

Judicially Modified Ordinances:
Monsanto v. Geertson and the Role of
Social Values in GMO Regulation

by

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Chapter 1

Introduction

Genetically modified organisms are a controversial topic; the subject of protests across the globe,^{1 2 3} stacks and stacks of books,⁴ and several documentary films.^{5 6 7 8} For a term that did not even exist two decades ago, “genetically modified organism” carries a heavy weight of connotations today. To some, it harks to “frankenfoods,” a word used by some anti-GM advocates, particularly in the European Union.⁹ To others, it represents the future of food and the cure to world hunger, an image often perpetuated by GM companies, like Monsanto and its “Better Seed for a Brighter Future” campaign.¹⁰ Perhaps it is because of the many connotations associated with the term “GMO” that many companies have switched to the acronym “GE,” for genetically engineered. With so many contradicting images, it’s no wonder that the GM debate seems overwhelming or off-limits to many citizens—a discussion best left to experts and those involved in the agricultural industry. Yet unlike some scientific fields,

¹ Monica Eng, *Anti-GMO Protests Heat Up This Fall*, Chicago Tribune (2011), available at http://articles.chicagotribune.com/2011-10-21/features/chi-food-policy-antigmo-movements-heat-up-this-fall-20111021_1_gmo-fda-food-safety-division.

² Anne Sewell, *Beekeepers & Anti-GMO protesters march in Warsaw*, Digital Journal (2012), available at <http://digitaljournal.com/article/321905>.

³ Jill Ettinger, *Haiti to Monsanto: "Take Your Seeds and Get Out!"*, Organic Authority (2011), available at <http://www.organicauthority.com/foodie-buzz/haiti-protests-monsanto-genetically-modified-seeds-gmos.html>.

⁴ An Amazon search of the term “GMO” brings up 781 results.

⁵ *Food, Inc.* Dir. Robert Kenner.

⁶ *The World According to Monsanto.* Dir. Marie-Monique Robin.

⁷ *The Future of Food.* Dir. Deborah Koons Garcia.

⁸ *David versus Monsanto.* Dir. Bertram Verhaag.

⁹ Dayle Hayes and Rachel Laudan, *Food and Nutrition: Volume 3*, 466 (2008).

¹⁰ Monsanto, *Who We Are*, available at http://www.monsanto.com/whoweare/Pages/default.aspx?WT.mc_id=1_wwa

genetically modified organisms are not something distant from and unrelated to the life of the average American; while genetically modified organisms fall under the category of “biotechnology,” they are not nearly so theoretical or isolated from human life as other biotechnologies, like cloning.

In fact, many Americans are completely unaware of the extent to which genetically modified organisms already play a significant role in our lives. It is estimated that about 70 percent of the processed foods Americans consume contains genetically modified ingredients.¹¹ Ninety-four percent of soybeans—an ingredient not just found in products like soy milk, tofu, and baby formula¹² but also indirectly consumed through livestock feed, which 98 percent of U.S. soybeans are turned into¹³—grown in America are genetically modified.¹⁴ Eighty-eight percent of corn—also consumed through livestock feed, as well as high fructose corn syrup, oil, and alcohol—in America is genetically modified.¹⁵ The U.S. grows by far the most genetically modified crops of any nation in the world; it accounts for almost two thirds of the world’s GMO production. And these numbers are only increasing; each year, a larger percentage of agricultural acreage in the U.S. is planted with GM crops, even as the list of countries that

¹¹ Brendan Koerner, *How Much of Our Food is Bioengineered?*, Slate (2003), available at http://www.slate.com/articles/news_and_politics/explainer/2003/05/how_much_of_our_food_is_bioengineered.html.

¹² Roddy Scheer and Doug Moss, *Soy Food Products: A \$4 Billion Market*, Business Ethics: The Magazine of Corporate Responsibility (2011), available at <http://business-ethics.com/2011/05/10/soy-food-products-a-4-billion-market/>.

¹³ *Soybean*, Encyclopaedia Britannica (2012), available at <http://www.britannica.com/EBchecked/topic/557184/soybean>.

¹⁴ *Adoption of Genetically Engineered Crops in the U.S.: Soybeans Varieties*, USDA Economic Research Center (2011), available at <http://www.ers.usda.gov/Data/BiotechCrops/ExtentofAdoptionTable3.htm>

¹⁵ *USDA National Nutrient Database for Standard Reference Release 18*, USDA Nutrient Data Laboratory (2005), available at <http://www.nal.usda.gov/fnic/foodcomp/Data/SR18/sr18.html>.

have banned them grows longer and longer.^{16 17} The presence of GMOs—both physically and in the discourse of the media, corporations, and activists—is expanding dramatically.

This thesis seeks to take the controversial and prevalent topic of GMOs out of the lens of scientific risk—i.e., are GMOs safe or dangerous?—and look at them from another angle: that of social values. While evaluating the scientific costs and benefits of GMOs is an essential part of the debate, I argue that there is much to be learned from understanding the social values surrounding GMOs as well. Despite having spent the past year examining literature on social values, science, and U.S. policymaking, I have found no general definition for “social values.” In this thesis, I use the term “social values” to encompass two distinct but interrelated concepts: ‘purely’ social values and socioeconomic values. I define social values as those that are shared by a group of individuals in a society and inform those individuals’ understandings of their society and themselves. In the case of *Monsanto v. Geertson Seed Farms*, this is mostly manifested in the specific social value of freedom of choice, which I will explore more in later chapters, but it can also include values such as cultural autonomy and the pursuit of happiness. I define socioeconomic values as those that are shared by a

¹⁶ Pew Initiative on Food and Biotechnology, *Factsheet: Genetically Modified Crops in the U.S.* (2004), available at http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Fact_Sheets/Food_and_Biotechnology/PIFB_Genetically_Modified_Crops_Factsheet0804.pdf.

¹⁷ This fact is not intended to imply a bias that the increased planting of crops in the U.S. is problematic; I simply want to demonstrate that the large to degree to which we have accepted GMOs in the U.S. is not the model followed by every country. There is not only much variation between levels of acceptance of GM technology across the globe but also much dispute over which view is correct. While the U.S. takes one very distinct stance on GM technology, I want to illustrate that other stances—including those at the opposite extreme—do exist. GMOs are not an uncontroversial, unquestioned technology.

group of individuals in a society and are based in tangible economic factors. In *Monsanto*, this is mostly manifested in economic impact on farmers' incomes and way that impact limits those farmers. At points when it is relevant, I emphasize the distinction between social and socioeconomic values. Social values already motivate much of the debate over GM crops but are entirely absent from the legislation regulating them in the United States. Through the lens of the 2010 Supreme Court case *Monsanto v. Geertson Seed Farms*, I will show that courts tend to be the arenas in which social values are introduced to the regulatory process for GMOs. I also seek to analyze how effective courts can be at serving in this role and what other prospects there are for the incorporation of social values into GMO regulation in the future.

GMOs are a huge part of our diet in the U.S. but many Americans are completely unaware of this; a 2005 survey showed that less than a third of Americans were aware that they regularly consumed GM products and almost half said they knew little about GM products at all.¹⁸ In 2010, the USDA acknowledged that “[m]ost U.S. consumers are unaware of the prevalence of GE content in the U.S. food supply” and one study showed “that only one-fourth of U.S. residents believed that they had ever consumed food containing GE ingredients.”¹⁹ A technology that is so prevalent and directly affects the very

¹⁸ *National Survey Shows Americans Are In The Dark Regarding Genetically Modified Foods*, ScienceDaily (2005), available at <http://www.sciencedaily.com/releases/2005/01/050131224504.htm>

¹⁹ USDA/APHIS, *Glyphosate-Tolerant Alfalfa Events J101 and J163: Request for Nonregulated Status Final Environmental Impact Statement* (2010).

foods we consume is largely a mystery to most Americans. To begin an adequate analysis of the regulation of GMOs in the U.S., then, an explanation of the technology and history behind genetic modification is necessary.

Although the first genetically modified food—the Calgene FlavrSavr tomato—was approved for commercial production in 1992, the history of genetic modification began a few decades before that. In the early 1970s, a new technology emerged called “recombinant DNA” or rDNA, which combined DNA from multiple organisms. The technology was patented by Stanford scientists in 1980 after the groundbreaking Supreme Court case *Diamond v. Chakrabarty* ruled that genetically altered life forms could be patented. In 1986, the Office of Science and Technology Policy, the agency established to advise the president “on the effects of science and technology on domestic and international affairs,”²⁰ released a report asserting that as far as they could tell, the rDNA process was not inherently more dangerous than traditional breeding. It also assigned the USDA, FDA, and EPA responsibility for overseeing genetic modification, with the idea that most GMOs should be reviewed by two of the federal agencies. The following year, the USDA facilitated the first field trials for genetically modified crops and began issuing permits. In 1992, they initiated a process by which GMOs approved for permits and considered benign could be removed from federal regulation—and thus commercially sold.

In the nearly two decades following the release of the Flavr Savr tomato, which was modified to have a slower ripening process than traditional tomatoes

²⁰ *About OSTP*, Office of Science and Technology Policy, available at <http://www.whitehouse.gov/administration/eop/ostp/about>.

by adding a gene which interferes with the softening of the fruit,²¹ dozens of GM foods have entered the U.S. market. In 1994, Calgene produced the first crop modified to be resistant to an herbicide. Since then, over a third of the GMOs allowed to be commercially sold by the USDA have been pesticide or herbicide tolerant. While several other types of GMOs have been approved for commercial production—including bacteria modified to produce human insulin to treat diabetes,²² and, in a recent controversial decision by the FDA, a salmon genetically modified to grow more quickly²³—it is widely known that the vast majority of GMOs produced commercially are plants.²⁴ It is pesticide and herbicide tolerant plants, as well as plants modified to produce their own pesticides and herbicides, that have been the focus of much of the international and national debates over GMOs. The particular GMO that is the focus of this work is Monsanto's Roundup Ready Alfalfa, an alfalfa crop modified to be resistant to the Monsanto-patented Roundup herbicide.

Since the early 1990s, the corporation Monsanto has been one of the main producers of GMOs and today its name has become synonymous with the genetic modification industry. Monsanto was once primarily a chemical and plastics manufacturer but quickly transitioned to focusing on the creation of GM plants

²¹ *Flavr Savr Tomato*, University of Kentucky College of Agriculture Agripedia, available at <http://www.ca.uky.edu/agripedia/glossary/flavr.htm>.

²² J.M. Brogard, J.F. Blickle, and D. Paris-Bockel, *Genetically engineered insulin: five years of experience*, PubMed (1985), available at <http://www.ncbi.nlm.nih.gov/pubmed/3915289>.

²³ *Transgenic salmon: coming soon to a store near you?*, CBCNews, available at <http://www.cbc.ca/news/interactives/gm-salmon/>.

