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Environmental Damage Assessment around the World

Dr. Michael Louis O'Brien
ITOPF - Senior Technical Advisor
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IOPCF Member States

158 IMO + 1 Coastal States

103 Coastal Member States to 1992 IOPC Fund Convention

Guinea-Bissau	Kuwait	Mauritius	Senegal	United States	Israel	Lebanon	Cape Verde
Sao Tome & Principe	Grenada	Iraq	Cuba	Singapore	Guinea	Bahrain	Argentina
United Arab Emirates	Yemen	Maldives	Chad	Uzbekistan	Qatar	Ukraine	Uzbekistan
Saint Kitts & Nevis	Maldives	Iran	Cameroon	Turkmenistan	N. Korea	Congo	Gambia
Papua New Guinea	Sudan	Ireland	Suriname	Kenya	Panama	Ukraine	Thailand
Hong Kong	Maldives	Brazil	Romania	Montenegro	Georgia	Finland	Comoros
Saudi Arabia	Nauru	Greece	Fiji	South Africa	Tunisia	Angola	Liberia
Equatorial Guinea	Sweden	UK	Oman	Seychelles	Croatia	Vanuatu	Tanzania
Antigua & Barbuda	Bulgaria	China	Malta	El Salvador	Slovenia	Netherlands	Somalia
Cook Islands	Latvia	India	Ghana	Bahamas	Yemen	Philippines	Bangladesh
Solomon Islands	Congo	Ecuador	Gabon	Germany	Honduras	Guatemala	S. Korea
Marshall Islands	Barbados	Albania	Poland	New Zealand	Mexico	Turkey	Kazakhstan
Faroe Islands	Nigeria	France	Portugal	Saint Lucia	Iceland	Samoa	Syria
Russian Federation	Tonga	Egypt	Palau	Madagascar	Monaco	Cyprus	Taiwan
Bosnia & Herzegovina	Japan	Eritrea	Italy	Myanmar	Uruguay	Qatar	
Trinidad & Tobago							
Dominican Republic							
Cote d'Ivoire							
Brunei Darussalam							
St. Vincent & Grenad.							

International Oil Pollution Compensation Fund

IOPCF and/or CLC-only Countries

Member States to '92-IOPCF & 34 CLC Convention ('69-, '76-, or '92)

Guinea-Bissau	<u>Kuwait</u>	Mauritius	<u>Senegal</u>	United States	Israel	<u>Lebanon</u>	Cape Verde
<u>Sao Tome & Principe</u>	Grenada	Iraq	Cuba	Singapore	Guinea	Bahrain	Argentina
United Arab Emirates							Yemen
Saint Kitts & Nevis							North Macedonia
Papua New Guinea							<u>Taiwan</u>
Hong Kong							Venezuela
Saudi Arabia							Yemen
<u>Equatorial Guinea</u>	Canada	Haiti	<u>Timor-Leste</u>	Mozambique	Jamaica	Estonia	<u>Viet Nam</u>
Antigua & Barbuda	Belize	Iran	Cameroon	Turkmenistan	N. Korea	Congo	<u>Gambia</u>
Cook Islands	Sudan	Ireland	Suriname	Kenya	Panama	<u>Ukraine</u>	Thailand
<u>Solomon Islands</u>	Maldives	<u>Brazil</u>	<u>Romania</u>	Montenegro	Georgia	Finland	Comoros
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Trinidad & Tobago	Congo	Ecuador	Gabon	Germany	<u>Honduras</u>	<u>Guatemala</u>	S. Korea
Dominican Republic	Barbados	Albania	Poland	New Zealand	<u>Mexico</u>	Turkey	<u>Kazakhstan</u>
<u>Cote d'Ivoire</u>	Nigeria	France	Portugal	Saint Lucia	Iceland	Samoa	<u>Syria</u>
Brunei Darussalam	Tonga	<u>Egypt</u>	Palau	Madagascar	Monaco	Cyprus	Taiwan
St. Vincent & Grenad.	Japan	Eritrea	Italy	Myanmar	Uruguay	Qatar	

Civil Liability Convention (CLC)

‘Environmental Damages’ under CLC/IOPCF

IOPCF Handbook:

“... compensation for impairment of [damage to] the environment other than loss of profit ...is limited to costs of reasonable measures of reinstatement actually undertaken or to be undertaken.”

This is a practical approach, similar to that for clean-up.

