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Bioenergy, Resource Scarcity, and the Rising Importance of Land Use Definitions

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BIOENERGY, RESOURCE SCARCITY, AND THE RISING IMPORTANCE OF LAND USE DEFINITIONS

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ABSTRACT

The rising demand for food and bioenergy from the world's burgeoning population has created tension between how man and nature use the land upon which cropping depends. Law as an institution likely will be the ultimate arbiter between competing uses as existing resources become more strained, greenhouse gas emissions increase due to new lands conversion, and ethical claims mount that bioenergy leads to food insecurity. One option to address this problem is to incentivize biomass cropping on lands not reserved for food production such as "marginal," "idle," "abandoned," and "degraded" lands (MIDA lands). In order to achieve balance through land use demarcation, policies first must shift from myriad, generic land use terms to a consistent definitional basis in law or regulation, which currently does not exist. Existing land classification tools serve as a starting point to build legally enforceable land use definitions, which this Article surveys. Significant challenges lie ahead, however, in designing and operationalizing enforceable land use categories that guide resource allocation. Legal metrics must reconcile complex interactions between the economic, cultural, and ecological values inherent in such lands. Systems-level definitions for MIDA lands thus are essential to preventing possible social and environmental harms caused by isolated, generic, and myopic terms confined within bioenergy policies. The constitutionally-delineated role of individual states in land use planning could get in the way of establishing a federal land use policy that provides harmonized, systems-based strategies for the definition and use of MIDA lands. Ultimately, bioenergy policies standing alone cannot solve broader, systemic structural and ethical failures of governments to manage lands for optimum social, economic, and environmental benefits. Bioenergy policies can, however, serve as a platform to consider regulating land uses more proactively and comprehensively in light of certain future resource scarcity.

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I. INTRODUCTION

While the extent of the "food-vs.-fuel" problem remains uncertain,[1] the debate continues to drive calls for bioenergy policies that favor cropping on land not used for feed, food, or other subsistence production. Initially, biofuels' opponents claimed that corn ethanol displaced food production

1. Gal Hochman et al., *Food and Biofuel in a Global Environment*, *in* HANDBOOK OF BIOENERGY ECONOMICS AND POLICY 267, 279 (Madhu Khanna et al. eds., 2010) (contending that energy crops compete for land with food production, raising the rental rate of land and increasing cost of food production, which increases food prices); John Baffes & Tassos Hanioits, *Placing the 2006/08 Commodity Price Boom into Perspective* 11-13 (The World Bank Dev. Prospects Grp., Working Paper No. 5371, 2010) (citing multiple studies that both supported and undermined the effect of biofuels on food prices); MICHAEL O'HARE ET AL., ARB INDIRECT EFFECTS WORKGROUP, *available at* http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/061710lcfs-ewg-food-effects-update.pdf (explaining the concept of how biofuel production competes with food) (draft).

and thus was the culprit behind the 2008 price spikes.[2] Now, however, the claim has spread to all fuel biomass such as perennial grasses − despite those crops' otherwise beneficial impacts within degraded agricultural landscapes − based on the theory that as land is displaced by fuel cropping, the global nature of the commodity grain market causes food prices to rise unacceptably in countries particularly vulnerable to food insecurity.[3] Often referred to as "indirect effects," at least one bioenergy statute recently adjusted its mandate to avoid food price pressure.[4] One study has gone so far as to claim biofuels are *unethical* unless bioenergy policies can effectively address issues of land use in relation to human rights, sustainability, and intergenerational justice.[5] The difficulty in refereeing land uses between food, fuel, and other needs is further exacerbated by the looming effects of climate change on agricultural production.[6] Bioenergy policy continues to bear the responsibility to solve broader, systematic failures to plan for current and future resource needs worldwide. Biofuels

2. TIM RICE, ACTION AID, MEALS PER GALLON 12 (Angela Burton ed., 2010) (documenting the damage of industrial biofuels on the environment, society, and energy security); *see also* ROUNDTABLE ON SUSTAINABLE BIOFUELS, RSB VERSION 1.0 FOOD SECURITY GUIDELINES 13 (2009) (elaborating the impacts biofuel production has on food security); U.N. Food & Agric. Organization, *Good Environmental Practices in Bioenergy Feedstock Production: Making Bioenergy Work for Climate and Food Security* 68-210 (Bioenergy & Food Sec. Criteria & Indicators Project, Working Paper No. 49, Andrea Rossi ed., 2012) (providing a set of good environmental practices that bioenergy feedstock producers can implement to reduce negative environmental impacts and also reduce the potential competition with food production).

3. *See generally* Hochman et al., *supra* note 1.

4. *See generally Proposal for a Directive of the European Parliament and of the Council Amending Directive 98/70/EC Relating to the Quality of Petrol and Diesel Fuels and Amending Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources*, COM (2012) 595 final (Oct. 17, 2012) [hereinafter *Proposal for a Directive*].

5. NUFFIELD COUNCIL ON BIOETHICS, BIOFUELS: ETHICAL ISSUES 64 (2011).

6. Mark Harvey & Sarah Pilgrim, *The New Competition for Land: Food, Energy, and Climate Change*, 36 FOOD POL'Y 40, 41 (2011) (explaining a trilemma between food, energy, and the environment, where energy demands from increasing the area of land cultivation presents a higher risk of increasing carbon footprint of agriculture, or in other words, increasing risk of further climate change); DEBBIE BARKER, CTR. FOR FOOD SAFETY, THE WHEEL OF LIFE: FOOD, CLIMATE, HUMAN RIGHTS, AND THE ECONOMY 22 (2011), *available at* http://www.boell.org/downloads/TheWheelofLife_Barker_website.pdf (claiming that the danger of industrial agriculture is that "high energy- and chemical- intensive farming practices contribute to climate change which, in turn, negatively impacts the ability to grow food); GOV'T OFFICE FOR SCI., FORESIGHT, THE FUTURE OF FOOD AND FARMING, FINAL PROJECT REPORT 77-153 (2011), *available at* http://www.bis.gov.uk/assets/foresight/docs/food-and-farming/11-546-future-of-food-and-farming-report.pdf (considering the policy challenges resulting from multiples pressures on the global food system); Robert Mendelsohn & Ariel Dinar, *Climate Change, Agriculture, and Developing Countries: Does Adaptation Matter?*, 14 WORLD BANK RESEARCH OBSERVER 277, 278-79 (1999) (stating that developing countries are especially vulnerable to environmental damages due to climate change, but that certain economic models show that farmers would adapt their behavior to the differing conditions); Molly E. Brown & Christopher C. Funk, *Food Security Under Climate Change*, SCI., Feb. 1, 2008, at 581 (stating that climate change will affect agriculture, especially in food insecure countries).

critics[7] will continue to thwart biomass-based energy unless advocates can convince policymakers that the sector is a critical part of multifaceted strategies to combat climate change, achieve greater energy security, and build green economies in rural areas. To prevail in this David-versus-Goliath battle, the biomass-based energy sector must assume a leadership role in reconciling global change, resource scarcity, and the demand for land in the absence of coherent national and international land-use policies.[8]

One proposed, near-term solution has been to incentivize production of biofuels feedstocks on lands otherwise not used for food cropping, such as "marginal," "degraded," "idle," and "abandoned" (MIDA) lands. While MIDA lands may exist in large amounts,[9] policies and their advocates thus far have tossed around these terms without concrete definitions that can be operationalized into legally enforceable classification criteria. Economics typically underpin MIDA classification, but the designation can also depend on environmental and cultural qualities of land.[10] As with all massive

7. *See, e.g.*, Nat'l Petrochemical & Refiners Ass'n v. EPA, 630 F.3d 145, 146-47 (D.C. Cir. 2010), *cert. denied*, 131 S. Ct. 571 (2011) (exemplifying litigation against the promulgation of regulations mandating biofuel use under the Energy Independence and Security Act of 2005); *see also* David Alexander et al., *Navy Moves Ahead on Biofuels Despite Congressional Ire*, REUTERS (July 6, 2012), http://www reuters.com/article/2012/07/06/us-usa-greenfleet-idUSBRE86513S201 20706 (detailing Congressional backlash to the Navy's "Green Fleet," a project to use biofuel blends in warships); Eric Beidel, *GOP Amendments Could Derail Military Biofuels Plan*, NAT'L DEF. (May 15, 2012), http://www nationaldefensemagazine.org/blog/lists/posts/post.aspx?ID=789 (explaining a proposed bill that would prevent the Pentagon from buying biofuels if it cost more than conventional fuels); Robert Bowen, *Biofuels Are on the Chopping Block in Congress as Oil Industry Attacks E-15*, EXAMINER (July 15, 2012), http://www.examiner.com/article/biofuels-are-on-chopping-block-congress-as-oil-industry-attacks-e-15 (documenting attacks by members of the current Congress who are antagonistic toward biofuel promotion).

8. *See, e.g.*, Tara Garnett, *Livestock Related Greenhouse Gas Emissions: Impacts and Options for Policy Makers*, 12 ENVTL. SCI. & POL'Y 491, 500 (2009) (suggesting that a policy to mitigate the high greenhouse gas emissions from livestock must consider aspects that life-cycle analysis models currently ignore); Lena Partzsch & Sara Hughes, *Food Versus Fuel: Governance Potential for Water Rivalry*, *in* FOOD ETHICS 153, 154 (Franz-Theo Gottwald et al. eds., 2010) (suggesting in the face of the current global water crisis, exacerbated by impacts of biofuel production and agricultural commodity trade, the use of virtual water accounting is a useful tool, and proposing policy solutions to place biofuel production in an appropriate context); Carmen G. Gonzalez, *The Global Food Crisis: Law, Policy, and the Elusive Quest for Justice*, 13 YALE HUM. RTS. & DEV. L.J. 462, 464 (2010) (addressing structural problems that lead to food insecurity in the Global South).

9. J. Elliott Campbell et al., *The Global Potential of Bioenergy on Abandoned Agriculture Lands*, 42 ENVTL. SCI. & TECH. 5791, 5792 fig.1 (2008).

10. *See, e.g.*, Ximing Cai et al., *Land Availability for Biofuel Production*, 45 ENVTL. SCI. & TECH. 334, 334 (2010) (deploying the terms to conduct an economic analysis using soil productivity, cultivation techniques, agricultural policies, and macroeconomic and legal conditions); Gayathri Gopalakrishnan et al., *A Novel Framework to Classify Marginal Land for Sustainable Biomass Feedstock Production*, 40 J. ENVTL. QUALITY 1593, 1594-99 (2011) (noting that the terms were first defined from a purely economic perspective, and then broadened to include soil health conditions and topography with the onset of satellite technology, but that the focus of marginality remains on agronomic profit perspective); LAURA KATHERINE JAMES, THEORY AND IDENTIFICATION OF MARGINAL LAND AND FACTORS DETERMINING LAND USE

quandaries such as climate change and massive aquatic dead zones,[11] the balancing of complex social, economic, and ecosystem needs is one of the greatest challenges currently facing policymaking. Lawmaking in the United States is ill equipped, for several reasons, to develop and deploy multi-criteria optimization methods to value and designate land uses. Laws almost always compartmentalize complex actions to fit specific issues due to political limitations and the inherent scientific and administrative difficulty in identifying massive problems and system-level solutions. Federal solutions are limited to those specifically enumerated in the Constitution, such as control over interstate commerce, spending, taxation, and executive emergency powers. The United States Constitution reserves "police power" to state and local governments, which traditionally includes land use designation and protection of human health and safety. Thus, while federalization of land use regulation could provide a consistent definition of MIDA lands, the structure of the United States Constitution ignores the transboundary nature of mounting resource competition and degradation. International treaties cannot overcome this constitutional obstacle, even if countries would otherwise be able to surmount political disagreements.

While critical, the task ahead in identifying and classifying land and its use consistently is an ominous one. The following sections explore both bioenergy-specific and generic laws in search of definitional guidance for MIDA lands. Part II reviews current bioenergy statutes and polices and concludes that none adequately or consistently define MIDA land. Part III explores broader socioeconomic and environmental methodologies outside the bioenergy context that could be used in building a more complete definition of MIDA lands. Finally, Part IV examines reconciliation of competing constitutional provisions in light of the United States Supreme Court's recent decision on the Affordable Health Care Act, federalized land use regime would trigger. Let us additionally consider an event where resources (e.g., food, water, fuel, land) become scarce enough to create a national crises, triggering the exercise of presidential emergency powers to federalize land use designations.

