill Rapid Assessment and Response Mission – Consultancy Report*, September 11, 2006, p.16 *et seq.*

exact importance. The future consequences of a situation can be ineluctable in that they constitute a direct and certain extension of the current situation born from the wrongful act⁽²⁴⁾, and will hence be covered by the reparation if they can immediately be assessed. The loss of chance and loss of profits (if a distinction is to be drawn between the two) are encompassed in the future prejudice⁽²⁵⁾, since not only the “*damnum emergens*” (the damage sustained by the victim) but also the “*lucrum cessans*” (the loss of profits) are covered by the reparation⁽²⁶⁾. It seems that the moral prejudice as such is not covered in French case law, e.g. the reputation prejudice of the region where the damage occurred towards the tourists is not covered because the damage sustained by the tourism sector (hotels, restaurants, etc.) itself is covered⁽²⁷⁾.

12. It is worth noting that it is not only the victim of a wrongful act that can claim for reparation, but also the “victim by ricochet” which did not directly sustain the prejudice but which is related to the victim and is supported by the latter whose losses would be reflected on the victim “by ricochet”⁽²⁸⁾. The notion of “victim by ricochet” is different from the notion of “indirect damage” which is expressly provided for in Article 134 of the C.O.C. and which is also covered by the reparation : the indirect damage is the damage sustained by the victim itself and which is not directly caused by the wrongful act but is linked to said damage and branches out thereof⁽²⁹⁾.

13. As is the case in various legal systems where the monetary compensation is favoured⁽³⁰⁾, Article 136 of the C.O.C. sets a principle whereby the reparation should be monetary. But it makes room for an exception, whereby the judge can give the reparation a form which is more appropriate to the interest of the victim. This exception could be to order the culprit to restore, as much as feasible, the environment as it was before the wrongful act⁽³¹⁾, i.e. to order a reparation in kind. However, it has been noted that the state of ignorance in which the specialists are regarding the valuation of the ecosystems and the animal and vegetal populations, as well as regarding the scientific criteria on the basis of which their restoration can be measured, make the reparation in kind very difficult and favours the monetary compensation⁽³²⁾. In French law, the legislator provides that any condemnation to pay a monetary reparation

²⁴) French Cour de Cassation, Chambre des Requêtes, June 1st, 1932, *Dalloz Périodique*, 1932.1.102 ; for an example in Lebanese law : Court of Appeals of Mount Lebanon, July 2nd, 1992, in N. Badaoui al Najjar, *The Law of Responsibility* (in Arabic), Al Mou'assassa al Haditha lil Kitab, 1997, p.563.

²⁵) Ph. Conte, “Responsabilité du fait d'autrui”, *op.cit.*, No.229 *et seq.*

²⁶) *The Responsibility* (in Arabic), The Legal Publications Sader, 2008, p.216, No.2

²⁷) J.-P. Beurier, *Droit international de l'environnement*, Pedone, 2010, No.913.

²⁸) Ph. Le Tourneau, *La responsabilité civile*, Dalloz, 1982, No.532 *et seq.*

²⁹) *The Responsibility* (in Arabic), *op.cit.*, pp.216-217, No.4 *et seq.*

³⁰) G. Viney, P. Jourdain, *Les effets de la responsabilité (Traité de droit civil – Sous la direction de Jacques Ghestin)*, L.G.D.J., 2001, No.2.

³¹) M. Prieur, *Droit de l'environnement*, Dalloz, 1996, p.863.

³²) Ch. Jarlier-Clement *et alii*, *Environnement*, Editions Francis Lefebvre, 1995, No.1862.

gives rise to interest to be paid on this amount at the legal rate as of the date of the judgment⁽³³⁾.

14. Lebanese Law No.444 dated July 29, 2002, on the protection of the environment refers expressly, in its Article 51, to the C.O.C. (and to the Penal Code) and provides that any environmental wrongful act which causes damages to the environment or to the persons gives rise to a duty to make reparation. This Article 51 consecrates the principle of “polluter pays” which is at the core of all domestic environmental laws⁽³⁴⁾. Article 10 of Law No. 690 dated August 26, 2005, governing the Ministry of Environment provides that the protection of the environment from damage and pollution relates to public policy (“*ordre public*”).
15. In environmental law, the identification of the aggrieved party gives rise to specific problems: who is that party, the individuals who sustained direct damages to their persons and properties and/or the community ? Above-mentioned Article 51 of Lebanese Law No.444 addresses this issue by empowering the Ministry of Environment, in its capacity as representative of the State, to present claims in relation with environmental prejudice, and by giving (with express reference being made to the C.O.C.) each individual the right to present claims in relation with personal prejudice. This means that both the community and the individuals are to be, separately, considered as aggrieved parties. By all means, the notion of victim by ricochet, opens the door wide for all aggrieved parties to present claims⁽³⁵⁾.

B- Two international instruments (as an exemple)

16. The mechanisms which are applicable under (domestic) Lebanese laws have their equivalent in public international law which also admits that every wrongful act which causes a prejudice gives rise to a duty to compensate⁽³⁶⁾. Two different instruments shall be examined below which tackle the issue of reparation in a valuable way and can give useful guidelines: a) the Iraq-Kuwait reparation scheme, and b) the draft articles on Responsibility of States for Internationally Wrongful Acts annexed to the Resolution of the United Nations General Assembly adopted on December 12, 2001.

a) The Iraq-Kuwait reparation scheme

³³⁾ Article 1153-1 of the French Civil Code.

³⁴⁾ M. Prieur, *Droit de l'environnement, op.cit.*, No.145 *et seq.* : principe “pollueur-payeur”.

³⁵⁾ M. Prieur, *Droit de l'environnement, op.cit.*, No.847.

³⁶⁾ E.-C. Gillard, “Reparation for violations of international humanitarian law”, *Revue Internationale de la Croix-Rouge*, 2003 (September) Vol.85., p.529, specially pp.530-531.

17. The report of the Secretary-General to the United Nations General Assembly dated October 23rd, 2013, and entitled “Oil slick on Lebanese shores”⁽³⁷⁾ contains, in its Section IV, three possible options to measure and quantify the environmental damage, and it refers directly to the United Nations Compensation Commission (for Kuwaiti claims against Iraq)⁽³⁸⁾. The first option would be to request the United Nations bodies and agencies and other relevant organizations involved in the initial assessment of the relevant environmental damage to undertake a further study to assess the environmental damage that resulted from the Oil Spill⁽³⁹⁾. The second option would be the establishment of a panel of independent experts appointed by the Secretary-General with the task of carrying out an assessment of the relevant environmental damage and the resulting report would then be submitted to the General Assembly or to any process established for the purpose of handling compensation. The third option would be the establishment of a task team composed of government-designated experts appointed by the governments concerned. Furthermore, the Secretary-General points out in his report to the possibility that, in any of these three options, the measurement and quantification of the environmental damage might involve a review process similar to that adopted by the F4 Panel of the UN Compensation Commission, and include *inter alia* the following steps : Identification of the activity in relevant areas, such as reasonable measures already taken to clean and restore the environment or future measures to clean and restore the environment, and reasonable monitoring and assessment of the environmental damage for the purposes of evaluating and abating the harm caused and restoring the environment; Where necessary, requesting additional information to substantiate the claim from the claimant or any third-party experts or body assisting with the claims review process, as appropriate; Review of the cost estimate submitted by the claimant and adjustment of the claimed amounts in the light of the additional information received; Recommendation on the amount of compensation.

