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Discussion paper

Conditions for effective risk sharing against marine pollution: the case of the Ría de Vigo

BY
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1 Introduction

The question of how effective protection against environmental impairment can be provided has spawned much literature. One instrument that is often invoked to provide compensation for environmental damage is insurance. Traditionally, a distinction is made between first and third party insurance. First party insurance may be acquired by potential victims of marine pollution, such as fisheries seriously harmed by ship-source oil spills. Conversely, third party insurance is sought by polluters to cover their legal responsibility and, at the same time, protect the potential victims from polluters unable to meet their financial obligations.

Notwithstanding the advantages insurance mechanisms offer, in some cases first party insurance products, eg against income loss, do not emerge or are not effectively used, even by those who could benefit from them, such as fisheries. This, in turn, begs the question whether a risk-sharing agreement could provide coverage where insurance would have reached its limits in transferring environmental risk. Risk-sharing agreements among operators can play an important role, for example, with respect to damage caused by offshore installations.¹ Risk sharing has also emerged to cover damage caused by ship-source marine pollution through the so-called Protection and Indemnity (P&I) Clubs.²

Potential polluters may be required to provide financial guarantees, such as third party liability insurance, to rule out situations in which the taxpayer, as the insurer of last resort, has to shoulder such outstanding costs as those incurred by the polluter's insolvency. Despite the introduction of some compulsory insurance schemes, operators may not meet their legal obligations, and risk-sharing agreements among operators or potential victims do not emerge even when such agreements are in the operators' best interest. This is particularly so in the case of the Ría de Vigo, a coastal area in the north-west of Spain, which is the subject of the present article (Figure 1). It is among the areas most adversely affected by the 2002 *Prestige* oil spill.

We carried out a detailed analysis of the environmental problems in that coastal area of the Northern Atlantic and of the demand for (insurance) protection that has emerged, related to those specific risks to which potential polluters and pollutees have been exposed. We undertook that case study based on a large number of interviews with relevant stakeholders: managers, proprietors, experts and advisers from fisheries, insurance companies, the shipping industry, tourism operators, academia and various competent authorities.

This detailed study provides insights into the reasons why specific requirements (eg obtaining financial security) are not complied with; the interviews also clarify why a risk-sharing agreement has not yet emerged even though, on the face of it, such an agreement seems to be well aligned with interviewees' interests. At a more general level, some insights point to why adequate compensation and risk-sharing mechanisms may not always emerge. In those cases, understanding the circumstances and conditions that need to be addressed is indispensable for an adequate risk-sharing mechanism to materialise.

The article is structured as follows: after this

1 See in particular Michael Faure and Hui Wang 'Compensating victims of a European *Deepwater Horizon* accident: OPOL revisited' (2015) 62 *Marine Policy* 25.

2 Protection and indemnity clubs offer tanker owners third party liability coverage for all maritime risks associated with vessel operations. On this marine oil pollution insurance offered by these P&I clubs see Jan C Bongaerts and Aline F M de Bièvre 'Insurance for civil liability for marine oil pollution damages' (1987) *Geneva Papers on Risk and Insurance* 145 and Liu Jing, Michael Faure and Hui Wang 'Compensating for natural resource damage caused by vessel-induced marine oil pollution: comparing the international, US, and Chinese regimes' (2014) 29 *Journal of Environmental Law and Litigation* 123.

introduction, we first provide some background information concerning the Ría de Vigo case study (section 2). Then we move on to the insurance schemes currently available and attempt to explain their low rate of market penetration (section 3). We then discuss reactions of interviewees to proposals concerning a mutual insurance scheme (section 4) and analyse the results (section 5) before concluding in section 6.

2 Background on the Ría de Vigo case

2.1 The natural landscape

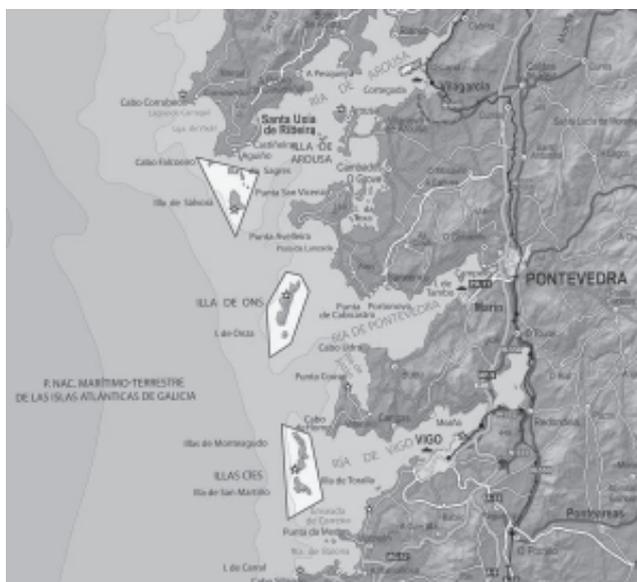
The city of Vigo is situated in the Spanish Autonomous Community of Galicia. The Ría de Vigo (42° N, 8° W) in the north-west of Spain is the most meridional of the Rías Baixas ('lower rias'), south of Cape Finisterre (43° N, 9° W),³ and a short distance from the Portuguese border at the Miño River (Figure 2). The Ría is a 32.5 km long, 176 km² coastal embayment,⁴ now fully inundated since the end of the last glacial retreat 6000 years ago, forming a long, narrow marine inlet with a markedly jagged coastline, tapering off towards its north-east side, where it ends in the Cove of San Simon.⁵

The Ría is semi-enclosed by the Vela Coast in the north, the Cíes Islands in the west and the Estelas Islands in the south. These three sites and the Cove of San Simon are designated special areas of conservation (SACs) and belong to the EU Natura 2000 network.⁶ The tidal range in the Ría is four metres.⁷

Figure 1. *Vigo and its place in Galicia (north-west Spain) and the world (MAGRAMA, 2013)*



Figure 2. *The Rías Baixas: Arousa, Pontevedra and Vigo (Instituto Geográfico Nacional, 2016)*



2.2 Actors

The most dominant maritime actor in the Ría is undoubtedly the Port of Vigo. With its 16 dry docks, six main shipyards and five fish auction markets,⁸ it is the most prominent urban feature of Vigo, a logistics behemoth stretching over 17.7 km of the Ría waterfront.⁹ The port is a world leader in terms of fish for human consumption, three quarters of which arrive frozen in cargo ships.¹⁰ There is little wonder, then, that Galicia is Spain's and Europe's most important fishing region.¹¹

³ Cape Finisterre (Finisterre means 'Land's end' in Latin) in the Death Coast (Costa da Morte) is a site of numerous shipwrecks. It was severely impacted by the 2002 *Prestige* oil spill (Rocio Dominguez Alvarez and Maria Loureiro 'Environmental accidents and stigmatised fish prices: evidence from the *Prestige* oil spill in Galicia' (2013) 13(2) *Economía Agraria y Recursos Naturales* 103.

