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Concepts for Industry Co-Regulation of Bio-fuel Weeds

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Introduction

H. L. Mencken's famous quote 'For every complex problem there is an answer that is clear, simple, and wrong' often seems appropriate to our attempts to distil simple policy answers to very complex social challenges as illustrated with bio-fuel policies, an intrinsically risky policy-making area.

Second-generation bio-fuels, which can be produced with energy crops, are promoted as one simple solution to the adverse effects of first-generation bio-fuels. First generation production from plant material that is also suitable for human or animal consumption poses the risks of price and availability pressures on competing valued uses. Second generation bio-energy inputs include waste material or species that are not consumed by humans and domestic stock. They hold the promise of providing new economic crops in areas that are unsuitably for present cultivation, or securing value from waste resources. However, some of the candidate feedstock that

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includes native species, woody or grassy weeds, exotic species and plants modified by plant breeding or genetic manipulation[1] have invasive features and might later become weeds. Recent analysis suggests that bio-fuel weeds risk is potentially a substantial 'downside' of this potential major industry.[2]

Traditional 'simple solutions' like bans on importation apply a simplistic 'risk-avoidance' approach to the prevention of biological invasions from imported crops and plants. Applying such a strategy to energy crops is likely to cause the loss of the opportunity for primary producers in both developed and developing countries and retard fossil fuel and carbon emissions reductions.[3] On the other hand, if potentially weedy crops are introduced without viable management methods to price and allocate risk and to fund control and restoration, then the costs to the public could be high. This is because in the absence of any significant other funds to control weeds, the outcome of weed invasion, is normally some combination of (1) loss of habitat and ecological service values from the contaminated land; (2) additional costs to 'innocent' land users, by loss of production, contamination of produce, control costs, or reduction of land value; (3) additional costs to both government and non-government organisations, who invest in addressing the weed problem on behalf of the public.

As an alternative to risk avoidance by simple bans, we argue that bio-fuels weeds risks may be minimised by risk management strategies inspired by the commercial sector. However, to be a trustworthy alternative to standard regulatory methods, this will require credible co-regulatory approaches that engage the public and private sectors in a partnership for cost-effective and publicly credible risk management. It is our view that it is in the interests of industry as well as government to make such a risk-control strategy effective.

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[1] K. Rath, 'The Potential for Green Gene Technology in Biomass Production – a Legal Examination', in B. Breckling et al (eds), *Implications of GM-Crop Cultivation at Large Special Scales* (2008) Peter Lang, Frankfurt.

[2] See: IUCN, ' Guidelines on Biofuels and Invasive Species' (2009) (available at http://cmsdata.iucn.org/downloads/iucn_guidelines_on_biofuels_and_invasive_species_.pdf); and GISP, *Biofuels Crops and the Use of Non-Native Species: Mitigating the Risks of Invasion* (2008) (available at http://www.gisp.org/publications/reports/ BiofuelsReport.pdf./).

[3] See for example: D. De La Torre Ugarte et al, 'Economic and Agricultural Impacts of Ethanol and Biodiesel Expansion' (2006) *Study Report* (available at http://beag.ag.utk.edu/pp/ Ethanolagimpacts.pdf).

Risk Concepts and their Application in the Commercial Sector

The concept of risk[4] involves subjective decisions involving uncertainties such as the characteristics and likelihood of the hazard and the nature, vulnerability, resilience and robustness features of the 'risk target' (environment, individual, institution) that might be impacted. The potential intensity of the impacts, the extent and outcomes of the recovery process (if any) are often not well known. The value – which is heavily contextual - of what might be lost by the occurrence of a hazard is also highly variable and affected by subjective considerations.

It is to be expected that people with different roles or interests will see biofuel weed risk quite differently. Environmental advocates with a deep exposure to weed impacts or habitats are likely to perceive a far greater likelihood and extent of harm than (for example) a biofuel process engineer whose prior exposure to weed issues is minimal.