Like clean-up, it also includes preventive measures:

“... any reasonable measures taken by any person after and incident has occurred to

International Regime foresees:

- **Clean-up costs for environment**
 - *E.g. marsh cleaning, animal cleaning/rehab., waste disposal*
- **Reasonable restoration costs**
- **Costs for reasonable preventive measures**
- **Loss of earnings for incomes deriving from environment (“pure economic loss”)**
 - *E.g. commercial fishing, mariculture, beach hotels*
- **Post-spill studies relating to damage**
 - *E.g. to study nature/ extent of damage or if reinstatement is working.*
- **Costs for reasonable use of claims advisors**
(depending on actual need of each claimant)

International Regime

Key principles relevant for Environmental

- **Loss is not automatic:** **Damage:** Just because there was an oil spill does not mean there is environmental damage or compensable loss.
- **Loss must be real:** Compensation is paid to the extent that the amount of loss or damage is actually demonstrated/ incurred
- **Not modelled:** Claims are not accepted for 'damage' based on abstract quantification using theoretical models.
- **Strong link:** There must be a strong link of causation between spill and loss
- **Alternative sites:** Reinstatement at some distance is possible (general vicinity), but it must enhance damaged resources
- **Chance for success:** Cleaning and reinstatement works should only be carried out where there is a reasonable chance of success.
- **Government decisions:** The fact that an official body makes a decision does not mean that it will be compensable.
- **Fisheries:** claims acceptable in principle, but are expected to be rare and must meet criteria (e.g. demonstrable, causally linked, limited alternative sources...)

US NRDA: Origins in CERCLA

'Comprehensive Environmental Response, Compensation, and Liability Act' of 1980

- 'Discovery' of long-term industrial pollution (brown-sites/ toxic dumps of - 1970s)
- Focus on both public health and environment (Love Canal).
- New, broad Federal (EPA) authority to respond directly to HNS releases/ threats
 - Short-term removals to address releases/ threats requiring quick response.
 - Long-term remedial response actions to reduce non-life threatening HNS risks at EPA-listed sites.
- 'Superfund' , a tax on the chemical/ petroleum industries
 - trust fund for cleaning up abandoned/ uncontrolled sites without viable responsible party.
- Resource Trusts authorized by 1996 (other resources held in trust for public):
2003
 - Resources: *land, fish, wildlife, biota, air, water, ground water, drinking water supplies...*
- Established liability of persons responsible for HNS releases, at these sites controlled by the United States, any State, an Indian Tribe, a local government, or a foreign government'
 - Basis for NRDA: *injury to, destruction of, or loss of natural resources, including*
 - *the cost of restoring injured resources to their baseline condition,*
 - *compensation for the interim loss of injured resources pending recovery, and*
 - *the reasonable cost of a damage assessment*

Legacy for OPA NRDA

- **Terms like “Responsible Party”**: *Useful when the company has stopped trading or there are several or thousands of parties... vague when everyone knows it's the ship*
- **‘Interim losses’**: *Capturing time element measured in years, useful for non-active spillers on land sites with low/no natural recovery, irrelevant for oil spills*
- **Discount rates**: *adding interest onto penalty if no action undertaken, typical situation for brownfield sites, irrelevant for oil spills, but turned around to reduce value of restoration projects that reach into the future...*
- **Artificial distinction between ‘response’ and ‘restoration’**:
Turf war between EPA & CG vs. Trustees
- **Minimal ‘primary restoration’ in favor of ‘compensatory restoration’**:
Trustees must leave cleaning and most emergency response to EPA/USCG
- **Idea of tax on industry to create a fund**: *(OSLTF-1986/90, \$409m spent to ‘07)*
- **Concept of Trustees**: *Typical role of government neglected in US politics*

US NRDA: Key features

- **DOI Regs. vs. NOAA Regs.**
 - i.e. CERCLA (1980 - HNS) vs. OPA90 (EVOS - oil)
- **Federal vs. State**
 - Commerce/trade/ national environmentalism vs.
 - local interests/ cash grabbing
- **Trustees**
 - DOI (Department of Interior): birds, wildlife
 - NOAA (National Oceanic & Atmospheric Admin): fish
 - State agencies
- **Multi-step, public process**
 - Clean-up (USCG/ USEPA) / information gathering (SCAT)
 - Pre-assessment (screen),
 - Damage Assessment & Restoration Planning (DARP)
 - Restoration Implementation