⁴ Ricardo Prego et al 'Estuary-ria exchange of cadmium, lead and zinc in the coastal system of the Ría of Vigo (NW Iberian Peninsula)' (2010) 74(S1) *Scientia Marina* 77 doi:10.3989/scimar.2010.74s1077.

⁵ Emanuela Sirtori, Mario Genco and Andrea Moroni *Integrated Environmental Regeneration of Ría de Vigo* (Centre for Industrial Studies 2012).

⁶ Ministerio de Agricultura, Alimentación y Medio Ambiente *Espacios de la Red Natura 2000 de ámbito marino competencia del Ministerio de Agricultura, Alimentación y Medio Ambiente* (2015) www.magrama.gob.es/es/costas/temas/proteccion-mediomarinario/biodiversidad-marina/espacios-marinos-prottegidos/red-natura-2000-ambitomarinario/espacios-red-natura-competencia-ministerio.aspx.

⁷ Ministerio de Agricultura, Alimentación y Medio Ambiente *Islas Atlánticas de Galicia: Medio marino* (2015)

www.magrama.gob.es/es/red-parques-nacionales/nuestros-parques/islasatlanticas/valores-naturales/valores-naturales-medio-marino.aspx.

⁸ Port Authority of Vigo *Annual Report* (Autoridad Portuaria de Vigo 2014).

⁹ Rías Baixas Comunicación SA *El Puerto de Vigo renuncia a 7,5 kilómetros de costa en la Ría y 153.000 metros* (2015) (Atlántico Diario) www.atlantico.net/articulo/vigo/puerto-vigo-renuncia-75-kilometros-costaria-y-153-000-metros/20150507090520473919.html.

¹⁰ See Folsom et al *World Fishing Fleets* (n 12).

¹¹ European Commission *Spain Flag Factsheets* (2010) (Farnet: the European Fisheries Areas Network) <https://webgate.ec.europa.eu/fpfis/cms/farnet/spain-flag-factsheets>.

Vigo is a homeport for one of the largest distant-water fleets, a fishing armada with a truly global reach.¹² Distant-water fisheries mostly consist of freezer trawlers, some of which are built in Vigo shipyards, generate considerably more revenues than artisanal (ie small-scale) boats,¹³ and can even start ‘wars’.¹⁴ It is difficult to estimate how much of the frozen fish landed in Vigo could be labelled as import, as much of them are fished by Spanish-owned vessels, landing their catch in foreign ports before it is freighted frozen to Vigo.¹⁵

In addition to distant-water fisheries, there is an important presence of small-scale fisheries and shell fisheries. Small-scale fisheries can be defined in any number of ways, mostly by a fishing capacity limited by quotas, fishing gear or vessel size. Shellfish gathering in the intertidal zone involves elements of both fishing and farming. Hand-harvesting clams, cockles and other bivalve molluscs burrowed in muddy, shallow waters is supplemented by sowing shellfish spats (seeds). Despite repeated attempts to farm fish and cephalopods, the only type of aquaculture to have gained a foothold in the Ría de Vigo after 1945 is mussel farming.¹⁶ Similarly to shellfish gathering, mussel farming is mostly a family business organised in *cofradías*,¹⁷ with each family operating a few rafts. The concession to ‘park’ and operate a mussel raft is granted by the Galician Department of Maritime Affairs (*Consellería do Mar*).¹⁸ Mussel farming owes its existence to coastal upwelling from April to October – the ascent of cold water masses, rich in nutrients (nitrates, silicates and phosphates) – which fertilises the entire Rías Baixas and boosts primary production.¹⁹

In addition to capture and farmed fisheries, Vigo has a long-standing food processing industry, particularly cooking and canning of fish and aquaculture products. The car manufacturer Citroën is a major local employer, as is the tourism industry.

2.3 Marine pollution

Compared with other coastal regions in the EU, Galicia has possibly experienced the largest amount of oil spilled per unit of coastline as a consequence of shipping accidents (Figure 3).²⁰ Along much of the Galician coastline a year-long ban on fishing and shellfish harvesting followed the most recent incident, on 13 November 2002.²¹ The *Prestige*, a single-hull tank-ship, broke apart off Cape Finisterre and sank six days later, 133 nm directly west of the Cíes Islands (42° N, 12° W).²² The *Prestige* spill released approximately 63,000 tons (75 million litres) of heavy fuel oil, which does not evaporate easily. This amount was merely a fifth of all the oil that had been previously spilled in countless other incidents off Galicia.²³ A large number of those ship-source spills happened in Francoist Spain (prior to 1976), so that their impact remained largely hidden from the rest of the world.²⁴

After taking a hit half a decade ago in the wake of the global financial crisis, increasing maritime traffic (ferry services, cruise ships etc) and its ensuing hazards threaten to raise the stakes of polluting incidents.²⁵ One interviewee held the pessimistic view that it was a matter of time before a black tide (oil spill) akin to a ‘second *Prestige*’ would reach the Ría, with the ensuing ecological and economic losses.

12 W B Folsom, D J Rovinsky and D M Weidner *World Fishing Fleets: An Analysis of Distant-water Fleet Operations, Past – Present – Future* (National Marine Fisheries Service 1993).

13 ARVI *El sector pesquero en Vigo: Evolución de su impacto socioeconómico* (Cooperativa de Armadores de Pesca del Puerto de Vigo 2013).

14 Such as the 1995 turbot war (*Guerra del fletán*) between Spain and Canada, sparked by the Vigo-based freezer trawler *Estai* and which put an end to more than four centuries of Galician fleets fishing off the Grand Banks of Newfoundland.

