

SOCIOECONOMIC AND ENVIRONMENTAL IMPACTS OF THE PRESTIGE OIL SPILL IN SPAIN



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Objective



- This present work contributes to the previous assessment literature mostly assessing the **total damages (total economic value) of the Prestige oil** spill in Spain, including environmental damages.
- It has been used by the Prosecutor in the Spanish trial against the Prestige tank.



The Prestige Accident



- On November 13, 2002, the single-hull 26 year-old oil tanker, *Prestige*, suffered a serious accident just 46 kilometers away from the Finisterra Cape, in the Northwest of Galicia (Spain).
- It carried about 77,000 metric tons (MT) of heavy low-quality oil.
- The Prestige sank 222 Kilometers away from the Cies Islands on November 19, 2002, after splitting in two during a storm.

The Prestige Spill

- The Prestige spilled more than 60,000 MT of oil, polluting more than 1,300 kilometers of coastline. Its spill was the most serious environmental accident ever suffered in Spanish and European waters.



red areas by the Prestige oil spill



The largest oil spill in Europe in the last 30 years

Ship	Year	Place	Oiled Birds Collected	Mortality
Torrey Canyon	1967	Cornualles (UK)	7,000	25,000
Amoco Cadiz	1978	Bretaña (France)	5,000	22,000
Exxon Valdez	1989	Alaska(USA)	30,000	100,000-300,000
Braer	1993	Shetland (UK)	1,500	5,000
Sea Empress	1996	Gales (UK)	4,600	10,000-15,000
Erika	1999	Bretaña (France)	77,000	150,000-300,000
Prestige	2002	Galicia (Spain)	15,610	115,000-230,000