CHANGE 6 (2010) (explaining that marginal land has been used as a production potential without offering much clarification, but that "[n]o quantification or physical analysis of marginal lands can be done until marginal is defined"); R. Lal, *World Crop Residues Production and Implications of its Use as a Biofuel*, 31 ENVTL. INT'L 575, 582 (2005) (defining marginal lands with regard to its poor quality for agricultural production).

11. *See generally* J.B. Ruhl & James Salzman, *Climate Change, Dead Zones, and Massive Problems in the Administrative State: A Guide for Whittling Away*, 98 CALIF. L. REV. 59 (2010).

II. MIDA LAND DEFINITIONS IN BIOENERGY POLICIES

Food price spikes of 2008, and fears of similar increases in 2013 following the nation's worst drought in fifty years,[12] has led almost to the foregone conclusion in academic and policy debates[13] that energy biomass should only be grown on lands suitable for, but not used for, food production (*idled* lands), lands not suitable for food production (*marginal* lands), or that have been degraded to a point where food production is infeasible because the lands have suffered from poor management (e.g., erosion) (*degraded* lands).[14] Land may be *abandoned* because it becomes economically marginal, whether a result of market conditions (e.g., low commodity prices) or because the environmental condition of the land makes it economically infeasible to grow crops (e.g., poor soils or dangerous toxic contamination). The following section reviews bioenergy policies – whose mandates lie at the heart of the food-versus-fuel controversy – to expose how their treatment of land classifications are responsive to the MIDA assumption, if at all.

A. CURRENT UNITED STATES BIOENERGY STATUTES AND POLICIES

United States bioenergy policies currently contain no formal definition of MIDA lands, even in those omnibus pieces of legislation where such a definition would seem appropriate and necessary to avoid resource conflicts. During the 2000s, Congress enacted a series of comprehensive energy and agricultural policies aimed at increasing biomass-based energy, including two acts that mandated increasing amounts of renewable fuels to be blended into the United States transportation fuel supply.[15] The 2002

12. Karl Plume & Deborah Zabarenko, *Worst Drought in 50 Years Could Last Through October*, CHRISTIAN SCI. MONITOR (July 19, 2012), http://www.csmonitor.com/USA/Latest-News-Wires/2012/0719/Worst-drought-in-50-years-could-last-through-October.

13. *See, e.g.*, Cai et al., *supra* note 10, at 334-39; RENEWABLE FUELS AGENCY, THE GALLAGHER REVIEW OF THE INDIRECT EFFECTS OF BIOFUEL PRODUCTION 9 (2008) (stating that biofuels production must target idle and marginal land); ROYAL SOCIETY, SUSTAINABLE BIOFUELS: PROSPECTS AND CHALLENGES 16 (2008) (concluding that to be acceptable, perennial crops must be grown on marginal land); Joseph Fargione et al., *Land Clearing and the Biofuel Carbon Debt*, SCI., Feb. 29, 2009, at 1237 (concluding that some detrimental "carbon debt" could be made up by use of abandoned and degraded land).

14. DAVID TURLEY ET AL., UK DEP'T FOR ENERGY & CLIMATE CHANGE, NF0444, ASSESSMENT OF THE AVAILABILITY OF 'MARGINAL' AND 'IDLE' LAND FOR BIOENERGY CROP PRODUCTION IN ENGLAND AND WALES 7 (2010), *available at* http://randd.defra.gov.uk/Document.aspx?Document=NF0444_9473_FRP.pdf (citing RENEWABLE FUELS AGENCY, THE GALLAGHER REVIEW OF THE INDIRECT EFFECTS OF BIOFUEL PRODUCTION 33 (2008)).

15. Energy Policy Act of 2005, Pub. L. No. 109-58, § 201(a)-(b), 119 Stat. 594, 650 (codified at 42 U.S.C. § 15851 (2006)) [hereinafter 2005 EPA]; Energy Independence and Security Act of 2007, Pub. L. No. 110-140, § 202(a)(2)(B)(i)(I), 121 Stat. 1492, 1522-23 (codified at 42 U.S.C. § 7545 (2006)) [hereinafter EISA].

and 2008 Farm Bills also contain significant incentives for biomass-based energy production.[16] However, neither address the land upon which biomass is grown in relation to potential competition with other economic uses.

The 2005 Energy Policy Act (2005 EPA) requires the Secretary of Energy to assess renewable energy resources, but ultimately it sidesteps land use by focusing on residues and better land management practices unrelated to land type.[17] The Energy Independence and Security Act of 2007 (EISA) restricts qualifying fuels to "renewable biomass" by excluding from the term biomass from federal lands (to protect forests) and any land not actively managed or fallow after the bill's enactment.[18] EISA does require National Academy of Sciences to report on the impacts of the Renewable Fuel Standard, and in their report they refer to the benefits from marginal land use several times.[19] The National Academy of Sciences borrows a definition from a seminal economic study that defines marginality as "low inherent productivity for agriculture, is susceptible to degradation, and is high risk for agricultural production."[20] The definition connects farmers' decisions to utilize otherwise marginal lands to macroeconomic and legal conditions, as well as available technologies.[21] The report's reliance on economic factors highlights the difficulty in arriving at a MIDA definition through complex modeling, which must make various assumptions and aggregation of data that do not take into account many site-specific characteristics of land.[22]

EISA also requires the United States Environmental Protection Agency (EPA) to report every three years on the impacts of the Renewable Fuel Standard on resource conservation and the environment.[23] The first report mentions marginal land in several contexts, but does not offer any

16. *See generally* Farm Security and Rural Investment Act of 2002, Pub. L. No. 107-171, 116 Stat. 134; Food, Conservation, and Energy Act of 2008, Pub. L. No. 110-246, 122 Stat. 1651 [hereinafter 2008 Farm Bill].

17. NAT'L RENEWABLE ENERGY LAB, REPORT TO CONGRESS ON RENEWABLE ENERGY RESOURCE ASSESSMENT INFORMATION FOR THE UNITED STATES 22, 23-24 (2006), *available at* https://apps3.eere.energy.gov/ba/pba/analysis_database/docs/pdf/fy06_epact_201_report.pdf.

18. EISA § 201(1)(I).

19. NAT'L ACAD. OF SCI., RENEWABLE FUEL STANDARD: POTENTIAL ECONOMIC AND ENVIRONMENTAL EFFECTS OF U.S. BIOFUEL POLICY 146 (2011), *available at* http://www nap.edu/catalog.php?record_id=13105 [hereinafter NAS RFS REPORT].

20. *Id.* (citing Ximing Cai et al., *Land Availability for Biofuel Production*, 45 ENVTL. SCI. & TECH. 334 (2010)).

21. *Id.*

22. HOLLY GIBBS ET AL., LAND COVER TYPES SUBGROUP: LOW CARBON FUEL STANDARD (LCFS) INDIRECT LAND USE CHANGE EXPERT GROUP, at i-iii (2010), http://www.arb.ca.gov/fuels/lcfs/workgroups/ewg/010511-final-rpt-land-cover-types.pdf.

23. EISA § 204.

operational definition beyond reference to the federal idle lands Conservation Reserve Program (CRP) and the ecological damage that could result from conversion to biomass crops.[24] It further acknowledges that use of marginal lands could increase water demand and fertilizer use because of generally poorer growing conditions.[25] Congress did not take the opportunity to address land competition in other EISA provisions such as Subtitle B (Biofuels Research and Development), Subtitle C (Biofuels Infrastructure),[26] and Subtitle D (Environmental Safeguards).[27]

"Marginality" also plays a part in both Renewable Fuel Standard[28] and California Low Carbon Fuel Standard [29] calculations of greenhouse gas emissions for purposes of meeting reduction thresholds. For example, the Global Trade Analysis Project and the Forest and Agricultural Sector Optimization Model take into account cropping shifts to "marginal" lands. For example, whether or not corn production can expand to marginal lands such as those in the CRP determine indirect land uses changes that in turn can lead to assignment of significant greenhouse gas penalties to a fuel's carbon score.[30]

EISA is not the only substantial legislative effort that largely sidesteps the issue of land use definitions. The 2000 Biomass Research and Development Act created the Biomass Research and Development Initiative to coordinate research between federal agencies on topics including the environmental performance of biomass-based energy and products.[31] Although this very type of coordination is necessary to construct a viable definition of MIDA lands, and while their many reports mention the possibility of using marginal lands to grow biomass multiple times, neither its Board nor Advisory Committee have devised an operational definition to guide business or regulatory decision making.[32] The 2008 Farm Bill

24. NAS RFS REPORT, *supra* note 19, at 1.

25. *Id.*

26. EISA § 241.

27. *Id*. § 251.

28. *Id.* § 201.

29. Exec. Order No. S-01-07 (Jan. 18, 2007), *available at* http://www.arb.ca.gov/fuels/lcfs/eos0107.pdf.

30. ROBERT BEACH ET AL., MODEL DOCUMENTATION FOR THE FOREST AND AGRICULTURAL SECTOR OPTIMIZATION MODEL WITH GREENHOUSE GASES (FASOMGHG) (2010), *available at* http://www.cof.orst.edu/cof/fr/research/tamm/FASOMGHG_Model_Documentation_Aug2010.pdf.

31. Biomass Research & Development Act of 2000, Pub. L. No. 106-224, § 307(d), 114 Stat. 358, 434-36 (codified at 7 U.S.C. 7624 (2006)).

32. *See generally* BIOMASS RESEARCH & DEV. INITIATIVE, INCREASING FEEDSTOCK PRODUCTION FOR BIOFUELS: ECONOMIC DRIVERS, ENVIRONMENTAL IMPLICATIONS, AND THE ROLE OF RESEARCH, http://www.usbiomassboard.gov/pdfs/increasing_feedstock_revised.pdf (last visited Apr. 9, 2013); BIOMASS RESEARCH & DEV. BD., SUSTAINABLE AND ADEQUATE BIOFUELS

established the Biomass Crop Assistance Program to incentivize perennial energy biomass production through federally-funded establishment and annual payments.[33] All agricultural land and nonindustrial forestland is eligible for a project area designation[34] while native sod, CRP, and Grassland Reserve Program lands are off-limits.[35] The statute outlines selection criteria, but none consider land use implications of subsidy decisions other than yields associated with the project proposal[36] Whether or not Biomass Crop Assistance Program incentivizes cropping on non-food lands ultimately depends on the amount of subsidy.[37] That is, if the United States Department of Agriculture (USDA) funds the program at a high enough level to allow for higher subsidies for a larger number of growers, Biomass Crop Assistance Program acres could displace less valuable food cropping.[38]

State bioenergy statutes also fail to delineate MIDA definitions within their renewable portfolio standards, which carry the same risk of incentivizing energy biomass production at the expense of food production by requiring minimum percentages of renewables in electricity generation. Of the twenty-nine states and the District of Columbia with renewable portfolio standards,[39] none make any MIDA distinction, although agricultural biomass qualifies as a renewable energy source under each renewable portfolio standards. Because adequate supplies of agricultural biomass for electricity generation are not yet available at market scale, utilities will turn to forest biomass that is readily available due to economic conditions in construction and paper markets.[40] Massachusetts currently is

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FEEDSTOCK PRODUCTION: RECOMMENDATIONS FOR FEDERAL RESEARCH AND DEVELOPMENT (2011), http://www.usbiomassboard.gov/pdfs/feedstock_production_2011.pdf; BIOMASS RESEARCH & DEV. BD., BIOFUELS FEEDSTOCK LOGISTICS: RECOMMENDATIONS FOR RESEARCH AND COMMERCIALIZATION (2010), http://www.usbiomassboard.gov/pdfs/biomass_logistics_2011_web.pdf; BIOMASS RESEARCH & DEV. TECH. ADVISORY COMM., ROADMAP FOR BIOENERGY AND BIOBASED PRODUCTS IN THE UNITED STATES (2007), http://www.usbiomassboard.gov/pdfs/obp_roadmapv2_webkw.