15 See Folsom et al *World Fishing Fleets* (n 12).

16 European Commission Maritime Affairs and Fisheries *Studies for carrying out the Common Fisheries Policy: Lot 3 Socioeconomic dimensions in EU fisheries* (2013) http://ec.europa.eu/fisheries/documentation/-studies/socio_economic_dimension/files/cs-galicia-6-vigo-report-template_en.pdf.

17 Fishermen are organised in associations called *cofradías* (literally ‘fraternal society’). It is a traditional form of association of fishermen owning a quota or a vessel.

18 MacAlister Elliott and Partners Ltd ‘The role of women in the fisheries sector’ (2002) http://ec.europa.eu/fisheries/documentation/studies/role_of_women/annex5_spain_en.pdf.

19 Marta Perez-Arlucea et al ‘Morphometric and hydrologic parameters of catchments and tributary rivers entering the Ría de Vigo: estimations on annual run off, suspended and dissolved loads’ (2000) 26 *Journal of Iberian Geology* 171.

20 Instituto Español de Oceanografía *Estrategia marina: Demarcación marina noratlántica. Parte I: Marco general evaluación inicial y buen estado ambiental* (Ministerio de Agricultura, Alimentación y Medio Ambiente 2012).

21 Fishermen, mussel growers and shellfish gatherers were compensated with €30 for each day of the fishing ban imposed in the Rías Baixas (La Voz de Galicia November 2002: *El naufragio del ‘Prestige’ se convierte en la mayor catástrofe ecológica de la historia de Galicia* (2002) www.ceida.org/prestige/Documentacion/olanegra.pdf).

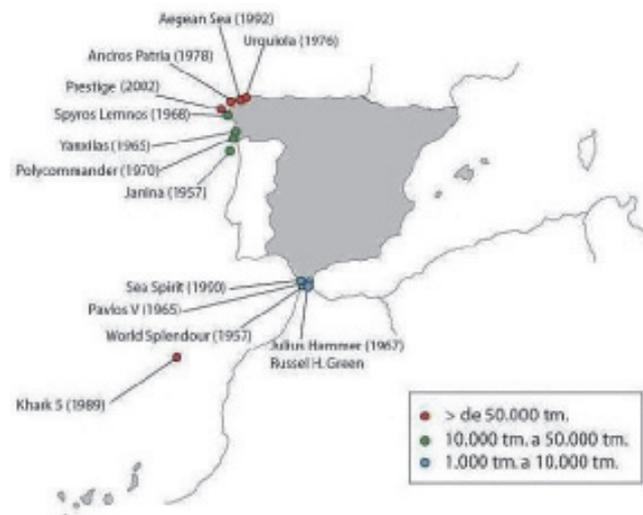
22 Andreas A Constantinou ‘Places of refuge: a myth or a reality?’ in *International Symposium on Maritime Safety, Security and Environmental Protection (SSE07)* (National Technical University of Athens 2007) 1–14 www.martrans.org:8093/symposium/papers/Track%20A/A42%20constantinou.pdf.

23 Raquel Fernández González ‘Instituciones y gestión de los recursos naturales: mecanismos de cumplimiento y resolución de conflictos’ in *XIV Jornadas de Economía Crítica* (Asociación de Economía Crítica 2014) 1–26.

24 Eduardo Rolland *Curiosidades del ‘Polycommander’* (2013) *La Voz de Galicia* www.lavozdeg Galicia.es/noticia/vigo/2013/11/10/curiosidadespolycommander/0003_201311V10C4999.htm.

25 See División de Medio Ambiente *Environmental Report* (Autoridad Portuaria de Vigo 2014) www.apvigo.com/ficheros/descargas/environmental_report_2014.pdf.

Figure 3. Major ship-source oil spills off Galicia (north-west Spain) (MAGRAMA, 2015)



Polyaromatic hydrocarbons (PAHs)²⁶ from the *Prestige* oil spill were soaked by sediment in the intertidal zone and persisted as a source of toxicity for some years. These compounds bioaccumulated in molluscan flesh, making the crop inedible.²⁷ Oil from the *Prestige* washed ashore into the Cíes Islands and the southwestern tip of the Ría de Vigo.²⁸ Civil liability claims are yet to be fully settled some 14 years after the *Prestige* disaster.²⁹ Thus, the complexity in implementing the polluter pays principle, ie the liability of a third party for environmental impairment, lies not only in the burden of proof – establishing the polluter's identity by linking pollution to its source – but failing to assert the polluter's legal responsibility may also leave the injured un-indemnified.

Further to accidental pollution, occasional (seasonal) discharge of bacterially contaminated storm water from the Lagares urban waste-water treatment plant into the Ría during a downpour in the main mussel harvesting season of October to March has been aggravated by a chronic (pervasive) microbiological contamination.³⁰ With a

drainage basin of 69.3 km², much of it in Vigo's urban and industrial areas, the Lagares River contributes 10 per cent of the overall fluvial input into the Ría.³¹ Owing to its poor chemical and deficient ecological status, the Lagares River is still classified as a 'heavily modified waterbody', according to the EU Water Framework Directive 2000/60/EC.³² Elsewhere in the Ría de Vigo, industrial effluents contaminate the waterbody in which several mussel production areas are located, earning it a 'poor' chemical status, which is non-compliant with the EU Water Framework Directive.³³ Discharging untreated effluents requires the 'decontamination' of mussels grown in that waterbody – a direct economic loss to the farmers, who as users must foot the price of pollution.

3 Currently available coverage

Based on the environmental problems portrayed in the previous section, it is to be expected that at least a few actors are subject to compulsory (third party liability) insurance, such as tankers navigating the traffic separation scheme off Cape Finisterre (the Finisterre Corridor).³⁴ With stakeholders vulnerable to pollution risk such as shellfish gatherers and mussel farmers, a demand for first party insurance coverage may be expected as well. Interviews showed us that, although it is possible to obtain this coverage, it has in fact only seldom been obtained. We will first review insurance schemes, two of which have been withdrawn from the market and a third one, which has been only marginally successful (section 3.1), and then try to analyse the reasons for this low market penetration (section 3.2).