Testifying in trial

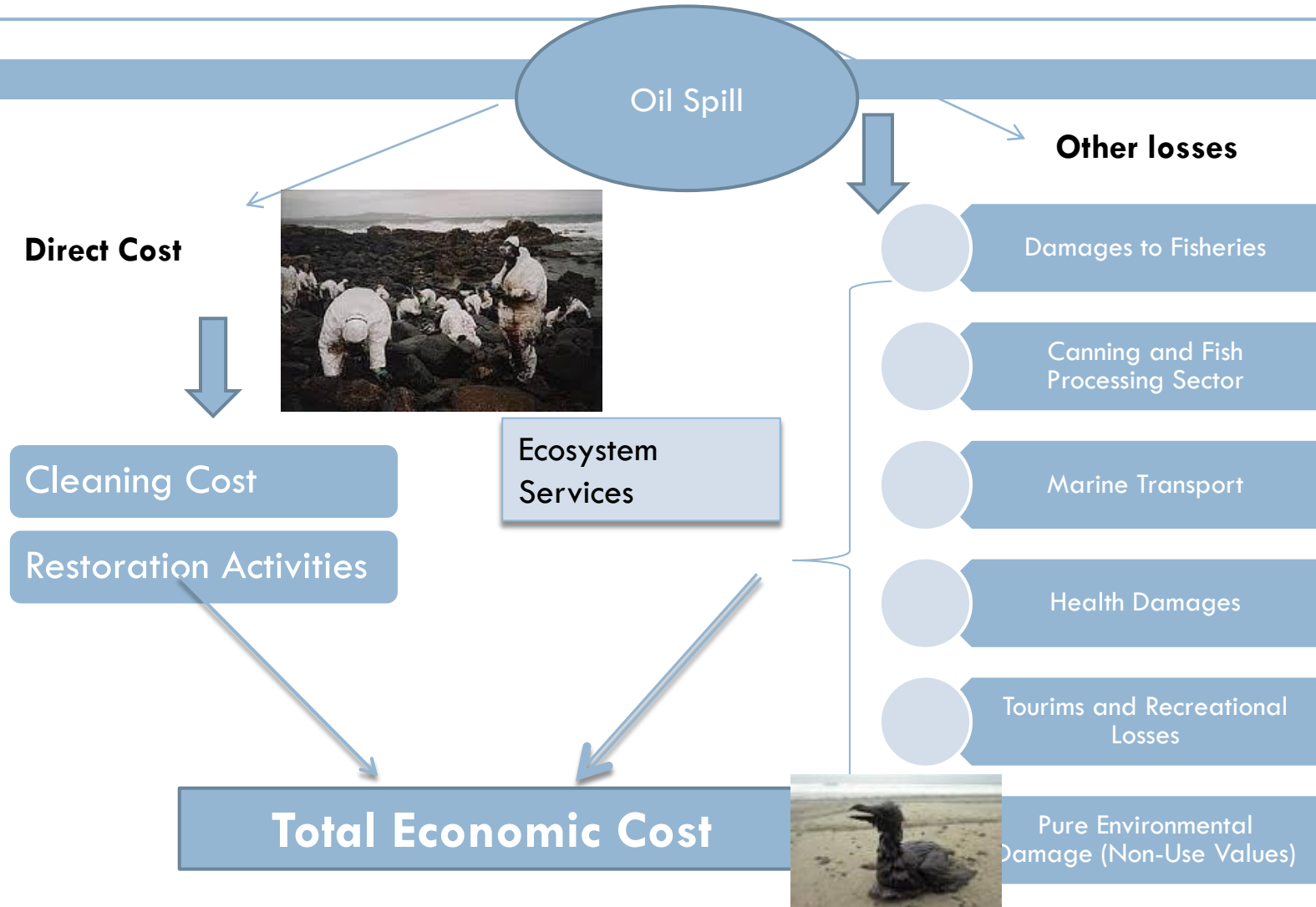


- 8 hours of oral
testification
- MAIN ISSUES:
causality, causality,
causality....

AERE NEWSLETTER

Association of Environmental and Resource Economists (AERE)

SOCIAL COST of PRESTIGE OIL SPILL



METHODOLOGY: ECOSYSTEM SERVICE ASSESSMENT

Techniques

- **Fisheries Losses: Market prices**
- **Losses in tourism sector: Travel cost method**
- **Image Losses: Hedonic Price Model**
- **Non-use values: Contingent Valuation**
- **Health Costs: “Cost of Illness Approach”**

Exxon Valdez (EE.UU, 1991): Coste de viaje y método de valoración contingente (Carson et al., 1992)
<http://are.berkeley.edu/~gh082644/Exxon%20Valdez%20Oil%20Spill.pdf>

Erika (Francia, 1999): Coste de viaje y método de valoración contingente (Bonnieux y Rainelli, 2001)