33. 2008 Farm Bill, Pub. L. No. 110-246, § 9011, 122 Stat. 1651, 2089-93.

34. *Id.* § 9011(a)(5)(A).

35. *Id.* § 9011(a)(5)(B)(i)-(v).

36. *Id*. § 9011(b)(B)(i)-(ix).

37. Madhu Khanna et al., *Land Use and Greenhouse Gas Mitigation Effects of Biofuel Policies*, 2011 U. ILL. L. REV. 549, 579-81 (2011).

38. *See generally id.*

39. U.S. DEP'T OF ENERGY ET AL., DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, SUMMARY MAP OF RENEWABLE PORTFOLIO STANDARD POLICIES (2012), *available at* http://www.dsireusa.org/documents/summarymaps/RPS_map.pdf.

40. R.D. Perlack & B.J. Strokes, *U.S. Billion-Ton Update: Biomass Supply for a Bioenergy and Bioproducts Industry*, U.S. DEP'T OF ENERGY (Aug. 2011), http://www1.eere.energy.gov/biomass/pdfs/billion_ton_update.pdf.

the only state with bioenergy-specific sustainability requirements,[41] one of which restricts forest biomass harvests in areas with poor soils as classified by the USDA. This type of MIDA distinction thus works in the reverse, emphasizing protection of the environmental sensitivities (e.g., soil erosion) that could occur on some MIDA lands without proper safeguards.

B. THE EUROPEAN UNION'S BIOENERGY POLICIES

The European Union's Renewable Energy Directive (RED) provides a greenhouse gas accounting credit for crops grown on "degraded" or "highly contaminated" lands.[42] The Directive leaves it to the Commission to develop regulations regarding the term, or in some cases defers to Member States.[43] The Commission proposed a Soil Framework Directive in 2006 to address land uses in relation to soil productivity, and human health and safety, but a minority of member states successfully blocked further progress.[44] Thus, it is unclear how the Commission would be any more successful in creating a pan-European definition of MIDA lands through the existing RED. The RED relies, therefore, on Member State definitions of MIDA lands.[45] In the United Kingdom, the Department for Environment, Food and Rural Affairs commissioned a study to determine the availability of marginal and idle lands for bioenergy production,[46] but does not maintain a codified definition. It does, however, define contaminated lands in the Contaminated Lands Regulation.[47]

The question perhaps now is moot, however, as the Commission recently acknowledged that merely encouraging biomass production on severely degraded or heavily contaminated land is no longer adequate to avoid indirect land use change in relation to greenhouse gas emissions.[48]

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41. *See Renewable Energy Portfolio Standard–Class I*, 225 CODE OF MASS. REGS. §§ 14.01-14.13 (2012), *available at* http://www mass.gov/eea/docs/doer/renewables/biomass/225-cmr-14-00-final-reg-doer-081712-clean-copy.pdf; *Biomass Eligibility and Certificate Guideline DOER*, MASS. DEP'T OF ENERGY REGULATION (Nov. 11, 2012), http://www mass.gov/eea/docs/doer/ /renewables/biomass/ma-rps-regulation-biomass-eligibility-and-certificate-guideline-doer-081712 xlsx.

42. Council Directive 2009/28, annex V, 2009 O.J. (L 140) 1, 54 (EC).

43. *Id.* pmbl., cl. 92, art. 4.

44. *Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, the Implementation of the Soil Thematic Strategy and Ongoing Activities*, at 20-21, COM (2012) 046 final (Feb. 13, 2012).

45. *See generally Summaries of EU Legislation: Subsidiarity*, EUROPA, http://europa.eu/legislation_summaries/glossary/subsidiarity_en.htm (last visited Feb. 7, 2012) (explaining, based on the basic principle of subsidiarity, if a Directive does not address the issue, or cannot address the issue because it is not authorized through treaty, then power is reserved to Member States).

46. *See generally* TURLEY ET AL., *supra* note 14.

47. Contaminated Land (England) Regulations, 2006, S.I. 2006/1380, § 2 (U.K.) (defining contaminated lands).

48. *Proposal for a Directive*, *supra* note 4, at 8.

Instead, the Commission is now proposing a five percent cap on food-based feedstocks that otherwise qualify for the RED mandate, an indirect land use change greenhouse gas penalty, and double-counting toward the mandate of non-food based cellulosics.[49] Thus, the Commission has approached the food-versus-fuel problem not through a MIDA land use categorization, but by type of crop.

C. BRAZIL'S RESPONSE IN ITS BIOENERGY PLANNING

In response to international pressure to prevent deforestation resulting from energy biomass cropping, Brazil has codified an agro-ecological zoning plan for the expansion of its sugarcane-to-ethanol industry (ZAE-CANA).[50] The multi-agency federal effort used soil, climate, hydrological, biological, socioeconomic, and regulatory criteria to designate where cropping can occur.[51] It automatically excluded areas of native vegetation and areas of high biodiversity such as the Amazon and Pantanal, focused on ensuring that land designation would support sustainability and protection of biodiversity,[52] and would reduce competition with food cropping.[53] Exact methodologies governing how all these factors were weighed in relation to one another, however, are not included in the ZAE-CANA document. Thus, it is not possible to discern exactly how MIDA lands were treated or prioritized. States must incorporate these land use designations into their legal regimes permitting expansion of sugar cane cropping.[54]

D. INTERNATIONAL STANDARDS REGARDING BIOENERGY STATUTES

Because bioenergy statutes have fallen short of providing concrete definitions, the Roundtable on Sustainable Biofuels has attempted to fill in gaps by developing an "indirect impacts" module in anticipation of European Union measures to combat food insecurity and indirect land use

49. *Id.* at 21-23.

50. *See generally* Ministério da Agricultura, Pecuária e Abastecimento, *Zoneamento Agroecológico da Cana-de-Açúcar [Minister of Agriculture, Livestock, and Sustenance, Zoning of Sugar Cane]* Documentos 110 (2009), *available at* http://www.cnps.embrapa.br/zoneamento_cana_de_acucar/ ZonCana.pdf [hereinafter ZAE-CANA]. The proposal was passed into law that same year. *See* Tarcizio Goes et al., *Sugarcane in Brazil: Current Technologic Stage and Perspectives*, REVISTA DE POLÍTICA AGRÍCOLA, Jan./Feb./Mar. 2011, at 62.

51. ZAE-CANA, *supra* note 50, at 7.

52. *Id.* at 7-8.

53. *Id.* at 8.

54. Decreto No. 6961, de 17 de Setembro de 2009, DIÁRIO OFICIAL DA UNIÃO [D.O.U.] de 9.18.2009 (Braz.).

change -induced greenhouse gas emissions.[55] Although not yet finalized, producers voluntarily can choose to cultivate biofuel crops on degraded or marginal land to lower their impacts.[56] To verify that a certified producer avoids indirect impacts, the Roundtable on Sustainable Biofules commissioned a study on how to define and identify MIDA lands.[57]

The study first focuses on the economic aspects of land to determine whether it should be considered degraded, such as low productivity resulting from human influence, or a combination of human and natural influence.[58] While acknowledging that degradation is a fluid term that can vary depending on who is classifying the land, the authors conclude that degraded land at a baseline exhibits low soil productivity that decreases plant growth and soil cover.[59] The study explores ways in which the Global Assessment of Land Degradation and Improvement project can identify land based on changes in net-primary production.[60] Net-primary production takes into account the change in a parcel of land not only in output, but from an ecosystem perspective as well.[61] The study concludes by urging that a complete definition of degraded land should take into account the root cause of the degradation, the potential losses to biodiversity if land is cultivated, as well as the potential benefits of leaving degraded land in a more natural state.[62]

A consortium of governments has convened the Global Bioenergy Partnership (GBEP) to develop international guidance for land management to avoid competition between food and energy biomass cropping. It has issued a set of indicators for sustainability[63] that include assessment of several potential land use change impacts, including the extension of

55. Roundtable on Sustainable Biofuels, Indirect Impacts of Biofuel Production and the RSB Standard 10 (Apr. 13, 2012) (unpublished manuscript), *available at* http://rsb.org/pdfs/working-and-expertGroups/II-EG/EG-on-Indirect/12-04-13-RSB-Indirect-Impacts.pdf.

56. *Id.* at 11.

57. KIRSTEN WIEGMANN ET AL., DEGRADED LAND AND SUSTAINABLE BIOENERGY FEEDSTOCK PRODUCTION: ISSUE PAPER 5 (2008), *available at* http://bioenergywiki.webfactional.com/images/4/43/OEKO_%282008%29_Issue_Paper_Degraded_Land_Paris_Workshop_final.pdf.

58. *Id*.

59. *Id.*

60. *Id*. at 6.

61. GLADA and NPP's attention to change is a positive step toward considering each piece of land as a unique space, but they do require a reference point in time. The report acknowledges that for some areas, no good figures exist for historical output, so the NPP is essentially impossible to calculate. *Id.*

62. *Id.* at 8.

63. GLOBAL BIOENERGY P'SHIP, THE GLOBAL BIOENERGY PARTNERSHIP SUSTAINABILITY INDICATORS FOR BIOENERGY 33-198 (2011), *available at* http://www.globalbioenergy.org/fileadmin/user_upload/gbep/docs/Indicators/Report_21_December.pdf.

agriculture onto currently unused land.[64] Significantly, the GBEP recommends countries consider environmental, social, and economic impacts when evaluating land uses (including how to exploit unused lands such as degraded or contaminated land), and the particular benefit when this is done as part of a national assessment on the suitability of land for biomass cropping such as that conducted by the Brazilian ZAE-CANA.[65] The GBEP recognizes that such an assessment is most effective when coupled with a comparison to the land use effects of other energy options such as coal and oil.[66] With regard to evaluating use of degraded or contaminated land, the GBEP draws on a 2007 United Nations Environmental Program definition: "land degradation is a long-term loss of ecosystem function and services, caused by disturbances from which the system cannot recover unaided."[67]

The United Nations Environmental Program considers an array of possible sources and indicators of land degradation, including chemicals, irrigation, and land use change.[68] The United Nations Food and Agricultural Organization largely agrees with United Nations Environmental Program's assessment, citing agricultural practices such as grazing, tillage practices, and irrigation, as well as deforestation and industrial activities, as the main causes of land degradation.[69] The Food and Agricultural Organization recognizes, however, that not all agricultural practices degrade land, and instead provide valuable phytoremediation,[70] bioremediation,[71] natural regeneration and accelerated natural regeneration,[72] and enrichment planting[73] that can counteract degradation.[74] Thus, the definition of degraded lands used by any bioenergy statute to counteract the negative indirect effects of biomass cropping should also take into account its rehabilitative benefits.

64. *Id.* at 95.

65. *Id.*

66. *Id.* at 95-96.

67. *Id.* at 97 (citing UNEP, 2007 GLOBAL ENVIRONMENT OUTLOOK 92 (2007)).

68. *Id*. at 94, 98-100.

69. U.N. Food & Agric. Organization, *supra* note 2, at 171.

70. *Id.* at 172 (defining phytoremediation as "us[ing] various plants to degrade, extract, contain, or immobilize contaminants from soil and water").

71. Bioremediation is the use of "biological agents" to rehabilitate soil and water that have been contaminated by hazardous substances. *Id*.

72. Natural and accelerated natural regeneration is the active management of plants to encourage quick reproduction. *Id.* at 173.

73. Enrichment planting is the planting of preferred trees, which are then given preferential treatment, to aid the rehabilitation of a depleted forest. *Id.*

74. *Id.* at 172.

III. BUILDING THE MODEL MIDA LANDS DEFINITION

For as prominent as the food-versus-fuel accusations have become – to the point where they threaten to derail biomass-based energy altogether – the debate surprisingly lacks specifics on how bioenergy policies can actually implement MIDA prescriptions. Existing land use laws do not contain straightforward definitions that bioenergy policies can easily incorporate by reference, but some do consider the economic, environmental, and social factors that would underpin any determination of marginality, idleness, degradedness, and abandonedness in the bioenergy context. For example, land condition can be economically tied to its productive capacity, which in turn depends on biophysical conditions (e.g., soil quality, landscape features such as slope, and climate) as well as socio-economic constraints (e.g., the availability of markets and access to markets). Lands possess environmental values such as wildlife habitat and the provision of ecosystem services (e.g., water filtration, beneficial insects, and climate regulation).[75] Cultural norms, too, whether rooted in religion, aesthetics, environmentalism, or public health and safety, can be behind how land is used.