Typical ITOPF Comments

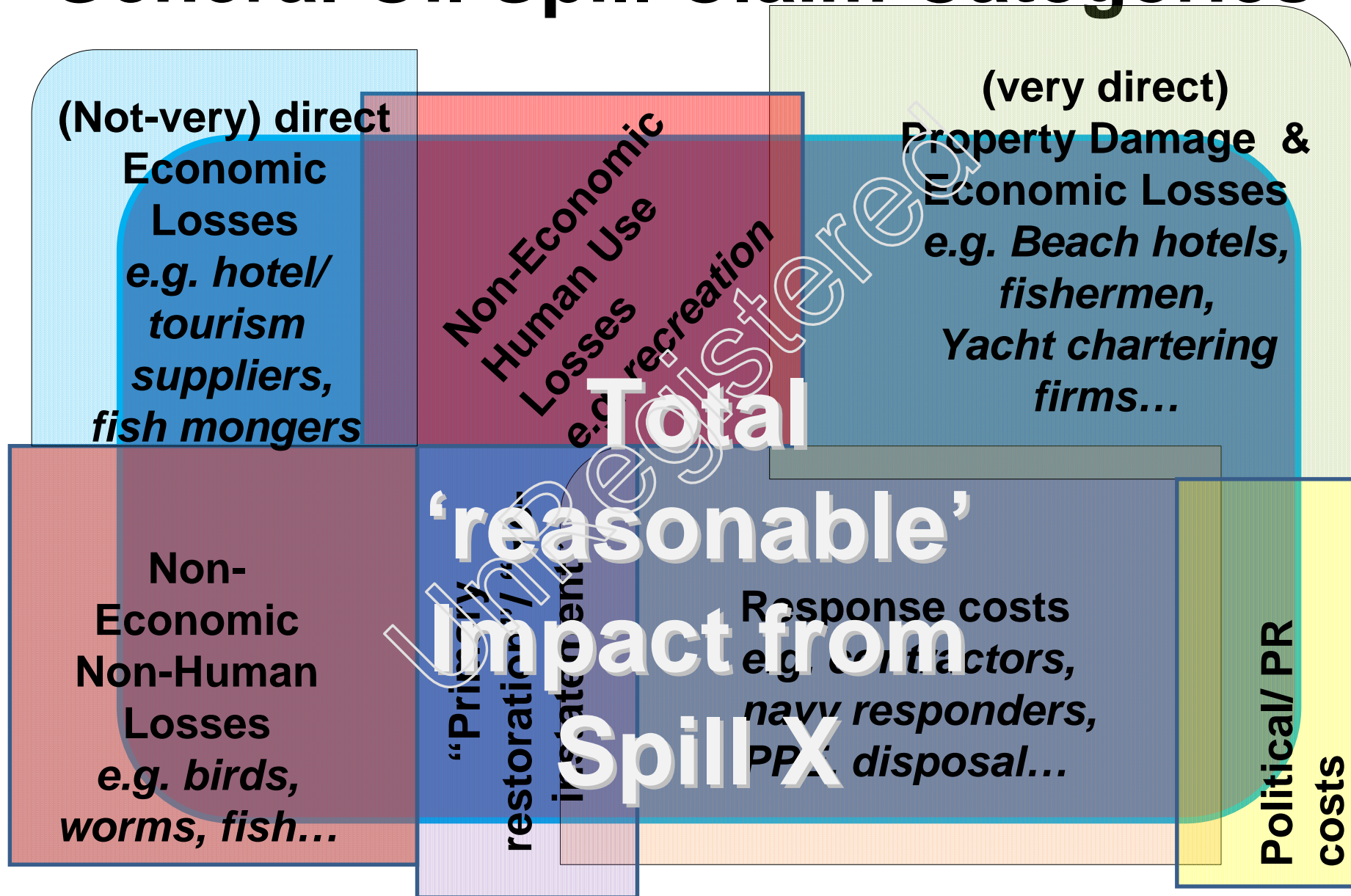
- **Theoretical modelling:** *Damage is estimated, rather than observed, calculations are full of assumptions, in some cases entirely*
- **Punitive:** *Approach out of line with accidental nature of incidents, especially inclusion of interim losses, especially with approach to “co-operation”*
- **Disconnected:** *Restoration projects forced, even where none needed by marine environment, resulting in shift to alternate sites, alternate resources*
- **Long and expensive:** *The damage assessment and public information costs are typically significant in relation to size of injury found...*
- **Pet projects:** *Typically no relation to spill, represent no actual, net improvement to environment as they would have been done by others...*
- **Poor science:** *e.g. failure to fingerprint/ take background oil into consideration; failure to differentiate between oil exposure and impact; improper application of lab results to field situation; generalisation of impact zones based on partial observations (over space and time)...*