Deep Water Horizon (EE.UU, 2010): valoración contingente y coste de viaje

Premises of Work

**ECONOMIC
MAGNITUDES:**
expressed in 2011
(prices updated via
CPI)

Sources: OFFICIAL
DATA

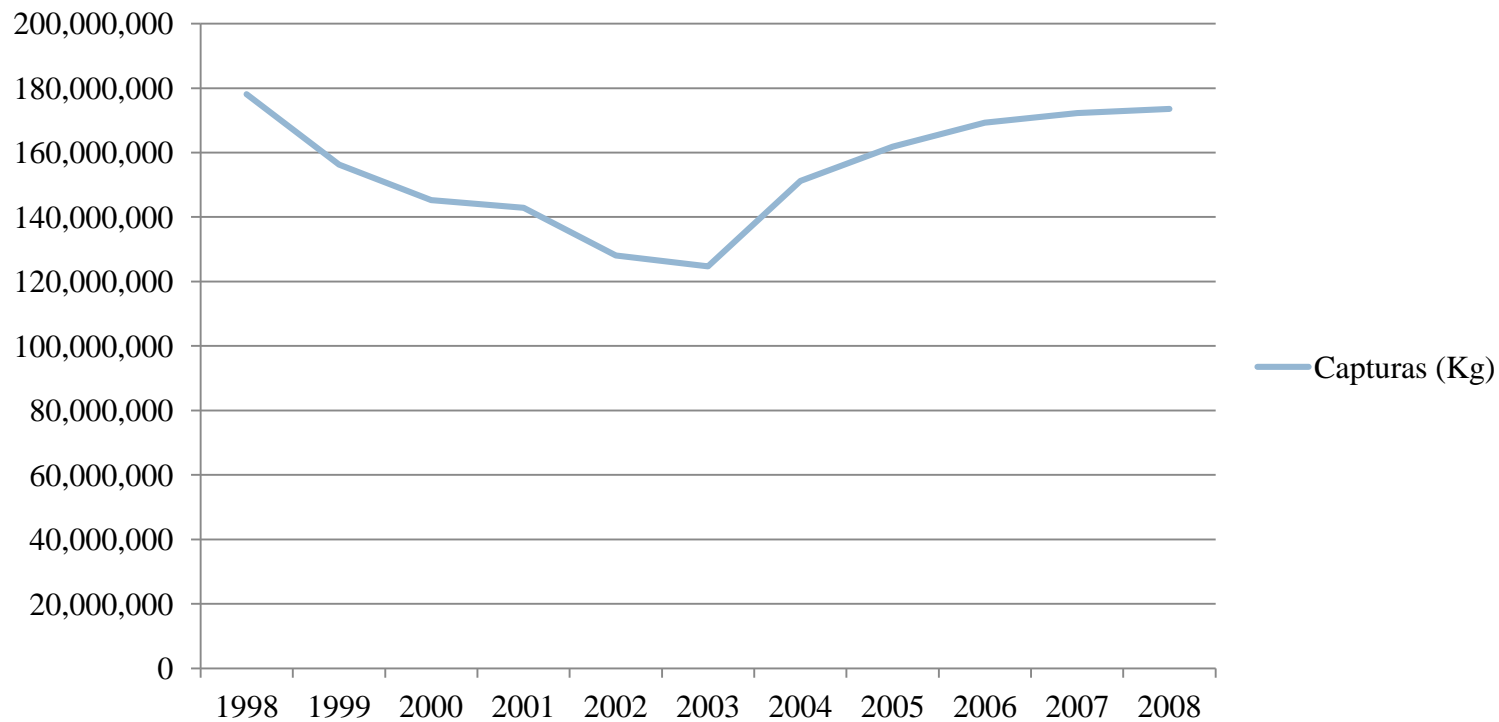
**GEOGRAPHICAL
AREA: GALICIA
AND CANTABRIC
COAST**

SHORT TERM
(accident- 2004)
& MID_TERM
COSTS (accident-
2006)

LOSSES IN THE FISHERIES SECTOR

FISH CATCH LOSSES

Total Fish Catches in Kilos



Elaborado a partir del Cuadro 3.2 Pág 21, Informe Pericial

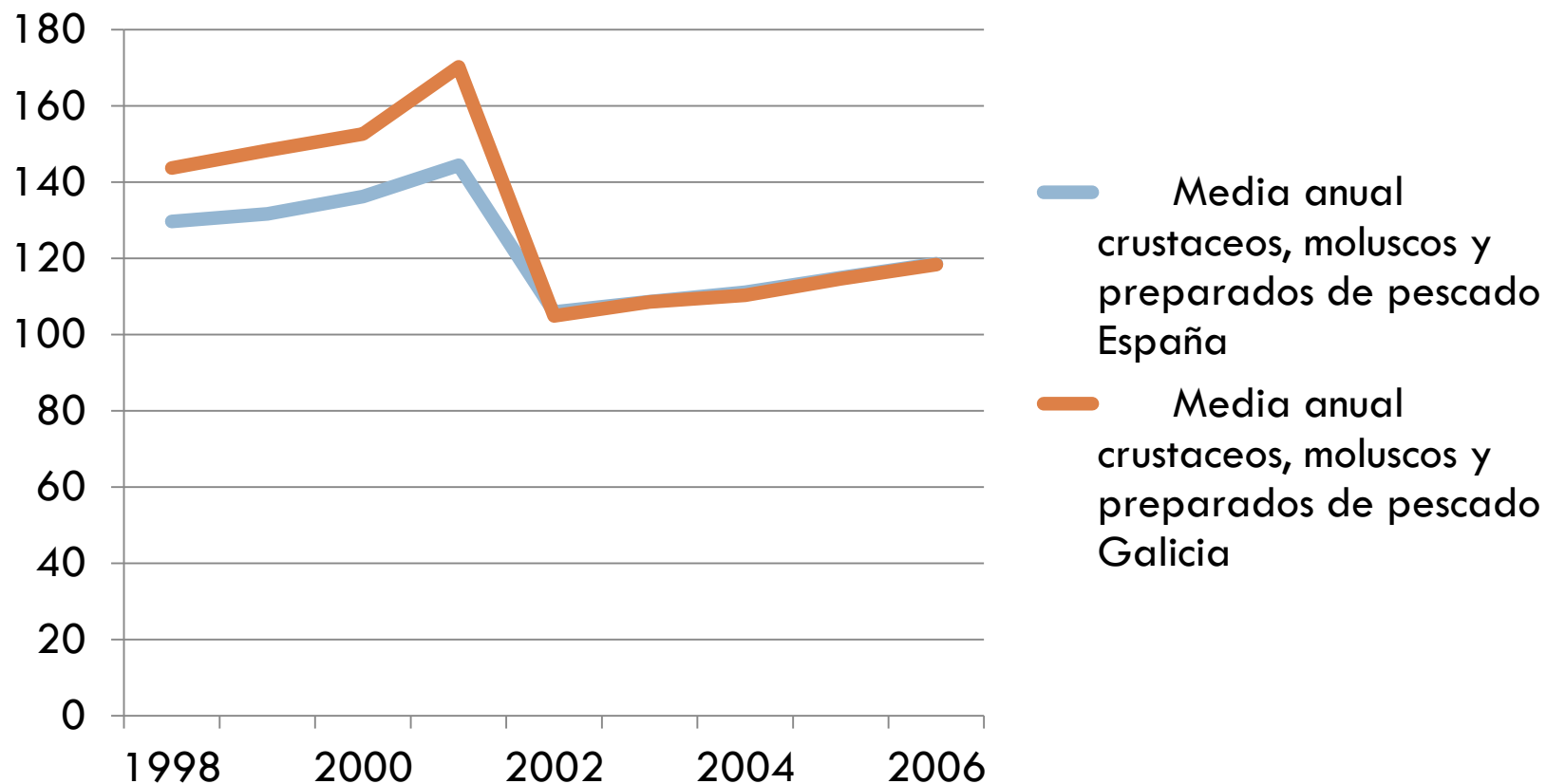
Fishing and Selfish sectors

- Data from different regional statistical departments from all the Cantabric coast in North Spain (all affected regions).
- Total losses for the entire Spanish fishing sector: 296.26 millions for the period 2002-2006.