3.1 Various insurance schemes

Of particular relevance for this study are three insurance schemes, two of which did not gain traction with fishermen. Both were initiated by the Galician regional administration³⁵

26 Chemical compounds such as cigarette tar – the highly carcinogenic BaP (benzo[a]pyrene).

27 Instituto Español de Oceanografía *Estrategia marina: demarcación marina noratlántica. Parte IV: descriptores del Buen Estado Ambiental* (Ministerio de Agricultura, Alimentación y Medio Ambiente 2012).

28 European Topic Centre on Urban, Land and Soil Systems (ETC/ULS) *Prestige Disaster (2007)* http://uls.eionet.europa.eu/en_Prestige.

29 Fernando J Pérez 'Sentencia El Supremo condena al capitán del *Prestige* por daño ambiental' *El País* (2016) http://politica.elpais.com/politica/2016/01/26/actualidad/1453809050_900584.html.

30 Pollution is considered chronic when its source remains unknown or untreated over a long period of time. Whereas chronic pollution, being a 'pre-existing condition', is principally uninsurable, in reality the distinction between accidental (acute) and chronic (gradual) pollution is not always clear-cut.

31 See Fernández González (n 23).

32 The status of a 'heavily modified waterbody' awarded to coastal, transitional and inland waters is based on the transposition of this EU directive into Spanish legislation.

33 Augas de Galicia *Plan Hidrológico da Demarcación Hidrográfica de Galicia-Costa 2015–2021: Capítulo 7. Valoración de estado das masas de auga* (Xunta de Galicia 2015).

34 To be clear, we merely focus here on the liability coverage for local business operators, such as fishermen, and first party insurance for potential pollutees, such as mussel farm owners. We do not focus on (compulsory) liability coverage for tanker owners passing through the Finisterre Corridor since they are subject to the Civil Liability Convention on Marine Pollution Damage and other international conventions governing maritime transport, which go far beyond the local case that is our focus here.

35 Xunta de Galicia is the governing body of the Autonomous Community of Galicia (Comunidad Autónoma de Galicia), located in Santiago de Compostela.

and managed by MAPFRE, Spain's largest commercial (publicly traded) insurer. Polar Seguros Marítimos offered third party P&I insurance in compliance with Galician legislation, whereas the other defunct insurance reviewed here was an optional, first party weather index-based policy.

Polar Seguros Marítimos was established in 2010 in response to the Galician Fisheries Law, which had become effective in 2009. This regional law obligates vessel owners in artisanal fisheries, shell fisheries and mussel farming to purchase liability insurance for their vessel, even if its payload falls short of 300 gross tonnage.³⁶ An interviewee suggested that about half of the fishing vessel owners affected by the 2008 Galician Fisheries Law did not comply with it.

Polar Seguros Marítimos offered owners of these small and midsize fishing vessels an affordable P&I insurance, also covering environmental liabilities, such as marine pollution.³⁷ However, it was unsuccessful in capturing any appreciable market share from other P&I clubs insuring Vigo-based fishermen and has been phased out.

The other failed scheme was a weather index-based insurance for artisanal and enhanced fisheries,³⁸ promoted by the Galician administration and developed together with local scientists.³⁹ Using oceanographic, meteorological and fisheries data (the so-called 'index'), scientists could identify weather conditions that closely correlated with low catch of fish and shellfish. Being a first party damage insurance, fishermen subscribing to this insurance were to be compensated for business interruption triggered by weather vagaries.⁴⁰

Only one insurance broker was permitted to offer this first party insurance in Galicia, a decision of the Galician administration which may have eventually backfired and led to the untimely demise of this initiative. Once a new political party came to power following the 2009 regional elections, heavy subsidies (60 per cent of the premium) for this weather index-based insurance were axed.

A third insurance scheme that has also received a lukewarm reception by local fishermen is that of the Spanish Group of Combined Agricultural Insurance Providers

(Agrupación Española de Entidades Aseguradoras de los Seguros Agrarios Combinados SA), or simply Agroseguro. This first party crop insurance is far from defunct elsewhere in Spain, yet its market penetration in the Ría de Vigo has been traditionally marginal. Only a handful of mussel farms in the Ría de Vigo were reported to be insured with this Agroseguro insurance product, even though it is continuously revamped to increase its marketability.

Agroseguro offers farmers of Mediterranean mussels a named-peril insurance against biomass loss due to red tides,⁴¹ black tides, chemical pollution, heavy storms, vessel collision and recovery costs for unsold mussels, with the last three of these perils being an optional coverage.⁴² Although Agroseguro is optional, its mussel insurance policy is heavily subsidised by the national government (35 per cent) and, on top of that, by the regional administration (5 per cent).⁴³ Furthermore, receiving extraordinary aid from the Spanish government due to catastrophic loss is conditional upon being an Agroseguro policy-holder.⁴⁴

3.2 Insurance penetration

Beyond the three insurance schemes reviewed above, interview respondents provided their own explanations for why they had not sought insurance coverage. As far as compulsory third party liability insurance is concerned, it was reported that not all shellfish gatherers and mussel farmers complied with the 2008 Galician Fisheries Law and insured their vessels against liability caused, inter alia, by pollution damage. The same law prohibits harming the environment by discarding farmed or captured species, although the continuous accumulation of shell debris and mussel detritus on the seabed of the Ría de Vigo goes unpunished.

Other interviewees were uncertain what their insurance policy covered, if they were perhaps underinsured (ie overexposed to risk) or even uninsured, mainly because their job remit did not include the financial aspects of their organisation, such as insurance. This may not come as a

36 Ley 11/2008 de 3 de diciembre de pesca de Galicia (Xunta de Galicia, Disposición del Diario Oficial de Galicia 2008) www.xunta.es/dog/Publicados/2008/20081216/Anuncio4C1EE_es.html.

37 Luis Tojeiro 'La agencia es una muestra de madurez del sector pesquero' (2010) 117 *Pesca Internacional* 22.

38 Formally in Spanish: *Seguro de indemnización diaria en caso de paralización y pérdida de la producción por condiciones climatológicas adversas en el sector pesquero y marisquero de Galicia*.

39 Dog No 207 de 24 de octubre de 2008 (Xunta de Galicia 2008) www.xunta.es/dog/Publicados/2008/20081024/Anuncio3FCBE_es.html.