International Regime vs. US NRDA

General Oil Spill Claim Categories:

- **Response costs**
- **Repair/ replacement of damaged property**
- **Economic losses**
 - ***“Consequential” (i.e. very direct) economic losses***
 - ***“Pure Economic” (i.e. less direct) economic losses***
 - ***Loosely-linked/ not-very direct economic losses***
 - ***PR costs (political, corporate, NGOs...)***
- **Non-economic losses**
 - ***Recreation***

General Oil Spill Claim Categories



US NRDA (OPA90) versus International Regime

OPA90 -NRDA:

International Regime:

(very direct)

Economic Losses
*e.g. Beach hotels,
fishermen,
Yacht chartering
firms...*

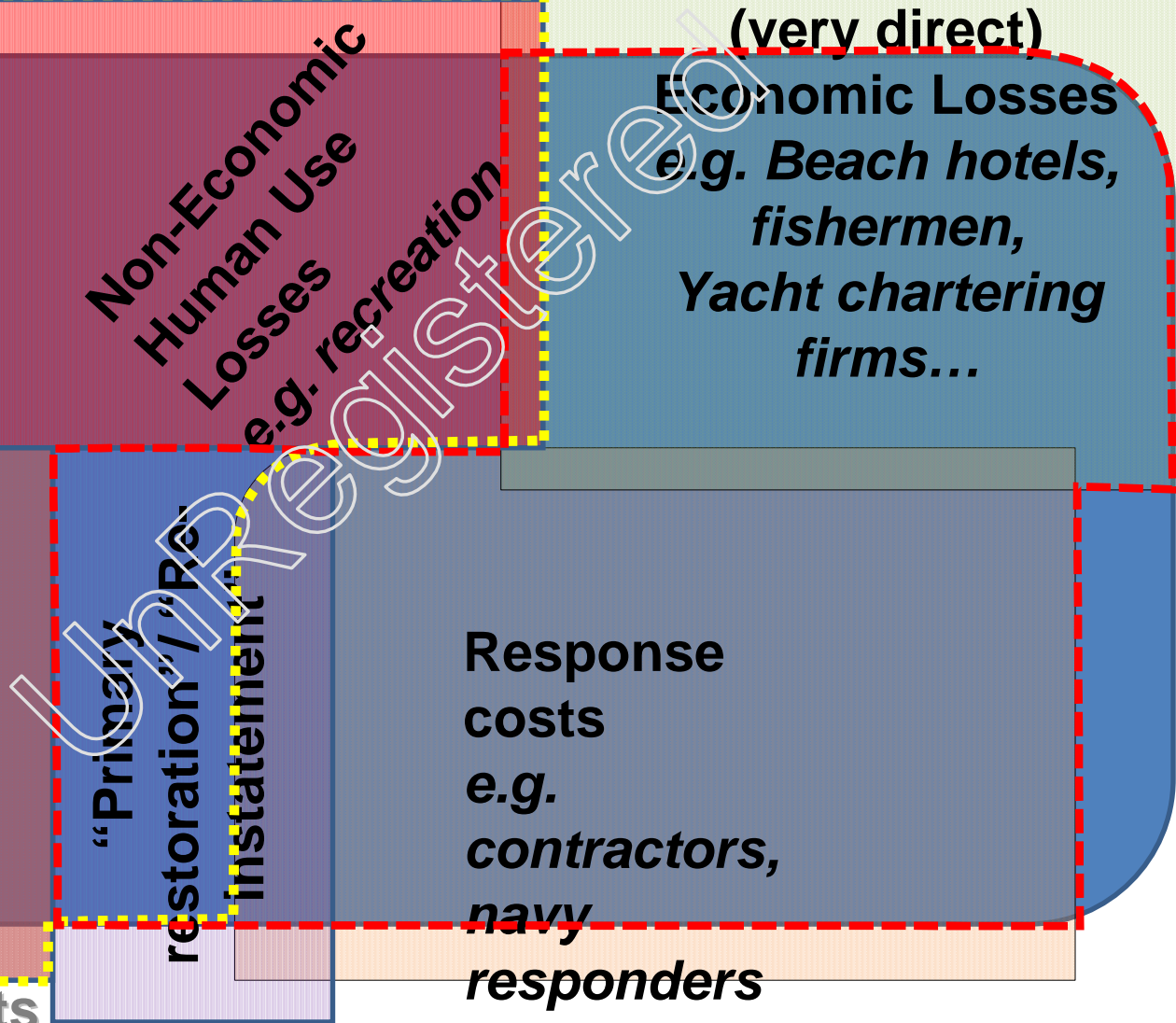
**Non-Economic
Human Use
Losses**
e.g. recreation