Economic value of fisheries

	Mean 1999-2001	2002	2003	2004	2005	2006
Galicia	471.76	406.12	400.94	452.37	463.72	469.85
Asturias	49.17	48.02	49.24	52.89	57.64	48.94
Cantabria	40.42	36.91	24.47	28.24	26.67	32.31
Basque Country	115.05	98.66	84.59	111.12	90.27	129.75
Losses at real prices		-86.69	-117.24	-35.50	-46.57	-10.24

PRICE DROP AFTER SPILL



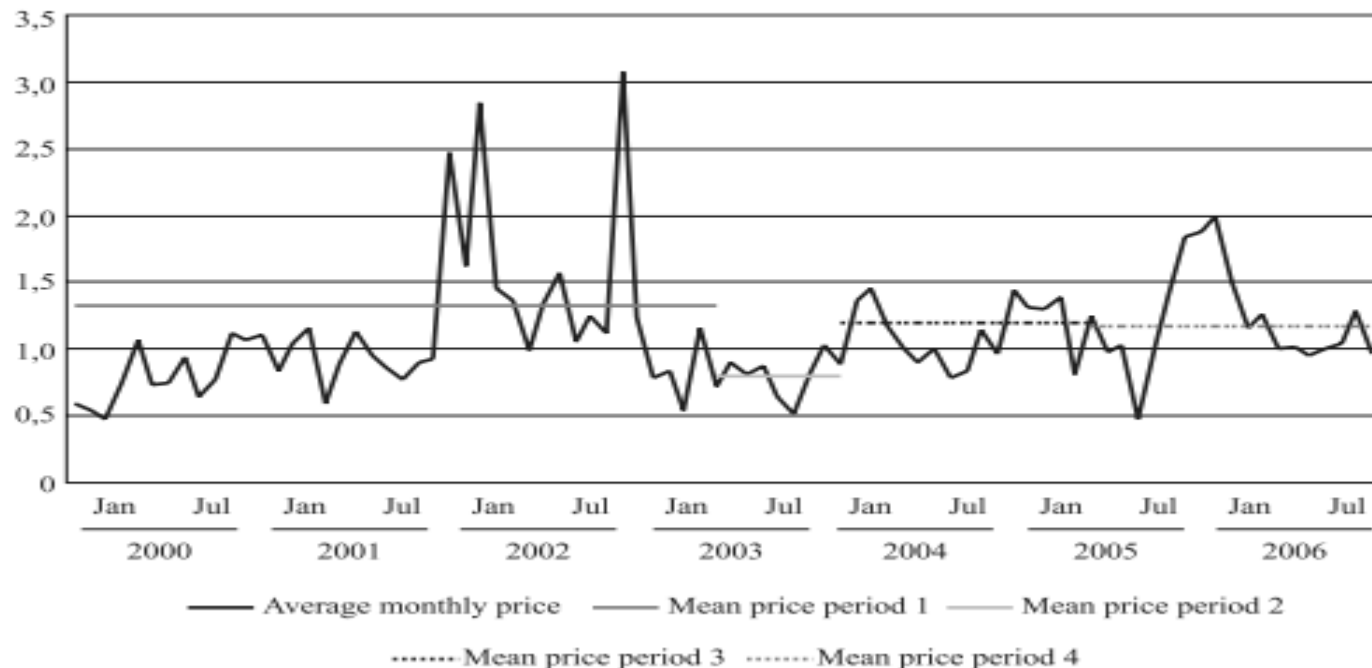
Fuente: INE

Figura Pág 31, Informe Pericial

Evolución del IPC de las rúbricas crustáceos, moluscos y preparados de pescado en Galicia y España durante el período 1998-2006 (Precios constantes, base 2001=100)