Thus, the challenge for land use policy will be to identify these values and find ways to balance them during the decision-making process. Scientific study has been better at identifying economic values than those rooted in the complex ecosystems or human culture. Perennial cropping systems, too, change landscape dynamics in ways currently unknown to scientists and that existing land use policies therefore cannot value accurately. For example, if unused land supports ecosystem services like the provision of habitat, developing that land for biomass cropping possibly could have negative consequences. Some MIDA lands, on the other hand, such as brownfields and former mining sites, are so degraded (and thus idled or abandoned) that biomass cropping could represent any improvement above baseline. The following sections identify existing programs that identify and weigh, to varying degrees, economic, environmental and social values in land use decisions in search of a framework for bioenergy policies' MIDA lands preferences

A. CONSERVATION VALUES INHERENT IN IDLED LANDS

Idle lands programs have been motivated by environmental conservation and their methodologies serve as one way to construct a

75. R.S. de Groot et al., *Challenges in Integrating the Concept of Ecosystem Services and Values in Landscape Planning, Management and Decision Making*, 7 ECOLOGICAL COMPLEXITY 260, 263 (2010).

MIDA lands definition that could balance biomass production with maintenance of conservation values. For example, Illinois' Conservation Enhancement Act aims to keep certain types of marginal agricultural land out of production to protect water and soil quality and to protect wildlife habitat.[76] The two programs it establishes, the Save Illinois Topsoil Program and the Illinois Natural Resource Enhancement Program, focus particularly on protecting land adjacent to waterways and the reestablishment of perennial vegetation.[77] The Topsoil program requires a landowner to convey to the state a conservation easement and apply a management plan that does not include agricultural production.[78] It is unclear, however, what metrics the Illinois Department of Natural Resources (DNR) uses to determine whether thresholds for idling lands for such conservation goals have been met, or how it assesses that idling of land has actually improved conservation values. A new biomass-to-energy paradigm presents an opportunity for Illinois to perhaps reevaluate the criteria for idling land for conservation to identify any benefits energy biomass cropping could provide.

The federal government maintains a similar idle lands program. While one of the CRP's initial purposes was to stabilize commodity prices through idling production, the program also seeks to control soil erosion.[79] Selection criteria have evolved to include an evaluation through an Environmental Benefits Index of several environmental benefits including the potential to sequester carbon, creation of wildlife habitat, and water quality protection from reduced erosion.[80] At present, CRP lands cannot be cropped for energy biomass purposes, although managed haying and grazing is allowed under a state environmental management plan.[81] These state and federal programs could at least serve as a starting point toward defining MIDA land, although their effectiveness has not been widely studied.[82] If energy biomass policy limits cropping to MIDA lands, idle

76. 505 ILL. COMP. STAT. 35/1-1 to 1-3 (1994).

77. *Id.* at 35/1-2.

78. *Id.* at 35/2-1.

79. 16 U.S.C. §§ 3831-3835a (2006); TADLOCK COWAN, CONG. RESEARCH SERV., RS21613, CONSERVATION RESERVE PROGRAM: STATUS AND CURRENT ISSUES 1 (2010), *available at* http://www.cnie.org/nle/crsreports/10Oct/RS21613.pdf; Thomas L. Daniels, *America's Conservation Reserve Program: Rural Planning or Just Another Subsidy?*, 4 J. RURAL STUDIES 405, 406 (1988) (stating that the purpose of the CRP was to remove highly erodible land from production, decrease excess surplus, and transfer income to farmers).

80. COWAN, *supra* note 79, at 7.

81. *Id.*

82. *National Wildlife Assessments*, NATURAL RES. CONSERVATION SERV., U.S. DEP'T OF AGRIC., http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/nra/ceap/?&cid=nrcs143_014151 (last visited Jan. 27, 2013) (listing various studies of federal program effectiveness).

lands programs should rethink "idleness" in relation to potential compatibility of energy biomass production with conservation program goals. This would require states to study how different types of perennial crops and associated management practices contribute to improvement of site-level and broader landscape environmental conditions. Illinois' idled lands program allows for such a redesign.[83] One obstacle is that tools are not readily available for value identification and effects assessment. Programs such as NatureServe,[84] State Natural Heritage Programs,[85] and State Wildlife Action Plans[86] provide some guidance, although states take varying approaches in classifying lands to protect biodiversity.[87] Completeness of lists varies from state to state and tools, and only recently have tools started to be developed to consider connectivity beyond state boundaries.[88] While the federal government enjoys the ability to make transboundary conservation decisions, protection of endangered and threatened species under the federal Environmental Standards Act has been criticized particularly for failure to designate appropriate critical habitats.[89]

B. CONTAMINATED LANDS

Another possible source of land to produce biomass includes previously industrialized or other commercial land with pervasive residual contamination. While use of contaminated lands can provide environmental and socioeconomic benefits, the wide range of contaminants present could require a MIDA lands policy that differentiates these lands to determine which is most appropriate or at all possible for agricultural or silvicultural activities. Some contaminated lands such as brownfields and

83. 505 ILL. COMP. STAT. 35/3-2(b) (1994).

84. NatureServe has its own methodology and criteria for setting what it calls the "Conservation Status Rank" of a particular species. *NatureServe Conservation Status*, NATURESERVE, http://www.natureserve.org/explorer/ranking htm (last visited Jan. 27, 2013). NatureServe offers visitors to their website the ability to download their rank calculator to determine what rank a particular species would have. *Rank Calculator*, NATURESERVE, http://connect natureserve.org/publications/StatusAssess_Download (last visited Jan. 27, 2013).

85. *Natural Heritage Programs and Conservation Data Centers*, NATURESERVE, http://www natureserve.org/visitLocal/ (last visited Jan. 27, 2013).

86. *State Wildlife Action Plans*, http://www.wildlifeactionplan.org/ (last visited Aug. 14, 2012).

87. JEFF LERNER ET AL., DEFENDERS OF WILDLIFE, CONSERVATION ACROSS THE LANDSCAPE: A REVIEW OF THE STATE WILDLIFE ACTION PLANS 6-15 (2006), *available at* http://www.defenders.org/publications/conservation_across_the_landscape_handout.pdf (describing and evaluating the varying methods of states' wildlife action plans).

88. Paul Beier et al., *Toward Best Practices for Developing Regional Connectivity Maps*, 25 CONSERVATION BIOLOGY 880, 890 (2011).

89. *See generally* Sherry A. Enzler et al., *Contested Definitions of Endangered Species: The Controversy Regarding How to Interpret the Phrase "A Significant Portion of a Species' Range,"* 27 VA. ENVTL. L.J. 1 (2009).

reclaimed mining sights can contain many levels and types of toxicity and generally are associated with unproductive soil and ecological damage.[90] EPA estimates between five hundred thousand to one million brownfields exist in the United States, but up to fifteen million could potentially qualify as a brownfield.[91] While some of these sites may be too toxic for cropping, even some of the most contaminated sites are viable for biofuel cropping.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) governs cleanup of the most hazardous and toxic sites in the United States, as recorded on the National Priorities List.[92] Due to limited financial resources for cleanup, the National Priorities List includes only the most severely contaminated lands[93] (Superfund sites) that receive federal funding for cleanup. The bulk of the nation's brownfields are not listed on the National Priorities List,[94] however. Many remediation options are available to liable parties. When EPA lists a site on the National Priorities List, it develops – in cooperation with the responsible party – a remedy that removes or control risks while maintaining the protection of human health and the environment[95] EPA expects parties to address principle threats and consider technological advances, engineering and institutional controls, or a combination of methods.[96] The remedial action chosen must consider long-term goals and be a permanent remedy.[97]

With these requirements in mind, a possible long-term remedial action for Superfund sites could be biomass cropping. One case study shows that even highly toxic sites are feasible for biomass cropping.[98] The Rose Township site near Detroit, Michigan was farmed before being converted to

90. Cai et al., *supra* note 10, at 334.

91. *Brownfields to Biomass: Tapping EPA's Grant Programs*, BIOMASS HUB (Apr. 20, 2010), http://biomasshub.com/brownfields-biomass-tapping-epa-grant-programs/ ("The EPA estimates that there are ½ to 1 million Brownfield sites in the U.S.").

92. Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-75 (2006) [hereinafter CERCLA].

93. *Id.*; Jerome M. Organ, *Subsidiarity and Solidarity: Lenses for Assessing the Appropriate Locus for Environmental Regulation and Enforcement*, 5 U. ST. THOMAS L.J. 262, 281-82 (2008).

94. TODD S. DAVIS, BROWNFIELDS: A COMPREHENSIVE GUIDE TO REDEVELOPING CONTAMINATED PROPERTY 6 (2d ed. 2002); Anne Marie Pippin, *Community Involvement in Brownfield Redevelopment Makes Cents: A Study of Brownfield Redevelopment Initiatives in the United States and Central and Eastern Europe*, 37 GA. J. INT'L & COMP. L. 589, 595 (2009) ("Brownfield sites, however, typically do not meet the contamination levels necessary for inclusion on the NPL; thus, any government response to these sites would not qualify for aid from the Superfund.").

95. 40 C.F.R. § 300.430 (2012).

96. *Id.* § 300.430(a)(1)(iii).

97. Lauri DeBrie Thanheiser, *The Allure of a Lure: Proposed Federal Land Use Restriction Easements*, 24 B.C. ENVTL. AFF. L. REV. 271, 278 (1997).

98. U.S. ENVTL. PROTECTION AGENCY, RENEWABLE AND ALTERNATIVE ENERGY AT SUPERFUND SITES 4 (2011), *available at* http://epa.gov/superfund/programs/recycle/pdf/renewable-energy.pdf.

a waste dump site in the 1960s.[99] The cleanup process first involved removing substantial amounts of polychlorinated biphenyls and other chemicals from the soil and ground water.[100] Once the researchers removed the contamination, they discovered that biofuel crops such as soybeans and switchgrass could be grown at yields comparable to area farmland.[101] Studies like Rose Township demonstrate that biomass cropping may fit EPA's remedial requirements.[102] The EPA, a party to the study, subsequently concluded that 367 of surveyed Superfund sites could support biopower facilities.[103]

One hurdle to implementing biomass cropping as a remedy on contaminated sites is the potential for liability, or increased liability, for resource damage. Liability under CERCLA applies to current and previous owners and is joint, several, and strict.[104] The tentacles of liability may even reach a biomass contractee who may not have been at fault for the initial contamination.[105] Such a potentially significant burden understandably makes third-parties wary of participating in site cleanup.[106] A legislative shield has been created, however, if a purchaser is interested in producing energy biomass on a Superfund site. The Small Business Liability Relief and Brownfields Revitalization Act of 2002 (Brownfield Act)[107] protects against CERCLA liability if the entity qualifies as a bona fide purchaser[108] or under a de micromis exemption.[109] For contractors, the

99. *Id.*

100. *Id.*

101. *Id.*

102. Tobias Plieninger & Mirijam Gaertner, *Harnessing Degraded Lands for Biodiversity Conservation*, 19 J. FOR NATURE CONSERVATION 18, 19 (2011).

103. U.S. ENVTL. PROTECTION AGENCY, *supra* note 98, at 2.

104. CERCLA, 42 U.S.C. § 9607 (2006).

105. Stefanie Sommers, Notes & Comments, *The Brownfield Problem: Liability for Lenders, Owners, and Developers in Canada and the United States*, 19 COLO. J. INT'L. ENVTL. L. & POL'Y 259, 269 (2008) (explaining how courts originally interpreted liability broadly to conform to CERCLA's "polluter pays" principle and even applied it to unaware owners without regard to a party's share of fault); Steven Ferrey, *Converting Brownfield Environmental Negatives into Energy Positives*, 34 B.C. ENVTL. AFF. L. REV. 417, 463 (2007).