**Non-
Economic
Non-Human
Interim
Losses**
*e.g. US-Style
Compensatory*

**“Primary
restoration” / “Re-
instatement”**

**Response
costs**
*e.g.
contractors,
navy
responders*

+ Assessment Costs



Other 'Potential' Systems

- Simple formulas:
 - *Ukraine, Saudi Arabia, Brazil*
 - *Norwegian formula in Egypt*
- Complex formulas/ models:
 - *US Washington State*
 - *Saudi Arabia: Jeddah Method*
 - *Russian Methodika*
 - *Chinese 'swept-area' / 'Costanza' model*
 - *EU Environmental Liability Directive (ELD)*
- International Regime with national top-up scheme
 - *Canada*
 - *Ad hoc, 'last-in-line' approach (France, Spain...)*

Complex Formulas: Washington State

- Pre-assessment screen to determine which method:
 - Compensation table (formulas and multipliers)
 - When actual data on injuries is sparse
 - When data is too expensive to obtain
 - When there are no restoration costs to claim for because there are no feasible restoration projects
 - Specific study & evaluation of impact
 - When the specifics of the case mean this will produce a larger claim?
- Method requires:
 - Quantity & type of oil
 - Exposed resources & their sensitivity
 - Response actions taken
 - Expert opinion to derive coefficients

Damages

$$(\$) = \text{gallons spilled} * 0.1 * [(OIL_{AT} * SVS_{AT,j}) + (OIL_{MI} * SVS_{MI,j}) + (OIL_{PER} * SVS_{PER,j})]$$

Credit for Oil Recovery

$$\text{Damages}(\$) = \text{Scaling coefficient} * [(SVS_{at} * Oil_{at} * \text{Spill to water volume}) + (SVS_{mi} * Oil_{mi} * \{ \text{Spill to water volume} - \text{Total 24 hour recovery volume} \}) + (SVS_{per} * Oil_{per} * \{ \text{Spill to water volume} - \text{Total 24 hour recovery volume} \})]$$

Where:

gallons spilled = the number of gallons of oil spilled;

$SVS_{i,j}$ = spill vulnerability score;

OIL_{AT} = Acute Toxicity Score for Oil;

OIL_{MI} = Mechanical Injury Score for Oil;

OIL_{PER} = Persistence Score for Oil.

i = acute toxicity, mechanical injury and persistence effect of oil

j = the most sensitive season affected by the spill

0.1 = multiplier to adjust the damages calculated to the \$1-100 per gallon range

Saudi Arabia – Jeddah Method

The cost formula of the Jeddah method is:

$$C = \frac{(F1 + F2 + F3)}{3} \times [(Rm) (V) + (Rpl) (V)]$$

where:

C = Total natural resource cost in US\$

F1 = Toxicity factor = $\frac{0.75 \times \text{API gravity}}{30}$ or

the value from table 1 if API gravity is not known

F2 = Degradability factor = $0.50 \times \frac{30}{\text{API gravity}}$ or

the value from table 1 if API gravity is not known

F3 = Dispersability factor, taken from table 1

Rm = Base rate for damaged marine resources according to degree of sensitivity shown in tables 2 and 3

Russia - Methodika

- Developed in 1967 to quantify environmental damages.
- Theoretical formula used to quantify damages, based on:
 - volume of oil spilled,
 - sensitivity of the area
 - rate at which the oil is cleaned up.
- Used in first Fund71 case – *Antonio Gramsci (Ventpils 1979)*
- Resulted in unanimous 1971 Fund Assembly Resolution in 1980 that: *‘the assessment of compensation to be paid by the International Oil Pollution Compensation Fund is not to be made on the basis of an abstract quantification of damage calculated in accordance with theoretical models’.*
- Still in controversial play for domestic and non-oil cases, seen again in 2003 in a CLC oil case.