18. In what is a première⁽⁴⁰⁾, the Security Council created a fund to pay compensation for Kuwaiti claims against Iraq, and established a United Nations Compensation Commission to administer the fund. This was the result of two resolutions: Resolution 687 (1991) dated April 3rd, 1991⁽⁴¹⁾, and Resolution 692 (1991) dated May 20, 1991⁽⁴²⁾. The present Report will only mention some items which could be relevant to the process of quantification and measurement of the damage caused by the Oil Spill of the Conflict of 2006.

³⁷⁾ A/68/544.

³⁸⁾ Paragraphs 13 *et seq.* of the report of the Secretary-General to the United Nations General Assembly dated October 23rd, 2013.

³⁹⁾ This first option was the one chosen by the General Assembly in its (first) Resolution 61/194 adopted on December 20, 2006.

⁴⁰⁾ J.-C. Martin, “La pratique de la commission d’indemnisation des Nations Unies pour l’Irak en matière de réclamations environnementales”, in *Le Droit international face aux enjeux environnementaux*, Colloque d’Aix-en-Provence, Editions Pedone, 2010, pp.257-258.

⁴¹⁾ S/RES/687(1991).

⁴²⁾ S/RES/692(1991).

19. The first valuable item is the setting up of a public authority which includes representatives of the private sector to which the whole process is entrusted and which is the sole counterpart of the United Nations in this respect. The Kuwaiti government established in 1991 the Public Authority for Assessment of Compensation for Damages resulting from the Iraqi aggression (PAAC), and entrusted it with all aspects of the claims process, primarily the assessment of the losses and damages sustained by the country and the people, the submission of the claims to the UN Compensation Commission and the follow up thereof. The Board of Directors of the PAAC, which is composed of nine representatives of the public and private sectors, is assisted by experts in various fields assembled into technical committees. This unique structure, which has the exclusivity on the claims process, involves both public and private sectors, and relies on technical experts, is a very efficient tool for the processing of the claims.

20. The second valuable item is to be found in the practice developed by the UN Compensation Commission which could be followed in the Oil Spill case. For instance, the Compensation Commission set up rules for "Business losses of Individual Eligible for Consideration under the Expedited Procedures"⁽⁴³⁾, whereby it considered that "*damage to intangible assets, lost business revenues and losses in connection with contracts may only be claimed if they are a direct loss resulting from*" Iraq's invasion and occupation of Kuwait⁽⁴⁴⁾.

21. The claims to be adjudicated by the Compensation Commission were classified into six categories, labeled in decreasing order of priority from "A" to "F", four of which covered the claims of individuals (A to D), one for corporations (E), and the last one for governments and international organizations (F). The environmental claims, which were labeled "F4" (lowest order of priority), covered losses and expenses arising from⁽⁴⁵⁾:

"(a) Abatement and prevention of environmental damage, including expenses directly relating to fighting oil fires and stemming the flow of oil in coastal and international waters;

⁴³⁾ The United Nations Compensation Commission, Decision taken by the Governing Council during its second session, at the 15th meeting held on October 18, 1991, S/AC.26/1991/4 dated October 23rd, 1991.

⁴⁴⁾ Section (i) of the Decision taken by the Governing Council of the UN Compensation Commission during its second session, at the 15th meeting held on October 18, 1991, *op.cit.*

⁴⁵⁾ The United Nations Compensation Commission, Decision taken by the Governing Council during its third session, at the 18th meeting held on November 28, 1991, S/AC.26/1991/7/Rev.1 dated March 17, 1992; see also : M. Dubarry Huston, "Wartime Environmental Damages : Financing the Cleanup", *University of Pennsylvania Journal of International Economic Law*, 2002, pp.912-913.

(b) Reasonable measures already taken to clean and restore the environment or future measures which can be documented as reasonably necessary to clean and restore the environment;

(c) Reasonable monitoring and assessment of the environmental damage for the purposes of evaluating and abating the harm and restoring the environment;

(d) Reasonable monitoring of public health and performing medical screening for the purposes of investigation and combating increased health risks as a result of environmental damage; and;

(e) Depletion of or damage to natural resources”.

b) The draft articles on Responsibility of States for Internationally Wrongful Acts

22. In its Resolution 65/19 adopted on December 6, 2010⁽⁴⁶⁾, the General Assembly *inter alia* acknowledged the importance of the draft articles on Responsibility of States for Internationally Wrongful Acts (the “Articles”), commended them to the attention of Governments, and decided to consider the question of a convention on such responsibility or other appropriate action on the basis of the Articles. The draft articles had been adopted by the International Law Commission in August 2001⁽⁴⁷⁾, and considered for the first time by the General Assembly in its Resolution adopted on December 12, 2001, to which the text of the Articles was annexed⁽⁴⁸⁾. As will be shown below, the provisions of the draft articles with regard to the reparation are fully in line with the principles admitted in Lebanese (and French) law. They are not yet in force and hence have not received any application, but they give clear indications to what the international legal system finds acceptable.

23. According to the draft articles, an internationally wrongful act should be attributable to a State under international law and should constitute a breach of an international obligation of the State. Article 31 provides for a duty for the responsible State to make full reparation for the injury caused by its internationally wrongful act, whatever this damage is, whether material or moral. The reparation for injury can take several forms⁽⁴⁹⁾ : Restitution, compensation and satisfaction, either singly or in combination⁽⁵⁰⁾ :

⁴⁶⁾ Resolution 65/19 dated December 6, 2010, A/RES/65/19.

⁴⁷⁾ The text was adopted by the Commission at its 53rd session, in 2001. The text appeared in the annex to General Assembly Resolution 56/83 of December 12, 2001, and was corrected by document A/56/49(Vol.1)Corr.4.

⁴⁸⁾ Resolution 56/83 dated December 12, 2001, /RES/56/83.

⁴⁹⁾ Articles 34 *et seq.*

⁵⁰⁾ see : J. Crawford, *The International Law Commission's Articles on State Responsibility*, Cambridge University Press, 2002.

a) Restitution aims to re-establish the situation which existed before the wrongful act was committed, provided and to the extent that restitution is not materially impossible and does not involve a burden out of all proportion to the benefit deriving from restitution instead of compensation.

b) Compensation is the duty to compensate for the damage caused, insofar as such damage caused hereby is not made good by restitution; the compensation shall cover any financially assessable damage, including loss of profits.

c) Satisfaction is an obligation to give satisfaction for the injury caused by the wrongful act insofar as it cannot be made good by restitution or compensation; satisfaction may consist in an acknowledgement of the breach, an expression of regret, a formal apology or another appropriate modality.