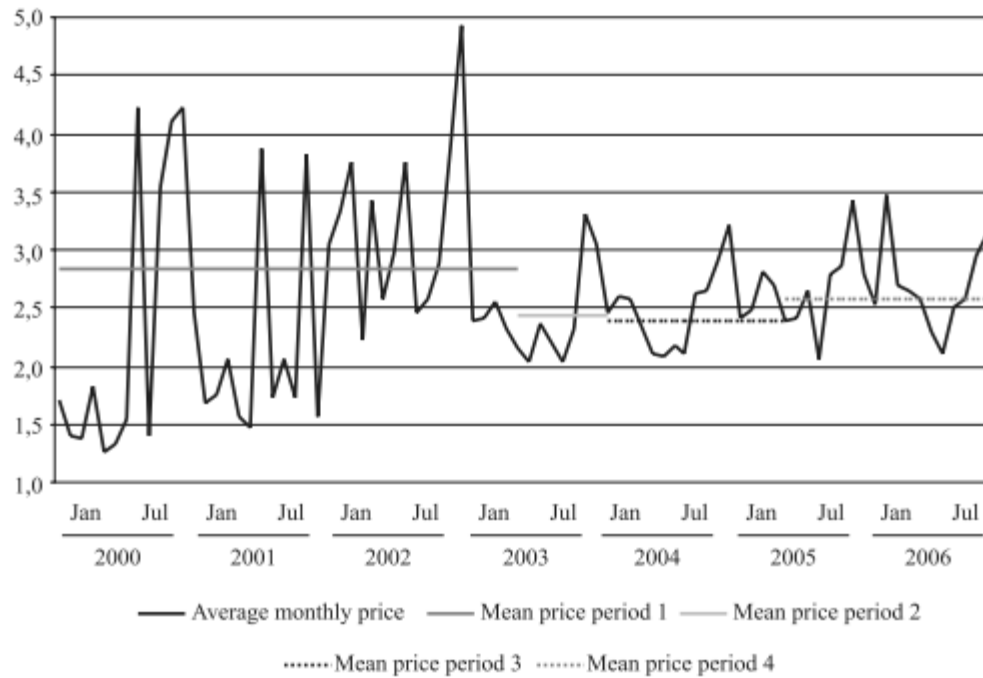
Examples of price drop: Mackarel

GRAPH 4
Horse mackerel prices per kg



Time series of fish prices

GRAPH 3
Prices of pelagic species per kg



STIGMA IMPACT ON FISH PRICES

Objective: To assess whether fish prices have suffered from Stigma

Método: Hedonic Price Models

Data bases www.pescagalicia.com & newspaper datbase:

EL PAIS
DIARIO INDEPENDIENTE DE ESPAÑA
10 DE DICIEMBRE DE 2002

Los últimos exploradores
Los prospeccionadores que exploran los barros de la Tierra

La cruz de Enrique Iñolázar
El coronel que murió en 1914 no logró salvar su país en España

La moda más rebelde
Pasados por lavadora los desechos de amor

Zaplaña se niega a restituir el PER y los sindicatos anuncian movilizaciones

Una nueva marea de fuel alcanza las playas de la Costa da Morte

Dos muertos y 24 heridos al descarrilar un Talgo en Albalcete

44 millones de hambrientos esperan a Lula

Domingo Preparando las urnas

Negocios: Venta de activos para pagar deuda

EL MUNDO
DEL SIGLO VEINTIUNO
10 DE DICIEMBRE DE 2002

INMIGRACION / Ataca en Las Palmas un barco hondureño con 250 sube: 'barriarles en sus bodegas' / 19

Rajoy 'responsabiliza' al PSOE de alentar 'la tensión social' en Galicia

El BCE recorta medio punto 'los tipos de interés para reactivar la economía de la Unión Europea'

MILISEN III
Seis II y cuatro III
Y mañana, la legión Galipoli

NOVIENOS
La juez del caso Caceres dirige un registro por sorpresa de las oficinas del ERE

ENTREVISTA
José Punter. Un agricultor de la zona de Ribera que se enfrenta a la sequía

Chávez ordena al Ejército proteger las plantas de petróleo tras cinco días de huelga

PP y PSOE secundarán la marcha convocada por Ibarretxe bajo el lema 'ETA kamorá'

MASH

ABC
FUNDADO EN 1903 POR DON TORCUATO LÓPEZ DE HARO
10 DE DICIEMBRE DE 2002

Intervención. Clave en la crisis del País Vasco

Sobredosis. El Gobierno del Partido socialista denuncia actividad antidemocrática en las listas de espera

Emergencia. Castilla se enfrenta a la segunda ola de incendios forestales

La segunda mancha se encuentra a sólo 22 kilómetros de Frísterre y llegará a la costa hoy o mañana

El Gobierno y la Xunta admiten ya la magnitud de la catástrofe y la toxicidad de los vertidos

El Consejo de Ministros aprueba la fusión digital con diez nuevas condiciones

El Ejecutivo no altera sustancialmente los requisitos de Compromiso

Cardenal sostiene que el Parlamento vasco no comedó deiro y Garçon le devuélvete el infierno sin leírlo

