



Do no harm? Risk perceptions in national bioenergy policies and actual mitigation performance

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ABSTRACT

This paper investigates how risks are anticipated in national bioenergy policies and in which way related expectations that harms can be prevented or mitigated have actually been met. The paper draws on the national biofuel policies of ten countries and the EU, selected to represent a diverse sample of regions, producers and consumers, and pioneers and latecomers. It proceeds in two steps: firstly, it identifies three risk categories most frequently mentioned across the investigated national policies. Secondly, it conducts a systematic review of available empirical research about biofuels' effects in these risk categories. Findings are discussed regarding the empirical conditions under which related expectations to do no harm have materialized or failed; and concerning the challenges of risks perception and management in actual policies. We observe issues of crop selection and inadequate sectoral governance of biofuels, but also challenges of large-scale modes of intensive production. Effective risk mitigation was often the result of risk adverse choices by contract farmers engaged in biofuels production. National policy documents have insufficiently conceptualized 'do no harm' concepts and strategies in place to address these performance issues; while remaining silent on the particular risk governance and accountability framework that keeps track of actual developments, commitments and responsibilities.

1. Introduction

Multiple risks associated with bioenergy production have gained prominence in research as well as headlines in international media – from peatland fires in Indonesia due to expansive oil palm production, to fires and increased respiratory problems due to sugarcane expansion in Brazil, felling of primary forests in the US to produce pellets for use in Europe, and land grabs in Africa linked to plans to produce bioenergy (Balch, 2015; Carlson et al., 2012; Cotula et al., 2008; Fairhead et al., 2012; Grandia, 2007; Mingorance Cruz, 2009; NRDC, 2015; Spanne, 2015; Uriarte et al., 2009). The above examples indicate that adequate risk assessments and effective precautionary measures are not only central to achieving the goal of producing sustainable biofuels, but also challenging.

But how do risks actually appear in national bioenergy policies? In addition to the “bundled” expectations about socio-economic and CO₂-related benefits (Hunsberger et al., forthcoming; Searchinger et al., forthcoming), policies contain expectations related to potentially negative outcomes of biofuels production and consumption to be avoided. These risk perceptions in the form of “do no harm” expectations take multiple forms across official documents, from vaguely

worded suppositions to assumptions backed by measures or strategies to mitigate negative effects. Moreover, they cover a wide range of potentially harmful outcomes, from food security effects to public health risks (see Sections 2 and 3 below).

This paper assesses existing “do no harm” conceptualizations and strategies of national bioenergy policies that were central in promoting liquid biofuels production, and contrasts that with their actual performance. The paper draws on national biofuel policies of eleven countries. The research asks how policy documents conceptualize and anticipate such potential risks; and the extent to which related expectations that harms can be prevented or mitigated have actually been met. The systematic review of existing case studies on the actual performance of biofuel production aims to identify the conditions under which effective mitigation or unintended harmful effects occur.

The paper proceeds as follows: Section 2 introduces the research methods. Section 3 reviews risks mentioned in national bioenergy policy documents from selected countries worldwide, and drawing on wider literature on the potential risks of biofuel production, develops a heuristic framework for the most prevalent risk categories that have been identified during the review: food security, land rights/land conflicts, and biodiversity. Section 4 applies this framework in the

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systematic review of empirical literature on risk performance in three “do no harm” categories. The paper proceeds by discussing the implications of the findings for policy and practice, including the particular challenges that come with framing potentially negative effects as risks to be mitigated (Section 5). In conclusion, key findings are summarized and recommendations provided (Section 6).

We would like to stress that our systematic review of risk perception and sustainability performance of liquid biofuels reflects our understanding that climate change demands a quick transition away from fossil fuels. How energy is produced and consumed has “a strong bearing on socio-economic relations,” and the potential to foster, or “destroy communities and profoundly affect the quality of life,” the environment, and the climate (Kyriakopoulos et al., 2016: 792; Searchinger et al., forthcoming). Therefore, the introduction of alternative energy sources should be subject to constant governance and performance evaluation.

2. Methods

The scope of this study consists of a document analysis of “do no harm” expectations in selected national bioenergy policies, combined with the systematic review of case studies on conditions of outcomes of biofuels production. The paper aims to broaden the qualitative understanding of the conditions under which harms were done and/or prevented.