Interest on any principal sum due under these provisions shall be payable when necessary in order to ensure full reparation. Interest runs from the date when the principal sum should have been paid until the date the obligation to pay is fulfilled. The interest rate and mode of calculation shall be set as to achieve that result.

C- Synthesis of the scope of the reparation

24. On the basis of the above, the scope of the reparation which could be claimed by Lebanon can be summed up as follows :

- The totality of the prejudice, i.e. restoration of the situation as it was before the wrongful action or, if this is not possible, compensation.
- The material prejudice.
- The moral prejudice⁽⁵¹⁾.
- The direct prejudice.
- The indirect prejudice.
- The current prejudice.
- The future prejudice.
- The loss of chance, the loss of profits, the loss of income
- The prejudice sustained by the “victim by ricochet”
- Interest on any monetary reparation to be received

The examples of prejudice admitted under law are innumerable⁽⁵²⁾:

- Costs of the response measures, i.e. the measures taken following the occurrence of the Oil Spill: the cleaning, including the remuneration of the personnel involved in the works, the cost of the purchased

⁵¹⁾ However, please see above limitation to that prejudice: Point 11 *in fine* of the present Report.

⁵²⁾ J.-P. Beurier, *Droit international de l'environnement, op.cit.*, No.913.

equipment, the depreciation of the pre-owned equipments, the travel expenses, etc.

- Costs of the salvage of and assistance to people : use of public properties to host them, lease of private properties, food, beverage, health assistance, electricity, telecommunication, etc.
- Rehabilitation of the environment, the infrastructure, the properties.
- Individual claims for loss of lives, injuries, prejudice to properties, loss of income, loss by ricochet, etc.

Clearly, the environmental damage assessment is a very complex and a multidisciplinary exercise which involves specialists in different fields of expertise: technical, legal, financial, economics, etc. The damage quantification, i.e. the analytical measurement of the extent, the severity and the duration of the damage in terms of alteration, deterioration, partial or total destruction, is nowadays based on very sophisticated models including a series of indicators and numerous mathematical components⁽⁵³⁾. This was somehow made in some of the Documents as shown in Section II below of the present Report.

25. Taking into consideration the scope of the reparation and the examples of prejudice admitted under law as detailed here-above in this Section I, Section II below of the present Report will be dedicated to checking how the Documents measure and quantify the environmental damage sustained by Lebanon, and hence how the reparation which can be claimed was assessed therein.

⁵³⁾ G. Di Marco and A. Maggiore (Italian National Agency for Environmental Protection and Technical Services), *Environmental Damage Assessment*, 2007, especially p. 4 *et seq.*, paper published on the website of the United Nations Economic Commission for Europe (unece.org) <https://www.google.com/url?q=http://www.unece.org/env/documents/2007/tei-wat/liabilitypresentations/ENVIDAMAGEASSESEMENTamaggiore.doc&sa=U&ei=yaeqU4-CAoefqAbyv4CIDA&ved=0CAgQFjAC&client=internal-uds-cse&usg=AFQjCNFWY23uyn6NxbvW1AXvXdmp75Fx1g>

II. SYNTHETIC PRESENTATION OF THE MEASUREMENT AND QUANTIFICATION OF THE ENVIRONMENTAL DAMAGE SUSTAINED BY LEBANON DUE TO THE OIL SPILL

26. The review of the seven Documents shows that their authors followed various procedures to measure and quantify the environmental damage caused by the Oil Spill, and did not make direct reference to the legal mechanisms detailed in above Section I of the present Report. Two of the seven Documents -World Bank, *Republic of Lebanon - Economic Assessment of Environmental Degradation Due to July 2006 Hostilities*; and United Nations Development Programme, *Rapid Environmental Assessment for Greening Recovery, Reconstruction and Reform*-, make a comprehensive analytical measurement of the extent, the severity and the duration of the damage in terms of alteration, deterioration, partial or total destruction (see above Point 24 *in fine* of the present Report).

A- Experts Working Group for Lebanon, *Lebanon Marine and Coastal Oil Pollution International Assistance Action Plan, 25 August 2006* :

27. This report is the result of a mission conducted by the Experts Working Group for Lebanon supervised by the Regional Marine Pollution Emergency Response Center (REMPEC)⁽⁵⁴⁾, and it focuses on the Oil Spill. The objective of the action plan leading to this report was *inter alia* to assess the type of assistance and resources (equipment, manpower, etc.) needed to respond to the spill and to elaborate a clean-up plan (page 4). The report contains a global estimate of the overall costs for the clean-up operations (being noted that these operations are only one of the numerous aspects of the prejudice sustained by Lebanon due to the Oil Spill), but it does not contain measurement and quantification of the environmental damage. This global “first” estimate, which is in the range of USD 137 million to USD 205 million, was made by the Lebanese Ministry of Environment and is based on the model of costs per ton spilled. The report considers this estimate to be an upper limit and proposes an initial amount of € 50 million for 2006 with additional funding requirements for 2007 (page 19).

28. Although this report does not directly tackle the measurement and quantification of the environmental damage sustained by Lebanon due to the Oil Spill, it does contain valuable indications in this respect. As stated by the Ministry of Environment, the main priorities were, at that time (i.e. immediately in the wake of the Conflict of 2006), *inter alia* : the recovery of bulk and mobile oil in ports and shoreline; the protection of uncontaminated sensitive areas; the cleaning of contaminated sensitive areas (page 12). The costs of these operations can be quantified, and the

⁵⁴⁾ See about it in : World Bank, *Republic of Lebanon – Economic Assessment of Environmental Degradation Due to July 2006 Hostilities*, *op.cit.*, p.12.

detailed table of the means needed to address each type of operations which is included in the report (pages 14 and 15) can be used as a basis for such quantification: the list contains a breakdown of the means per item, and covers human resources and equipments.

B- International Union for Conservation of Nature (IUCN), *Lebanon Oil Spill Rapid Assessment and Response Mission – Consultancy Report, September 11, 2006* :

29. This report is the result of a mission conducted by Professor Richard Steiner upon the request of IUCN and the Lebanese Ministry of Environment. It is of direct interest to the present Report since it is focused on the damage caused by the Oil Spill (and does not cover other prejudice sustained by Lebanon during the Conflict of 2006) The work was conducted too early after the Oil Spill, at a time when access to the area was restricted by the Israeli army, and hence this report could not possibly contain any meaningful measurement and quantification of the environmental damage: no figures of quantities, surface, amounts, etc. are to be found. Still some very useful parts thereof are very useful *inter alia* :

a) The indication that much of the shoreline ecosystem was heavily impacted, but the ecological impact of the spill remained speculative at the time the report was drafted, since “*spill ecological injury can often take time to manifest as sub-lethal, chronic effects*” (pages 6 and 7).

b) The description of the initial response which gives some indications about the human resources and equipments used at this stage (pages 10 and 11).

c) The presentation of the potential restoration options for Lebanon, which distinguishes between direct and indirect restoration : the direct restoration includes restocking of fisheries, additional cleanup of contaminated sites, and enhancing sea turtle nesting success; the indirect restoration is much more developed and includes pollution abatement, improved/intensified management of sensitive species, habitat protection, designation of protected areas, economic alternatives for local fishermen, development of tourism and recreational alternatives, development of an environmental education for children and adults, etc. (pages 16 to 23).