40 See Dog No 241 de 30 de noviembre de 2015 (n 43).

41 Harmful algal blooms releasing phytoplankton biotoxins.

42 Ministerio de Agricultura, Alimentación y Medio Ambiente *Mejillón de Galicia* (2015). Agroseguro considers crop (here, fish and mussels) to be property. Hence, this first party insurance against crop failure is, in effect, against property damage and not against income loss (Agroseguro 2016). Obviously, since self-employed aqua-culturists' earnings depend greatly on their property, the two (property and income) are one and the same in this case.

43 Dog No 241 de 30 de noviembre de 2015 (Xunta de Galicia, Disposición del Diario Oficial de Galicia 2015) www.xunta.es/dog/Publicados/2015/20151218/AnuncioG0426-101215-0001_es.html.

44 Agroseguro *Seguro de Acuicultura Marina para Mejillón* (Agroseguro 2016) <http://agroseguro.es/productos/sectores/seguro-acuicola/413-acuicultura-marina-para-mejillon>.

surprise as, in most organisations, those responsible for financial risk and those responsible for environmental risk work in different departments.⁴⁵ Other interviewees admitted that insurance was a new discussion topic to them.

A variety of explanations was provided by respondents for the relatively low penetration of insurance products:

- Artisanal fishermen, shellfish gatherers and mussel farmers have social security insurance with the Spanish Social Marine Institute for pure economic loss⁴⁶ and may, therefore, be under the false impression that taking out first party insurance is redundant. There is an additional, retroactive compensation offered by the Galician Department of Maritime Affairs.⁴⁷
- Over-reliance on protectionist policies (*clientelismo*, or preferential treatment) of the Galician administration and the Spanish Government, which compensate local fishermen for business interruption, eg owing to red or black tides.
- Insurance was seen by many as a sunk cost because it is an investment that covers hypothetical losses over an indefinite amount of time (essentially, so long as premiums are paid). Otherwise put, if it is not used, it will be of little value.
- Insurance requires forward-looking, careful planning and risk awareness.

Whereas most business operators fulfil the requirements for opening a business by subscribing to at least one form of third party financial security (eg civil liability insurance), first party insurance has gained only a shaky foothold in artisanal fisheries and aquaculture.

4 Hard to increase the demand for insurance?

Despite large exposure to risk either as a polluter or as a pollutee,⁴⁸ insurance coverage in the Ría de Vigo remains modest, resulting in two regional insurance schemes having

to be scrapped. Studying the reasons for those failures in depth may provide meaningful insights into the difficulties in developing environmental insurance also in other coastal areas. We did so by conducting interviews with relevant stakeholders, asking them about their interest in the development of a hypothetical mutual insurance scheme against marine pollution risk in the Ría de Vigo.

At the outset of the interviews, the proposed insurance was defined as including two types of businesses, namely those whose operations depend on good water quality, ie users (such as fisheries), and those businesses whose operations can threaten good water quality, ie polluters (such as shipyards). In case of a pollution incident, the mutual pays the affected users for loss of earnings, and the polluter – for civil liability protection. The results of those interviews showed that there were several misperceptions among stakeholders concerning the function of insurance (see section 4.1). Some stakeholders put forward (often erroneous) arguments against the proposed risk-sharing scheme (section 4.2), whereas others defended it (section 4.3). Specific observations were also formulated as to whether the mutual insurance should be made compulsory (section 4.4).

4.1 Misperceptions

Several interview respondents approached the research topic of insurance as a *terra incognita* that they had barely heard of, many of whom had some serious misunderstanding concerning the function of insurance. To provide two examples: an interviewee at a nautical tourism club rated pollution risk as high, yet dismissed insurance as being of no consequence. Yet another interviewee expressed interest in insuring against global risks such as ecological disturbance and loss of habitat, risks precisely for which no insurance policy is currently offered. There were a few other misconceptions showing that insurance as a risk transfer mechanism is often misunderstood:⁴⁹

- Some respondents suggested that business operators take out an insurance policy when they already know that an existing condition is going to get worse, or even retroactively, after the disaster has already struck, whereas a golden rule of insurance is that a ‘burning house’ can never be insured.
- The risk-sharing agreement was confused with a commercial, for-profit insurance, demonstrating unfamiliarity with the principle of mutuality, where

45 Ben Norris *Introduction: Executive Overview* (Aon Plc 2013) www.aon.com/attachments/risk-services/environmental/article_cre-eil-report-intro.pdf.

46 Seguridad Social *La protección por cese de actividad en el régimen especial del mar* www.seg-social.es/prdi00/groups/public/documents/binario/178917.pdf.

47 Asesoría del mar en Vilagarcía de Arousa *Ayudas Compensatorias Derivadas del Cierre por Toxinas* (2015) www.asesoriadelmar.com/detallar-subvencion.php?id=40.

48 In some cases, this is an oversimplification: mussel farmers and tourism operators are de facto both polluters and potential victims of pollution.

49 As also held by Wolfgang Müller ‘Theoretical concepts of insurance production’ (1981) 21 *Geneva Papers on Risk and Insurance* 63.

operators share each other's risks and losses and where surplus funds are either reserved for future losses or paid back to policy-holders as dividends.

- Some also considered insurance as a clearing house: just a money (and not a risk) transfer mechanism, whereby the polluter would pay to the injured through the insurer.
- It was also suggested that a risk-sharing agreement would provide coverage for common-pool resources, thus guaranteeing the quality of the water in the Ría de Vigo.
- Finally, the suggested risk-sharing scheme was confused with a group insurance whereby eg all fishermen would collectively subscribe to an existing insurance policy.

4.2 Objections against risk sharing

Several respondents provided the following reasons why they would not be interested in joining the mutual:

- Preventing pollution is the sole responsibility of the polluter; the user is merely on the receiving end and is not responsible in any way for pollution damage or prevention. In other words, pollution risk is not shared but entirely owned by the potential offender.
- Money is better invested in loss prevention (ie anti-pollution measures) rather than in insurance. Otherwise put, insurance has little if any preventive merit.