²⁴ An analysis of the literature about GMOs shows that GM crops are the main topic of discussion; concerns over GM food dominate the dialogue of the GM debate. Because GM animals are a recent introduction the world of GM food, they have not yet entered the debate to nearly the extent that GM plants have.

after successes with genetic modification in the 1980s. The corporation has become the face of the genetic modification industry, presenting itself as an innovative company working “alongside farmers” to meet “the needs of today while preserving the planet for tomorrow,”²⁵ while simultaneously being held up as an example of the most evil type of corporate bully by many in the anti-GM movement. Likely due in part to its patent infringement lawsuits against small farmers and the many links between the corporation and the USDA, Monsanto has become a rallying point against genetic modification, used to illustrate the corruption and monopolization of the genetic modification industry. Monsanto has been a party in many cases involved in the regulation of GMOs and is the plaintiff in the case I examine.

Since the 90s, the GMO debate has largely broken down into just that—a debate. Rather than being portrayed as the multifaceted and complex controversy it is, it is often broken down into a two-sided, black and white issue; GMOs are either a technological breakthrough that has the potential to save our species²⁶ or they are an evil product full of danger.²⁷ Corporations like Monsanto, U.S. government agencies like the USDA, elected officials, and some academics have taken the position that genetically modified organisms are the solution to

²⁵ Monsanto, *Who We Are*, *supra*.

²⁶ Glenn Davis Stone, *Both Sides Now: Fallacies in the Genetic Modification Wars, Implications for Developing Countries, and Anthropological Perspectives*, 43 *Cur. Anthro.* 614 (2002). “The core element in pro-genetic-modification discourse is the warning about current and future food shortages and the need for crop genetic modification to avert famine: ‘Agri-biotechnology offers promising means to a more sustainable agriculture. . . . This is a critical need in developing countries, where over 90% of the world’s 11 billion people will be living in 2050.’”

²⁷ *Id.* at 618. “The greens’ scorn for public research . . . likely results from a perceived need to engage the struggle on a large scale with strong financing and a wide following. Large, ardent followings of check-mailing opponents of genetic modification are better mobilized by bold black-and-white slogans than by critical evaluations of the potential effects of different genetically modified products.”

the planet's growing food shortages and that studies have shown that the genetic modification process is safe.^{28 29 30} On the opposing side are many small farmers, organic food advocates, environmental activists, and nonprofits—as well as the governments of many nations, in particular members of the European Union—arguing that the technology is unsafe and threatens farmers, consumers, and the environment.^{31 32 33 34 35}

While the arguments are often much more complex than this simplified summary, the question returned to again and again by advocates of both sides of the debate is that of safety: are GMOs “safe” or not? In this thesis, I will seek to break the GMO debate out of this divide and portray it as a much more complex issue, i.e. one in which the issue of safety is complicated by the presence of other concerns, primarily social and socioeconomic values. Indeed, I argue that the definition of “safety” is itself highly influenced by these values and that incorporating social values into regulation is worthwhile. I will examine the role the courts play in this process in the U.S. and evaluate their effectiveness in this role.

²⁸ Tom Vilsack, *Remarks as Prepared for Delivery: Agriculture Secretary Vilsack Speaks Before the House Committee on Agriculture*, USDA (2011), available at http://www.usda.gov/wps/portal/usda!/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os_gAC9-wMJ8QY0MDpxBDA09nXw9DFxcXw2ALU_2CbEdFAF-soRU!/?printable=true&contentidonly=true&contentid=2011%2F01%2F0025.xml

²⁹ Robert Paarlberg, *Food Politics: What Everyone Needs to Know*, 167 (2010).

³⁰ Henry I. Miller and George P. Conko, *The Frankenfood Myth: How Protest and Politics Threaten the Biotech Revolution*, 9-12 (2004)

³¹ *Center for Food Safety v. Vilsack*, No. C 08-00484 JW, 2009 WL 3047227 (2009).

³² Mae-Wan Ho, Lim Li Ching, *GMO Free: Exposing the Hazards of Biotechnology to Ensure the Integrity of Our Food Supply* (2004).

³³ Say No to GMOs!, available at <http://www.saynotogmos.org/>.

³⁴ Non GMO Project, available at <http://www.nongmoproject.org/>.

³⁵ Network of Concerned Farmers, available at <http://www.non-gm-farmers.com/>.

I analyze these concepts through the lens of the 2010 Supreme Court case *Monsanto v. Geertson Seed Farms*. I choose this case for several reasons. First, it is the only case involving the challenge of the deregulation of a GMO to ever reach the Supreme Court. This is significant not only because Supreme Court decisions carry so much weight in the U.S. but also because a case that has reached the highest court can be analyzed at three separate court levels, providing insight into the differences between social values incorporation in a district court, a circuit court of appeals, and the Supreme Court. Second, this case was the first to actually alter the regulatory process for GMOs. Before this case, the Animal and Plant Health Inspection Service (APHIS), a branch of the Department of Agriculture (USDA), had never required the completion of an Environmental Impact Statement (EIS), the document the National Environmental Policy Act (NEPA) requires federal agencies to complete before approving of any project that may “significantly affect the quality of the human environment,” before deregulating a GMO. Instead, for every single GMO they had approved, they had completed a much shorter preliminary Environmental Assessment (EA) and concluded that the GMO presented no significant impact. That this case resulted in such a clear action makes its impact not only significant but much more traceable from the decision. Third, following the Supreme Court’s decision, there was much debate about who had actually won the case.³⁶ With some media

³⁶ Ian Froeb, *Monsanto v. Geertson Seed Farms: The Supreme Court Rules, Everyone Claims Victory*, Riverfront Times: News of the World (2010), available at http://blogs.riverfronttimes.com/gutcheck/2010/06/monsanto_v_geertson_seed_farms_supreme_court_ruling_genetically_modified_gmo_alfalfa_st_louis_food_blog_news_062210.php.

outlets claiming victory for Monsanto³⁷ ³⁸ and others claiming victory for the farmers and environmental groups,³⁹ ⁴⁰ the actual results were fairly unclear. The controversy and confusion over what this case actually meant hooked me in; I not only wanted to produce a thesis that clarified the results of *Monsanto v. Geertson Seed Farms* but I also wanted to sate my own curiosity about the implications of the case.

In Chapter 2, I will explain the regulatory system for GMOs in the U.S. I will first examine the history of the relationship between science and regulation in the U.S., arguing that since the very structuring of our nation through to the present day, policymakers and other stakeholders in the science policy process have viewed science with reverence, as an institution separate from the partisanship of politics, able to inform policy by discerning the “truth.” I demonstrate that this perspective that scientific expertise should be valued above all else in regulatory decision making is in many ways unique to the U.S.; many countries have different understandings of the role science ought to play—and is capable of playing—in policy. These differences translate into three distinct models for regulating GMOs, as described by Daniel Lee Kleinman. I explain the three models and demonstrate why a social values-based model,

³⁷ James Oliphant and P.J. Huffstutter, *Supreme Court overturns ban on Monsanto's genetically modified alfalfa seeds*, Los Angeles Times (2010), <http://articles.latimes.com/2010/jun/22/business/la-fi-court-monsanto-20100622>.

³⁸ Andrew Pollack, *Justices Back Monsanto on Biotech Seed Planting*, New York Times (2010), available at <http://www.nytimes.com/2010/06/22/business/22bizcourt.html>.

³⁹ Center for Food Safety Press Release, *Supreme Court Ruling in Monsanto Case is Victory for Center for Food Safety, Farmers*, True Food Network (2010), available at <http://truefoodnow.org/2010/06/21/supreme-court-ruling-in-monsanto-case-is-victory-for-center-for-food-safety-farmers/>.

⁴⁰ Andrew Kimbrell, *Supreme Court Case a Defeat for Monsanto's Ambitions*, HuffPost Food (2010), available at http://www.huffingtonpost.com/andrew-kimbrell/supreme-court-case-a-defe_b_620087.html.

although not by any means the norm, may be desirable. Next, I explain the complex labyrinth of legislation that constitutes the regulatory process for GMOs. I describe how this regulatory process was created and I detail the pathway a GM crop would follow through the process.

In Chapter 3, I will discuss the role courts play in the regulation of GMOs in the U.S. Although social values are not included in the legislation regulating GMOs, I argue that courts have taken up the role of introducing such social values to the regulatory process. I examine how and why courts fill this role in the U.S., taking into consideration claims that courts have generally become more actively involved in policy in recent decades and that particularly in the realm of scientific matters, courts have shifted away from a traditional role of “deference” to agencies. Further, I analyze what about the topic of GMOs in specific makes them an area that allows courts to play the role of social values introducer. The vagueness of legislation combined with the social values that underlie the debate over GMOs, I argue, has in large part led stakeholders in the GMO controversy into the courts in pursuit of the incorporation of social values. I examine two specific countries where social values played a large part in GMO debates and demonstrate how similar values affect the U.S. debate as well, even if they are less acknowledged.

Chapter 4 will examine in detail the incorporation of social values by courts through the lens of the case *Monsanto v. Geertson Seed Farms*. I follow the case from the district court in 2007 to the court of appeals in 2009 and finally to the Supreme Court in 2010. I analyze the introduction of social values at all three

levels of the court, highlighting the differences between the decisions and the ways in which they agree. I conclude that the courts reinterpreted definitions of “injury” and “human environment” to include social values in ways that the regulatory process for GMOs had not previously included, expanding not only the expectations of federal agencies in regulating GMOs but also the role of courts in the regulatory process.

In Chapter 5, I will examine what effect the courts’ decisions actually had on the regulatory process, breaking down APHIS’ conclusions in the final EIS. I argue that the extent to which courts can affect change is limited; the courts’ inclusion of social values ultimately has little effect on the regulation of GMOs. Proposing that courts are limited in creating change more broadly by the larger political system, I find that courts are not capable of the significant change we often attribute to or expect of them. I also question what role we believe courts *should* play, presenting the issues with relying on courts to make changes to regulation.

I conclude by considering where we can or should go from here; if the introduction of social values through courts is not an effective method, how can we institute such change? I look at movements toward other options for incorporating social values and consider the benefit of courts in shifting the overall framework even if they cannot change the outcomes of GMO deregulation on a case-by-case basis. Despite the challenges, I end on an optimistic note; courts may not be able to dramatically adjust the terms of regulation in the near

future, but the evidence that the GMO debate is already shifting is significant in itself.

Chapter 2

The Regulation of GMOs

The regulation of genetically modified organisms in the United States is a complex labyrinth, with broad and vague legislation governing controversial products and minute differences in products leading them down completely different regulatory pathways. While explaining the ins and outs of every piece of legislation involved in the regulatory puzzle of GMOs is a larger task than is necessary for this thesis,⁴¹ this chapter will illustrate the path a typical GM crop follows as it makes its way through the regulatory process, using the Roundup Ready Alfalfa in *Monsanto v. Geertson*⁴² to explain. To understand why GMOs are regulated in the U.S. the way they are, though, we need to pull the lens a little farther back—actually, a lot farther back—both historically and geographically.