Prohibida la pesca en la franja atlántica gallega

ETA reaparece con un coche bomba en Santander que no causó víctimas

La Voz de Galicia
10 DE DICIEMBRE DE 2002

Los marineros intentan salvar las rías con sus propias manos

Desesperación en los puertos por la falta de contenedores

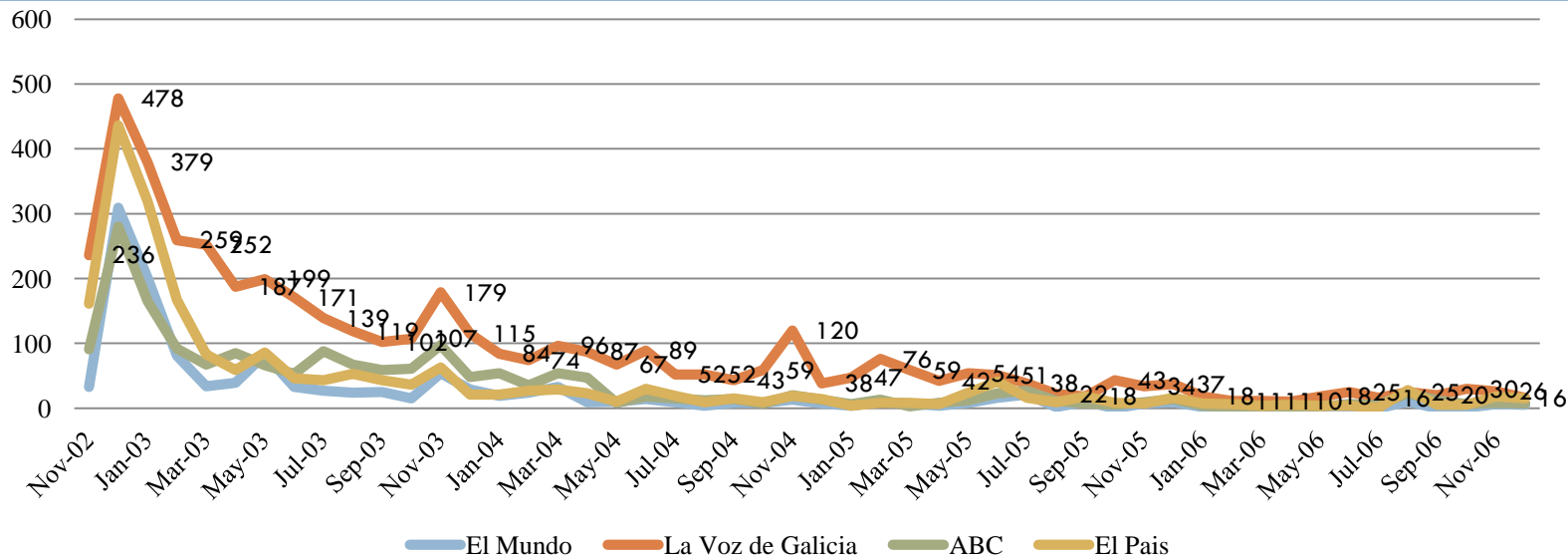
Carga policial contra voluntarios en Santiago y comato de agresión al alcalde de Ribera en Argüeso

La marca negra cerca las Cies y Ons, parajes del único parque nacional que tiene Galicia

ETA reaparece con un coche bomba en Santander que no causó víctimas

NUMBER OF PUBLISHED NEWS OVER TIME

Noticias totales por meses



- Definición de variables:
- Periodo 1: antes del hundimiento del buque Prestige
- Periodo 2: desde la fecha del accidente hasta el 31/12/2003
- Periodo 3: Año 2004
- Periodo 4: Año 2005
- Periodo 5: Año 2006

Figura Pág 323,
Informe Pericial

STIGMA EFFECT: HEDONIC MODEL

- **The model was estimated as:**
- **Price=F(lagged news, fish species, local variables....)**
- **The hypothesis to be tested:**
 - ▣ **Do news impact in a negative way....?**

PELAGIC SPECIES : HeDONIC REGRESSION MODEL

Precio	Coficiente	Std. Err.	P> t
Periodo 1=Antes del Prestige	4,561	0,048	0,000
Periodo 2=	4,298	0,049	0,000
Periodo 3=2003	4,211	0,048	0,000
Periodo 4=2004	4,220	0,048	0,000
Periodo 5=2005	4,198	0,048	0,000
Noticias no negativas	-0,015	0,006	0,013
Vigo	-0,433	0,016	0,000
Pontevedra	-0,357	0,016	0,000
Muros	-0,654	0,019	0,000
Fisterra	-0,320	0,024	0,000
Costa da Morte	-0,444	0,017	0,000
Cedeira	-0,208	0,021	0,000
Mariña	-0,814	0,016	0,000
Coruña-Ferrol	-0,787	0,016	0,000
Abadejo	1,796	0,047	0,000
Bonito del Atlántico	0,442	0,083	0,000
Bacaladilla	-2,902	0,048	0,000
Merluza	1,171	0,047	0,000
Qvenlla	-2,410	0,056	0,000
Sardina	-2,852	0,048	0,000
Caballa	-3,150	0,047	0,000
Jurel	-2,862	0,047	0,000
Invierno	0,211	0,013	0,000
Primavera	0,020	0,012	0,086

$$R^2 = 0,692$$

N=114.720

Figura Pág 68-69,
Informe Pericial

Pérdidas de Imagen: GALICIA

Modelo de Regresión del Precio: Especies Pelágicas

Pérdidas de imagen en los pescados pelágicos(€ nominales)