Along with a concern for understanding and protecting value, the essential element of risk management is embracing the uncertainties at the heart of risk and building the management of uncertainty into the methods used for its control.[5] The potential for innovation through this approach is illustrated by the enormous array of existing risk-targeted commercial services and instruments. Moving well beyond risk avoidance, these encompass conscious risk assumption or self-insurance, management using targeted responses contingent on the occurrence of the hazard or harm; or spreading the uncertain costs of harm through contract-based risk transfer mechanisms, such as risk pooling, risk-adjusted pricing and risk hedging techniques. One characteristic of private market approaches is the emphasis on converting risk into opportunity. Private litigation, based on contract or tort underpinned by property rights, is also used to protect interests vulnerable to third party harm, or to obtain recompense for harms. Notwithstanding the recent global financial crisis, partly attributable to misuse of financial risk instruments, commercial innovation in the management of risk has delivered substantial benefits. Commercial risk mechanisms enable investments and activities that might otherwise be non-feasible. For example, a 'put' option over the

[4] There are many methods for evaluating risk such as the Australian/New Zealand Standard (AS/NZS ISO 31000:2009).

[5] It is beyond of the scope of this paper to discuss the objective concept of value (which is to a large extent subjectively perceived) and its intertwined relationship with the concept of risk.

production of a factory reduces the investor uncertainty about the market for that product, and potentially makes viable an otherwise unattractive investment; or specific liability insurance gives a regulator confidence to approve a new industrial process.

Transposition of Commercial Risk Management Strategies for Bio-Fuels Weeds Control

Despite increasing risk sophistication in the design of weed control programmes,[6] very few economic risk instruments are used conventionally in environmental protection. Weed insurance is non-existent; and weed risk assessment is merely a process for government quarantine approvals or the design of weed control programmes. Risk pricing is not used in weeds policy. The instruments we suggest involve a price for undertaking a specific risk or penalty for a failure to manage or remediate the impact. They seek a behavioural response of risk-identification and risk-reduction by creating a contingent cost on failures to control the risk. Generally, they seek to attach that price to the risky action and to the beneficiary of that action. They could help create an accountability loop between the source of the risk and its control. Thus there should be less need for government to rely upon bans because the accountability for risk (and the costs of recovery) would be primarily addressed within the private sector. Such an approach should enable more effective and economical management of (bio-fuels) weeds risk.

Conceptual Architecture for a Bio-Fuels Weeds Risk Management Model

Principles

The principles we propose for designing such reliable risk-based strategies are:

- The form of intervention should be proportionate to the risk, spanning prohibition (high level of risk), through insurance and structured ongoing evaluation (medium level of risk), to industry self-management and reporting (low level of risk). A

[6] For a suite of studies see: Weeds CRC, *Development and Testing of Decision Support Systems for Incursion Response* (available at http://www.weedscrc.org.au/ projects/ project_1_3_2.html).

precautionary approach should inform the assessment of the level of risk, and a core goal should be to ensure that there are sufficient private funds available as needed to immediately and effectively respond to any risk that transforms from a mere contingency to be coming a tangible harm or hazard. This framework that has the capacity and the strong economic motivation to effectively cure any failures implies that the costs of failures must fall upon specific people or organizations.

- Use of a safety net of safeguards, involving multiple instruments at different points of intervention.[7] The points of intervention include the evaluation, importation, propagation, distribution, plantation operation and hazard control stages indicated in the diagram on the following page. The types of instruments are detailed later in this paper.
- The costs and the responsibilities are borne by those who might gain from the undertaken risk. This implies that there are sufficient incentives for private actors to control weeds. Generally this implies that either an energy crop producer, or an insurer with whom they have contracted, will have a legal liability that is greater than the costs of taking immediate action to control the harm.
- Government should ensure transparent and reliable risk governance so that the public interest is demonstrably protected. If public confidence is not protected, then the industry is likely not to have the essential social license to undertake the risk. Under these conditions the economic incentive to carry out risk management would dissolve, as the bio-energy crop opportunity would erode.