For starters, let's take a look at the way the U.S. has historically viewed science and its regulation. The United States of America was founded at a time when science, as the industry and art we recognize, was just blossoming: a period known as the Age of Reason.⁴³ The central themes of the Age of Reason—rationality, the possibility of scientific classification of *everything*⁴⁴, natural rights based in science—were integral to the formation of the new nation; not

⁴¹ For a more in-depth exploration of the routes any given GMO can follow through the regulatory process, see Pew Initiative on Food and Biotechnology, *Guide to U.S. Regulation of Genetically Modified Food and Agricultural Biotechnology Products* (2001), available at http://www.pewcenteronthestates.org/uploadedFiles/wwwpewtrustsorg/Reports/Food_and_Biotechnology/hhs_biotech_0901.pdf

⁴² As explained in Chapter 1, I chose to focus on *Monsanto v. Geertson Seed Farms* for several reasons. See p. 11-12.

⁴³ I. Bernard Cohen, *Science and the Founding Fathers*, 20 (1997).

⁴⁴ Lynn Thorndike, *L'Encyclopedie and the History of Science*, 362 (1924).

only did the founding fathers adamantly believe in these principles, but they intentionally based the construction of their new government in a scientific understanding of the world.⁴⁵ ⁴⁶ Science was in a way the antithesis of the religion that had been left behind in England and had justified the monarchy the early Americans fought against. Unlike religion, which the founding fathers so carefully made sure was kept separate from their new nation's government, science was an "objective body of knowledge."⁴⁷ As Clinton Rossiter asserted, American political philosophy was based in a belief that "the political and social world is governed by laws as certain and universal as those which govern the physical world."⁴⁸ Rossiter believed that "Newtonian science quickened the advance toward free government" through reverence of "the power of human reason," the correspondence of the scientific method and democratic procedure, and the "direct influence" of Newtonian ideas of immutable natural law on "American political and constitutional thought."⁴⁹ Indeed, some scholarship suggests that the constitution was directly influenced by science; Steven Goldberg contends that the framers intentionally built the protection of science into the Constitution. He argues that the establishment of religion clause protected science by prohibiting government support of religion, a "traditional adversary of science," and that the speech and press clauses were designed to include scientific expression. Further, he argues that the "Constitution

⁴⁵ Cohen, *supra* at 255.

⁴⁶ Stephen Goldberg, *The Constitutional Status of American Science* U. Ill. L.F. 1 (1979), available at <http://heinonline.org/HOL/LandingPage?collection=journals&handle=hein.journals/unilllr1979&div=11&id=&page=>.

⁴⁷ Ole Peter Grell and Andrew Cunningham, *Medicine and Religion in Enlightenment Europe*, 190.

⁴⁸ Cohen, *supra* at 255.

⁴⁹ Cohen, *supra* at 255-256.

envisioned considerable federal support for science through the military, coinage, weights and measures, patent, and spending powers.”⁵⁰ By structuring the Constitution around scientific principles and to protect scientific expression, the framers encouraged the pursuit of scientific knowledge. Many of the framers were adamant believers in Newtonian scientific principles. Thomas Jefferson’s *Notes on the State of Virginia* is a shining example of the faith the founding fathers had in science; Jefferson has a passionate desire to classify and scientifically describe the entirety of his surroundings.⁵¹ In fact, according to John Adams, Jefferson’s scientific prestige was one of the main reasons he was qualified to write the Declaration of Independence.⁵² Benjamin Rush believed that the study of natural history—and scientific knowledge—was “the foundation of all useful and practical knowledge.” The founding fathers saw a direct link between science and politics, between the “natural and the social.”⁵³ This belief that our policy should be governed by science—so integral to the nation’s birth—has continued to mold and shape our country; indeed, the idea that science would and should do so is a large part of the reason for the privileging of scientific knowledge in the Constitution.

In the centuries since America’s founding, a policy of reverence for science—of the belief that scientific experts are capable of finding the true solutions to the nation’s problems—has not only remained but has grown

⁵⁰ Golberg, *supra*.

⁵¹ Silvio A. Bedini, *Jefferson and Science*, 46 (2002)

⁵² Cohen, *supra* at 23

⁵³ Christopher Looby, *The Constitution of Nature: Taxonomy as Politics in Jefferson, Peale, and Bartram*, 22 *Early Am. Lit.* 252-253 (1987).

dramatically, expanding within the governmental sphere and amongst other stakeholders. In the nineteenth century, the use of science for applied technology led to a new-found belief in its expertise; “nowhere else in the world was technology worshipped so much and nowhere was there such fascination with new gadgets.”⁵⁴ In the early 1900s, the scientific community grew dramatically; not only did the number of scientists and amount of scientific research grow, but investment—from both government and business—increased as well. Successful businessmen invested in science and in some cases even created their own laboratories and research institutions.⁵⁵ World War I established the importance of industrial scientific research for the stability of the nation⁵⁶ but it was not until World War II that the mindset of a reverence for science began to shift into a *reliance* on science.⁵⁷ Vannevar Bush, one of the most influential scientists in the policy world in the last century,⁵⁸ firmly believed that provided the resources, science could solve the world’s problems—he encouraged a social contract in which government would fund basic research and the research would in turn provide the discoveries that would cure the nation’s ills. He and his colleagues “truly saw scientific research and technology as saviors.”⁵⁹ As one

⁵⁴ Otto Doering, *Science and Public Policy: Shotgun Wedding or Marriage Made in Heaven?*, 8 *Weed Technology* 875 (1994).

⁵⁵ Daniel J. Kevles, *George Ellery Hale, the First World War, and the Advancement of Science in America*, 59 *Isis* 427 (1968).

⁵⁶ Daniel Lee Kleinman, *Politics on the Endless Frontier: Postwar Research Policy in the United States*, 44 (1995).

⁵⁷ Bruce L.R. Smith, *American Science Policy Since WWII*, 2-3 (1990).

⁵⁸ Vannevar Bush, *As We May Think*, *The Atlantic* (1945), available at <http://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/3881/>

⁵⁹ Kleinman, *Politics on the Endless Frontier*, 59.

of the first scientific advisers to the president,⁶⁰ he helped usher in a new phase of governmental investment in science and belief that science could and should inform governmental decision-making. As World War II loomed, President Roosevelt realized that America would need science to win,⁶¹ particularly in relation to the atomic bomb and the Manhattan Project.⁶² At Bush's suggestion, Roosevelt approved an order to create the National Defense Research Committee, the first of many government science agencies.⁶³ In 1962, President Kennedy created the Office of Science and Technology—which eventually transformed into the current Office of Science and Technology Policy—with the explicit purpose of informing and advising policy.⁶⁴ The Cold War provided much of the impetus for the creation of the OST due to rising concerns over asserting military power and “conquering the new frontier of outer space,”⁶⁵ but the potential of using science for “public good” was a significant factor as well⁶⁶. As Smith wrote, “Science and technology were leading people toward a fuller life: disease, poverty, and other traditional scourges would be conquered. The cure for the ills of science was more science.”⁶⁷ As a result of this changed attitude toward science, research and development expenditures grew dramatically during World War II; new government laboratories were created and more

⁶⁰ Peter Dizikes, *A difference maker*, MIT News Office (2011), available at <http://web.mit.edu/newsoffice/2011/timeline-bush-0216.html>.

⁶¹ Kleinman, *Politics*, 64

⁶² Smith, *supra* at 34

⁶³ Kleinman, *Politics*, 61

⁶⁴ Kleinman, *Politics*, 176

⁶⁵ David H. Guston and Kenneth Keniston, *The Fragile Contract: University Science and the Federal Government*, 22 (1994)

⁶⁶ *Id.*

⁶⁷ Smith, *supra* at 62

funding was allocated to university laboratories.⁶⁸ State and corporate financial investment in the sciences was growing rapidly, indicative of the prevailing ideological investment in the power of science as its own exclusive realm, separate from the influence of politics.

Following World War II, faith in, and funding of, science continued to grow. Immediately after the war, it was generally agreed upon by not only the scientific, political, and military community but also by other stakeholders including representatives from the private sector and journalists⁶⁹ that creating a mechanism to provide funding for scientific research was necessary. While there was some struggle over how precisely such a mechanism would work, the final product—the National Science Foundation—subscribed heavily to the same attitude of reverence for science and science experts. The board of the NSF would be composed of science elites, although its role for policy making was somewhat vague.⁷⁰ Federal support for research and development (R&D) continued to grow, particularly after the Soviet Union launched Sputnik in 1957. The increased medical research during the war showed no signs of stopping—existing agencies and institutes involved in health research were expanded and

⁶⁸ National Academy of Sciences Committee on Criteria for Federal Support of Research and Development, *Supplement 1: The Evolution and Impact of Federal Government Support for R&D in Broad Outline, Allocating Federal Funds for Science and Technology* (1995), available at <http://www.ncbi.nlm.nih.gov/books/NBK45556/>.

⁶⁹ Kleinman, *Politics*, 100.

⁷⁰ Kleinman, *Politics*, 137,

new ones created.⁷¹ The “postwar consensus” that scientific activities should be supported and expanded was largely fulfilled.⁷²

Public and governmental support for science research wavered in the 60s and 70s due to tensions between the government and the scientific community over unequal funding distribution, the increasingly complex structure of the R&D system,⁷³ and a “growing rift between defense scientists and those on the nation’s campuses who opposed the Vietnam War.”⁷⁴ Nonetheless, when Reagan entered office in 1981, his administration quickly reversed this attitude, picking up the pieces of the collapsing government-science system and restoring the governmental position to one of reverence for science. The Reagan administration increased federal funding for research despite aiming to decrease government spending overall, channeling funds from other federal programs into what they saw as an “area filled with spectacular success.”⁷⁵ Indeed, despite the seeming loss of faith in science to solve the nation’s problems that occurred after the Vietnam War⁷⁶—and even concerns from within the scientific community itself about the limits and elitism of science⁷⁷— “the basic outlines of the ‘social contract’ proposed in Bush’s famous report . . . have remained more or less intact, and are still broadly accepted by the public and politicians;”⁷⁸ despite

⁷¹ James L. Penick, Jr., Carroll W. Pursell, Jr., Morgan B. Sherwood, and Donald C. Swain, *The Politics of American Science*, § 3.IV (2d ed. 1972).

⁷² Smith, *supra* at 57.

⁷³ *Id.* at 73-74.

⁷⁴ *Id.* at 75.

⁷⁵ *Id.* at 110.

⁷⁶ *Id.* at 76.

⁷⁷ Jonathan R. Beckwith, *Eli Lilly Award Acceptance Speech*, *The Politics of American Science*, *supra* § 6.II.