106. Ferrey, *supra* note 105, at 463.

107. Small Business Liability Relief and Brownfields Revitalization Act, Pub. L. No. 107-118, 115 Stat. 2356 (2002) (codified as amended at 42 U.S.C. §§ 9601-9675 (2006)).

108. 42 U.S.C. § 9601(40) (2006). The bona fide prospective purchaser defense allows one to purchase contaminated property with knowledge of contamination, provided certain conditions are met. *Id*. Previously purchasers could only use the limited "innocent landowner" defense, available to those who purchased property after contamination, did not know or had no reason to know of prior disposal of hazardous substances, and followed certain procedures. *Id.* §§ 9607(b), 9601(35).

109. *Id.* § 9607(o). The de micromis exemption shields liability for waste generators or transporters of hazardous waste who disposed only of small amounts of materials that contained hazardous waste. *Id*.

statute only specifies that liability lies for those who obtain "operator" status such as those who arrange or transport hazardous material.[110] Farmer-contractors would not be considered operators if soil is disturbed onsite for agricultural or silvicultural operations unless they had authority to control a site at the time of disposal.[111] Otherwise innocent parties may bear responsibility, however, if they play a role in post-contamination soil disturbance that spreads to uncontaminated areas.[112] Any integrated federal resource management program should consider liability protections for biomass cropping on Superfund sites if best management practices are followed. At a broader level, accelerated cleanup of contaminated lands frees up land for core redevelopment, sparing productive farmland from conversion to nonagricultural uses.[113]

States also maintain their own analogous programs for voluntary and mandatory cleanup of contaminated sites short of Superfund designation.[114] Almost every state in the United States maintains a voluntary cleanup program to promote the remediation and development of brownfields through liability protection.[115] States have adopted different cleanup standards depending on the end use of the land, allowing for relaxed standards where human health is not at risk.[116] Thus, biomass cropping likely would be viable to the extent the most dangerous contamination that risks human health is remediated prior to soil disturbing activities. To the extent perennial crops and trees minimize disturbance, state human health standards should take differing levels of disturbance into account.

One type of state controlled, contaminated land targeted for potential biomass production has been former mining sites. Both surface mining and

110. *Id.* § 9607(a).

111. *See, e.g.*, Nurad, Inc. v. William E. Hooper & Sons Co., 966 F.2d 837, 842 (4th Cir. 1992).

112. Kaiser Aluminum & Chem. Corp. v. Catellus Dev. Corp., 976 F.2d 1338, 1340-41 (9th Cir. 1992) (holding a contractor hired to redevelop a newly bought property after soil contamination liable after it moved and graded the soil, spreading contaminated soil to an uncontaminated area); *see also* Ferrey, *supra* note 105, at 461-62, 466.

113. William W. Buzbee, *Urban Sprawl, Federalism, and the Problem of Institutional Complexity*, 68 FORDHAM L. REV. 57, 59, 74 (1999).

114. Heidi Gorovitz Robertson, *Legislative Innovation in State Brownfields Redevelopment Programs*, 16 J. ENVTL. L. & LITIG. 1, 2-3 (2001).

115. Allen Blackman et al., *What Drives Participation in State Voluntary Cleanup Programs? Evidence from Oregon*, 86 LAND ECON. 785, 785 (2010); Scott W. Brunner, *Comment: Sharing the Green: Reformatting Wisconsin's Forgotten Green Space Grant with a Public-Private Partnership Design*, 95 MARQ. L. REV. 305, 336-56 (2011) (describing measures taken by Wisconsin to promote efficient brownfield development).

116. Heidi Gorowitz Robertson, *One Piece of the Puzzle: Why State Brownfields Programs Can't Lure Business to the Urban Cores Without Finding the Missing Pieces*, 51 RUTGERS L. REV. 1075, 1101 (1999).

underground mining[117] cause great ecological damage leaving often bleak chances of re-growth.[118] States are primarily responsible for implementing the Surface Mining Control and Reclamation Act according to federal specifications.[119] Although some mining sites are listed in the NPL[120] and subject to Superfund liability, many are not.[121] The Government Accountability Office (GAO) has estimated that at least 161,000 abandoned hardrock mine sites exist in twelve western states[122] where mining historically occurred. More recently, the eastern United States has seen a great increase in mountaintop removal mining that has destroyed over one million acres of forests and 2000 miles of streams.[123]

Setting aside continued contention surrounding mining as an energy source,[124] scientists are actively pursuing studies on the ability of energy biomass to remediate these impacts.[125] For example, research has shown that fast growing tree species, such as poplar and willow trees, can successfully remediate mining sites.[126] One challenge to biomass cropping on contaminated lands, whether agricultural or silvicultural, is meeting nutrient needs.[127] If additional nutrients are needed, this can boost the greenhouse gas footprint of the crop. Despite lower productivity soils, however, woody biomass is considered both a successful remediation tactic

117. MARK SQUILLANCE, THE STRIP MINING HANDBOOK 25 (2009), *available at* https://sites.google.com/site/stripmininghandbook/chapter-2-1.

118. M.A. Palmer, *Mountaintop Mining Consequences*, SCI., Jan. 8, 2010, at 148.

119. Surface Mining and Reclamation Act, 30 U.S.C. § 1235 (2006).

120. *Superfund - Non - NPL Mining Sites*, U.S. ENVTL. PROTECTION AGENCY (Aug. 2012), http://www.epa.gov/aml/amlsite/npl htm (listing abandoned mining sites listed on the NPL as of August 2012).

121. *Id.*

122. *Abandoned Mines - Information on the Number of Hardrock Mines, Cost of Cleanup, and Values of Financial Assurances: Testimony Before the Subcommittee on Energy and Mineral Resources, Committee on Natural Resource*s, 112th Cong. 6 (2011) (statement by Anu K. Mittel, Dir. of Natural Resources and Env't Team at the Gov't Accountability Office), *available at* http://www.gao.gov/assets/130/126667.pdf.

123. *Leveling Appalachia: The Legacy of Mountaintop Removal Mining*, YALE ENV'T 360, http://e360.yale.edu/feature/leveling_appalachia_the_legacy_of_mountaintop_removal_mining/2198/ (last visited Feb. 7, 2013).

124. Tom Zeller Jr., *A Battle in Mining Country Pits Coal Against Wind*, N.Y. TIMES (Aug. 14, 2010), http://www nytimes.com/2010/08/15/business/energy-environment/15coal.html?page wanted=all.

125. Rolf Bungart & R.F. Huttl, *Production of Biomass for Energy in Post-Mining Landscapes and Nutrient Dynamics,* 20 BIOMASS & BIOENERGY 181 (2001); AMY BRUNNER ET AL., VA. TECH, HYBRID POPLAR FOR BIOENERGY AND BIOMATERIALS FEEDSTOCK PRODUCTION ON APPALACHIAN RECLAIMED MINE LAND 44 (2009); D.M. Evans et al., *Tree Species and Density Effects on Woody Biomass Production on Mined Lands: Establishment and Two Year Results* (Paper presented at the 2010 National Meeting of the American Society of Mining and Reclamation, Lexington, KY, June 4-5, 2009).

126. Bungart & Huttl, *supra* note 125, at 186.

127. *Id.* at 185; Evans et al., *supra* note 125, at 289.

for low productivity mining lands as well as a strong candidate for intensive biomass production.[128] The EPA has endorsed minefields for renewable energy facilities because they offer large amounts of acreage with few owners, the presence of nearby infrastructure, are already zoned for development, and provide job opportunities in economically-depressed mining areas.[129] These qualities should be considered when deciding whether bioenergy policies should emphasize cropping on contaminated lands. In order to further incentivize biomass production on mining lands, Pennsylvania recently amended its Surface Mining Conservation and Reclamation Act to provide for early bond release for operators who grow biomass crops such as switchgrass, camelina, canola, and others for site remediation pursuant to a reclamation plan.[130] As long as the site is cropped with energy biomass, the Pennsylvania Department of Environmental Resources guarantees financial support to cover reclamation liability.[131]

C. DEGRADED LANDS

The definition of land degradation has been a "source of confusion, misunderstanding, and misinterpretation."[132] Generally, land degradation represents an "irreversible decline" in the ecosystem services land provides, resulting in some cases in decreased economic productivity.[133] A joint international workshop on degraded land, however, found slightly different definitions of degraded land that were similar in principle but unclear on causes and recovery.[134] Causality is complicated because ecosystem services depend "on numerous interacting factors and [are] difficult to define," but include factors involving land, landscape, terrain, vegetation, water, biotic resources, and climate.[135]

Researchers have reviewed the number of assessment tools available to determine the inventory of degraded lands worldwide, and concluded that it is difficult to determine the relationship between the severity of degradation

128. Bungart & Huttl, *supra* note 125, at 186.

129. *EPA's Mapping Tool Facilitates Biomass Power Plant Siting*, BIOMASS HUB (Jan. 7, 2010), http://biomasshub.com/epa-mapping-tool-biomass-energy-siting/.

130. H.B. 608, 2011 Gen. Assemb., Reg. Sess. (Pa. 2012) (codified at 52 PA. CODE § 1396.4 (2012)).

131. *Id.*

132. H. Eswaran et al., *Land Degradation: An Overview*, *in* RESPONSES TO LAND DEGRADATION 20, 23 (E.M. Bridges et al.eds., 2001).

133. *Id.*

134. WIEGMANN ET AL., supra note 57, at 2-3.

135. H. Eswaran et al., *supra* note 132, at 23.

and productivity.[136] The only comprehensive degradation map, maintained by the United Nations Food and Agricultural Organization, is based on land properties rather than tying those properties to productivity potential.[137] Where yield data exist, scientists attempt to correlate that information to the physical, chemical, landscape, and climatic conditions to varying degrees. The United States National Commodity Crop Productivity Index uses chemical, physical, landscape, and climate criterion, along with yield data to guide CRP payments.[138] In Illinois, like many states, a technical committee devises productivity indices for tax purposes based on economic and soil factors related to commodity cropping systems.[139] The productivity index for non-farmland, non-idled "wasteland" (as Illinois would define degraded land) depends on whether the wasteland has a "contributory value" to farmland, such as serving as an area to channel runoff.[140] If the land has contributory value, the Department of Revenue assesses the land at 1/6 of the lowest productivity index.[141]

USDA maintains a broader type of assessment tool called the Land Evaluation and Site Assessment program that is used to guide federal[142] and local planning to preserve and protect prime agricultural lands,[143] but also can be used to value other lands such as rangeland, forestland, wetlands, riparian zones, and aggregate sites.[144] A committee appointed through the

136. *See generally* Freddy O. Nachtergaele & Clemencia Licona-Manzur, *Land Degradation Assessment in Drylands (LADA) Project: Reflections on Indicators for Land Degradation Assessment*, *in* THE FUTURE OF DRYLANDS (Cathy Lee & Thomas Schaaf eds., 2008).

137. *Id.* at 339.

138. *See, e.g.*, NATURAL RES. CONSERVATION SERV., U.S. DEP'T OF AGRIC., USER GUIDE: NATIONAL COMMODITY CROP PRODUCTIVITY INDEX (NCCPI), VERSION 1.0, at 2 (2008), *available at* ftp://ftp-fc.sc.egov.usda.gov/NSSC/NCCPI/NCCPI_user_guide.pdf; Robert Dobos et al., National Res. Conservation Serv., U.S. Dep't of Agric., NCCPI: National Commodity Crop Productivity Index at the 2008 National State Soil Scientist's Workshop (Mar. 19, 2008).

139. 35 ILL. COMP. STAT. 200/10-110 to 200/10-169 (1994) (describing the process for valuing farmland) Ill. Dep't of Revenue, Publication 122, Instructions for Farmland Assessments 2 (Jan. 2013), http://www revenue.state.il.us/Publications/pubs/pub-122.pdf [hereinafter Pub. 122] (explaining the differences between farmland, idle land, and wasteland); *Average Crop, Pasture, and Forestry Productivity Ratings for Illinois Soils*, UNIV. OF ILL. (Aug. 2000), http://soilproductivity nres.illinois.edu/Bulletin810ALL.pdf.