	Cantidades ventas (kg)	Diferencias de precios(€/kg)	Pérdida por periodo(€)
12/11/2002- 31/12/2003	71.196.720	-0,263	-18.706.867
Año 2004	87.811.882	-0,350	-30.697.453
Año 2005	97.437.816	-0,340	-33.168.125
Año 2006	100.716.070	-0,363	-36.559.128
		TOTAL	-119.131.573

Figura Pág 71, Informe Pericial

For more information

Economía Agraria y Recursos Naturales. ISSN: 1578-0732. e-ISSN: 2174-7350. Vol. 13, 2. (2013). pp. 103-126

Environmental accidents and stigmatized fish prices: Evidence from the prestige oil spill in Galicia

Rocío Domínguez Álvarez^a y María L. Loureiro^a

Tourism losses

Sectorial analyses were conducted in order to assess economic damages. The most affected sectors were the fishing and tourism sectors.

Tourism sector

- Data collected from the *Institute of Tourism Studies*. Total damages in the first four years after the Prestige oil spill: €718.78 million.

Total expenditures of domestic tourists

	2002	2003	2004	2005	2006
Galicia	1,287.96	1,136.07	1,486.89	1,105.97	1,182.76
Asturias	342.72	354.87	454.39	480.41	500.79
Cantabria	349.49	319.40	362.83	495.20	497.98
Basque Country	288.98	276.16	390.04	359.10	338.34
Losses at real prices		-151.89		-181.99	-105.20

Total expenditures of international tourists

	2002	2003	2004	2005	2006
Galicia	589.95	468.63	608.65	937.23	876.11
Asturias	130.54	105.40	184.16	282.40	226.22
Cantabria	129.66	120.59	215.26	319.92	273.14
Basque Country	558.57	477.38	572.96	611.46	638.51
Losses at real prices		-236.72			

Other Economic Damages

□ **Maritime transportation:**

- To compute the reduction in the international shipping, we collected data from different regional maritime departments, such as the Galician Institute of Statistics and the Department of Transportation.
- In year 2003, the damage amounted to €0.80 millions in Galicia and €4.58 millions in the entire Cantabrian coast.

□ **Cleaning tasks:**

- In Galicia during 2002-2003 amounted to €387.43 millions. In the case of Spain, the losses rose to € 446.97 million until 2006.

Public Administration Expenditures

- **Total:** €451.69 million in Galicia and €737.18 million for the total of Spain.

- These amounts include expenses related to:
 - ▣ Cleaning tasks (€446.97 millions)
 - ▣ Expenses to build infrastructures (€31.12 millions)
 - ▣ Fiscal measures taken to assist those affected by the sinking of the Prestige (€26.75 millions)
 - ▣ Campaigns made with the goal to restore the image of Galicia as a desirable tourist destination (€31.04 millions)
 - ▣ Payments to support fishermen while fishing bands were established (€171.33 millions).
 - ▣ Restoring of the food safety standards of fish and shellfish (about €49 millions)
 - ▣ Research to learn about the impact of this spill (€15 millions).

Computing environmental damages

Environmental Damages (or non-market damages) were computed in a similar fashion as in the Exxon Valdez oil spill; i.e. asking individuals how much they would be willing to pay from their own pocket to avoid the environmental damages caused by the Prestige oil spill.



Contingent Valuation (CV)

- **A survey was employed following the guidelines suggested by Carson et al. (2003).**
- **Data collection: Steps**
 - **2006**
 - 1. Five discussion groups: La Coruña, Orense, Vigo, Madrid y Barcelona.
 - 2. Pre-test survey-pilot 1: Oviedo and León (North part)
 - 3. Pretest survey-pilot 2: Murcia y Castellón (South eastern part)
 - 4. Final survey: data collection over 3 months, concluded in August 2006
 - A total of 1,140 surveys were collected

Contingent Valuation (CV) II

- Individuals were asked how much they would be willing to pay to finance an oil spill prevention program. This program would reduce the impact and damages of future oil spills.