⁷⁸ Smith, *supra* at 109.

periods where investment decreased, the U.S. has largely stayed committed to funding R&D and trusting scientists to find solutions. The Reagan era saw a resuscitation of faith in science accompanied by an expansion of government involvement. Industry became more involved as well with the creation of Cooperative Research and Development Agreements, designed to encourage collaboration between companies and federal research laboratories.⁷⁹ By the end of the 80s, the attitude toward science was optimistic enough that, as Smith speculated, “set on its present course, the nation could drift into the position of excessive faith in science and technology, of undertaking too many initiatives that could not be successfully completed, of working at cross-purposes with itself.”⁸⁰

Today, this reverence for science as a field of expertise perfectly situated for informing policy permeates our society as much as ever. In a speech to the National Academy of Sciences, President Obama announced a “new effort [of the Office of Science and Technology Policy] to ensure that federal policies are based on the best and most unbiased scientific information. I want to be sure that facts are driving scientific decisions—and not the other way around.” At this point in the transcript of the speech, two brackets indicate the audience’s laughter.⁸¹ It seems obvious to the point of being humorous that the experts of the scientific world ought to inform governmental decisions. Indeed, Obama’s faith in the

⁷⁹ National Academy of Sciences Committee, *supra*.

⁸⁰ Smith, *supra* at 158.

⁸¹ Barack Obama, *Obama’s Speech to the National Academy of Sciences*, (2009), available at http://www.realclearpolitics.com/articles/2009/04/27/obama_speech_academy_of_sciences_transcript_96221.html.

abilities of science advisers seems as unwavering as Kennedy's when the Office of Science and Technology was first created.

There is, of course, a counter-narrative to the history of an expanding reverence for and reliance on science among government and other stakeholders. Climate change skepticism over the past several years provides a perfect example; despite countless assertions by the scientific community that the earth's changing climate has been proven,^{82 83} there is still a prevalent debate within our government about its existence. In fact, in 2011, the House Energy and Commerce Committee voted against a bill amendment that stated that global warming exists.⁸⁴ I assert, however, that despite rejecting a consensus statement of the scientific community, the congressmen did not claim to reject science. Instead, they continued to frame the issue as one that could be solved by science. Although a few of the members who voted against the amendment cited religious reasons and public opinion as their rationale,⁸⁵ the dialogue for the most part was based around debating the science. As the chairman of the committee put it, "My good friend from California tries to make

⁸² NASA, *Climate change: How do we know?*, available at <http://climate.nasa.gov/evidence/>: "Scientific evidence for warming of the climate system is unequivocal."

⁸³ Donald F. Boesch, *Climate change is real, and action is needed*, The Baltimore Sun (2011), available at http://articles.baltimoresun.com/2011-10-30/news/bs-ed-climate-letter-20111030_1_climate-change-climategate-global-warming.

⁸⁴ John Rennie, *House Repubs Vote That Earth Is Not Warming*, Scientific American (2011), available at <http://www.scientificamerican.com/podcast/episode.cfm?id=house-repubs-vote-that-earth-is-not-11-03-16>.

⁸⁵ Sean Pool, *House Energy and Commerce Committee Votes for Science Denial* (2011), available at <http://scienceprogress.org/2011/03/house-energy-and-commerce-committee-votes-for-science-denial/>: "[O]ne of the committee members voting against the amendments John Shimkus (R-IL), cites the Bible as his reason for rejecting climate science . . . Another, Michael Burgess (R-TX), cited an online public opinion poll . . . as reason for rejecting the science of global warming."

it clear that the science is settled. I would say it's not settled.”⁸⁶ Indeed, climate change skepticism within the government is almost always framed as a scientific issue;⁸⁷ rather than shifting the debate outside science, the assertion is that the jury is still out on the evidence of climate change and whether or not humans are causing it. Although policymakers may not always have deference to decisions from the scientific community, exceptions to the historical pattern of emphasizing that science can always lead to a solution are few and far between.

This belief that we must look to science to inform our policy—what Sheila Jasanoff calls the “technocratic approach”⁸⁸—is fundamental to all U.S. science policy. In examining the method the U.S. uses to regulate GMOs, it is necessary to grasp our nation’s historical understanding of the relationship between science and policy. It would be difficult to overstate the role that belief in scientific solutions has in U.S. regulation for science—not simply because that belief is so powerful in determining policy outcomes but also because it is quite unique on the international stage. Jasanoff suggests that this reliance on and belief in the objective is in part based on a fundamental distrust of government that is present in the U.S. in a way it is not in any other country. Where in many European nations subjectivity is an accepted facet of the political system, in the

⁸⁶ Lucy Madison, *House Republicans reject climate change science*, CBSNews (2011), available at http://www.cbsnews.com/8301-503544_162-20043909-503544.html.

⁸⁷ *While Congress Debates Climate Science, China and Europe Move Ahead*, The Climate Post (2011), available at <http://theclimatpost.wordpress.com/2011/03/10/while-congress-debates-climate-science-china-and-europe-move-ahead/>: “Meanwhile, in the U.S. Congress, hearings continued about a bill to block the U.S. Environmental Protection Agency ‘from promulgating any regulation concerning, taking action relating to, or taking into consideration the emission of a greenhouse gas to address climate change, and for other purposes.’ As *Science* showed in its live blogging of the bill’s most recent hearing, it centered not on policies, but on the science of climate change.”

⁸⁸ Sheila Jasanoff, *The Fifth Branch: Science Advisers as Policymakers*, vii (1994).

U.S., citizens expect solid, numerical proof for decision-making. In one example, Jasanoff explains that “whereas British actuaries and French railroad engineers admitted that their cost-benefit calculations reflected professional judgments, [U.S. Army] Corps [of Engineers] stoutly maintained that their assessments were not so compromised; *their* numbers were not subjective estimates but reliable representations of reality.”⁸⁹ Implicit in the expectation that policy be grounded in science is the assumption that science is free from politics; that it is objective truth. In the U.S., we are so used to this model of understanding that it can often be difficult to see any other possibility.⁹⁰

These different understandings of policy and the role of science translate, unsurprisingly, into different models for regulating GMOs. Daniel Lee Kleinman assigns labels to three different models of regulation: liberal science-based, precautionary science-based, and social values-based.⁹¹ Liberal science-based regulation, the United States’ model, essentially posits that unless scientific evidence shows harm or danger, it is best to let a GMO be produced and sold. What Kleinman does not touch on is the assumption inherent in this model that science is best left to its own devices; the best possible outcome will be achieved if we leave science alone and let scientists find solutions.

⁸⁹ Sheila Jasanoff, *Designs on Nature: Science and Democracy in Europe and the United States*, 18-19 (2007).

⁹⁰ One recent example of public expectation that science be free from politics is “Climategate,” the leaked climate scientist e-mails that “painted researches as censorious,” as one article in *Scientific American* put it. Evidence indicating that scientists had a political agenda and were manipulating the data was a scandal to Americans; how could the objective experts succumb to political goals rather than presenting the truth? The article presents the questions: “How badly have recent events shaken people’s faith in science? Does the public still trust scientists?” See *In Science We Trust*, *Scientific American Magazine* (2010).

⁹¹ Daniel Lee Kleinman, Abby J Kinchy, and Robyn Autry, *Local variation or global convergence in agricultural biotechnology policy? A comparative analysis* 36 *Sci. and Pub. Pol.* 361, (2009), available at <http://www.drs.wisc.edu/documents/articles/kleinman/local-variation.pdf>.

In contrast to the liberal science-based model of regulation is the precautionary science-based model: the model the European Union uses.⁹² Where the liberal science-based model assumes a GMO is innocent until proven guilty—safe unless solid proof can show otherwise—the precautionary science-based model flips the burden of proof, asserting that it is safer to assume that risk is likely and wait until proof surfaces that it is not than to suffer damage to human or environmental health. Both models are based deeply in different nations’ cultural and historical identities.

The third model Kleinman presents is social values-based: a system of regulation that intentionally incorporates social and cultural values, subverting the other two models almost entirely by rejecting the assumption that science alone is capable of providing answers to controversial debates. I will return to this model with a much more in-depth exploration in the next chapter, but it is relevant to understanding the spectrum along which models of science regulation can lie. The concept of social values-based regulation situates the European and American models of regulation much more closely than the polarized GM debate would make it seem; because they both rely on the expertise of science—based on a belief in the objective—to be the determinant factor of regulation, they are much more similar to each other than a country that regulates by including values outside of science as well.⁹³

Moving beyond theoretical and comparative frameworks for understanding U.S. regulation of GMOs, let’s take a look at the actual system of

⁹² *Id.* 363

⁹³ *Id.* 369

regulation—or, perhaps, lack of regulation. The major piece of legislation establishing the rules of regulation for genetically modified organisms in the U.S. is the Coordinated Framework for Regulation of Biotechnology,⁹⁴ an Office of Science and Technology Policy—the White House office of science advisers created by Kennedy—document. At the time the Coordinated Framework was published, rDNA technology (the technology by which a plant or animal is genetically modified) was still relatively new; the process had been discovered only a decade earlier and ruled patentable—along with the products it created—six years before.⁹⁵ The Coordinated Framework established two important assumptions that—because they have been identified, as Gregory Mandel asserts, as the “cause of many of the deficiencies . . . [of the] regulatory structure governing genetically modified products”⁹⁶—are worth dissecting briefly: 1) the rDNA process is not inherently different from “traditional genetic modification techniques”⁹⁷ in a significant way and thus 2) existing legislation—which regulates the *product* rather than the *process*—is adequate for regulating this new technology.⁹⁸

The grounds upon which the rDNA process was evaluated were ones of risk—particularly to human health and the environment. In the most simple of

⁹⁴ Coordinated Framework for Regulation of Biotechnology, 51 Fed. Reg. 23302 (June 26, 1986).

⁹⁵ Susan Wright, *Recombinant DNA Technology and Its Social Transformation, 1972-1982*, 2 *Osiris* 303-360 (1986), available at <http://www.jstor.org/stable/301837>.

⁹⁶ Gregory N. Mandel, *Gaps, Inexperience, Inconsistencies, and Overlaps: Crisis in the Regulation of Genetically Modified Plants and Animals*, 45 *Wm. & Mary L. Rev.* 2167, 2242 (2004).

⁹⁷ 51 Fed. Reg. 23302, 3

⁹⁸ *Guide to U.S. Regulation of Genetically Modified Food and Agricultural Biotechnology Product*. Pew Initiative on Food and Biotechnology, available at http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Food_and_Biotechnology/hhs_biotech_0901.pdf.

terms, as the Coordinated Framework lays it out, the question was “whether products resulting from the recently developed techniques would pose greater *risks* than those achieved through traditional manipulation techniques.”⁹⁹ There is an entire field of academia and analysis exploring the concept of risk and risk assessment,¹⁰⁰ but what is key is that in policy debates and discussions, particularly in the U.S., “risk” is inherently tied up in science; it relies upon “objective, scientific opinion, based on the actual facts of the case”¹⁰¹ and thus is often framed as a dispute between “those who accept the findings of science and those who do not.”¹⁰² While I dispute this understanding of risk and instead posit that risk debates are in fact “primarily debates about values,”¹⁰³—which I will explore much more in the next chapter— it is important to understand that the rDNA process is evaluated on a scientific understanding of risk—and a belief that the true answers can always be found in science. The OSTP found that most of this new technology posed little risk to human health and the environment and thus as a *process* was safe. Thus, it would be the *products* of the process that would be regulated individually and not the process itself.