30. The above three items give rise to the following comments :

a) The first item shows that Lebanon needs to conduct periodical surveys and to make relevant reports on the newly manifested ecological injury to be able to keep tabs on the measurement and quantification of the evolving environmental damage.

b) The second item gives valuable indications about what the claim for prejudice should encompass: the details of human resources, equipments, etc. used to contain the Oil Spill, and to clean up and restore the environment.

c) The third item commingles what is properly restoration as legally understood (i.e. returning the victim back to the situation in which it would have been had the wrongful act not occurred - see above Point 10 of the present Report) and what are recommendations for environmental education, awareness and development of precaution and protection systems which do not constitute legal restoration per se.

C- Conseil National de la Recherche Scientifique (CNRS), *Results of the Scientific Researches Undertaken by the Council in relation with the consequences of the last Israeli aggression on Lebanon (in Arabic), October 20, 2006:*

31. This report was prepared by the CNRS and published in a press conference held by its Secretary General on October 21st, 2006. The text analyzed in the scope of the present Report is dated October 20, 2006 and bears on the bottom of each page thereof the following mention: "The press conference of the Secretary General of the National Council of Scientific Research, Dr. Mounir Hamzeh". It is not limited to the damage caused by the Oil Spill, and covers other damage sustained by Lebanon during the Conflict of 2006. A section thereof (Section 4, pages 3 to 7) covers the pollution of the coast and the fishery and is of direct interest to the present Report.

32. This report gives rise to the following comments :

a) It compares the pollution resulting from the Oil Spill to the pollution caused on the French Atlantic coast in 1999 by the sinking of the oil tanker "Erika"⁽⁵⁵⁾, and mentions that the French authorities had immediately proceeded to splitting up the oil slick in small parcels and then treated them separately. This comparison is probably based on the magnitude of the spill, since the toxicity of the fuel spilled in Lebanon has been considered lower than that of the Erika's fuel⁽⁵⁶⁾. The report mentions that Lebanon could not take this mitigating measure because of the Israeli blockade, which compounded the prejudice. This part of the report is doubly important :

⁵⁵⁾ The "Erika" sank off the coast of Brittany on December 12, 1999, with a cargo of about 31,000 tons of fuel oil, causing a major environmental disaster; see Commission Permanente d'Enquêtes sur les Evénements de Mer, *Rapport d'enquête sur le naufrage de l'ERIKA survenu au large de la Bretagne le 12 décembre 1999*, 2000
: http://www.beamer-france.org/BanqueDocument/pdf_54.pdf

⁵⁶⁾ World Bank, *Republic of Lebanon – Economic Assessment of Environmental Degradation Due to July 2006 Hostilities*, *op.cit.*, p.11.

(i)- First, because it gives a scientifically based comparison with a similar case, which permits to use the same basis of calculation and measurement of the prejudice; and

(ii)- Second, because it gives a scientifically based argument relating to the compounding of the prejudice due to the blockade and to the impossibility for Lebanon to mitigate the prejudice.

b) As to the prejudice sustained by the fishery, it gives new elements to be used in the quantification of the prejudice : It mentions the heavy damage sustained by the sandy and rocky coasts which led to the pollution of the seafood and to a large decrease in the fishes alimentary sources and hence to the migration of the surviving fishes which caused a loss of revenues to the fishermen.

D- Food and Agriculture Organization of the United Nations (FAO), Lebanon – Damage and Early Recovery Needs – Assessment of Agriculture, Fisheries and Forestry, November 2006 :

33. This report is the result of a mission conducted by FAO upon the request of the Lebanese Ministry of Agriculture. Its objective was to evaluate the overall damage to farming and fishing communities, and to elaborate an early recovery program. Here too, the work, which was not limited to the damage caused by the Oil Spill, was conducted too early after the end of the Conflict of 2006 and, as mentioned therein, "*the environmental damage due to the warfare is yet to be quantified, but includes an oil spill, affecting half of the Lebanese coast ...*" The report does contain some monetary quantification of the prejudice and losses which however are not directly related to the Oil Spill. For instance, it estimates the most immediate losses (direct and indirect damage) of the fisheries sector at USD 9,730,000 (page vii and pages 18-19) resulting from the bombing of the port of Ouzaii and of the cooperative of Aabde, the targeting of the trout farms at Hermel in the Bekaa Valley, as well as the damage resulting from the Oil Spill. And it estimates the need of the emergency assistance for early recovery communities at USD 1,344,750 (page 28).

34. In direct relation with the damage caused by the Oil Spill, the report mentions the following : the oil made the fishing vessels inoperable, as the floating oil blocked cooling water intakes resulting in engine damage; there was a need for replacement of gear and lines and cleaning of boats; there was growing resistance to fish consumption from Lebanese consumers because of perceived food safety concerns, and the resulting reduction of market demand inevitably led to reduced prices and made fishing unprofitable; there is a need to clean harbours and shorelines (pages 11 and 12). It also mentions the loss of income for a prolonged period when there was no fishing and the subsequent reduction in demand which occurred during the peak fishing season (pages 18).

35. The Oil Spill-related part of this report gives rise to the following comments:

a) The scope of this report is focused on the fisheries sector, whereas the Oil Spill caused prejudice to other sectors too. A brief reference is made to “*environmental costs of the damage*” to say that an estimation thereof is being undertaken by the World Bank and the United Nations Environment Programme (page 18).

b) The report gives good and detailed indications about what the claim for prejudice should encompass : damage to fishing vessels; decrease in fish consumption and hence reduction of market demand and of prices which made fishing unprofitable; cleaning of harbours, shorelines and vessels; fishermen loss of income for a prolonged period; etc.

c) The report also gives a good indication as to how the calculation of damage should be done for each sector and case. For instance, and in relation with the fisheries, the report states that “*the value of the total catch forgone during the enforced tie up of 60 days at US\$4/kg was of the order of US\$8.7 million, of which the share for the owner and the crew can be estimated at two-thirds or US\$5.8 million – this is the money that would have reached the community but excludes employment for workers engaged in ancillary activities, mechanics, etc. Adding this to the direct damage gives an estimate for the most immediate losses of almost US\$9.7 million.*” (page 18).