140. Pub. 122, *supra* note 139, at 2.

141. *Id.* at 10.

142. Farmland Protection Policy Act, Pub. L. No. 97-98, §§ 4201-09, 95 Stat.1213, 1341-44 (2006) (codified at 7 U.S.C. §§ 4201-4209 (2006)) (directing federal agencies to assess the effects of federal programs on maintenance of productive farmland).

143. JAMES R. PEASE & ROBERT E. COUGHLIN, LAND EVALUATION AND SITE ASSESSMENT: A GUIDEBOOK FOR RATING AGRICULTURAL LANDS 4-5 (2d ed. 2001), *available at* http://www nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1047455.pdf [hereinafter LESA GUIDEBOOK]; Jess M. Krannich, *A Modern Disaster: Agricultural Land, Urban Growth, and the Need for a Federally Organized Comprehensive Land Use Planning Model*, 16 CORNELL J. L. & PUB. POL'Y 57, 68-69 (2006).

144. LESA GUIDEBOOK, *supra* note 143, at 5.

political process weighs factors such as land capability, agricultural productivity, parcel size, farm investment, surrounding uses, indices of development pressure (e.g., protection by plans or zoning and distance to sewers), and public values such as scenic quality and wildlife habitat.[145] While the tool focuses on determining the value of agricultural land relative to other agricultural lands, the tool could adapt existing factors and test new factors to more comprehensively design what has been an elusive definition of degradedness particularly in the context of bioenergy cropping. That is, if the tool determines that a parcel is not "worth" preserving for traditional agricultural purposes, adding a bioenergy cropping factor that weights the opportunity to preserve the most productive lands for food production through cropping energy perennials on degraded lands to the tool might alter that conclusion to favor bioenergy cropping.

In the European Union, farmers in "less favoured areas" receive payments to disincentivize abandonment and to maintain environmental and other values dependent on agricultural production.[146] Less favoured areas include: (1) lands with "significant natural handicaps" such as "low soil productivity or poor climate conditions and where maintaining extensive farming activity is important for the management of the land;"[147] and (2) lands with specific handicaps "where land management should be continued in order to conserve or improve the environment, maintain the countryside and preserve the tourist potential of the area or in order to protect the coastline."[148] Because Member States have not agreed on European Union-wide criteria for designating less favoured areas, the Commission has issued a set of technical guidelines for designating less favoured areas.[149] The criteria focus on biophysical characteristics such as climate, soil, and climate-soil interaction, and terrain.

D. CULTURAL VALUES AND LAND USE DESIGNATIONS

Whether MIDA land may be considered for biomass production not only depends on the land's environmental condition, but also on the *human* values inherent in the decision, for example, to idle land or otherwise utilize land recklessly. Lands may have been idled based on past perceptions of

145. *Id.* at 13-14.

146. Council Regulation 1698/2005, 2005 O.J. (L 277) 4 (EC).

147. *Id.* art. 50(3)(a).

148. *Id.* art. 50(3)(b).

149. *Commission Staff Working Document Accompanying the Communication From the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Toward a Better Targeting of the Aid to Farmers in Areas with Natural Handicaps, Technical Annex*, COM (2009) 161 final (Apr. 24, 2009).

the need to preserve land in its pristine state (e.g., national parks), for religious or cultural reasons, a particular aesthetic (e.g., zoning that requires large residential lots), or health and safety (e.g., large interstate right of ways). "New world" ideals of unlimited land now must give way to land sparing, which involves not only scientific analyses, but also cultural introspection for land to be viewed in new ways. Lands idled for cultural reasons potentially could encompass a broad swath of lands.

Historic preservation of lands embodies cultural values by seeking to preserve those values. For example, the United States Congress created the National Parks system in 1916 to manage existing federal preserves for conservation and public recreation[150] while protecting archeological, cultural, and ethnographic items.[151] The National Park Service must pursue "appropriate uses"[152] and avoid "unacceptable impacts"[153] that would "harm the integrity of park resources or values."[154] This depends on the severity, duration, and timing of the impact.[155] Whether or not National Parks could accommodate biomass cropping, therefore, would depend on its interference with the conservation and recreational values that Congress intended the National Park Services prioritize. Whether other cultural values could influence National Park Services decisions about biomass cropping on national park lands – such as society's concern that they be protected from climate change that could negatively affect recreation – has questionable support in statutes underlying National Park management.

The United States National Historic Preservation Act (NHPA)[156] mandates that in the face of modern development the federal government has a duty to preserve the "cultural foundations"[157] of the United States. Sites qualify for protection if associated with a significant historical event, person, or structure.[158] Some of these sites contain large stretches of land.[159] For any federal initiative to support biomass cropping on NHPA-

150. National Park Service Organic Act, 16 U.S.C. §§ 1-4 (2006).

151. 36 C.F.R. § 2.1 (2012).

152. NAT'L PARK SERV., U.S. DEP'T OF THE INTERIOR, PARK SERVICE MANAGEMENT POLICIES 13, 98 (2006).

153. *Id.* at 12.

154. *Id.* at 11.

155. *Id.*

156. National Historic Preservation Act, 16 U.S.C. § 470 (2006).

157. *Id.* § 470(b)(2).

158. 36 C.F.R. § 60.4(a)-(d) (2012).

159. *National Register of Historic Places*, NAT'L PARK SERV., http://www.nps.gov/nr/research/ (last visited Feb. 10, 2013). The National Register of Historic Places, which records the NHPA-designated properties, lists a total of 88,000 sites, buildings, districts, and objects. *Id.* The records are in the midst of being digitized, and a partial searchable listing of designated properties can be found at National Park Service's website. *National Register of Historic Places: NPS*

protected lands, NHPA requires consultation to determine whether it has the "potential to cause effects on historic properties."[160] If the project could potentially affect historic properties, the agency must consult a State Historic Preservation Officer and/or Tribal Historic Preservation Officer[161] to identify any potential or existing historic properties that could be disturbed,[162] and consult with all relevant parties including the public.[163] If historic sites are present and will be affected, the agency makes an assessment of adverse effects on the site.[164] If the assessment results in no adverse effect, the project can move forward;[165] if an adverse effect is found or parties cannot agree on the effect, the parties meet to develop alternatives that could "avoid, minimize, or mitigate" the adverse effects.[166] During this process, the NHPA recognizes that public input is "essential" to decision making.[167]

The NHPA generally highlights the potential for biomass cropping on lands idled for cultural purposes if a process is in place that allows for public engagement. It is through a public process that governments can distil and balance attitudes toward land use, including biomass' broader role in how society meets resource scarcity challenges. Individual statutes can only go so far, however, in facilitating cultural shifts that lead to broader change. Climate change has prompted policymakers to develop more holistic policies to rethink the role lands can play in balancing and securing resources. For example, Colorado, as part of its climate change action planning, studied the extent to which idled state right-of-ways can contribute renewable energy.[168] This demonstrates a cultural shift within individual states, and its agencies, toward the necessary broader systems view of land use.[169]

Focus, NAT'L PARK SERV., http://nrhp focus nps.gov/natreghome.do?searchtype=natreghome (last visited Feb. 10, 2013).

160. 36 C.F.R. § 800.3(a) (2012).

161. *Id.* § 800.3(c).

162. *Id.* § 800.4(a).

163. *Id.* § 800.3(d)-(f).

164. *Id.* § 800.5.

165. *Id.*

166. *Id.* § 800.6.

167. *Id.* § 800.2(d).

168. *See* RICK KREMINSKI ET AL., COLO. DEP'T OF TRANSP., CDOT-2011-3, ASSESSMENT OF COLORADO DEPARTMENT OF TRANSPORTATION REST AREAS FOR SUSTAINABILITY IMPROVEMENTS AND HIGHWAY CORRIDORS AND FACILITIES FOR ALTERNATIVE ENERGY USE, RESEARCH REPORT, at vi-vii (2011), *available at* http://www.coloradodot.info/programs/research/pdfs/2011/restareas/view.

169. Susan Owens & Louise Driffill, *How to Change Attitudes and Behaviors in the Context of Energy*, 36 ENERGY POL'Y 4412-18 (2008).

MIDA land use is an important part of rethinking land availability for food and fuel production, including idled lands in parks, cemeteries, and ditches. Attempts to pin down a definition of MIDA lands in isolated bioenergy policies ignores, however, much greater threats to land from urban sprawl that idles permanently land for agriculture. American culture's myopic view of land use has its roots in twentieth century zoning,[170] particularly after World War II when municipalities began structuring their zoning ordinances to preserve a certain quality of life for returning soldiers' families.[171] Suburbs particularly use zoning laws to separate residential, industrial and commercial uses, designate minimum lot sizes, and exclude higher-density housing deemed counter to the suburban way of life.[172] As a result, USDA estimates that just between 1982 and 2007, fourteen million acres of prime farmland was lost mostly due to urban development[173] despite state right-to-farm laws that theoretically protect farmers from urban encroachment through protection from nuisance suits and other favorable tax schemes.[174] Like individual bioenergy statutes, right-to-farm laws alone cannot direct comprehensively land uses to meet all resource needs.[175] Initiatives such as "new urbanism" that aim to make cities more compact and thus livable, represent society's growing recognition that separate-use zoning not only has led to unhealthy lifestyles, but generally inefficient uses of land.[176]

Resource scarcity may even push MIDA land definitions to include those areas in urban settings never considered previously for *any* productive use. Vertical farming has been touted as a promising solution to land scarcity in urban and densely populated areas through cropping systems on tall building faces that reuse waste water and either deploy passive solar or

170. Georgette C. Poindexter, *Light, Air, or Manhattanization?: Communal Aestheticsin Zonin Central City Real Estate Development*, 78 B.U. L. REV. 445, 472-73 (1998).

171. David B. Fein, *Historic Districts: Preserving City Neighborhoods for the Privileged,* 60 N.Y.U. L. REV. 64, 68 (1985).

172. *Id.*

173. NATURAL RES. CONSERVATION SERV., U.S. DEP'T OF AGRIC., SUMMARY REPORT: 2007 NATIONAL RESOURCES INVENTORY 7 (2009), *available at* http://www nrcs.usda.gov/ Internet/FSE_DOCUMENTS/stelprdb1041379.pdf.

174. Krannich, *supra* note 143, at 74; Neil D. Hamilton, *Right-to-Farm Laws Reconsidered: Ten Reasons Why Legislative Efforts to Resolve Agricultural Nuisances May Be Ineffective*, 13 DRAKE J. AGRIC. L. 103, 109-11 (1998); Alexander A. Reinert, *The Right to Farm: Hog-Tied and Nuisance-Bound*, 73 N.Y.U. L. REV. 1694, 1695 (1998).

175. Hamilton, *supra* note 174, at 105; Reinert, *supra* note 174, at 1736-38.

176. *See* Eliza Hall, *Divide and Sprawl, Decline and Fall: A Comparative Critique of Euclidean Zoning*, 68 U. PITT. L. REV. 915, 920-32 (2007) (explaining how Euclidian zoning contributes to unchecked urban sprawl through mandating single-use districts and inhibiting mixed-use areas, causes environmental harm, and economic distortion of land).

highly-efficient LED lighting for plant growth.[177] It provides a locally secure source of food and conceivably energy biomass, too, for high-demand urban centers, eliminating pressure to convert far-way, virgin lands to food or biomass production. Vertical farming exemplifies not only the technological innovation necessary to meet the world's resource needs, but an innovation in cultural perspective toward integrated systems. In transitioning from theory to practice, cities would have to eliminate single-use in favor of multiuse zoning that promotes commercial, residential, and agricultural uses simultaneously.[178]

IV. THE NEED FOR COMPREHENSIVE FEDERALIZED LAND USE DEFINITIONS

The food-versus-fuel controversy will likely only grow in light of record-setting drought across most of the United States last year.[179] Bioenergy policies thus must continue to pursue more structured MIDA lands definitions that apply consistent methodologies to account properly for ecological, social, and economic values. Many of these values, however, do not respect local or state jurisdictional boundaries. Landscape-level habitat connectivity, and water and air sheds, cross state and international boundaries. Further, while individuals ultimately choose between planting bioenergy and food crops, international commodity pricing largely dictates what choice will be made unless provisions like MIDA land prescriptions are embedded in incentives policies. Few have questioned whether it is reasonable for policymakers to expect bioenergy statutes to shoulder the balancing of food, energy and environmental needs that are mediated through an international market system and dependent on local zoning decisions. A few foresighted bioenergy scholars have called for more comprehensive accounting for consumer dietary choice in figuring biofuels' land-based indirect effects.[180] G20 and United Nations Food and Agricultural Organization policies, on the other hand, myopically continue

177. Dickson Despommier, *The Vertical Farm: Controlled Environment Agriculture Carried Out in Tall Buildings Would Create Greater Food Safety and Security for Large Urban Populations*, 6 JOURNAL FÜR VERBRAUCHERSCHUTZ UND LEBENSMITTELSICHERHEIT [JVL] [JOURNAL OF CONSUMER PROTECTION AND FOOD SAFETY] 233-36 (2011).