4.3 Favours risk sharing

Whether interviewees were in favour of a risk-sharing agreement did not only depend on environmental risk awareness and willingness to cooperate but also on the perceived relevance of such an agreement to accepted pollution prevention and mitigation measures. Respondents in favour of a risk-sharing agreement justified their position thus:

- The interest of the mutual insurer is not to distribute payouts (more precisely: not to be in the red). Therefore, the mutual will incentivise its insured to take preventive measures to diminish their exposure to environmental risks.
- Financial losses following an indemnification case are bound to create a ripple effect, reverberating throughout the insured group, possibly followed by a collective premium rise (a 'supplementary call'). Already knowing this in advance will impose peer discipline and adherence to the rules.

- With a *bonus-malus* system (BMS)⁵⁰ or another form of premium adjustment, the mutual rewards environmentally responsible behaviour (by paying a 'double dividend'), thus saving on transaction costs. A BMS can increase member retention by reimbursing some of the premium paid by policy-holders who have not experienced a loss.
- A home-grown mutual insurer has a complete picture of all the industrial activities in the Ría de Vigo with access to local stakeholders and their know-how. This overview can be useful when assessing and underwriting risk. Regular inspections of installations, eg by marine surveyors, can be easily arranged as an additional loss prevention measure.
- When combating pollution, an agile mobilisation of personnel and equipment can be further facilitated by the coordination and information-sharing network offered by the mutual.
- A group of companies who know (of) each other, or a 'community insurance', is best suited to minimise information asymmetry underlying the principal-agent problem. If the mutual fails, it is because its members have failed.
- The public administration discriminates against small and medium enterprises when it comes to penalising marine pollution. Associating can offer protection against being unfairly treated by the competent authorities, or as one interviewee put it: 'When people get together, great things can happen'.
- Owing to coordinated bargaining, collective insurance is cheaper than taking out individual policies.

4.4 Compulsory membership in a risk-sharing scheme

A moot point that re-emerged in interviews was whether membership in the mutual should be made compulsory. A risk-sharing agreement is, in essence, a voluntary arrangement among business operators. However, in the absence of a duty to join or some other legislation that gives the market a gentle nudge in the right direction, it is likely that the mutual would not come into being in the first place. In the specific context of the Ría de Vigo, it might imply that the suggested risk sharing would not fare much better than the now defunct weather index-based insurance of 2008, as discussed above. The main reason advanced by respondents in favour of compulsory membership in the mutual was the fear of having non-

⁵⁰ Insurance pricing whereby the premium is adjusted based on the indemnification record of the insured.

member businesses enjoy a cleaner and safer Ría without the financial burden associated with bringing this about, or even engage in risky behaviour at the expense of members (free riding). As one interviewee put it, unless all potential polluters subscribe to the risk-sharing scheme, 'it won't work'.

5 Analysis

This case study, set in the Ría de Vigo, is not only revealing with respect to stakeholders' expressed motivation whether to join the risk-sharing scheme. We will show that the failure of the local insurance market aligns well with similar findings in the literature (section 5.1). The same can be stated for reservations expressed towards developing a risk-sharing agreement (section 5.2).

5.1 Learning from a failing insurance market

The local insurance market has Agroseguero offering mussel farmers premiums heavily subsidised both by the Spanish Government as well as the Galician administration. Extraordinary aid paid by the national government in Madrid is conditional upon mussel farmers being policy-holders with Agroseguero, as it is a nationwide insurance scheme. Irrespective of whether a mussel farmer is insured or not, aid is also provided by the Galician administration.

The subsidisation of disaster insurance policies is evident in many legal systems. The reason is often the same: if risk differentiation were applied to the full extent, ie that individuals exposed to higher risks would pay higher premiums, this may often lead to unaffordable premiums, especially for vulnerable parts of the population. The problem with this type of cross-subsidisation is that insurance premiums then no longer correctly reflect risk and that insurance also misses its risk-reducing effect. Risk-dependent premiums are often seen as a tool that can provide policy-holders with incentives for risk reduction.⁵¹ In the domain of disaster insurance, governments often intervene to subsidise premiums since it may often be the poorest segment in the population who are exposed to the highest risks (eg flooding). However, even in that case the literature has argued that other methods should be employed to make insurance affordable without distorting incentives.⁵²

The case for such a subsidy for environmental insurance may be even weaker, as the redistributive argument may

be less clear than in the case of disaster insurance. However, politicians may be under pressure to provide subsidies on insurance premiums. That may well account for the extraordinary aid, both from the national government and the Galician administration, in case of a catastrophic loss; those extra payments are considered problematic in the literature. One author even qualified those payments as 'catastrophic responses to catastrophic risks'.⁵³ Obviously, eligibility to receive extraordinary aid from the government based on subscribing to Agroseguero failed to increase insurance buy-in in the Ría de Vigo and beyond. It is also striking that in other regions, for example in the US, catastrophe insurance is often subsidised, but the subsidy as such will not increase the demand. One example of this is the National Flood Insurance Plan (NFIP) in the US. Notwithstanding the fact that premiums for flood insurance under the NFIP receive high subsidies, the demand for this flood insurance remains generally low.⁵⁴

The case of the Ría de Vigo is also interesting because of the generally low use of insurance products and the reasons that were provided; some of those reasons correspond with earlier findings in the literature.⁵⁵ Such is the case regarding over-reliance on protectionist policies of the Galician administration for compensating local fishermen for business interruption as a result of acute biological (red tide) or chemical (black tide) pollution. The literature has equally held that too generous intervention by the government could precisely reduce incentives to purchase insurance. This is referred to as the charity hazard.⁵⁶ This argument can be readily understood: why would fishermen in Galicia purchase insurance and pay insurance premiums if they can in fact free-ride on the state? It also shows the point made by Gollier: 'solidarity kills market insurance'.⁵⁷ However, when self-interest is correctly represented in the risk-sharing mechanism, solidarity among first and third parties insured can create a viable market solution. Furthermore, free-riding can be avoided if, based on risk differentiation, high-risk members are asked for a higher contribution to the mutual than low-

51 George L Priest 'The government, the market and the problem of catastrophic loss' (1996) 12(2) *Journal of Risk and Uncertainty* 19.

52 See Howard Kunreuther et al 'Managing catastrophic risks through redesigned insurance: challenges and opportunities' in Georges Dionne (ed) *Handbook of Insurance* (Springer 2013) 517–46.