The second assertion essentially states that because the process of rDNA technology does not make a product inherently different from a traditionally modified organism, we do not need any new legislation to regulate it; the same legislation that is used to regulate traditionally modified organisms can be

⁹⁹ 51 Fed. Reg. 23302, 3 (*italics mine*).

¹⁰⁰ See, for instance, Paul Slovic, *Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield*, 19 *Risk Anal.* 689 (1999).

¹⁰¹ Conrad G. Brunk, Lawrence Haworth, and Brenda Lee. *Value assumptions in risk assessment: a case study of the alachlor controversy*, 1 (1995).

¹⁰² *Id.*

¹⁰³ *Id.*

applied here. Most of the remaining pages of the Coordinated Framework are spent explaining what legislation applies to which products: that is to say, how a particular genetically modified organism will be regulated.

There are many, *many* routes a GMO can take through the regulatory pathway. The Coordinated Framework¹⁰⁴ is 123 pages and even the Pew Initiative’s simplified handbook—the Guide to U.S. Regulation of Genetically Modified Food and Agricultural Biotechnology Product¹⁰⁵—is 29 pages. Three main agencies—the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA), and the Department of Agriculture (USDA)—are responsible for regulating GMOs. Each follows different methods and pathways. For instance, a transgenic plant is regulated completely differently—by a different agency under different legislation following different rules and guidelines—than a transgenic animal. And even within those boundaries, there are different regulatory pathways; a plant that is genetically modified to be resistant to a pesticide is regulated completely differently than a plant that is genetically modified to *produce* a pesticide (the former is regulated by the USDA and the latter by the EPA, to highlight what is perhaps the biggest difference). Because the system of regulation is composed of what the Coordinated Framework calls a “mosaic of existing federal law,” there is no single, clear route a GMO follows to be regulated.

Clearly, because this patchwork of laws creates so many different and confusing pathways for a given GMO to take, it would be both inefficient and

¹⁰⁴ Coordinated Framework, 51 Fed. Reg. 23302, *supra*.

¹⁰⁵ *Guide to U.S. Regulation, supra*.

unnecessary to explain every one of the many regulatory pathways for GMOs. Thus, I will be focusing on the specific regulatory pathway relevant to the case *Monsanto v. Geertson Seed Farms*:¹⁰⁶ that of a transgenic herbicide resistant plant. Most GMOs currently produced commercially fall under this category; in fact, the term “GMO” often is used in articles to refer specifically to GM crops. While there are other types of GMOs that are the subject of current controversy—AquAdvantage salmon, the first GM animal to be sold for human consumption, is one such example¹⁰⁷—most of the GMOs commercially sold are GM crops.

The Coordinated Framework assigns transgenic plants that do not produce their own pesticide or herbicide to be regulated by the Animal and Plant Health Inspection Service (APHIS), a branch of the Department of Agriculture (USDA), under legislation that in 2002 was consolidated into the Plant Protection Act (previously including legislation such as the Federal Plant Pest Act and The Plant Quarantine Act¹⁰⁸—the earliest of which was passed in 1912¹⁰⁹). Via the Coordinated Framework, a transgenic plant is considered to be a “plant pest” and under the PPA is thus deemed a “regulated article.”¹¹⁰ A regulated article is subject to strict regulations, the most significant of which is that it cannot be commercially produced or sold.

¹⁰⁶ For information on why I use this case as my example, see p. 11-12.

¹⁰⁷ *Transgenic salmon, supra*.

¹⁰⁸ Coordinated Framework, 51 Fed. Reg. 23302, *supra* at 6.

¹⁰⁹ *About APHIS*, USDA/APHIS, available at http://www.aphis.usda.gov/about_aphis/history.shtml.

¹¹⁰ *Monsanto v. Geertson Seed Farms*, 130 S. Ct. 2743 (2010).

Thus, the main method by which transgenic plants are regulated is through *deregulation*. When a party (in this case, Monsanto) wants to produce a GM plant for sale, it applies for nonregulated status. The legislation that determines how an agency must go about approving this application is the National Environmental Policy Act of 1969 (NEPA). NEPA is a broadly written environmental act designed to keep federal actions—this can be anything from a coal mine to a highway to a transgenic plant¹¹¹—in line with larger environmental goals. NEPA directs federal agencies to evaluate the potential environmental impacts of “every recommendation or report on proposals for legislation and other major Federal actions *significantly affecting* the quality of the human environment.”¹¹² What makes an action—such as the deregulation of a GMO—“significant” is left completely undefined; the act provides no criteria by which an agency can determine which actions “significantly affect” the human environment. NEPA does require an agency, when proposing an action, to include an Environmental Impact Statement (EIS) that addresses:

- (i) the environmental impact of the proposed action,
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.¹¹³

¹¹¹ National Environmental Policy Act (NEPA) Policies & Guidance, EPA, available at <http://www.epa.gov/compliance/resources/policies/nepa/>

¹¹² 42 USC § 4332, (*italics mine*)

¹¹³ *Id.*

Once again, however, it leaves important terms such as “environmental impact,” and “adverse environmental effects” undefined.

More importantly, if a shorter Environmental Assessment (EA) is completed and shows that an EIS is not necessary, the agency is not required to complete an EIS at all. An EA often breaks down into a mini-EIS, using the same basic categories to evaluate a GMO: alternatives to the proposed action and the potential environmental impacts. The proposed alternatives are usually “No Action,” meaning the GMO remains a regulated article and cannot be sold, “Determination that [the article] is No Longer Regulated, in Whole” meaning the GMO is no longer subject to any regulatory oversight and can be produced and sold freely, and “Determination that [the article] is No Longer Regulated, in Part,” meaning that the GMO can be produced and sold but is still subject to some oversight and regulations designed to limit its environmental impacts.¹¹⁴

¹¹⁵ It seems unlikely that APHIS actually considers these alternatives with any level of depth, however, considering that never *once* for any GMO petition have they chosen any alternative other than full deregulation.¹¹⁶ ¹¹⁷ Not only have

¹¹⁴ U.S. Department of Agriculture Animal and Plant Health Inspection Service, *USDA/APHIS Environmental Assessment In response to Monsanto Petition 06-178-01p seeking a Determination of Non-regulated Status for Roundup RReady2Yield Soybean MON 89788* (2006).

¹¹⁵ U.S. Department of Agriculture Animal and Plant Health Inspection Service, *USDA/APHIS Environmental Assessment In response to Monsanto Petition 06-178-01p seeking a Determination of Non-regulated Status for Roundup Ready Alfalfa Events J101 and J163* (2004).

¹¹⁶ Bruce Knight, *Catching and Keeping Up*, Agri-Pulse (2011), available at: http://www.agri-pulse.com/Opinion_Knight_CatchingupandKeepingUp_11132011.asp: “The safety of biotech crops is well-established, based on repeated scientific evaluations. As a result, APHIS has never denied a deregulation request.”

¹¹⁷ Kristin Hubbard, *Regulatory Oversight of GE Crops Just Got Weaker*, Organic Seed Alliance (2011), available at <http://blog.seedalliance.org/2011/04/20/regulatory-oversight-of-ge-crops-just-got-weaker/>: “The government largely relies on the manufacturer’s own data when putting together an environmental assessment before approving (because they’ve never denied) a petition.”

they approved every single petition for nonregulated status, they have done so without ever concluding that more than the basic EA was necessary; of the 89 GM crops APHIS has approved for nonregulated status, only one has ever undergone an EIS before being completely deregulated. That crop is the Roundup Ready alfalfa that the Supreme Court ruled required an EIS in *Monsanto v. Geertson Seed Farms*,¹¹⁸ essentially forcing APHIS to perform an EIS.¹¹⁹ NEPA does not provide specific criteria for determining when an Environmental Assessment is sufficient and when an Environmental Impact Statement is necessary; it leaves much of this decision making to the agency. “Although NEPA requires agencies to go through an environmental assessment process, it does not require agencies to make decisions based on that assessment. In addition, agencies have discretion to establish categorical exclusions from NEPA requirements.”¹²⁰ The vagueness of NEPA gives federal agencies—in this case, APHIS—a huge amount of leeway in deciding how to order the regulatory process for GMOs.

It is important to note that NEPA is not the only guide APHIS has for regulating GMOs; there are three sets of federal regulations designed to instruct APHIS’ implementation of NEPA: the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA,¹²¹ Office of the Secretary of Agriculture Implementation of NEPA,¹²² and the APHIS NEPA Implementing Procedures.¹²³

¹¹⁸ *Petitions for Nonregulated Status Granted or Pending by APHIS as of February 27, 2012*, USDA/APHIS available at http://www.aphis.usda.gov/biotechnology/not_reg.html

¹¹⁹ This will be explained in much more detail in Chapter 4.

¹²⁰ *Guide to U.S. Regulation, supra*

¹²¹ 40 CFR § 1500–1508 (1984)

¹²² 7 CFR § 1b (1983)

Yet these regulations are similarly vague and broad, doing little to clear up the confusion of NEPA. For instance, one section of the APHIS NEPA Implementing Procedures defines a class of “[a]ctions normally requiring environmental assessments but not necessarily environmental impact statements” as one that “generally is related to a more discrete program component and is characterized by its limited scope (particular sites, species, or activities) and potential effect (impacting relatively few environmental values or systems).”¹²⁴ Here, we find similar questions as with NEPA: How is a “discrete program component” defined? How limited must the scope of a project be? How many particular sites, species, or activities can it affect? What constitutes a limited potential effect? How many environmental values or systems must a project affect before it surpasses “relatively few?”