The Approach

A risk accountability approach requires the preliminary understanding of the socio-economic system within which the relevant risks arise. Our approach in other studies has been to map the transactions within that system, taking into account both direct and indirect transactions and the actors who drive them.[8] The weeds pathway[9],

[7] P. Martin, 'Cross Pollination or Cross-Contamination? Directions for Informing the Management of Invasives with Market-Economy Concepts' in R. Van Klinken et al (eds), *16th Australian Weeds Conference Proceedings: Weed Management 2008 Hot Topics in the Tropics* (2008), Queensland Weeds Society.

[8] P. Martin and M. Verbeek, 'Cartography for Environmental Law: Finding New Paths to Effective Resource Use Regulation' (2000) *Research Report* (available at http://www.une.edu.au/aglaw/research/cartography_paper.pdf). See also P. Martin, J. Williams and C. Stone, 'Transaction Costs and Water Reform: the Devils Hiding in the Details'

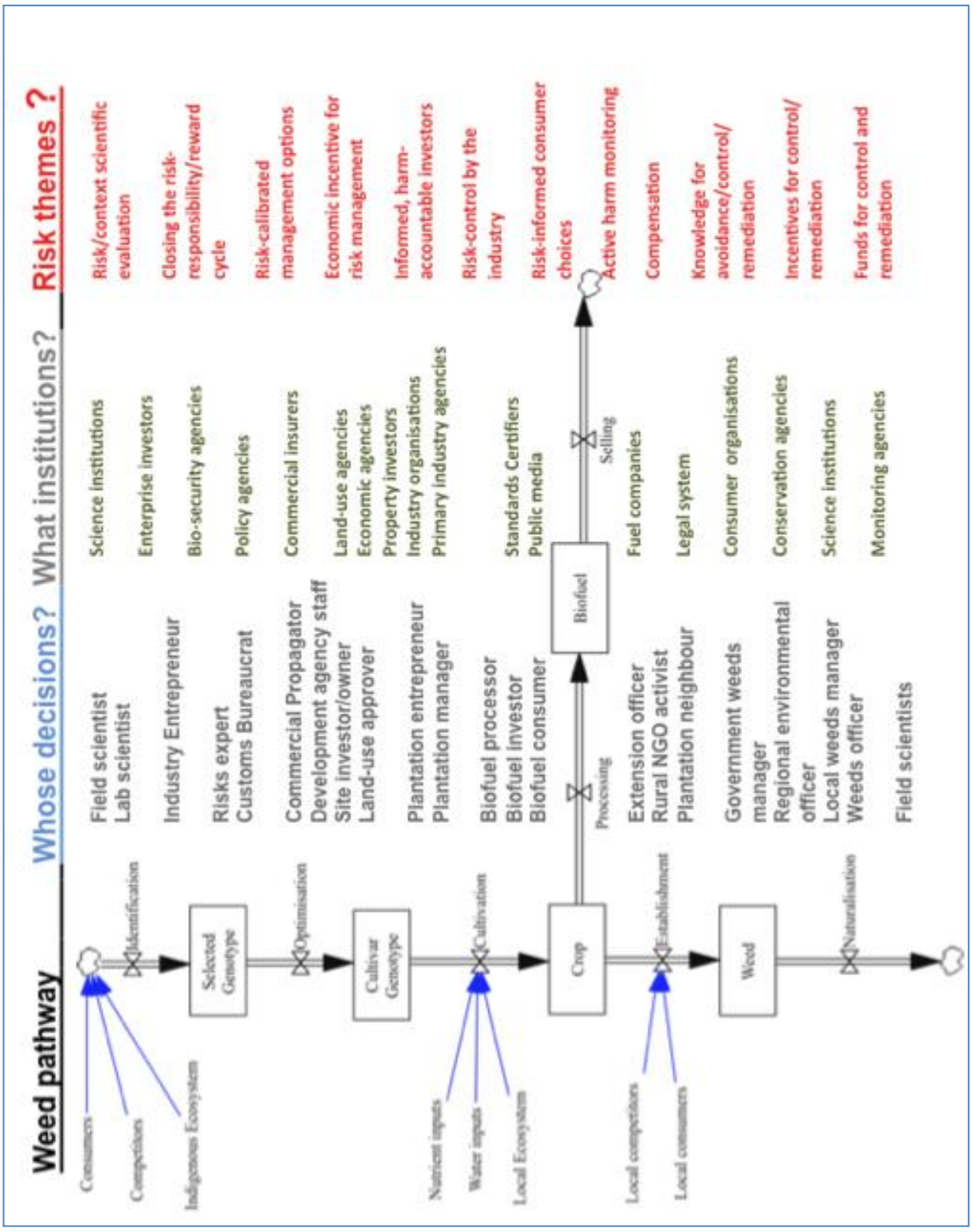
which presents a linear sequence of transactions and events by addressing the entry, establishment, acclimatisation, and spread of an invasive species, has been described to support proposals for control strategies for bio-fuel weeds.[10] A deconstruction of transactions through a pathway enables targeting of hazards, their likelihood and impacts. It identifies foci for optimal risk-management interventions[11], as illustrated in the following diagram which traces the pathway of plant genetic material from its first scientific evaluation, through identification of its bio-energy crop potential, establishment as a commercial crop, and management of any escape and establishment. It identifies the key transactions and the decisions that drive these. It also 'flags' the significant institutions and risk considerations along this pathway. This approach is an extension of the weeds pathway approach used in weed science. It places specific emphasis on transactions, decisions and institutions through which the trajectory of a weed becoming established and problematic can be altered.