178. Dorothy D. Nachman, *When Mixed Use Development Moves in Next Door: Finding a Home for Public Discourse and Input*, 23 FORDHAM ENVTL. L. REV. 55, 65 (2012) (describing zoning by type of use, such as: commercial, heavy industrial, single family residential, and multi-family residential).

179. Plume & Zabarenko, *supra* note 12.

180. *See, e.g.*, Seungdo Kim et al., *An Alternative Approach to Indirect Land Use Change: Allocating Greenhouse Gas Effects Among Different Uses of Land*, 46 BIOMASS & BIOENERGY 447, 451 (2012); Jonathan Foley et al., *Solutions for a Cultivated Planet*, 478 NATURE 337, 340-41 (2011).

to focus on the need to conduct bioenergy-centric assessments of land use tradeoffs and heavily rely on reactionary international market mediation for solutions.[181]

The land use balancing that is currently expected of biomass-to-bioenergy policies must be expanded to account for the interactions of *all* land use decisions in light of increasing land scarcity.[182] Proactive and comprehensive land use planning that mediates mounting pressure for land from all sectors prevents undesirable activities – in this case land use that depletes food production capability – from "leaking" to an unregulated area.[183] That is, restricting biomass cropping to MIDA lands has no effect on curtailing urban sprawl that takes productive land permanently out of production. Indeed, restricting perennial cropping to marginal areas theoretically allows for more prime farmland to be available for urban uses that forever put the land out of food production. Comprehensive land use planning also should consider land use dedicated to commodity "feed" cropping of corn and soybeans and its role in food insecurity.[184]

While local land use planning efforts have had varying success at saving prime farmland,[185] none incorporate the value of space for bioenergy cropping within the target land shed. Further, land management through yield increases alone are not a substitute for comprehensive land use zoning if technology improvements actually lead to more land in cultivation where it otherwise should not occur (e.g., in fragile habitats and high carbon stock areas), otherwise known as "rebound" effects.[186] Such agriculture-centric practice solutions again ignore land use decisions made in other contexts

181. *See, e.g.*, G20 Meeting of Agricultural Ministers, Paris, Fr., June 22-23, 2011, *Action Plan on Food Price Volatility and Agriculture*, ¶¶ 9-11, *available at* http://un-foodsecurity.org/sites/default/files/110623_G20_AgMinisters_Action_Plan_Agriculture_Food_Price_Volatility.pdf (calling for international policy coordination of market policy and emphasizing the "important role that international trade can play in improving food security and in addressing the issue of food price volatility," but not discussing coordination of land use policies except through the FAO BEFS process that is bioenergy specific); U.N. FOOD & AGRIC. ORGANIZATION, THE BEFS ANALYTICAL FRAMEWORK 4-5 (2010), *available at* http://www fao.org/docrep/013/i1968e/il968e.pdf (stating that "sustainable biofuels development relies on accurate measurement of the *sector* and of the trade-offs that may arise from the development. Consequently, sound bioenergy policy development needs to be the outcome of a . . . country specific analysis of the net costs and benefits" (emphasis added)).

182. Eric F. Lambin & Patrick Meyfroidt, *Global Land Use Change, Economic Globalization, and the Looming Land Scarcity*, 108 PROC. NAT'L ACAD. SCI. 3465, 3466 (2011).

183. *Id.* at 3467.

184. *See generally* Kim et al., *supra* note 180 (calling for GHG accounting to include "consumer dietary preferences" for animal-based protein, which necessarily calculates land allocation for animal feed cropping of corn and soybeans).

185. Margaret Rosso Grossman, *Farmland and Food Security: Protecting Agricultural Land in the United States*, *in* GOVERNING FOOD SECURITY: LAW, POLITICS AND THE RIGHT TO FOOD 233, 244-45 (Otto Hospes & Irene Hadiprayitno eds., 2010).

186. Lambin & Meyfroidt, *supra* note 182, at 3467-68.

(e.g., urban development and sprawl[187]).[188] While international markets may have some success in "segregating spatially" nature and intensive agriculture, leading to "land use specialization,"[189] reactionary markets must be accompanied by proactive regulation such as land use zoning.

Thus, even if law succeeds in building a definition for MIDA lands based on the models elaborated in previous sections of this Article, the "food-versus-fuel" controversy demonstrates why legal scholars must resurrect the notion of federalized land use planning to future land-based resource scarcity.[190] Many factors stand in the way of federalization, however, including "a complicated mixture of American law, history, culture, institutional capacities, political structures, economic systems, demography, land utilization and ownership patterns, [and] stages of nationwide development."[191] These obstacles are only amplified at the international level, and thus this Article reserves analysis of the necessity for and design of an international land use regime for another day. Instead, this Article focuses on whether the "food-versus-fuel" debate and the quest for MIDA land definitions represent only the tip of the iceberg of policy design dilemmas that land-based resource scarcity increasingly will present. In light of climatic changes witnessed up close only recently by the vast destruction wrecked by Hurricane Sandy, and accompanying rationing policies put in place by local governments,[192] federalization of land use zoning to ensure adequate resources – including our means to produce life-sustaining food, fiber and energy from land – is no longer an anathema.

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187. *See supra* footnotes 167-73 and accompanying text.

188. *See, e.g.*, Foley et al., *supra* note 180, at 337-42 (proposing solutions to "global agricultural challenges" without considering those challenges within other non-agricultural land use contexts).

189. Lambin & Meyfroidt, *supra* note 182, at 3469.

190. Ashmira Pelman Ostrow, *Land Law Federalism*, 61 EMORY L.J 1397, 1400 n.5 (2012) (concluding that "scholars and policy makers often reject the notion of an expanded federal role" in land use and citing all previous legal scholarship on the issue); Todd A. Wildermuth, *National Land Use Planning in America, Briefly*, 26 J. LAND RESOURCES & ENVTL. L. 73 (2005); Krannich, *supra* note 143, at 94 (citing BRUCE BABBIT, CITIES IN THE WILDERNESS: A NEW VISION OF LAND USE IN AMERICA (2005) for the premise that although land use as a local matter "has come to dominate the political rhetoric of our age . . . this notion is outdated").

191. Jerold S. Kayden, *National Land-Use Planning in America: Something Whose Time Has Never Come*, 3 WASH. U. J.L. & POL'Y 445, 450 (2000).

192. *See, e.g.*, Elizabeth A. Harris, *A Slow Return to Normal Skips the Gas Station*, N.Y. TIMES (Nov. 3, 2012), http://www nytimes.com/2012/11/04/nyregion/gas-rationing-is-new-burden-after-hurricane-sandy html?_r=0.

A. COMMERCE CLAUSE AUTHORITY FOR FEDERALIZATION OF LAND USE PLANNING

While states retain police powers under the Tenth Amendment of the Constitution to designate land uses within their borders through zoning and other public health and safety regulations,[193] Congress has the constitutional power to regulate interstate commerce between states.[194] Although not appearing on its face to be in any way related to land use, the Supreme Court's recent decision on the constitutionality of the Patient Protection and Affordable Care Act provides interesting insight on how the Justices might reconcile the two constitutional provisions as applied to a federal attempt to regulate the provision of land-based resources under conditions of scarcity.[195] Setting aside regulatory takings arguments,[196] what if Congress passed a law that implemented controls over what could be grown and where on private land? The one attempt by Congress to establish specifically a federal land use policy – The National Land Use Policy Act of 1970 – failed, but this was due to political will more than constitutional constraints (at least as those constraints were understood at the time).[197] Plus, the proposal did not directly control local land use decision, but instead sought to coordinate state and local action through federal environmental and other statutes.[198]

In *National Federation of Independent Business v. Sebelius*,[199] Chief Justice Roberts reasoned that Congress could not justify the individual health care mandate under its Commerce Clause powers, despite how not purchasing health insurance could "have a substantial effect on interstate commerce."[200] He explained that the authority to direct consumers to do something they are not doing – even if it is not good for society particularly in combination with the "similar failures of others" – "remains vested in the

193. U.S. CONST. amend. X.

194. U.S. CONST. art. 1, § 8, cl. 3.

195. *See generally* Nat'l Fed'n of Indep. Bus. v. Sebelius, 132 S. Ct. 2566 (2012).

196. Although beyond the scope of this Article, land use zoning to ensure greater resource certainty poses interesting questions of Fifth Amendment regulatory takings jurisprudence. *See generally* Sarah Schindler, *The Future of Abandoned Big Box Stores: Legal Solution to the Legacies of Poor Planning Decisions*, 83 U. COLO. L. REV. 471 (2012) (pondering the constitutionality of down-zoning to combat unprecedented "big box" store abandonment); R.S. Radford & Luke A. Wake, *Deciphering and Extrapolating: Searching for Sense in Penn Central*, 38 ECOLOGY L.Q. 731, 742-48 (2011) (speculating that the Roberts court may take a regulatory takings case in an attempt to try and add clarity to regulatory takings law).

197. S. 3354, 91st Cong. (1970); Kayden, *supra* note 191, at 448.

198. S. 3354, 91st Cong. (1970); Kayden, *supra* note 191, at 448.

199. 132 S. Ct. 2566 (2012).

200. *Nat'l Fed'n of Indep. Bus*., 131 S. Ct. at 2585-86 (quoting United States v. Darby, 312 U. S. 100, 118-19 (1941)).

States[']" police power.[201] Although he acknowledged, "[e]veryone will likely participate in the markets for food, clothing, transportation, shelter, or energy; that [did] not authorize Congress to direct them to purchase particular products in those or other markets today."[202] Justice Roberts was not convinced by the Government's argument "that the individual mandate can be sustained as a sort of exception to this rule, because health insurance is a unique product" and is necessary to cover "universal risks."[203] He opined that such "cradle to grave" regulation is not any more unique than a scenario where the government would order consumers to purchase broccoli to prevent obesity and thus save health care costs.[204] "That is not the country the Framers of our Constitution envisioned."[205]

Would Justice Roberts' opinion be swayed considering whether America's founders envisaged otherwise abnormal catastrophic weather events occurring more regularly at the scale of Hurricane Sandy? Although perhaps not as acutely dramatic, climate change has the potential to adversely affect agricultural systems[206] on a worldwide scale in ways the earth's inhabitants 250 years ago could not imagine. After enjoying centuries of natural resource abundance, questions are emerging for the first time asking whether global shortages created by exponential population growth coupled with climate change "could . . . bring down civilization."[207] As biofuels' opponents argue, land use decisions incentivized by bioenergy mandates, collectively have a worldwide, systemic effect on commerce in food, and thus should be curtailed or stopped altogether to benefit society. The "universal risks" to food security beyond land use in the biofuels context are perhaps even greater than the risk to society from skyrocketing costs to the entire health care system that Congress sought to remedy in *National Federation of Independent Business*. Whether the risk of widespread, land-based resource scarcity presents enough "uniqueness" to except federalized land use zoning from Tenth Amendment prescriptions,

201. *Id.* at 2589, 2591.

202. *Id.* at 2590-91.

203. *Id.* at 2591.

204. *Id.*

205. *Id.* at 2589.