E- United Nations Development Programme (UNDP), *Rapid Environmental Assessment for Greening Recovery, Reconstruction and Reform - 2006*, Copyright 2007:

36. This report was prepared by UNDP in collaboration with the Lebanese Ministry of Environment. As stated therein, the objectives of this report were not to measure and quantify the prejudice caused by the Oil Spill, but to identify and prioritize environmental impacts caused by the war on air, soil, water and biodiversity, to propose measures to alleviate those impacts, and to recommend opportunities for greening the recovery and reconstruction process (page ix of the Preliminary Pages). This report qualifies the Oil Spill as one of the most significant environmental impacts of the Conflict of 2006 and devotes a full sub-chapter thereto (sub-chapter 7.2) among the chapters devoted to the other damage caused by the Conflict of 2006.

37. The Oil Spill-related part of this report gives rise to the following comments :

a) In relation with the future prejudice (see above Point 11 of the present Report), the report brings two indications:

(i)- For the time period during which the impact of the Oil Spill on marine biodiversity is likely to occur, it mentions (page xvi of the Preliminary Pages) the same figures as those mentioned in World Bank, *Republic of Lebanon - Economic Assessment of Environmental Degradation Due to July 2006 Hostilities* (see above Point 37 of the present Report).

(ii)- It mentions the difficulty to predict the waste quantity and quality generated, and it gives historical data which show that oil spills impacting the shoreline can, in extreme cases, produce up to 30 times more waste than the volume of oil originally spilled (page 7-4).

b) This report gives clear indication about the clean-up process and options (processing, re-use, stabilization and storage, treatment, transport, export, separation, decontamination, incineration, landfilling, etc.) with their related costs. This could be used either to calculate the costs actually incurred several years ago if they have not been separately invoiced in detail at that time, or to make a comparison between these figures and those actually incurred and invoiced.

c) This report uses an assessment rating to evaluate the significance of the impact on the soil, the littoral, etc. : critical non-significant; severe significant; critical significant (pages 10-4 and 10-5). A verification of whether this rating is or could be translated into a financial model should be made, so that it is used as a basis for the calculation and measurement of the prejudice.

d) Although expressly qualified as “not comprehensive”, the overview of the coastal and marine ecosystem of Lebanon which is made in this report (pages 11-8 *et seq.*) can usefully be used as a basis for the identification of each sub-sector (Nature reserve, birds, plants, etc.) as well as for the assessment and quantification of the prejudice caused thereto (which are not done in this report.)

F- World Bank, *Republic of Lebanon - Economic Assessment of Environmental Degradation Due to July 2006 Hostilities*, October 11, 2007:

38. This report, which is the result of a mission conducted by the World Bank, is very comprehensive and detailed, and it could be used as a model for the full exercise of measurement and quantification of the prejudice caused by the Oil Spill. It covers all the damage sustained by Lebanon during the Conflict of 2006, and devotes a whole chapter (Chapter 2, comprising 33 pages : pages 9 to 41) and four pages of an Annex (Annex 4) to the Oil Spill. It considers that the high impact of the Oil Spill is mainly

due to the costs of cleaning, the cost of oil burnt and spilled, and the income loss of coastal services (resorts, hotels, etc.) (page 4). It conservatively estimates the overall damage and clean-up cost due to the Oil Spill at about USD 203 million (pages 39).

39. The Oil Spill-related part of this report gives rise to the following comments:

a) The report tackles the issue of the time period during which the impacts of the Oil Spill are likely to occur, which is very important for the assessment of the future prejudice (see above Point 11 of the present Report). It does not give definite figures but refers to UNDP which considers that the impact on marine biodiversity is expected to last ten to fifty years and on the littoral one to ten years (pages 19-20).

b) The points of impact are very detailed and thorough: impacts on biodiversity and ecosystems (shoreline biota, subtidal bottom communities, birds, fish, marine mammals and reptiles, etc.); and impacts on water quality (contamination of ground water). The report expressly states what impacts it did not consider, which gives a clear indication as to what a future work of assessment and quantification should cover : impacts on health, on ecosystem services (habitat, potential ground water contamination), and on marine biodiversity (page 2).

c) The report contains valuable methodological indications and scientifically-based assumptions, that any future work of assessment and quantification should verify and use. It gives space-related and time-related assumptions : e.g.

(i)- It considers that the strongest impacts are on activities taking place in or closest to the sea (space-related assumption) and during the period starting at the date of occurrence of the Oil Spill and ending on December 31st, 2006 (time-related assumption).

(ii)- It adopts a three-year time frame, 2006-2008, during which the losses will gradually subside.

(iii)- It uses mathematical equations to calculate the loss of income for the coastal activities (fishing, hotels, beach resorts, restaurants, marina sport activities, natural reserves, etc.): 5% to 10% of expected income in 2007, and 0% to 5% in 2008.

(iv)- It considers both the collective prejudice (environment) and the individual prejudice, going into the details from top (hotels and resorts) to bottom (owner of private boat).

(v)- Not only does it foresee the necessity to undertake monitoring operations, but it also gives estimates of the costs thereof.

(vi)- It contains USD denominated figures of the losses and damage.

G- United Nations Environment Programme (UNEP), *Lebanon – Post-Conflict Environmental Assessment, 2007:*

40. This report is the result of a mission conducted by UNEP upon the request of the Lebanese Ministry of Environment. It qualifies the Oil Spill as “*one of the most high profile issues of the conflict*” (page 4), and it covers other damage sustained by Lebanon during the Conflict of 2006. The environmental assessment made in this report had three main objectives: to obtain baseline data on the environment in Lebanon after the conflict; to identify issues of concern constituting a threat to public health and requiring urgent remediation measures; and to identify other issues of concern that should be taken into consideration during post-conflict reconstruction.
41. In relation with the Oil Spill, this report is rich in description (especially the response measures, clean-up, etc. – pages 136 *et seq.*), analysis and technical findings of pollution factors (pages 140 *et seq.*) and (mostly long-term) recommendations (pages 162 *et seq.*). Although it does contain neither measurement and quantification of the damage, nor any monetary estimation or means to obtain such estimation, this report could be useful for the assessment of the costs related to the clean-up.

III. REVISED OIL SPILL DAMAGES

42. As mentioned earlier, The World Bank has prepared the Republic of Lebanon Economic Assessment of Environmental Degradation Due to the July 2006 Hostilities in 2007 --Report No. 39787-LB, Washington, D.C. where the degradation associated with the Oil Spill per se amounted to US\$ 203.1 million with a lower bound of US\$ 166.3 million and an upper bound of US\$ 239.9 million in 2006 prices. However, this amount did not include the passive use value of the coastal resource that is usually added to the direct and indirect values. Therefore, this initial omission is addressed below and amounts to US\$ 217.9 million in 2006 (see Annex I). Hence, the oil spill damages and passive use value are adjusted for global inflation and lost opportunity in terms of interest rate that should accrue from February 18, 2007 until this update, i.e., mid-2014 (Annex I).