(2008) *CRC for Irrigation Futures Technical Report* No.08/08 (available at http://www.irrigationfutures.org.au/news.asp?catID=9&ID=768), at 2-5.

[9] B. Sindel et al, 'Pathway Risk Analysis for Weed Spread within Australia' (2008) *Report* (available at http://lwa.gov.au/projects/2566).

[10] Adopting a risk-avoidance philosophy, out of the 18 proposed bio-fuel plants, it was recommended that 16 should not be cultivated. This is reported in T. Low and C. Booth, 'The Weedy Truth About Biofuel' (2007) *Report* (available at http://www.invasives.org.au/documents/file/reports/isc_biofuels_revised_march08.pdf). See further IUCN, 'Guidelines on Biofuels and Invasive Species' (Draft for Comment, 6 July 2009) (available at http://www.gisp.org/whatsnew/docs/IUCNBiofuels_IASdraft.pdf), at 4-7).

[11] See also Martin (n.7), at 10).



Source: Martin (2010)

The Potential for Co-Regulation

Co-regulation is a term to describe a form of partnership between government as regulator, and an industry or community body, to achieve regulatory objectives at

least cost to the industry. There are many forms of co-regulation including industry certified compliance systems such as the 'Green Dot' recycling system in Europe (discussed later), the enforcement of animal welfare standards through the R.S.P.C.A, or the use of professional standards alongside mandatory certification to practice as a doctor, lawyer, dentist, psychiatrist or any of a vast array of professions.

The difficulty of establishing individual responsibility for weeds introduction and/or spread, as illustrated with GMOs[12], justifies an industry collective accountability approach. Because it is difficult to trace particular weeds to particular sources and incidents, it is almost impossible to apply conventional methods of legal liability. This is an argument for simple risk avoidance ban of the potential weed. However if the need to prove individual accountability is replaced by a (credible) mechanism of collective responsibility, this argument for a ban is removed. Industry risk governance, relying on collective self-regulatory based responsibility programmes, is increasingly being used to justify the social license of an industry and reduce spillover risks.[13] This logic could justify the embrace of such a strategy by the bio-fuels industry. Industry certification and accreditation schemes based on credible lifecycle[14] and risk analyses may form part of such a programme. However, self-management or co-management has not proven to be fully trustworthy.[15] An independent bio-fuels industry risk-management commission or equivalent structure, with public accountability reporting, could offer a reliable systematic governmental oversight. As demonstrated with the German 'Green Dot' recycling system [16] introduced in the early 1990's, a co-regulatory risk-sharing mechanism can effectively engage the public and private sectors provided that there is a clear sanction structure should the industry programme fail. Should flexible regulatory and co-regulatory