Environmental Damage Claims in China – Recent ITOPF Experience

- *Direct & extensive involvement in 17 cases since 2000*

Incident	Year	place	Cause	Oil type	cargo/bunker
BOW CECIL / DE HANG	2000	Guangzhou	collision	HFO	cargo
LONG BO 6	2001	Taiwan Straits	grounding	HFO	bunkers
DAINTY RIVER/ ST	2001	Dalian	collision	MDO	bunkers
ACCORD	2002	Shanghai	grounding	MDO	bunkers
TASMAN SEA	2002	Tianjin	collision	crude	cargo
CHANG YANG	2003	Shanghai	collision	HFO	bunkers
MSC ILONA	2004	off Guangzhou	collision	HFO	bunkers
ARTEAGA	2005	Dalian	grounding	crude	cargo
GG CHEMIST	2005	off Shanghai	collision	MDO	bunkers
BMT/ QDY1	2005	Dalian	collision	HFO	cargo
JUBILEE GLORY	2005	Shanghai	dry dock	HFO	bunkers
DA QING 91	2005	Bohai Bay	hull failure	crude	cargo
HYUNDAI INDEPENDENCE	2006	Zhoushan	dry dock	HFO	bunkers
MMM GALVESTON	2007	Yantai	grounding	HFO	bunkers
HUI RONG	2007	off Zhoushan	collision	HFO	bunkers
PRICELESS	2007	Ningbo	operational	HFO	bunkers
INABA PRIDE	2007	off Shanghai	sinking	HFO	bunkers

10/ 17 cases on ITOPF file have fisheries / environmental damage

Fisheries vs. Environmental Damage

- No clear distinction between fisheries/ aquaculture and environmental damage claims. E.g. [BOW CECIL / DE HANG](#) (2000) claims by same authority
 - “Direct Economic Losses of Aquatic Products” (RMB 3.5 million)
 - Theoretically assessment by multiplying estimated affected sea area with assumed fish density, a loss factor per unit area and alleged market prices.
 - ITOPF comments on the approach were long and very critical.
 - ITOPF suggests identifying affected fishermen and comparing their post-with pre-spill net earnings.
 - “Losses of Natural Fisheries Resources” (RMB 14 million).
 - Looks like an environmental damage claim, but it targets same commercial species as above . It is calculated as a multiple of the first claim category.
- Almost identical approach taken in TASMAN SEA (2002), ARTEAGA (2005), GG CHEMIST (2005), JUBILEE GLORY (2005), DA QING 91(2005) cases.
 - ITOPF finds this approach to be entirely theoretical and outside the realm of reasonable claims as defined in the International (CLC/ IOPCF) system.

Usual Approach

- Usual approach - 3 main components:
 - (1) estimating the affected area,
 - (2) estimating the loss, generally kg of commercial species,
 - (3) calculating the loss in financial terms.
- In recent development, instead of market prices, the third step imagines what a hatchery & release program might cost. (e.g. HYUNDAI INDEPENDENCE, MMIM GALVESTON).
 - E.G. - RMB 29,000,000 claim by:
 - ECSFEEMC (East China Sea Fishery Ecological Environment Supervision Center of the Ministry of Agriculture)
 - OFESS (Oceanic Fishery Environment Supervision Station)
 - Zhejiang Province
 - ITOPF assessment:
 - the claim is entirely abstract and theoretical,
 - Instead, restoration measures should be based on the actual losses and measured mortalities, not on speculated and extrapolated data.
 - Recommendation that no payment for the claim was reasonable, although we did accept the assessment charges.

Shadow-Engineering Approach:

- Variation: Determine the area affected (as above), then value the loss by modeling the costs of an imaginary water purification plant to clean an assumed volume of water.
- E.g. TASMAN SEA (2002) and BUNGA MAS TUJUH (2005).
- ITOPF comments: “Among other serious flaws:
 - 1) the unit price is simply assumed without objective justification,
 - 2) the surface water *area through which the oil is* assumed to pass is incorrectly translated into a *volume*
 - 3) *the treatment* facility is not actually used and there is no indication that it will be built (in other words, it is purely a speculative exercise), and
 - 4) the methodology is arbitrary and capricious.In sum, the methodology is both hypothetical and incorrect.”