43. The adjusted oil spill damages and passive use value amount to US\$ 856.4 million by mid-2014 with the following breakdown: US\$ 448.8 million for the direct and indirect oil spill damages; and US\$ 407.6 million for the passive use value. The passive use value is assumed to cover some of the future and irreversible damages as it is very difficult to quantify and predict the loss of ecosystem services in the future.

Table 1: Oil Spill Direct, Indirect and Passive Value When Adjusted for Global Inflation and Yearly Compounded Interest Accruing in mid 2014, US\$ million

Item	2006	2007	2008	2009	2010	2011	2012	2013	6/2014
Oil Spill Damages	239.9	269.1	311.2	329.4	350.0	376.1	399.6	424.4	448.8
Passive Use Value	217.9	244.5	282.7	299.2	317.9	341.6	363.0	385.5	407.6
Total	457.8	513.6	593.9	628.6	668.0	717.7	762.6	809.9	856.4

Source: Annex I.

CONCLUSION

44. The reports mentioned in Section II constitute a solid basis for the measurement and quantification of the environmental damage caused to Lebanon by the Oil Spill for *inter alia* the following reasons (resulting from a consolidated reading of these reports) :

a) They evidence the damage actually sustained by the community and the individuals in a very detailed manner, and hence no new fact-finding is needed anymore.

b) They pave the way to the claims for “future” prejudice (e.g. they consider that the impact on marine biodiversity is expected to last ten to fifty years and on the littoral one to ten years).

c) They definitely exculpate Lebanon from any counterclaim of negligence for non-mitigation of the damage.

d) They give figures for part of the prejudice, and they contain valuable methodological indications and scientifically-based assumptions.

e) They describe thoroughly the points of impacts considered, i.e. the various sectors and areas which were damaged.

f) They give valuable comparison basis (e.g. the sinking of the oil tanker “Erika”) that could be used as benchmark for further calculation if needed.

45. More work can be done based on the avenues opened by the reports mentioned in Section II and on the legal mechanisms described in above Section I of the present Report *inter alia* :

a) The reports mentioned in Section II cover the damage sustained in the immediate aftermath of the Conflict of 2006. In order to quantify and measure the damage which has and which will appear later on, periodical surveys should be conducted and relevant reports made on the newly manifested ecological injury.

b) The losses sustained by the “victim by ricochet” should be measured.

c) Although some points of impact are described in detail, some other points of impact are not considered but are identified (impacts on health; on ecosystem services: habitat, potential ground water contamination; on marine biodiversity), and this gives a clear indication as to what a future work of assessment and quantification should cover.

46. The adjusted oil spill damages and passive use value, US\$ 856.4 million, can be used for an interim compensation to be immediately paid , and additional calculation and measurement can be made with regard the “future” prejudice as of 2006-2007 (taking into consideration above Point 45 of the present Report.)

Annex I

1. Inflation and Opportunity Cost Adjustments

The inflation adjustment is based on the International Monetary Fund World Consumer Price annual adjustment whereas the opportunity cost adjustment is based on US Prime Rate applicable at the beginning of the year as the payment was not made after 60 days further to the United Nations General Assembly Resolution 61/194 of December 20 2006 adopted at the 83rd Plenary Meeting and distributed on February 6, 2007. Yearly UN Resolutions have been adopted since hence reemphasizing the need for compensations. Therefore, the yearly compounded interest rate starts accruing as of February 18, 2007 and is updated until June 30, 2014. The inflation and opportunity loss method adjustments are those used by the United Nations in case of litigation. The results are illustrated in Table A1.1 with a total of US\$ 856.4 million by June 30, 2014 of which US\$ 205.8 million representing the accrued interest.

Table A1.1: Oil Spill Direct, Indirect and Passive Value When Adjusted for Global Inflation and Yearly Compounded Interest Accruing in mid 2014, US\$ million

Item	Amount in 2006	2007	2008	2009	2010	2011	2012	2013	5/2014
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Rates used									
Inflation Rate (Global)		5.05%	8.96%	2.93%	3.52%	5.02%	3.68%	3.70%	3.20%
US Prime Rate		3.25%	7.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%
Inflation									
Oil Spill Damages	239.9	252.0	274.6	282.6	292.6	307.3	318.6	330.4	340.9
Passive Use Value	217.9	228.9	249.4	256.7	265.7	279.1	289.4	300.1	309.7
Total	457.8	480.9	524.0	539.3	558.3	586.4	607.9	630.4	650.6
Yearly Compounded Interest									
Oil Spill Damages	0.0	17.1	19.5	10.1	10.7	11.4	12.2	13.0	13.8
Passive Use Value	0.0	15.6	17.7	9.2	9.7	10.3	11.1	11.8	12.5
Total	0.0	32.7	37.2	19.3	20.4	21.7	23.3	24.8	26.3
Cumulative Yearly Compounded Interest									
Oil Spill Damages	0.0	17.1	36.6	46.8	57.5	68.8	81.1	94.1	107.8
Passive Use Value	0.0	15.6	33.3	42.5	52.2	62.5	73.6	85.4	98.0
Total	0.0	32.7	69.9	89.2	109.7	131.4	154.7	179.5	205.8
Inflation and Interest									
Oil Spill Damages	239.9	269.1	311.2	329.4	350.0	376.1	399.6	424.4	448.8
Passive Use Value	217.9	244.5	282.7	299.2	317.9	341.6	363.0	385.5	407.6
Grand Total	457.8	513.6	593.9	628.6	668.0	717.7	762.6	809.9	856.4

Note: inflation rate is until March 2014 but applied for the first semester of 2014. Interest rate is over 316 days for Year 1 and over 182 days for Year 8. US prime rate used is the one at the beginning of the year. Yearly inflation is applied on principal only whereas yearly interest rate is applied on principal and previous year accrued interest.

Source: IMF IFS (2014); WSJ website: www.fedprimerate.com/wall_street_journal_prime_rate_history.htm; World Bank (2007); Annex I, Sections 2 to 4.

2. The Total Economic Value of a Resource

Several previous oil spill cases helped to establish the building blocks for calculating the total economic value of oil spill, which could be used for litigation and compensation. The 1989 *Exxon Valdez* oil spill in Alaska was the first oil spill to help bring about an approach for valuation, which was later refined and endorsed by the US National Oceanic and Atmospheric Administration (NOAA). It is based on Spurgeon's Total Economic Value:⁵⁷

1. **Direct-use values:** goods and services directly consumed by users. This includes the forgone socio-economic activity in terms of fishing, tourism, recreational, educational activities, etc.;
2. **Indirect-use values:** indirect benefits arising from ecological systems. This entails restoring the injured natural resource to an *ex ante* situation or baseline, i.e., before July 12, 2006. This will include the cleanup costs, replacement costs and restoration of the marine wildlife, etc. with a provision which will allow restoring natural resource damages unforeseen at the time of the settlement;
3. **Passive use values:** the manifestation of people's willingness to pay (WTP) for a resource regardless of their ability to make any use of the resource now or in the future: less direct, less tangible benefits to society and include option and existence values. The option value is the value an individual places on the potential future use of the resource. Existence values include bequest, stewardship, and benevolence motives. Bequest value is the satisfaction gained through the ability to endow a natural resource on future generations. The stewardship motive is derived from an altruistic sense of responsibility toward the preservation of the environment and a desire to reduce environmental degradation. The benevolence motive reflects the desire to conserve an environmental resource for potential use by others. Plaintiffs in a lawsuit could base their claim on any of the four sub-categories of the passive use values.
4. **Intrinsic value:** the value of nature reflects the belief that all living organisms are valuable regardless of the monetary value placed on them by society. This aspect will however be difficult to value and legitimize in a court of law.