The Office of the Secretary of Agriculture Implementation of NEPA regulations, which are largely focused on exceptions to the requirements of NEPA—that is, which projects do not require an EA or EIS and which agency units do not have to prepare EAs or EISs—explicitly leaves much of the regulatory planning to APHIS: “Agencies will identify in their own procedures the activities which normally would not require an environmental assessment or environmental impact statement.”¹²⁵

The CEQ Regulations for Implementing NEPA, despite being by far the most in-depth of the three sets of regulations, still use vague language and leave

¹²³ 7 CFR § 372 (1995)

¹²⁴ *Id.* at § 372.5b (1995)

¹²⁵ 7 CFR § 1b.3b(1983)

many definitions unclear. For instance, they devote a large section to defining “significantly,”¹²⁶ one of the most confusing and undefined words used in NEPA as described above, but fails to provide any specific criteria. For instance, it directs agencies to pay attention to “context,” explaining that “in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole,”¹²⁷ but fails to address what types of effects—either in a specific site or within the “world as a whole”—the agencies should take into consideration. Similarly, it directs agencies to consider “intensity”—that is, “the severity of the impact”¹²⁸—by evaluating “both beneficial and adverse” impacts,¹²⁹ the “degree to which the proposed action affects public . . . safety,”¹³⁰ and the “degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks”¹³¹ without providing any criteria for examining these categories. What would make an impact beneficial or adverse? Are the terms “beneficial” and “adverse” not inherently subjective? What constitutes “public safety?” How should an agency determine if an action is “safe” or not? Even where it does provide a definition, as it does with the term “human environment,” it still leaves unanswered questions. The CEQ regulations assert that “‘Human environment’ shall be interpreted comprehensively to include the natural and physical environment

¹²⁶ 40 CFR § 1508.27

¹²⁷ *Id.* at § 1508.27a

¹²⁸ *Id.* at § 1508.27b

¹²⁹ *Id.* at § 1508.27b1

¹³⁰ *Id.* at § 1508.27b2

¹³¹ *Id.* at § 1508.27b5

and the relationship of people with that environment.”¹³² Yet this definition is incredibly vague. What constitutes the “natural and physical environment?” Do parks, farms, or houses count? What about the “relationship of people with that environment?” Does a philosophical relationship such as the enjoyment of ‘natural’ foods count? Even where the CEQ regulations attempt to fill in some of the loopholes in NEPA, such as defining “effects,” they offer only a vague answer; “effects” include “ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative.”¹³³ Once again, we are left questioning what is considered an aesthetic effect, a cultural effect, a social effect.

Undoubtedly, much of the vagueness of these regulations derives from the fact that they apply to a broad swath of federal actions, not just GMO regulation. How can the same criteria for approving, for instance, a plan to manage the damage gray wolves cause in Idaho¹³⁴ be applied to the deregulation of a GMO? Mandel asserts that such problems are a result of “the historical accident of transgenic products being squeezed into statutory definitions not intended for them.”¹³⁵ I assert, however, that the modge podge of laws our GMO regulatory process relies on is no accident; the Coordinated Framework explicitly sought to

¹³² *Id.* at § 1508.14

¹³³ *Id.* at § 1508.8

¹³⁴ USDA/APHIS and Idaho Department of Fish and Game, *Draft Environmental Assessment: Gray Wolf Damage Management in Idaho for Protection of Livestock and other Domestic Animals, Wild Ungulates, and Human Safety* (2010), available at http://www.aphis.usda.gov/regulations/pdfs/nepa/idaho_wolf_ea.pdf (last visited Apr. 10, 2012)

¹³⁵ Mandel, *supra* at 2251.

answer the question of “whether the regulatory framework that pertained to products developed by traditional genetic manipulation techniques was adequate for products obtained with the new techniques.”¹³⁶ The answer, for the OSTP, was yes—the existing regulatory framework is sufficient. Clearly, we can see the challenges this creates. With such confusing and broad legislation, much of the process and requirements for regulating GMOs are left to the agencies—in the case of GM crops, APHIS—to establish.

APHIS interprets the criteria for constituting environmental impact very narrowly. Because APHIS assumes authority for regulating genetically modified plants under the Plant Protection Act, the agency determines that if a genetically modified plant is harmful (according to NEPA’s standards of what constitutes an environmental harm), it will be because it is a plant pest risk. Thus, in order for APHIS to deregulate a GM crop, it must prove that the crop presents no plant pest risk. This assumption of the types of harm a GM plant may present—i.e., those of a plant pest—is a narrow interpretation of NEPA’s criteria. Why is it assumed that a GM plant presents only the potential harms a plant pest would? Is there no possibility that a GM plant will present environmental harms not encompassed by the definition of a “plant pest”—no possibility that it will harm the environment beyond plants? Yet even within this narrow interpretation, there is still much vagueness; the term “plant pest” is incredibly vague in definition. According to the PPA, “The term ‘plant pest’ means any living stage of

¹³⁶ Coordinated Framework, 51 Fed. Reg. 23302, *supra* at 3-4.

any of the following that can directly or indirectly injure, cause damage to, or cause disease in any plant or plant product:

- (A) A protozoan.
- (B) A nonhuman animal.
- (C) A parasitic plant.
- (D) A bacterium.
- (E) A fungus.
- (F) A virus or viroid.
- (G) An infectious agent or other pathogen.
- (H) Any article similar to or allied with any of the articles specified in the preceding subparagraphs.¹³⁷

We may ask: does proving that a GMO does not fall into any of the categories A through H constitute proving that it is not a plant pest risk? That is, can a GMO be deregulated simply by showing that it is not like any of the above? Further, and perhaps more significantly, we may also ask (once again): what constitutes injury?

Usually, APHIS conducts public comment sessions at which citizens can come to express opinions about the deregulation of a GM crop, although the extent to which APHIS is required to take these comments into account is not clearly established, which I explore more in the next chapter.¹³⁸ Once APHIS has approved a GMO for nonregulated status, they release the EA (or EIS) final report and a public announcement of Determination of Nonregulated Status.

At every step of the GMO regulation process, definitions, requirements, and guidelines are hazy. The separate acts of legislation that have been forced together to create a makeshift regulatory process for GMOs leave many unexplored loopholes and unanswered questions. Clearly, the complexity and

¹³⁷ Title IV—Plant Protection Act, 114 STAT. 438 (2000).

¹³⁸ 40 CFR Sec. 1506.6

vagueness of this regulatory process has consequences for the effectiveness of the regulatory system. In the following chapters, I will explore these effects.

Chapter 3

The Role of Courts in GMO Regulation

As we have seen, the process of regulating GMOs in the U.S. is a labyrinth; simultaneously complex and vague, confusing and broad, it can be a challenge to navigate. It is in large part because of the confusion and contradictions inherent in the regulatory structure that stakeholders seek answers in the courts. Yet there are other causes for this movement toward courts as regulators as well—some based in the structure of the GM regulation process, some based in the role courts play in the U.S. legal system overall, and some based in the balance between courts and other policymakers in the scientific regulatory structure. In this chapter, I will explore the reasons that the courts have become the means by which parties can bring social values to the table in the GM regulation process in the U.S.

Over the past several years, GMO cases have been popping up in federal courts all over the country. The typical case¹³⁹ involves a group of NGOs suing one of the three agencies charged with regulation of GMOs—the Environmental Protection Agency (EPA), the Animal and Plant Health Inspection Service (APHIS), a branch of the Department of Agriculture (USDA), or the Food and Drug Administration (FDA)—with improperly regulating a specific product. The

¹³⁹ This summary excludes the recent *OSGATA et al v. Monsanto* and other patent infringement cases as well as false advertising lawsuits against companies like Frito-Lay, ConAgra, and Naked Juice for labeling their GMO-based products “all-natural.” These cases, while extremely interesting and undoubtedly worth a thesis of their own, involve completely separate areas of law and are not about the process of or legislation for regulating GMOs. For the purpose of this thesis, I will be sticking to cases involving the regulation of (i.e., the decision to commercially release) GMOs.

NGOs are usually environmental groups such as Greenpeace¹⁴⁰ or the Natural Resources Defense Council,¹⁴¹ ¹⁴² food safety and consumer rights groups such as the Center for Food Safety,¹⁴³ and farmers' alliances and unions.¹⁴⁴ Almost all of these cases have sprung up in the past decade, during which time the ratio of crops planted that are genetically modified has shot up from less than half to well over three quarters—and, in the case of some crops, nearly all.¹⁴⁵ As the GMO debate has grown, so has the role of courts in regulating them. Why have courts become the arena in which the GMO debate is being played out? What factors have allowed or even encouraged the courts to take on this role?

One trend identified in recent decades that may have an influence on the prevalence of GMO cases in courts is that the power of judges and courts has been expanding. Policymaking, once seen as the job of the legislature, is increasingly an area in which courts are having a hand.¹⁴⁶ Issues that were once considered off-limits to judges have become the subject of many Supreme Court cases: *Roe v. Wade* and *Bush v. Gore* are some of the most glaring examples of this, taking highly political controversies and turning them into the matter of

¹⁴⁰ *Greenpeace Wins First Round in EPA Lawsuit to Ban Bt Crops*, Organic Consumers (2000), available at <http://www.organicconsumers.org/ge/grnpeacesuit.cfm>.

¹⁴¹ David Martin, *Group Sues EPA over Popular Weed Killer 2, 4-D*, Organic Consumers Association (2012), available at http://www.organicconsumers.org/articles/article_24953.cfm.

¹⁴² David Erickson and Mark Anstoetter, *NRDC sues USDA seeking documents related to deregulation of GM plants*, Association of Corporate Counsel (2012), available at <http://www.lexology.com/library/detail.aspx?g=639f7064-efe5-478b-b535-c487c52e3934>

¹⁴³ *Center for Food Safety*, *supra*

¹⁴⁴ Press Release, *Farmers and Consumer Groups File Lawsuit Challenging Genetically Engineered Alfalfa Approval*, Center for Food Safety (2011), available at <http://www.centerforfoodsafety.org/2011/03/18/farmers-and-consumer-groups-file-lawsuit-challenging-genetically-engineered-alfalfa-approval/>

¹⁴⁵ *Adoption of Genetically Engineered Crops*, *supra*.

¹⁴⁶ Donald L. Horowitz, *The Courts and Social Policy*, 4 (1977).

courts.¹⁴⁷ As Donald L. Horowitz wrote, “the scope of judicial business has broadened . . . the courts have tended to move from the byways onto the highways of policymaking.”¹⁴⁸ Some critics blame this shift on “judicial activism”¹⁴⁹—judges manipulating the law to implement their own values as policy rather than simply interpreting it—while others assert that the job of judges is to do precisely what such critics are labeling activism.¹⁵⁰ Yet the surge in conversation about the transforming role of courts is undeniable, and the fact that the responsibility of individual judges is so hotly debated suggests that the change may be more systemic.¹⁵¹

A more recent iteration of this argument is that of the judicialization of politics, which Martin M. Shapiro and Alec Stone Sweet define as the process by which courts and the judicial system “progressively [shape] the strategic behavior of political actors engaged in interactions with one another.”¹⁵² In Ran Hirschl’s simpler language, judicialization of politics is “the ever-accelerating reliance on courts worldwide for addressing core moral predicaments, public policy questions, and political controversies.”¹⁵³ The authors of both pieces argue that the judicialization of politics is occurring rapidly, and not just in

¹⁴⁷ Jeffrey A. Segal and Harold J. Spaeth, *The Supreme Court and the Attitudinal Model Revisited*, 2 (2002).

¹⁴⁸ Horowitz, *supra* at 9.