[12] In Australia, there is no special liability regime that regulates damage caused by GMOs. In common law actions under the doctrine of negligence, legal responsibility require that a legally protected interest has been harmed and that a causal connection is established between the plaintiff's damage/injury and the defendant's act or omission. There is no obligation upon GMOs growers to inform anyone that that they are planting GMOs. On the difficulty of allocating liability see the Canadian case *Hoffman v Monsanto* [2005] SKBB225.

[13] For example, industry mandatory insurance under the Oil Spill Disaster Recovery legislation; or (in Australia) industry mandatory codes of conduct under the Trade Practices Act.

[14] For example, ISO 14040.

[15] See R. Baldwin and M. Cave, *Understanding Regulation - Theory, Strategy and Practice (1999)* OUP, Oxford, at 125-37. A credible threat of higher costs from a failure to meet social or environmental targets provides a powerful incentive for the industry to align its diverse interests around a credible approach.

[16] See for details: 'Der Grüne Punkt - Duales System Deutschland GmbH' (available at http://www.gruener-punkt.de/?L=1).

schemes not achieve the agreed performance standards, penalty-based mechanisms, and the reduction of state supports could be substituted. We propose below a number of possible instruments that could be deployed at various points in the weeds pathway we have described above. We propose that they would be most effective within the framework of a credible industry-wide programme. Under such a programme, the industry would:

- assume collective responsibility for any escapes of bio-energy crops; and (on this basis);
- put in place management, insurance, and governance arrangements to minimise the collective risk; and
- support the essential legal requirements to underpin such a system These include clear specification of producer liability and management obligations, regulatory approval and oversight, and public reporting.

To provide the incentive for industry to embrace what will be costly arrangements (when compared to weak controls and public assumption of the weed risk) it is necessary that industry know that the alternative is a 'zero tolerance' approach to biofuels weed risk, and that any industry programme will have to meet high standards of integrity and reliability.

New Risk-Based Weed Instruments

Table 1 below extrapolates some possible mechanisms applied in other settings or proposed by researchers that could form parts of an industry co-regulatory approach. It is not anticipated that all would form part of a cost-effective programme but a variety of combinations of the constitutive elements is feasible.

There are two types of mechanisms. The first one aims to increase private investment for bio-fuel weeds control, such as financial responsibility mechanisms (FRMs)[17] that 'require potential polluters to demonstrate - before the fact - financial

[17] They can be classified into 3 categories: penalties, fees and assurance. See R. Porter and J. Diamond, 'New Tools for Responsible Shipping in the Great Lakes - Using Financial Responsibility Policies to Prevent Ballast-Borne Biological Pollution - An Environmental Law Institute White Paper' (2009) (available at http://www.elistore.org/ reports_detail.asp?

resources adequate to correct and compensate for environmental damage that may arise in the future'.[18] This category includes insurance arrangements, environmental performance bonds, and risk pooling mechanisms.[19] The second category of 'enabling mechanisms' aims to reduce information deficiencies,[20] lower the transaction costs of weed detection, ensure monitoring of control action and eliminate impediments to civil action that could close the accountability loop. These mechanisms mainly impact on the flow of information[21] that shapes decisions. They include certification and labelling schemes supported by third-party verification and green investment indexes in financial markets. The latter mechanism creates pressure upon indexed companies/sectors to demonstrate high standards of environmental stewardship, as a means of achieving preferred status with investors. This also creates an incentive for non-indexed corporations to seek to comply with the index-related standards to attract investors. A system of plantation permits, under which legal permission is required to grow potentially risky plants on a particular site, would provide a legal mechanism for both approval and enforced removal of weedy species. A variation on this would be to cap the total amount of potentially weedy species using a transferable permit system. This may provide a strong private incentive for the permit buyer to require that the vendor remove the previously permitted species from the vendor's site. Finally, field inspections monitor site-specific risk and ensure that risk-pricing techniques are reliable. An effective, systematic programme is likely to involve mechanisms of both types deployed along the weeds pathway.