Direct and indirect value were calculated by the World Bank (2007) and amounts to US\$ 203.1 million in 2006. Whereas it is difficult to account for intrinsic values, it is nevertheless important to consider passive use values in the damage calculation. Indeed, NOAA convened a panel in 1992, chaired by two Nobel laureates that concluded that "contingent valuation (CV) studies can produce estimates reliable enough to be the starting point for a judicial process of damage assessment, including lost passive use values."⁵⁸

⁵⁷ Spurgeon (1998); Adapted from NOAA website: <www.noaa.org>; and the UN Millennium Ecosystem Assessment website: <www.millenniumassessment.org>.

⁵⁸ United States *Federal Register* 460, January 15, 1993, vol. 58, no. 10, pp. 4601-4614: website: <www.bts.gov/publications/federal_register/>.

3. Methodology to Estimating the Passive Use Value of the Jiyeh Oil Spill

Given the complexity and costliness of performing a Contingent Valuation (CV), the next best alternative was to use a benefit transfer for CV performed for other oil spills⁵⁹ and apply it to the Jiyeh oil spill. The benefit transfer involves transposing existing monetary environmental values estimated at one site (study site) to another (policy site), usually with similar context or physical characteristics.⁶⁰ There are two approaches for the benefit transfer: the unit value transfer; and the transfer function. In this particular case, we will rely on the unit value transfer and more specifically on the transfer of the unit to adjust for differences in income value as described in Navrud (2009).

The transfer of the unit to adjust for differences in income value is as follows:

$$VAP_p = VAP_s \times (Y_p / Y_s)^\beta$$

Where :

VAP_p = willingness to pay by household in policy country

VAP_s = willingness to pay by household in study country

Y_p = income in the country policy denominated in purchasing power parity dollar (PPP\$)

Y_s = income in the country of study denominated in purchasing power parity dollar (PPP\$)

β = income elasticity for different environmental goods and services, which are considered normal goods,⁶¹ are typically smaller than 1, and often range between 0.4 - 0.7.

Table A1.1: Building the Case for Passive Use Value Losses of the Jiyeh Oil Spill

Oil spill Survey or Study Case	Survey Date	Oil Spill Size		In-country WTP per Household		Benefit Transfer WTP per Lebanese Household		
		Year	Km spread	Metric tons	JS\$ rebased to 2006	Lower Bound US\$ 2006 ε = 0.4	Upper Bound US\$ 2006 ε = 0.7	Mid-point US\$ 2006
USA/Canada: Nestucca	1991	Minor	1,000	Mean	191	67	105	86
USA: Exxon Valdez	1992	>1,100	38,800	Median	39	13	21	17
Norway: Blucher latent oil spill ¹	1994	100 length	1,500	Mean	641	198	330	264
Belgium: hypothetical oil spill study ²	2001	0 - 65	53,000	Median	135	57	83	70
Norway: hypothetical oil spill study ³	2004	1,500	60,000	Midpoint	148	46	77	62
Lebanon: Jiyeh memorandum item	2006	>150	13,500					

Notes: ¹ The Blucher case is in fact a World War II sunken ship with a large quantity of oil that is still trapped in the shipwreck, which could be released at any time on the shores of the 100 km-length Oslo fjord. ² Study restricted to Belgian shores but a hypothetic oil spill could eventually affect the French, Dutch or any other shores as well. ³ The study has a high and low case scenario and the midpoint for both the oil spill size and the median WTP was considered. Assumptions for the calculations: Lebanon GDP/capita PPP\$ (2006) / Developed country GDP/capita PPP\$ (2006); Purchasing power parity (PPP) conversion factor or international dollar is used for the GDP/capita, which is the number of units of a country's currency required to buy the same amount of goods and services in the domestic market as a U.S. dollar would buy in the United States.

⁵⁹ Per Capita GDP Adjustment for Transnational Transfer: this implies that people spend a smaller proportion of their disposable income on environmental impacts when income decreases. The underlying implication is that environmental goods and services are neither necessities nor luxury goods but normal goods, since the poor spend more of their income on necessities than the rich.

⁶⁰ Navrud (1996); and USDA website:

<www.csrees.usda.gov/nea/nre/in_focus/ere_if_environmental.html>.

⁶¹ Pearce (2003).

Source: Navrud (2004); Navrud (2009); IMF IFS (2014); NOAA website <www.noaa.org>; and World Bank World Development Indicators (2014).

In this particular case, the income elasticity is assumed to be conservatively set between 0.4 (lower bound) and 0.7 (upper bound), which means that the percentage responsiveness of quantity demanded (in this case the resource) is slightly and significantly lower to the percentage change in income respectively.

Table A1.2 gives a range of options from other oil spills to build the case and be considered for passive use value losses. All the cited studies consider a one-time WTP installment, which derive the passive use value losses of a resource attributable to an oil spill. These figures, which range between US\$ 17 and 264 per household in Lebanon when a benefit transfer is applied and assumes a similar context, show a large gap that may be explained by at least these major variables: (i) the intensity of the natural resource injury stemming from the oil spill; (ii) the proximity vs. distance from the oil spill of the directly or indirectly affected population; (iii) the spatial population considered (community/municipality, Casa/district, Mohafaza/governorate, region, state or a nation; in this particular case citizens living beyond the state borders); (iv) the importance of this resource to the directly or indirectly affected population; and (v) most importantly, the income groups of the population that were directly or indirectly affected by the oil spill.

At the lower end of the spectrum, *Exxon Valdez* is considered a large spill (38,800 metric tons) that contaminated more than 1,100 km of shores of which 200 km were extensively damaged. The WTP figure of US\$ 17 in 2006 prices per household in Lebanon after applying a benefit transfer (see Table A1.1), which could be considered a robust lower bound for any option and existence value analysis, is the median for a very low number of low-income people directly affected by the spill (the coastal region of Alaska, mainly low density Native American fishermen) and the US entire population of the 50 states. Households outside Alaska brought down the mean WTP figure significantly, although the total passive value was above US\$ 4 billion due to the large number of households considered. It is important to note that in the case of the *Exxon Valdez* litigation, the passive value amount exceeded US\$ 4.5 billion and included accrued interest. The punitive damage amount ruled by the court was based on a single year's profit realized by Exxon (currently Exxon-Mobil) amounting to US\$ 5 billion in 1989. Incidentally, profits have reached US\$ 32.6 billion in 2013.⁶²

Considered as a middle bound case for option and existence values, a number of studies provide a WTP ranging between US\$ 62 and 86 with an average WTP of US\$ 74 per household in Lebanon in 2006 prices after applying a benefit transfer (see Table A1.2). Except for the *Nestucca* case, all of these have some similar characteristics where a very large spill with a variable shore contamination ranging from 0 to 1,500 km, a serious natural resource injury and a statewide community (as opposed to a group or union of

⁶² Exxon Mobil website: <www.exxonmobil.com>.

states such as the United States or the European Union) are considered in the surveys (distal).