“Costanza Method”

The value of the world's ecosystem services and natural capital

Robert Costanza^{*,†}, Ralph d'Arge[‡], Rudolf de Groot[§], Stephen Farber^{||}, Monica Grasso[†], Bruce Hannon[¶], Karin Limburg[#], Shahid Naeem^{**}, Robert V. O'Neill^{††}, Jose Paruelo^{‡‡}, Robert G. Raskin^{§§}, Paul Sutton^{|||} & Marjan van den Belt^{¶¶}

* Center for Environmental and Estuarine Studies, Zoology Department, and † Institute for Ecological Economics, University of Maryland, Box 38, Solomons, Maryland 20688, USA

‡ Economics Department (emeritus), University of Wyoming, Laramie, Wyoming 82070, USA

§ Center for Environment and Climate Studies, Wageningen Agricultural University, PO Box 9101, 6700 HB Wageningen, The Netherlands

|| Graduate School of Public and International Affairs, University of Pittsburgh, Pittsburgh, Pennsylvania 15260, USA

¶ Geography Department and NCSA, University of Illinois, Urbana, Illinois 61801, USA

Institute of Ecosystem Studies, Millbrook, New York, USA

** Department of Ecology, Evolution and Behavior, University of Minnesota, St Paul, Minnesota 55108, USA

†† Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37831, USA

‡‡ Department of Ecology, Faculty of Agronomy, University of Buenos Aires, Av. San Martin 4453, 1417 Buenos Aires, Argentina

§§ Jet Propulsion Laboratory, Pasadena, California 91109, USA

||| National Center for Geographic Information and Analysis, Department of Geography, University of California at Santa Barbara, Santa Barbara, California 93106, USA

¶¶ Ecological Economics Research and Applications Inc., PO Box 1589, Solomons, Maryland 20688, USA

The services of ecological systems and the natural capital stocks that produce them are critical to the functioning of the Earth's life-support system. They contribute to human welfare, both directly and indirectly, and therefore represent a part of the total economic value of the planet. We have estimated the current economic value of 17 ecosystem services for 16 biomes, based on published studies and a few original calculations. For the entire biosphere, the value (most of which is outside the market) is estimated to be in the range of US\$16–54 trillion (10¹²) per year, with an average of US\$33 trillion per year. Because of the nature of the uncertainties, this must be considered a minimum estimate. Global gross national product total is around US\$18 trillion per year.

Because ecosystem services are not fully 'captured' in commercial markets or adequately quantified in terms comparable with economic services and manufactured capital, they are often given too

little weight. This estimate represents a minimum value, which would probably increase: (1) with additional effort in studying and valuing a broader range of ecosystem services; (2) with the incorporation of

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ITOPF Comments:

- An attempt is made to quantify the loss of “service” provided by the “damaged” environment by distilling down global environmental service estimates from an article published in 1997 in “Nature” magazine.
- A per-hectare dollar value of the open sea surface is derived (RMB 33,631.5 /ha) without explanation and multiplied by the estimated 62km² swept sea surface area.
- As above, the methodology used is entirely theoretical and equally wrong; it has no scientific or technical basis.
- The methodology and results would not stand up to scrutiny in another C.I.C jurisdiction.

Environ. Damages in Canada

- Full member of International Regime
 - 1992 CLC, 1992 IOPC Fund
 - Abides by all the rules and definitions of IOPCF system
- **SOPF: Ship-source Oil Pollution Fund**
 - Based on Maritime Liability Act, origins back to 1971 (4yrs b4CLC'69, 7 yrs b4 '71Fund, decades b4OPA'90 in USA)
 - Extra layer of compensation above CLC&IOPCF (\approx USD 120 million)
 - SOPF pays for IOPCF contributions (US\$1.75million/ yr)
 - All sources and types of ship-based oil pollution, not just persistent oils from tankers or their bunkers
 - Typically small clean-ups in recent years (>60% SOPF 'cases')
 - Coverage extends further into salvage and wreck removal (>50%)
 - No extension into environmental damages (3 cases w/ bird cleaning)
- **EDF: Environmental Damages Fund**
 - Fed entirely by fines received for criminal offences with some environmental aspect

Questions?

Advanced topics for discussion:

- Swept area
- “restoration” vs. “reinstatement”
- Discount rates
- Interim losses
- ‘Primary’ vs. ‘compensatory’ restoration
- “abstract and theoretical”
- “population effects”
- Exposure vs. impact
- Alternate sites (“off site, out of kind”)