ID=11355&topic=Biodiversity_and_Invasive_Species). As our concern is risk instruments, our focus is upon assurance.

[18] J. Boyd, 'Financial Responsibility for Environmental Obligations: Are Bonding and Assurance Rules Fulfilling Their Promise?' (2001) *Discussion Paper 01-42* (available at http://www.rff.org/rff/Documents/RFF-DP-01-42.pdf), at 1).

[19] FRMs can be combined with strategies to ensure that the obligation for responsibility is crystallised by particular transactions, such as inspection and certification at the point of transfers of property ownership. For such a proposal in relation to weeds, see Martin (n.7).

[20] P. Martin and J. Shortle 'Transaction Costs, Risk and Policy Failure' (2009) Unpublished Conference Paper presented at *Global Conference on Environmental Taxation* (10th edition), Lisbon. See further Martin, Williams and Stone (n.8).

[21] See: Martin and Verbeek (n.8); and P. Martin and M. Verbeek, *Sustainability Strategy* (2006) Federation Press, Sydney, at 84 and 241-251.

Table 1: Theoretical Market Mechanisms for Invasives Control

CONCEPT/ MECHANISM		APPLICATION OF THE MECHANISM	INCIDENCE OF THE MECHANISM	INDUSTRY EXAMPLES
FINANCIAL RESPONSIBILITY MECHANISMS	**Civil liability**	Statutory liability for weed cost (economic, cleanup, or ecological harm). Financial liability arises should invasiveness emerge. Liability insurance may create a market mechanism to price the risk characteristics of alternative crop types and management regimes.	Liability for a failure to control bio-fuel weeds potentially imposed upon importers, seed or plant supply companies, crop growers. Liability arises upon proof of harm (to the legally required standard).	G.M.O. liability Pollutant emission liability Contaminated site liability
	Individual performance bonds/ guarantees	Mandatory financial guarantee (deposit or bank) to fund environmental restoration or economic loss.	On approval to plant or introduce new bio-fuel species, or establish production facility. Cost imposed at point of approval (deposit) or on proof of harm (bank guarantee).	Mine site rehabilitation bonds (e.g. Queensland Environment Protection Act, 1994) Construction guarantees
	Industry pooled risk sinking funds	Industry risk-management funding pool for prevention, control and restoration). Firms must: • contribute to the pool funds, and • prove they have risk protection under the scheme. A scheme can also be state-sponsored and administered.	Potentially levied across the bio-fuels supply chain; or selected participants Potentially levied on states to provide funding for a national invasiveness response	US Oil Spill Liability Trust Fund (OSLTF)/ US Oil Pollution Act, 1990) California's oil spill strategy (Lempert-Keene-Seastrand Oil Spill Prevention and Response Act, 1990, California) US States' Interstate Pest Control Compact/ Pest Control Insurance Fund
	Environmental risk insurance	Contractual mechanism to transfer environmental risks to third-party insurers to pool the risk of invasiveness and the costs of control and rehabilitation. Facilitated by civil liability.	Similar to risk pooling	Similar to risk pooling. Insurance products such as storm or other natural disaster.