53 Richard A Epstein 'Catastrophic responses to catastrophic risks' (1996) 12 *Journal of Risk and Uncertainty* 287.

54 This is largely attributable to wrong risk perceptions in the population. See Veronique Bruggeman *Compensating Catastrophe Victims. A Comparative Law and Economics Approach* (Kluwer Law International 2010) 427–32.

55 See Michael Faure and Veronique Bruggeman 'Catastrophic risks and first-party insurance' (2008) 15(1) *Connecticut Insurance Law Journal* 14.

56 See Paul Raschki and Hannelore Weck-Hannemann 'Charity hazard: a real hazard to natural disaster insurance' (2007) 7 *Environmental Hazard* 321.

57 C Gollier 'Some aspects of the economics of catastrophic risk insurance' in *Catastrophic Risks and Insurance* (OECD Publishing 2005) 13–30.

risk members. Therefore, it is crucial that local initiatives such as risk-sharing mechanisms and statutory laws are in lockstep with one another.

The same argument can be used to contextualise interviewees' observations that insurance is a sunk cost. The behavioural literature has equally indicated that individuals wrongly perceive insurance as an investment: if policy-holders have never received a return on insurance during their lifetime, it would be felt that the money would be 'lost', which partly explains why there is such a low demand for disaster insurance.⁵⁸

Although the 2008 weather index-based insurance was not meant to cover financial losses caused by marine pollution, it serves as an eye-opener insofar as obstacles to market positioning of first party insurance exist. Furthermore, low subscription rates experienced by *Agroseguro* demonstrate that subsidised policies do little to guarantee their popularity among fishermen, even when an insured peril such as red tides has intensified over the last decades.⁵⁹ Surprisingly, the intuitive assumption that the more a business relies on natural,⁶⁰ or nearly-natural water quality for its operations, the more likely it is to insure itself against losses incurred by marine pollution, has proven to be false. More than that, it points to a distorted risk perception: this myopic economic stance dismisses the role of financial protection against environmental impairment. Additionally, first party insurance was not viewed by *cofradías*, tourism operators and even conservationists as a resource access fee to natural capital. In other words, premium payments for risks posed to common-pool resources by business operators were not perceived by the latter as a form of green tax levied for benefiting from coastal upwelling, sunlight disinfection, the Cíes Islands serving as natural breakwaters at the mouth of the Ría de Vigo, and so on.

The most striking reason for the lack of take-up of insurance in the coastal area concerned seems to be insufficient enforcement of the duty to seek insurance, at least as far as liability coverage among local fisheries and mussel farms is concerned. As mentioned above, an interviewee attested that some fishermen take their chances with the Galician Coastguard, which has exclusive competence over monitoring coastal fishing, shell fishing

and mariculture, and choose not to insure their vessels against liability as required by the Galician Fisheries Law.⁶¹

From the potential polluters' perspective, the lack of coverage is a rational, self-seeking response to the absence of effectual enforcement. However, from a social welfare perspective, the side-effects of costs incurred by the polluter's non-compliance with the obligation to seek financial protection and an impending insolvency may pose a serious threat to the local economy and beyond. The findings from this case study underscore once more that it does not suffice merely to introduce a duty to obtain financial guarantees, and that the particular duty should also be enforced actively.⁶²

5.2 The difficulties in sharing environmental risks

Despite a relatively well-developed environmental risk awareness, particularly with respect to marine pollution risk, stakeholders presented with the hypothetical risk-sharing agreement revealed a profound misunderstanding concerning the precise working of insurance and its potential benefits. In fact, stakeholders preferred not to engage in a costly risk-sharing agreement because existing obligations to purchase insurance coverage were not always followed. The question is not, therefore, whether membership in a risk-sharing agreement (for liability coverage) should be made compulsory.

The first and foremost issue that policymakers in Galicia should tackle is actively enforcing the duty to seek financial protection for the liability risk. That should automatically lead to a larger interest of the business community in participating in a risk-sharing agreement. As far as the first party insurance is concerned, in the form of own coverage for losses incurred by a third party, the current *modus operandi* where businesses rely on *ex post* government intervention (bailout) may discourage them from entering into a risk-sharing agreement.⁶³

That risk-sharing agreements can be beneficial, as well as providing protection against environmental risks, has been strongly emphasised in the literature and is no longer disputable.⁶⁴ A major advantage of risk sharing in comparison with commercial insurance is that the members

58 See Paul Slovic, Howard Kunreuther and Gilbert White 'Decision processes, rationality and adjustment to natural hazards' in Paul Slovic (ed) *The Perception of Risks* (Earthscan 2000) 1–31.

59 Bibiana G Crespo et al 'Microplankton composition of NW Iberia at the end of the upwelling season: source areas of harmful dinoflagellate blooms' (2008) *Marine Ecology Progress Series* 355 paras 31–43 doi:10.3354/meps07261.

60 A 'high ecological status' of a waterbody, according to the EU Water Framework Directive (2000/60/EC).

61 Conflicts of interest may arise as both the Galician Coastguard and coastal fisheries are supervised by the same Galician Department of Maritime Affairs.

62 See Michael Faure 'Compulsory liability insurance: economic perspectives' in Attila Fenyves et al (eds) *Compulsory Liability Insurance from an Economic Perspective* (De Gruyter 2016) 319–41.

63 This is precisely the charity hazard referred to above.

64 See Goeran Skogh 'Risk-sharing institutions for unpredictable losses' (1999) *Journal of Institutional and Theoretical Economics* 505; Goeran Skogh and Hong J Wu 'The diversification theorem restated: risk-pooling without assignment of probabilities' (2005) 31(1) *Journal of Risk and Uncertainty* 35.

of the insured pool may have more and better ‘insider information’ than commercial insurers do, thus reducing transaction costs. Engaging in mutual monitoring may enable the pool effectively to enforce risk reduction and loss aversion measures among its members (self-policing), thus minimising the moral hazard of taking unnecessary risks. Finally, when few and far between losses occur, the money set aside in the pool could be redeemed for future purposes instead of being ‘siphoned off’ the community (as would often happen with premiums paid to a commercial insurer).