□ Oil Spill Prevention Program



- European Program
- Experimental stage in Spanish waters
- Surveillance of ships across Spanish waters
- Scout ships: carry equipment and qualified personell

Contingent Valuation (CV) III

- **Realistic Description of:**
 - Economic damages
 - Environmental Damages
 - Health Effects on volunteers

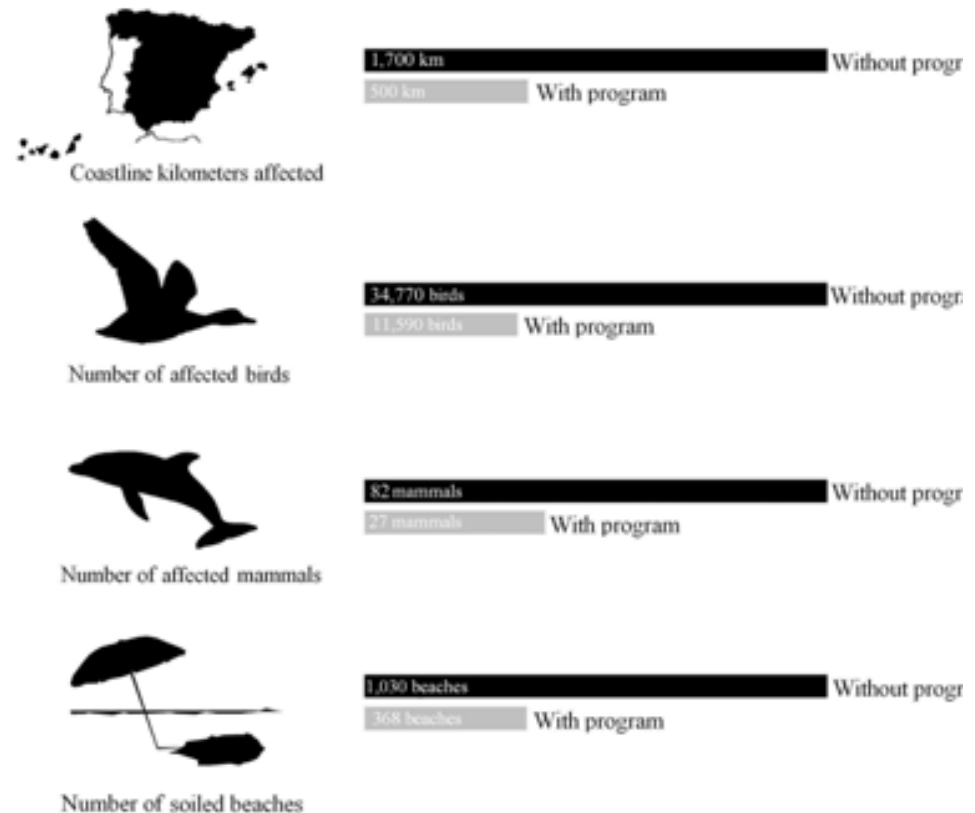
- Use of photographs of healthy animals, clean beaches, etc.



Contingent Valuation (CV) IV

Expected Damages every 7 years
caused by oil spills

- Based on scientific predictions of damages, individuals were shown the difference between the expected environmental damages in the next 7 years with and without the proposed program.



WTP question and results

- **The WTP question for the oils spill prevention and response program was the following:**

It is expected that this program is in full operation in 2010. If the application of the escort ship program described above would cost your household xx€-, would you vote in favour to pay this amount just one single time (say in the next tax declaration) to reduce the damages described from the oil spill to the nature and fauna by oil spills?

YES1

NO2

DON'T KNOW..... 3

- **Mean WTP by household:**
 - Spain: €40.51
 - Galicia (the most affected area): €228.28
- **According to last national statistics, Loureiro, Loomis and Vázquez (2009) estimated the mean social WTP amounts to:**
 - Spain: €1 174.76 millions
 - Galicia: €669.30

For more information



Environmental and Resource Economics
December 2009, Volume 44, Issue 4, pp 537-553

Date: 03 Jul 2009

Economic Valuation of Environmental Damages due to the Prestige Oil Spill in Spain

[Maria L. Loureiro](#), [John B. Loomis](#), [Maria Xosé Vázquez](#)

Conclusion

TEV = Use values + Non-use values

Conclusion

- **Total amount of damages:**
 - Galicia 2002-2006: €2413 million
 - Spain 2002-2006: €3551.81 million
 - Spain + France 2002-2006: **€3635.18** million

- **Public Administration expenditure:**
 - Galicia: €451.69 million
 - Spain: **€737.18** million

Conclusion II

- Nowadays, such important losses have not been yet compensated/awarded to the affected parties.
- The capitan was found not guilty of negligence or wrong doing.
- Thus, although human and governmental actions were significant in order to restore the affected ecosystems, still much work has to be done to restore the damage caused to the private affected parties, and to the public.