206. JOHN BEDDINGTON ET AL., COMM'N ON SUSTAINABLE AGRIC. & CLIMATE CHANGE, ACHIEVING FOOD SECURITY IN THE FACE OF CLIMATE CHANGE 3 (2012), *available at* http://ccafs.cgiar.org/sites/default/files/assets/docs/climate_food_commission-final-mar2012.pdf (citing the findings and recommendations of 16 major assessment reports).

207. Lester R. Brown, *Could Food Shortages Bring Down Civilization?*, SCI. AM., May 12, 2009, at 50-57; Maurie J. Cohen, *Is the UK Preparing For War? Military Metaphors, Personal Carbon Allowances, and Consumption Rationing in Historical Perspective*, 104 CLIMATIC CHANGE 199, 199 (2011) (noting the spike in media references to combatting climate change as a "war").

however, is unlikely because the problem has yet to be realized and state remedies have not yet been proven ineffective.[208]

One could argue that the Obama administration's Clean Water Act strategy in the Chesapeake Bay is already testing the federal government's power to control land use decisions. In that watershed, the EPA is pushing the limits of its constitutional authority to dictate land uses in order to clean-up agricultural non-point source pollution. Unless a state submits a watershed implementation plan that includes specific land use plans to prevent water pollution, the EPA will tighten Clean Water Act permit limits on point source dischargers to the Chesapeake Bay.[209] The Supreme Court's decision in *National Federation of Independent Business*, holding the Medicaid provisions of the Patient Protection and Affordable Care Act as unconstitutionally coercive under the Tenth Amendment, although based on spending clause powers, may call into question EPA's regulatory tactics in the Chesapeake based on the Commerce Clause power to enact environmental regulation.[210] A reviewing court may, by analogy to the spending clause at issue in *National Federation of Independent Business*, find the back stop authority an "inducement" that constitutes "much more than 'relatively mild encouragement.'"[211] If, too, the federal government attempted to designate land uses to ensure increased resource certainty through its myriad agricultural and highway subsidy programs, the Court may find the same unlawful inducement.

B. EMERGENCY POWERS

In the likely event that the Supreme Court would find federalized land use zoning unconstitutional, how could the President and Congress exercise emergency powers to deal reactively with a worldwide food shortage? The United States arguably has taken the first step toward building governance structures to address the potential problem through its participation in the Rapid Response Forum established in April 2012.[212] The Forum: (1) promotes the "early discussion of crisis prevention and responses among policy-makers;" (2) assists in "mobilizing wide and rapid political support for appropriate policy response and actions on issues affecting agricultural

208. *See generally* U.S. CONST. amend. X.

209. U.S. ENVTL. PROTECTION AGENCY, CHESAPEAKE BAY TOTAL MAXIMUM DAILY LOAD FOR NITROGEN, PHOSPHORUS AND SEDIMENT (2010), *available at* http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/FinalBayTMDL/CBayFinalTMDLExecSumSection1through3_final.pdf/.

210. Nat'l Fed'n of Indep. Bus. v. Sebelius, 132 S. Ct. 2566, 2635 (2012).

211. *Id.* at 2661 (quoting South Dakota v. Dole, 483 U.S. 203, 212 (1987)).

212. *Rapid Response Forum*, AMIS-OUTLOOK, http://www.amis-outlook.org/amis-about/forum/en/ (last visited Feb. 10, 2013).

production and markets in times of crisis . . . [;]" and, (3) establishes a two-way dialogue with the United Nations Committee on World Food Security.[213] The group's website, however, does not elaborate what "appropriate policy responses" involving agricultural production would include.

One police response could be the declaration of a national emergency. Other than the suspension of habeas corpus, the Constitution does not directly state that any of its provisions may be suspended during a national emergency,[214] but the preamble does state that government must "provide for the common defence [sic]" and "general welfare."[215] The exercise of emergency powers, therefore, is "contingent upon the personal conception which the incumbent of the Presidential office has of the Presidency and the premises upon which he interprets his legal powers."[216] The authority of the President in times of emergency to dictate the actions of not only sections of government but also private citizens is a well-documented historical practice.[217] President Roosevelt issued several orders during World War II allocating available food resources.[218]

Typically, emergency powers are granted by Congress and must be activated by the President.[219] The National Emergency Act of 1976 clarified the procedure by which the President could activate his emergency powers.[220] The Act requires the President to expressly announce that the United States is in a state of emergency before the emergency powers become active.[221] The Act also dictates that the state of emergency declared by the President automatically lapses after one year, unless renewed by the President.[222] Thus, the Act does not grant new emergency

213. *Id.*

214. HAROLD C. RELYEA, NATIONAL EMERGENCY POWERS: CRS REPORT FOR CONGRESS 3 (2007), http://www.fas.org/sgp/crs/natsec/98-505.pdf. While the President can seize land during an emergency, it is almost certain that he would still be forced to follow the strictures of the Takings Clause of the Constitution and pay the land owner fair market value if the seizure amounted to a taking. *Id.* (citing U.S. CONST. amend. V, cl. 4.).

215. U.S. CONST. pmbl.

216. RELYEA, *supra* note 214, at 3 (quoting WILLIAM HOWARD TAFT, OUR CHIEF MAGISTRATE AND HIS POWERS 139-40 (1916)).

217. *Id.* at 4-8.

218. A. Bryan Endres & Jody M. Endres, *Homeland Security Planning: What Victory Gardens and Fidel Castro Can Teach Us in Preparing for Food Crises in the United States*, 64 FOOD & DRUG L.J. 405, 411 (2009).

219. RELYEA, *supra* note 214, at 2 (stating that some emergency powers – such as declaring war – are inherently within the President's authority as defined in the Constitution).

220. National Emergencies Act of 1976, Pub. L. No. 94-412, 90 Stat. 1255.

221. RELYEA, *supra* note 214, at 12.

222. *Id.* The inclusion of this lapse provision was deemed necessary because at the time the Act was passed, states of emergency declared in 1933, 1950, 1970, and 1971 were all technically

powers or restrict specific grants of power by Congress; rather, it guides the manner in which the powers can be executed. The fact that the Act does not restrict the emergency power is important in light of the fact that some presidents, such as Roosevelt, have taken a broader view of emergency powers than just those granted by Congress,[223] while other presidents are more circumspect in their exercise of such powers.[224]

Once the President activates the emergency powers per the procedure dictated in the Act, the President has the authority to seize land if doing so will help rectify or alleviate the emergency.[225] The question then becomes exactly how critical the strain on food, feed, and fuel systems would have to be before the President could declare a national emergency. While the definition of a national emergency is not set in stone, four factors are typically considered: (1) an event with sudden, unforeseen, or unknown duration; (2) an event dangerous and threatening to life and well-being; (3) the person who determines the phenomenon is occurring; and, (4) an element of necessary response.[226] Although the food-versus-fuel debate is not based on having reached a national emergency, its value may be in searching for ways in which to legally ensure that land is used to achieve equitable and ethical results, either proactively through zoning or through exercise of emergency power.

V. CONCLUSION

The nascent biomass-to-bioenergy sector faces formidable challenges to its successful adoption as part of a balanced energy portfolio. Arguably, the greatest obstacle to second generation transportation fuels is technology development to overcome cellulosic materials' recalcitrance to the degradation required to make ethanol.[227] EPA is trying to force accelerated technology development by refusing to waive RFS mandates despite claims that the program is causing food price inflation.[228] Despite these efforts, one of the potentially largest market players recently announced it would

still in effect with no way to officially deactivate them. The Act, as amended in 1985, also allows for an earlier termination by the joint action of the President and Congress. *Id.*

223. Roosevelt argued that it was in fact his duty to do that which was good for the country so long as it was not prohibited to him by law or Constitution. *Id.* at 2.

224. President Taft believed that presidential powers were limited by the Constitution and grants of congress. *Id*. at 2-3.

225. *See generally id.*

226. *Id.* at 4.

227. U.S. DEPT. OF ENERGY, DOE/SC-0095, BREAKING BIOLOGICAL BARRIERS TO CELLULOSIC ETHANOL: A JOINT RESEARCH AGENDA, at iii (2006), *available at* http://www.inl.gov/bioenergy/reports/d/1005_breaking_the_barriers_optmized.pdf.

228. Notice of Decision Regarding Requests for Waiver of the Renewable Fuel Standard, 77 Fed. Reg. 70, 752 (Nov. 27, 2012).

withdraw for the most part from developing cellulosic fuels in the United States.[229]

Arguably the second greatest challenge for cellulosic biofuels, whether blended as ethanol or "dropped in"[230] as diesel, is how the sector will answer accusations that its indirect effects stemming from land use changes for bioenergy crops create food insecurity and copious GHG emissions. One solution highlighted in this Article has been movement of bioenergy cropping to MIDA lands. Assuming this policy course, significant obstacles remain to implementation. First, preference for MIDA lands cropping in policy discussions to address the food and GHG dilemmas has not transformed into definitions in bioenergy statutes. One likely reason is that MIDA lands definitions are difficult to design. Economic models do use defined marginal land assumptions to determine carbon foot printing, but "economic marginality" for purposes of modeling does not translate easily into enforceable legal land definitions, and ignores other environmental and social characteristics of marginal lands. Some examples do exist for balancing environmental and socio-economic characteristics of land, as described herein, but questions remain regarding both their methods of measuring the complexity of interactions and the absence of biomass-to-bioenergy cropping systems in factor analysis. This is particularly acute when ecosystems span various landscapes, and where ecosystem services must be accurately assessed and valued.[231] These methods, too, lack tools for farmers to make valid marginality or degraded assessments.

If the United States incorporates some type of MIDA land prescription in its bioenergy mandates, the exercise likely is a valid exercise of Congressional power under the Commerce Clause. This Article contends, however, that bioenergy policies should not shoulder the burden of balancing land uses in periods of scarcity – that is food price inflation caused by finite amounts of land to grow crops. Federal policy should instead recognize the need to coordinate land use policy in light of climate shifts, mass ecosystem collapse, and generally a future that most likely holds great uncertainty with regard to resource availability. Governments are quietly putting pieces in place in preparation, albeit not yet explicitly in

229. *BP Cancels Plan for US Cellulosic Ethanol Plant*, BP (Oct. 25, 2012), http://www.bp.com/genericarticle.do?categoryId=2012968&contentId=7079431.

230. Susan Winsor, *Btus From Biomass–What's Next? Next Generation Fuels Face Big Hurdles*, CORN & SOYBEAN DIGEST (Aug. 1, 2010), http://cornandsoybeandigest.com/energy/btus-biomass-what-s-next-next-generation-fuels-face-big-hurdles (explaining that there are two types of biofuels, one that is distilled into ethanol, and the other that is a close substitute for gas, diesel or jet fuel without concerns about infrastructure or engine modification).

231. *See generally* de Groot et al., *supra* note 75.

the context of possible land use controls. Internationally, the GBEP has already called for countries to conduct assessments of land availability,[232] and the G20 have started to fortify data collection efforts to prepare for and respond to food price volatility crises.[233]

Unlike Brazilian land use zoning, federal zoning of land uses undoubtedly would conflict with state police powers reserved in the Constitution. The United States Supreme Court's recent decision on the constitutionality of "Obamacare" portends how the Court views federal action in circumstances of unique risks that threaten society's general welfare. Thus, it is unlikely that the federal government would be able to directly exercise its power to define land types and designate uses, whether for bioenergy or more generally. Policy design cannot settle on isolated solutions such as yield increases and MIDA land use. Perhaps it is time instead to revisit the proposed National Land Use Policy Act as a means to get states to comprehensively plan to ensure lands are managed to maintain ecosystem services upon which agricultural production depends. In light of low probability that such an act would pass in a polarized Congress, agencies could take more aggressive, like the EPA is doing in the Chesapeake to combat environmental degradation of critical fishery habitats. USDA, on the other hand, faces more of an uphill battle to condition monies or program implementation on better land use planning because of restrictive underlying statutes and politically powerful commodity groups. Whatever the method chosen, biomass-to-bioenergy may not be able to withstand much longer the weight of universal, international land use regulation failures resting entirely on its shoulders.

232. *See supra* footnote 63 and accompanying text.
233. *See supra* footnote 211 and accompanying text.