The research follows a three-step approach. In the first step, the content of national policy documents were analyzed to identify expectations associated with risks, and how policies make sense of or aim to mitigate those risks. In addition, a regional (European) bioenergy policy has been assessed, to accommodate the advanced stage of integration of the European Union and its member states in this policy arena (Olsen and Rønne, 2016). Based on the purposive selection of national bioenergy policies, we draw out cross-cutting expectation patterns and concepts through analysis. The focus on national bioenergy policies to assess risk perception and management is justified from the viewpoint of manageability and comparability of data. Moreover, the relevance of national bioenergy policies for the study of “do no harm” expectations rests in the tendency for various social and environmental commitments to be enshrined at this level (Bailis and Baka, 2011; Katzenstein, 1977; Hunsberger et al., forthcoming). The document analysis is limited to ten countries and the EU. The countries were selected to represent a diverse sample of societies at different levels of industrial development and from different world regions, including pioneers and latecomers, producers and consumers of biofuels. The diversity of the country sample allows us to be aware of variations but also capture cross-cutting tendencies regarding “do no harm” expectations in national policies (see Table 1).

Table 1

Selected Countries and National Biofuels Policies.

Country/Region	Selection Criteria	Sources/Policy Documents
Brazil	Pioneer in biofuels production, major producer, major consumer, regional balance	(Brazilian National Congress, 1993; Brazilian National Congress, 1997; Brazilian National Congress, 2005; de Andrade and Miccolis, 2011; MAPA, 2006; MDA, 2009a; MDA, 2009b)
China	Emerging economy, major producer (among the top 10)	(Koizumi, 2008; USDA-FAS, 2006; Myers, 2015)
Colombia	Regional balance, major producer (among the top 10)	(Conpes, 2008; MADR, 2010; Minambiente, 2016; MME, 2007; Myers, 2015)
EU	Major consumer bloc, major producer (biodiesel) bloc	(EC, 2009)
India	Emerging economy	(MNRE, 2009)
Indonesia	Regional balance, major producer (among top 10)	(Caroko et al., 2011; Sardjono, 2014; Suharto, 2012; Myers, 2015)
Mozambique	Regional balance	(Republic of Mozambique, 2009, Schut and Florin, 2015)
South Africa	Regional balance	(Republic of South Africa, 2007)
Thailand	Regional balance, major producer (among top 10)	(DEDE, 2012; Tongsovit and Greacen, 2012; Myers, 2015)
UK	Major consumer	(Bailis and Baka, 2011; UK, 2007)
USA	Major producer, major consumer, pioneer of modern large-scale production of bioenergy	(US Congress, 1990, 2005; US EPA, 2007, 2010, 2016; Myers, 2015)

The second stage involved the development of a heuristic framework for evaluating evidence from published literature by identifying how select expectations identified as most prevalent across documents are framed. The framework draws on rationalizations expressed in the policy documents, and where such standards exist, includes international standard definitions (e.g., food security).

The final stage consisted of a systematic review of published case studies for each “do no harm” expectation, employing criteria from the framework developed in step 2. In evaluating empirical evidence of outcomes, we searched for peer reviewed journal articles and research published by authorities for the topics under review within the last 10 years (since 2006–2016). The search sourced articles through Web of Science, Scopus, and Google Scholar. Search terms were systematically applied across the search engines as outlined in Table 2. Modelling publications were excluded. The timeline 2006 reflects the year in which biofuels production and consumption took off worldwide – both regarding world production of fuel ethanol, the main form of biofuel, but also concerning worldwide biofuel innovations in major technical pathways (Albers et al., 2016). In terms of scope, we focus on crop-based sources of liquid biofuels. Our analysis includes crops that can be used for food (corn, sugarcane, cassava, soy, oil palm) as well as some that cannot (Jatropha, castor).

This approach comes with certain limitations. Our analysis is solely based on existing literature, and the recommendations for policy makers are mainly based on it. One finding is that to date, empirical studies on outcomes and circumstances of biomass production (for biofuels) remain surprisingly limited in all of the three risk categories we evaluated (also see Harris et al., 2015). The comparatively small number of available empirical case studies enhances the risk of publication bias in our database that occurs where a small number of empirical studies exist on the issue. To highlight potential bias, we placed a brief overview of main focal points in the assessed literature prior to our three systematic reviews of outcomes. Notably, the analytic inferences from this methodological approach do not aim to establish universal generalizations across a broad range of cases studied, nor does this approach focus on prediction. Rather, the qualitative systematic review presents a useful approach to explore the particularities that led to positive or negative outcomes in the different “do no harm” categories; and to use these insights to reflect upon existing “do no harm” expectations and risk performance.

3. Do no harm expectations of national biofuel policies

3.1. Identification of policy expectations

Table 3 shows the main “do no harm” expectations raised by biofuels policies in 11 countries.

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