At the upper end of the spectrum, the *Blucher* latent oil spill case (see note in Table A1.2) is a relatively small spill (1,500 metric tons) with serious natural resource injury, which is however supposed to affect the Oslo fjord area which is intensively used for recreation. Moreover, the survey covered the largely affluent community affected by the potential oil spill (proximal); hence the high WTP of US\$ 264 in 2006 prices per household in Lebanon associated with option and bequest value after applying a benefit transfer (see Table A1.2).

4. Benefit Transfer Results to Derive the Passive Use Value Losses of the Jiyeh Oil Spill

Important lessons may be derived from the above cases to consider fair lost passive use values of the Jiyeh oil spill. If we confine the analysis to Lebanon, Lebanese citizens living abroad still carrying the Lebanese nationality, it is fair to differentiate the application of the results according to household oil spill proximity in order to derive conservative passive use value losses for the Jiyeh oil spill:

1. The WTP *Blucher* upper bound case of US\$ 264 for the households living in all the coastal cities, towns and villages as well as in Mount Lebanon (with significant more weight on the existence than the option values), which may be estimated to represent 88 percent where Lebanese households live.
2. The WTP middle bound case with an average of US\$ 74 may be considered for all the households living in the Lebanese hinterland (with equal weight between the existence and the option values) or an estimated 12 percent of the households.
3. The WTP *Exxon Valdez* lower bound case may be applied to all the Lebanese households living abroad (with significant more weight on the option than the existence values), which might sensibly increase the passive use value losses of the Jiyeh oil spill. Nevertheless, the WTP to be used should not be US\$ 17 listed in Table A1.2 but rather differentiated WTP figures based on the GDP/capita in PPP\$ where Lebanese are living abroad. The categories of countries are listed in Table A1.2. Criteria for selection include the Lebanese *diaspora* in terms of Lebanese expatriates from 1992 to 2007. A *diaspora* estimate is available in Appendix 1 to this Annex but is not considered in the calculations.

The passive use value in term of welfare losses of the Jiyeh oil spill is conservatively estimated at US\$ 214.7 million in 2006 prices when only Lebanese residents are considered. Nevertheless, the preliminary passive use value figure reaches US\$ 217.9 million in 2006 prices when the Lebanese *diaspora* represented by households that migrated between 1992 and 2007.⁶³

⁶³ It is very difficult to compile worldwide statistics and EU-CARIM (2009) remains the most reliable source although the *diaspora* from the early 20th century till 1992 is not accounted for:

Table A1.3: Conservative Passive Use Value Losses of the Jiyeh Oil Spill

Differentiated Cases	Household Member per Household 2006	Population 2006	Lebanese Household Number 2006	GDP/capita PPP\$ 2006	One WTP Installment per Household (US\$) 2006	Passive Use Value Used as Losses for the Jiyeh Oil Spill (US\$) 2006
Proximal Coastal zone and Mt Lebanon ¹	4.23	3,311,223	782,798	9,883	264	206,819,102
Distal Hinterland including Baalbeck-Hermel and Bekaa ²	4.23	447,913	106,015	9,883	74	7,845,110
Subtotal Lebanon		3,759,136	888,813			214,664,212
Overseas diaspora³						
Europe	2.4	104,619	42,904	29,032	25	1,066,561
US/Canada	2.6	103,271	39,720	45,508	40	1,588,785
Australia	2.5	41,462	16,585	34,170	29	485,251
Arab countries	5.6	104,619	18,682	7,830	3	54,925
Latin America	4.7	14,682	3,141	9,764	16	48,859
Sub Saharan						
Africa	5.6	36,716	6,556	1,875	3	19,592
Other countries	5.1	2,605	511	9,662	15	7,864
Subtotal Overseas		407,974	128,098			3,271,836
Grand Total		4,167,110	1,016,911			217,936,049

Note: 1Proximal households are located in the Mohafazat of Beirut, Mount Lebanon, Northern Lebanon, Southern Lebanon, Akkar and Nabatieh. 2Distal households are located in the Mohafazat of Baalbeck-el Hermel and the Bekaa. Both proximal and distal households are based on 2007 CAS figures. 3The overseas Lebanese diaspora figures that were used are based on the EU CARIM figures for the Lebanese that migrated from 1992 till 2007 as other figures provided through various sources estimate the diaspora at more than 12.0 million. Adding 2007 as a year is accounted for in lieu on one of the years prior to 1992 where the migration has been ongoing. Other countries include all the countries not considered in the other categories. Totals may not add up due to rounding. For the benefit transfer for Europe, US/Canada and Australia, the elasticity used is equal to 1. Number of member in household for the various regions of the World is derived from UN data. The hypothesis of the number of member per household for Lebanese overseas is assumed to be similar to the region or country's number of member per household.

Source: Lebanon's Central Administration for Statistics (2007) website: <www.cas.gov.lb>; EU-CARIM (2010); World Bank World Development Indicators (2014); UN Economic Commission for Europe's Trends in Europe and North America, The Statistical Yearbook of the Economic Commission for Europe 2007 website: <www.unece.org.stats>; John Bongaarts' Household

as a matter of example, the latest US Census Bureau reports that the US has about 400,000 residents whose ancestry is solely or partly Lebanese. This figure significantly increases when the Lebanese Global Information Center (LGIC) figure of 3 million US citizens descending from Lebanese origin is considered. Census and citizenship records are usually underreported because they do not often specify the country of origin, i.e., Lebanon, which could explain the Census low figure, whereas the LGIC compiles information through the Ellis Island and Mormon database, churches, mosques and Lebanese networks. US Census, New York Times and LGIC websites:

<http://www.factfinder.census.gov/servlet/GRTTable?_bm=y&-geo_id=01000US&-_box_head_nbr=R1105&-ds_name=ACS_2005_EST_G00_&-redoLog=false&-mt_name=ACS_2003_EST_G00_R41_US30&-format=US-30>;

<<http://select.nytimes.com/gst/abstract.html?res=F3091FF734590C7A8CDDAA0894DD404482&n=Top%2fReference%2fTimes%20Topics%2fOrganizations%2fC%2fCensus%20Bureau>>; and <www.lgic.org/>.

Size and Composition in the Developing World <www.popcouncil.org/pdfs/wp/144.pdf>; and Table A1.2.

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