It is not necessary for policy-holders to exercise this mutual monitoring themselves. One way of doing this is through environmental certification or other environmental management systems.⁶⁵ The prevalence of environmental certification proves that businesses are willing to commit money, time and human resources to improve their environmental performance. Environmental certification and risk mutualisation are not dissimilar, as both deal with the improvement of environmental risk management: with certification, the company’s environmental performance is audited externally, but the goals are set internally;⁶⁶ with a risk-sharing agreement, underwriting is done by the mutual, yet the subscriber sets the limit of risk to be covered. The two do differ in one crucial aspect: risk mutualisation requires cooperation, whereas environmental certification is solely an in-house undertaking.

To summarise, in the case of the Ría de Vigo, a risk-sharing mutual failed to emerge not only because of a lack of enforcement of the duty to seek financial coverage against liability, but also as a result of insufficient information concerning the benefits and working of a risk-sharing agreement and apprehensions about free-riders abusing the risk-sharing agreement. Additionally, safely assuming that in case of a disaster, the government is going to intervene with compensation dilutes the incentive to create a risk-sharing agreement.

6 Conclusions

This article addresses a case study of marine pollution risk in the north-west of Spain, more particularly, in the Ría de Vigo. We chose this coastal area for our case study since it exemplifies a shared geophysical domain in which conflicts and environmental eventualities arise owing to marine and maritime activities partially incompatible with one another.

Interviews held with stakeholders provided much insight into past failures of some insurance products and the current reluctance to create a mutually beneficial risk-sharing agreement.

The theoretical starting point is clear: the provision of satisfactory financial protection is crucial in capturing and thus attenuating undesired impact business operations may have on the environment. The insolvency of an uninsured polluter may not only leave the injured to bear losses caused by the environmental impairment; a polluter no longer exposed to the financial burden associated with environmental damage may feel it has the right to exercise risk-seeking behaviour (moral hazard).

Empirically, our study into the willingness of stakeholders to engage in a risk-sharing agreement showed low willingness of business operators in the Ría de Vigo collaboratively to insure themselves against the risk of marine pollution. Mutual insurers are often established to insure risks that are either refused by commercial insurers or are not yet covered by existing policies (a missing market). However, this is obviously not the case here. We showed that insurance products have been repeatedly rejected by local stakeholders owing to a misconception of insurance, protectionist policies forcing the government to shoulder the burden of cost recovery and the reinstatement of water quality, non-compliance among fishermen and non-enforcement of anti-pollution measures.

As far as the low demand for third party liability coverage is concerned, it appears that notwithstanding formal obligations in legislation, small fishing vessel owners, under a statutory duty to take out an insurance policy, do not always meet this obligation. The regulatory failure is just as evident when addressing the first party damage coverage: many potential injured (eg fishermen suffering business interruption as a consequence of red or black tides) can bank on generous government intervention as a result of which, not surprisingly, a demand for insurance or alternatives (such as a risk-sharing agreement) is stifled. Environmentally responsible behaviour implies a broader adoption of first party insurance by such industries as fisheries and tourism.

Therefore, to ensure an equitable distribution of environmental responsibility among business operators using the same waterbody, the polluter pays and user pays principles must be equally implemented because the polluter cannot always be held entirely liable. Users’ very presence in the Ría de Vigo raises environmental impairment liability (and operating) costs, not only for themselves but also for polluters. A co-insurance mechanism based on the polluter pays and user pays

65 To achieve certification, eg with the ISO 14001 standard, businesses must be audited annually for their environmental performance.

66 OECD *Environment and the OECD Guidelines for Multinational Enterprises: Corporate Tools and Approaches* (2005).

principles makes much sense because businesses that depend on good water quality in the Ría de Vigo are well aware of its susceptibility to pollution; however, they still choose to put themselves ‘in harm’s way’. Hence, user and polluter alike share a responsibility for addressing and reducing pollution risk. Mandating the adoption of first party insurance among users may get the ball rolling in the direction of reciprocal insurance.

Although we do realise that it is only with caution that we may put forth policy conclusions based on interviews in a pre-selected coastal area in the north-west of Spain, our findings are nevertheless in line with the literature and allow us to conclude as follows:

- It does not suffice to require potential polluters to provide financial security, such as insurance; the imposition of obtaining such a duty to cover remedial costs of a significant environmental impairment, as foreseen by the EU Environmental Liability Directive (2004/35/EC),⁶⁷ should be accompanied by strict enforcement measures as well, as otherwise the demand for coverage may fail.
- The policymaker should, in line with the literature,⁶⁸ abstain from unconditional, *ex post* compensation payouts for pure economic loss, as that will not provide incentives for disaster-reduction

mechanisms to gain a foothold and may adversely affect the development of an insurance market.

- Policymaking could stimulate the market for environmental insurance by clearly outlining the financial ramifications of risks to which stakeholders are exposed and the advantages of particular insurance or risk-sharing constructions.
- The government must, by introducing mandatory regulation with which all stakeholders have to comply, guarantee that a minimum level of prevention is followed, through effective enforcement, by all stakeholders in order to stimulate further the emergence of a risk-sharing agreement.

With this article, we hope to have shown that a detailed analysis of the case of the Ría de Vigo can provide a telling example of issues that have been addressed in theoretical literature. The difficulties that the Ría de Vigo area has encountered in providing adequate protection for risks of environmental impairment provide additional insights at a more general level. Those difficulties show some of the challenges, but equally some of the conditions, that need to be addressed at the policy level so as to provide an adequate protection of the marine environment either through insurance or risk sharing.

67 Spanish companies that have already acquired environmental impairment liability (EIL) insurance as a form of financial security have done so voluntarily, because a date for the financial security to become a compulsory requirement in Spain, as stipulated by Directive 2004/35/EC, has yet to be announced.

68 See more particularly Richard A Epstein ‘Catastrophic responses to catastrophic risks’ (1996) 12 *Journal of Risk and Uncertainty* 287 and Louis Kaplow ‘Incentives and government relief for risk’ (1991) 4 *Journal of Risk and Uncertainty* 167. Note, however, that these negative incentive effects of government intervention only apply to victim compensation, not to relief efforts, consisting of effective, damage-limiting responses immediately after an event. For those different types of responses see Giuseppe Dari-Mattiacci and Michael Faure ‘The economics of disaster relief’ (2015) 37(3) *Law and Policy* 180.