CONCEPT/ MECHANISM		APPLICATION OF THE MECHANISM	INCIDENCE OF THE MECHANISM	INDUSTRY EXAMPLES
ENABLING MECHANISMS	**Invasiveness risk inspection in property transactions**	Independent reporting of the potential costs of control and eradication of invasive plants at the time of property transfer. Information and incentive to negotiate over and price invasiveness risk (and an incentive to minimise the risk)	At the time of transfer of a property upon which bio-fuel plants are grown.	Contaminated lands inspection and reporting. Pre-sale weed inspections proposed in Martin (2008).[22]
	Plantation permits[23]	Permits to grow potentially invasive species. Synergistic with weed risk inspection mechanism. Legal obligation to eradicate if no permit is held.	Owners and establishers of bio-fuel crop plantations, and vendors of affected properties require permits for the level of risk/plantings proposed. The permit vendor certifies the eradication of the species on the site from which the permit is transferred or lapses.	Theoretical model proposed by Horan and Lupi (2005) for ballast water invasive species control. Tradable development rights (e.g. Chesapeake Bay). Reported success to date has been limited. Emissions permit to control air quality risk.
	Bio-fuel 'green' investment standards	Green standards to inform investors of the social performance of publicly listed bio-fuel enterprises. Invasive species risk could be included.	Publicly listed bio-fuels enterprises.	Sustainable investment indices and funds. Bache Commodity Green Index [SM]
	Eco-certification and eco-labelling	Product evaluation against environmental standards potentially including invasiveness risk. Market incentive to lower environmental risk.	May be public certification or labelling, or industry through bio-fuel purchaser chains (at wholesale or retail level), or non-government certification and labelling	Voluntary Environment Management stds. (e.g. ISO 14001, 14040). 'Green' certification and consumer information programmes. Supply chain purchasing standards

[22] See Martin (n.7).

[23] A theoretical model for the development of a tradable risk-based bio-pollution permit scheme has been proposed in R. Horan and F. Lupi, 'Tradeable Risk Permits to Prevent Future Introductions of Invasive Alien Species into the Great Lake' (2005) 52 *Ecological Economics* 289. Transferable risk-based development rights to be traded between landowners and commercial developers is another conceptual strategy. For an explanation of environmental development rights markets, refer to M. Walls and V. McConnell, 'Incentive-Based Land Use Policies and Water Quality in the Chesapeake Bay' (2004) (available at http://www.rff.org/RFF/Documents/RFF-DP-04-20.pdf). However, this article, and more generally the literature on tradable development rights, does not explain how these markets can internalise commercial risk-based techniques. Our evaluation is that the use of transferable permits is not likely, but we have included them in the table as they may have a value that we have not recognised.

Conclusion: Creating an Effective Co-Regulatory Scheme for Bio-Fuel Weeds

We have presented a conceptual architecture for a risk management model that relies on market-based alternatives or complements to conventional command and control bans for the management of the bio-fuels weeds risks. Under this model where industry believes that there is an economic advantage available from a potentially invasive species that might otherwise be banned, industry would need to develop a credible risk-management system as a precondition to approval to grow. We have outlined the elements in such a programme. They include clear individual and collective responsibility coupled with a series of financing and enabling mechanisms. These elements can be assembled in a large variety of combinations and permutations. The process of design of such a strategy would require scientific, governance and legal expertise, coupled with industry/government negotiation. This approach reflects contemporary developments in credible co-regulation with legal controls and a variety of nuanced commercial risk market arrangements. They can be integrated into a complete programme encompassing multiple commercial risk-based instruments and an industry-led collective accountability approach.

We acknowledge that embedded in these concepts are many legal as well as political complexities. These include the need for sufficiently strong regulatory arrangements to create the impetus for industry to take on such a strong self-regulatory role, and liability arrangements that reduce the potential for less responsible members of the industry to free-ride on their peers.

Beyond the multiple opportunities associated with bio-fuels crops, bio-fuel regulation, as representative of a new class of institutional challenges, also provides us with an important test bed to develop the types of legal and institutional arrangements that will be necessary in the future. It is in the interest of all stakeholders to rise to this societal challenge. New processes need to be found for engaging both the public and private interests in a broader shared system of accountability. This involves a new form of jurisprudence, encompassing legal theory, behavioural effectiveness and system redesign. This challenge is a microcosm of the larger transformation that will be required in our attempts to move to a more sustainable and just approach to using and conserving the increasingly scarce natural heritage of mankind.