¹⁴⁹ Mark Reed Levin, *Men in Black: How the Supreme Court is Destroying America*, 14 (2005).

¹⁵⁰ Kermit Roosevelt III, *The Myth of Judicial Activism: Making Sense of Supreme Court Decisions* (2008).

¹⁵¹ Horowitz, *supra* at 9.

¹⁵² Martin M. Shapiro and Alec Stone Sweet, *On Law, Politics, and Judicialization*, 71 (2002).

¹⁵³ Ran Hirschl, *The New Constitutionalism and the Judicialization of Pure Politics Worldwide*, 75 *Ford. L. Rev.* 721 (2006), available at <http://ssrn.com/abstract=951610>.

America; across the globe, judges and courts are playing a larger and larger role in policymaking.^{154 155}

Although high-profile cases like *Roe* and *Bush* are clearly very different from a case about the regulation of GMOs, the overall trend is significant. The increasingly large role courts are playing in policy and politics has an effect on not just visible, controversial issues like abortion but trickles down to affect policy at all levels. As Shapiro, Sweet, and Hirschl assert, policymaking is moving more and more into the realm of courts across the board. GMOs may simply be following the pattern, the courts influencing GMO regulation more and more just as they are having a greater hand in any given area of policymaking. Another possibility is that the visibility of the trend of judicialization encourages stakeholders to pursue policy changes through the courts; because they can see the effect courts are having on a myriad of policy, they view the courts as the best route for enacting policy change. Perhaps GMOs are part of a larger pattern, but perhaps they are part of the pattern because the pattern is encouraging interested parties to bring their policy concerns to the courts. The judicialization of politics is one factor that is likely influencing the large role of courts in regulating GMOs; as courts take on a larger and larger role in policymaking overall, the regulation of GMOs is bound to follow suit.

Further, and more specifically, courts have clearly become active players in the regulation of science in recent years,¹⁵⁶ igniting debate about what role

¹⁵⁴ Shapiro and Sweet, *supra* at 1.

¹⁵⁵ Hirschl, *supra*.

¹⁵⁶ Jasanoff, *Fifth Branch*, *supra* at 49.

non-scientist judges ought to have in scientific controversies.¹⁵⁷ In the 70s, as citizens became frustrated with federal agencies' slowness in acting on Congressional mandates, they turned to the courts to force the regulators to regulate. As Jasanoff explains, "the courts were more than willing to steep themselves in the intricacies of environmental and public health legislation and to make their own independent evaluations of the agencies' technical determinations."¹⁵⁸ Indeed, despite judges' continued insistence on their own restraint and deference to scientific expertise, they have increasingly taken on the role of scientific regulators themselves.¹⁵⁹ Thus, it is no surprise that as GMOs have entered scientific discourse, they, like chemical health hazards,¹⁶⁰ DNA property rights,¹⁶¹ air pollution,¹⁶² and a long list of other scientific controversies, have found their way into court.

Beyond general trends toward courts as regulators and policymakers, however, the regulatory system for GMOs specifically has undoubtedly had a part to play in the prevalence of GMO cases in courts. The simultaneous complexity and vagueness of the legislation, the confusion of the process, and the many players in the system lead controversies over GMOs into court.

The attempt to use existing legislation to cover all the bases of GMOs, as explained in the previous chapter, has essentially created a confusing hodge-podge of laws and agencies. GMOs can take one of what seems an unending

¹⁵⁷ Sheila Jasanoff, *Science at the Bar: Law, Science, and Technology in America*, 1 (1997).

¹⁵⁸ Jasanoff, *Fifth Branch*, *supra* at 49.

¹⁵⁹ Jasanoff, *Fifth Branch*, *supra* at 53-55.

¹⁶⁰ Jasanoff, *Fifth Branch*, *supra* at 51.

¹⁶¹ Jasanoff, *Science at the Bar*, *supra* at 18.

¹⁶² Jack Landau, *Chevron, USA v. NRDC: The Supreme Court Declines to Burst the EPA's Bubble Concept*, 15 *Env'tl. L.* 285 (1984-1985).

number of pathways through the regulatory system; depending on its attributes, it can be delegated to one of three agencies under one or more of eleven laws and statutes, examined for completely different risks or properties, and controlled or released according to completely different sets of rules and processes. A genetically modified plant is regulated by either the EPA or the USDA, depending on its characteristics, while a genetically modified animal is regulated by the FDA. The set of standards each of the agencies uses to determine the safety of a GMO are dramatically different from one another. For instance, where the APHIS *deregulates* a plant according to the Plant Protection Act (PPA) for it to be sold¹⁶³, the EPA requires that a plant be *registered* according to the Federal Insecticide, Fungicide and Rodenticide Act in order for it to be sold¹⁶⁴—and the criteria required for obtaining each of these statuses, as well as the steps for determining that those criteria are met, are, of course, different depending on the act. Some GM products are not even clearly delegated to any particular agency by the myriad statutes and laws applied to GMOs; the FDA was not officially made the agency responsible for regulating GM animals until 2009, when the first such animal—the AquAdvantage salmon¹⁶⁵—was seeking commercial approval.^{166 167 168} Products *derived* from transgenic organisms—e.g., a food derived from a genetically modified plant or a chemical

¹⁶³ *Guide to U.S. Regulation, supra* at 10.

¹⁶⁴ *Guide to U.S. Regulation, supra* at 13.

¹⁶⁵ *Transgenic salmon, supra*.

¹⁶⁶ *Guide to U.S. Regulation, supra* at 15.

¹⁶⁷ *FDA Issues Final Guidance on Regulating Genetically Engineered Animals*, FDA News Release, (2009), available at

<http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2009/ucm109066.htm>.

¹⁶⁸ April Forristall, *Genetically Modified Salmon Still Waiting FDA Approval*, Seafood News Aquaculture, available at <http://www.seafoodsource.com/newsarticledetail.aspx?id=2342>.

produced by a genetically modified animal—open up a whole new set of laws and regulations even more complex and confusing than for transgenic organisms themselves.¹⁶⁹

In addition to this confusing assortment of laws, agencies, and rules that have been almost haphazardly brought together to constitute a regulatory system for GMOs, the criteria for determining whether or not a GMO is safe is another challenge in the process; simultaneously narrow and vague, what we use to classify a GMO as dangerous or not is just as confusing as determining which agency is responsible for giving it such a classification. As discussed in the last chapter, the legislation, because it was drafted before GMOs even existed, uses language that is not only confusing to apply to GMOs but leaves much room for interpretation to the agencies. APHIS is required by the National Environmental Policy Act (NEPA) to evaluate the potential “environmental impact” of a GMO before deregulating it, but what constitutes a significant environmental impact is barely defined. Further, what an agency is required to do if they *do* find a significant environmental impact is not clearly established. The federal regulations designed to inform APHIS’ implementation of NEPA do little to clarify NEPA’s guidelines; the language they use is often just as confusing and sometimes seems to broaden the definitions even further, giving more leeway to the agencies in determining their meaning.¹⁷⁰ In response to such vague rules and criteria, it seems, APHIS has adopted extremely narrow definitions of what constitutes an environmental impact. Because the PPA

¹⁶⁹ *Guide to U.S. Regulation, supra* at 18-19.

¹⁷⁰ See, for instance, 40 § C.F.R. 1507.3 Agency procedures.

designates the USDA—specifically APHIS—as the agency that regulates herbicide and pesticide resistant GM plants, APHIS bases its deregulation process around the concept of “plant pest risk,” disregarding a whole host of other potential environmental impacts that may exist outside the realm of a plant pest. The vague definition leaves much room for challenges of the agency’s interpretation of the vague NEPA definitions—and courts often become the arenas for this.

Courts take on this role because APHIS does not. Although APHIS provides a forum for public comments before they deregulate a GMO, such a forum cannot do nearly enough to accommodate concerns over GMO legislation. If a citizen wishes to challenge the deregulation of a GMO, the public comment period allows them to express their concern—but only within the limits of APHIS’ interpretation of NEPA’s definitions. If a GMO may present an environmental impact that a citizen believes falls within NEPA’s vague definition of environmental impact but outside APHIS’ narrow interpretation of this definition, the public comment period does little to respond to their concerns. As Toddi A. Steelman asserts¹⁷¹, the information citizens provide at public comment sessions tends to be “value-based” and that “such value-based information is more difficult to manage and respond to than technical information.” Steelman argues, however, that such comments are valuable and that agencies “may need to adapt accordingly.” If the values a citizen presents during a public comment

¹⁷¹ Toddi A. Steelman, *The Public Comment Process: What Do Citizens Contribute to National Forest Management?*, 97 *Journal of Forestry* 22 (1999). Although this study is focused on the National Forest Service, its conclusions transfer well to other federal agencies.

period do not fall within APHIS' definition of a potential environmental impact, they are essentially disregarded. A paragraph from the Environmental Impact Statement for Roundup Ready alfalfa following *Monsanto v. Geertson Seed Farms* demonstrates this:

[N]one of the comments received during the public comment period of the original EA in 2005 . . . and during the public comment period of the NOI or the Draft EIS cited concerns regarding a difference in or occurrence of any plant pest risks in GT alfalfa lines J101 and J163.¹⁷²

Because the comments from the public comment period did not assert that the alfalfa presented a potential environmental impact according to APHIS' narrow definition—that is, a “plant pest risk,” they did not have any significant effect on the outcome of the regulation. Even when the comments expressing disagreement with a deregulation decision vastly outnumber the comments agreeing with a deregulation decision, as they did during the public comment period for the Roundup Ready alfalfa—“of the 663 comments received by the agency, 520 opposed deregulation”¹⁷³—only comments that fit within an objective science-based framework hold any weight. This is where courts come into play; where agencies do not provide a forum for the inclusion of a wider array of values, courts do. For many citizens, courts become the arena in which values that find no welcome in agency decision-making can become part of the discussion.

¹⁷² *Events J101 and J163 Environmental Impact Statement, supra* at 16.

¹⁷³ *Geertson Seed Farms v. Johanns*, No. C 06-01075 CRB, 2007 WL 518624, at 3, lines 2-3

Despite the way the regulation of GMOs is framed in the U.S.—as a matter of science, of deducing harm and safety—there are many more values at play than appear on the surface. As Glenn Stone wrote, all sides of the debate over genetic modification consistently portray it as a “monolithic project”—something that is universally good or evil, an issue on which one must take a side and stick to it.¹⁷⁴ Yet genetic modification is a many-sided issue that cannot be broken down so neatly. Beyond just the science—i.e. are GMOs dangerous and unhealthy or are they the potential cure to famines across the globe?—the issues at play in the genetic modification debate are complex and based in deeply-seated social values, as I will explore in both this chapter and Chapter 4.

Although the GMO debate is framed as a polarized issue whose ultimate solution lies in science, I assert that there are social values underlying this black and white portrayal. To begin with, even the ‘science’ on which genetic modification regulation is based is inherently rooted in values. As Les Levidow and Joseph Murphy wrote, “In seeking and organizing more facts about risks, regulators implicitly make sociopolitical choices. For example, they choose what potential harms to prevent and, in so doing, what opportunities to forego.”¹⁷⁵ In other words, as Chaia Heller wrote, “Never did actors note the possibility that risk might be one frame among others for talking about technoscience issues. Nor did they appear to be conscious of . . . other related concerns such as food

¹⁷⁴ Stone, *supra* at 611.

¹⁷⁵ Les Levidow and Joseph Murphy, *Reframing Regulatory Science : Trans-Atlantic Conflicts over GM Crops*, 68-69 *Cahiers d'économie et sociologie rurales* 50 (2003).

quality, the ethics of life-patenting, and so-on.”¹⁷⁶ APHIS’ traditional interpretation of what constitutes an environmental impact is a perfect example of this; they view the only potential risks as ones associated with plant pests, inherently prioritizing science over social values—a value statement in itself. Social impacts, such as the effect the spread of a GM variety of a crop may have on a consumer’s right to choose what foods they eat, and socioeconomic impacts, such as the effect a GMO’s release may have on an organic farmer’s income—both values that *Monsanto v. Geertson Seed Farms* addresses as I will illustrate in Chapter 4—are never calculated into risk. Many other social values are entirely absent from the regulation of GMOs; the value of family farms vs. corporate farms, the impact of a few large corporations controlling much of the U.S. food supply, the ethical aspects of being able to patent a living plant—just to list a few—are value-based concepts never considered in the science-based process of regulation. The regulatory framework makes no space for social values like these; its patchwork of legislation—vague and confusing by choice¹⁷⁷—makes room only for “objective” data, ironically expressing its own value judgments of the objectivity of science over the social and socioeconomic impacts on stakeholders. APHIS chooses to interpret the legislation along very narrow definitions, furthering the divide between “science” and “non-science” social values. While the U.S. is not unique in its science-based, safe-or-dangerous regulatory process for GMOs, however, there are other models for regulating.

¹⁷⁶ Chaia Heller, *Risky Science and Savoir-Faire: Peasant Expertise in the French Debate over Genetically Modified Crops*, in *The Politics of Food*, Ed. Marianne E. Lien and Brigitte Nerlich, 83 (2004).

¹⁷⁷ See Chapter 2, p. 37-38

Indeed, as Kleinman presents in his analysis of different models for regulating biotechnology, while not the norm, there are states that use social values-based regulatory systems. Rather than assuming that there is an answer to the concerns of the GMO debate and that it can be found in science, “determination of benefits and costs are, in these cases, admitted forthrightly by supporters of this approach to be value-based, and such regulation aims to prohibit release and commercialization where the social cost passes specified thresholds.”¹⁷⁸ Whereas in the U.S., our regulatory system can be seen as a “triumph of scientism over social regulation,”¹⁷⁹ some nations are not so quick to prioritize science over social values. These states take into account socioeconomic values, impacts on all stakeholders, public perceptions, and moral and ethical concerns. Rather than attempting to keep their debates neatly divided between issues of science and non-science, they acknowledge that a wide array of values affects perceptions and embrace this in their regulatory process. Whereas the U.S. regulatory structure’s reliance on objective science can result in the exclusion of a majority opinion (as with the public comment period discussed on p. 48-49) and legislation that is vague and confusing, social values-based regulatory systems are not restrained in the same ways.

In nations across the globe, the GMO debate has taken many shapes other than the science-based form it takes in the U.S. In France, farmers took the debate out of the hands of only scientific experts by reframing the issue outside of scientific risk. A group of family farmers started a campaign that presented

¹⁷⁸ Kleinman, *Local Variation*, *supra* at 364

¹⁷⁹ *Id.*

the values they considered relevant to the GMO debate: “food quality linked to productivist agriculture, cultural homogenization, and globalization.”¹⁸⁰ This struck a chord with the French public. Focusing the discourse at anti-GMO events on “food quality, farmers’ duties to protect and develop French seeds, and the implications of industrialized agriculture on rural peoples and cultures,”¹⁸¹ they shifted the debate to include values that were previously completely absent. By pushing the debate past the traditional ‘risk’ framework,¹⁸² they were able to bring it into a sphere based on the issues that truly mattered to a wider circle of stakeholders—farmers, consumers, and those outside the realm of scientific expertise. By renegotiating the actors involved and the issues at play, France changed the definition of the GM crops problem, as Christophe Bonneuil, Pierre-Benoit Joly, and Claire Marris wrote, to “one of socioeconomic choice rather than one of environmental or health risks.”¹⁸³

In Hungary, similarly, the GMO debate took a completely different form than one of safety and risk. For Hungarians—not just civilians, but members of parliament as well—became concerned over “philosophical and moral issues” as well as the concept of “eco-colonialism, in which rich countries dump risky products and technologies on poor countries where environmental legislation is

¹⁸⁰ Heller, *supra* at 81.

¹⁸¹ *Id.* at 87.

¹⁸² *Id.* at 82.

¹⁸³ Christophe Bonneuil, Pierre-Benoit Joly, and Claire Marris, *Disentrenching Experiment: The Construction of GM—Crop Field Trials as a Social Problem*, Science Technology Human Values (2008), available at http://www.hks.harvard.edu/sdn/articles/files/Bonneuil_Joly_Marris_STHV2008_final.pdf.

lax and citizens' ecological awareness is low."¹⁸⁴ Environmental activists started the movement toward an understanding of GMOs beyond traditional risk-based analysis; they presented concerns that Hungary would "[slip] into the 'Third World'" as a result of these new technologies and become the subjects of human experimentation.¹⁸⁵ Intent on breaking the decision-making process out of the bubble of scientific experts and including public opinion, they drew together leaders from all over the country and from different sides of the environmental movement.¹⁸⁶ They successfully reframed the issue; government officials and the public became concerned that Hungary could become the guinea pig for the western world's new GM technology. As oversight for the drafting of legislation for the new technology, "the Hungarian Parliament set up a GM advisory board made up of seventeen representatives from government ministries, scientific academies, and environmental, consumer protection, agricultural, and health NGOs."¹⁸⁷ While scientific expertise was viewed as part of the knowledge necessary for creating proper regulation, it was not by any means the only part. Patriotism became closely tied with the GM debate in Hungary after a Hungarian scientist dissented with the international scientific community regarding

¹⁸⁴ Krista Harper, *The Genius of a Nation Versus the Gene-Tech of a Nation: Science, Identity, and Genetically Modified Food in Hungary*, Anthropology Department Faculty Publication Series, 12 (2004), available at http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1079&context=anthro_faculty_publications&sei-redir=1#search=%22genius%20nation%20versus%20gene%20tech%20nation%3A%20Science%20identity%20genetically%20modified%20food%20Hungary%22.

¹⁸⁵ *Id.* at 12-13.

¹⁸⁶ *Id.* at 8.

¹⁸⁷ *Id.* at 13-14.

GMOs;¹⁸⁸ the social value of asserting their country's autonomy in the face of international pressure became a key part of resisting GMOs. As Harper wrote, "Hungarian environmentalists reframe food consumption issues (and in particular food safety) as complex social problems requiring collective, society-level solutions;"¹⁸⁹ Hungary prioritized social values over strict scientific constructions of harm.

As we will see in the case of *Monsanto v. Geertson Seed Farms* in Chapter 4, social values do play a significant role in the debate over GMOs in the U.S. Because our regulatory structure relies so heavily on the autonomy of science and the power of scientific knowledge,¹⁹⁰ however, finding forums that acknowledge the importance of social values is difficult. The U.S. GMO debate is caught where the French debate was before the peasant movement. Heller explains that in France, "[w]hen questioned about the relative absence of 'non-risk' frames for GMOs in public debate, actors in both powerful and activist institutions would often mention, off the record, that they did have 'personal' concerns regarding GMOs, but that they would never articulate such opinions because they fell outside the realm of 'what the media wanted to hear' or of 'what the public can understand.'"¹⁹¹ This is where the U.S. is stuck. Social values are clearly at play, underlying the black and white debates about safety and risk; what seems to break down into an argument of science is as much about actual

¹⁸⁸ *Id.* at 17.

¹⁸⁹ Krista Harper, *Green Carnivores, Mad Cows and Gene Tech: The Politics of Food in Hungarian Environmentalism*, 21.1 *Anthropology of Eastern Europe Review* 103-108 (2003), available at: http://works.bepress.com/krista_harper/7.

¹⁹⁰ See Chapter 2.

¹⁹¹ Heller, *supra* at 84.

concerns over the safety of GMOs as it is about concerns over corporate control,¹⁹² consumer choice,¹⁹³ ¹⁹⁴ the loss of family-owned business,¹⁹⁵ ¹⁹⁶ free trade,¹⁹⁷ and free market values.¹⁹⁸ Yet addressing these values directly in the regulatory process is impossible because this forum sees them as illegitimate; the solution to the debate lies in the quantifiable, provable data of science, just as all good policy does. Stakeholders in the GMO debate are currently “unable to *think about* their own voluntary conformity to risk as the central frame for talking about the technology.”¹⁹⁹

This is the underlying cause of the GMO debate being played out in court. Concerns about social values in the debate are as prevalent as, if more hidden than, concerns about safety and harm. While the debate on the surface breaks down into scientific questions of risk assessment, the issues involved are much more complex—just as in countries where the debate has been reframed to address and include these other concerns. The changing perspective on courts and judges in recent decades has allowed them to be viewed as a new avenue for

¹⁹² Donald L. Barlett and James B. Steele, *Monsanto's Harvest of Fear*, Vanity Fair (2008), available at <http://www.vanityfair.com/politics/features/2008/05/monsanto200805>.

¹⁹³ Monica Eng, *Anti-GMO Protests Heat Up This Fall*, Chicago Tribune (2011), available at http://articles.chicagotribune.com/2011-10-21/features/chi-food-policy-antigmo-movements-heat-up-this-fall-20111021_1_gmo-fda-food-safety-division.

¹⁹⁴ Monica Eng, *With no labeling, few realize they are eating genetically modified foods*, Los Angeles Times (2011), available at <http://www.latimes.com/health/ct-met-gmo-food-labeling—20110524,0,6084626,full.story>.

¹⁹⁵ *Family Farmers Amplify Complaint Against Monsanto's GMOs, Reinforcing their Arguments with Additional Plaintiffs: Monsanto's Failure to Provide Binding Legal Covenant To Protect Family Farmers Threatened by GMO Contamination Necessitates New Complaint*, Public Patent Foundation (2011), at <http://www.pubpat.org/osgatavmonsantoamended.htm>.

¹⁹⁶ *Agricultural Giant Battles Small Farmers*, CBSNews (2011), available at http://www.cbsnews.com/2100-18563_162-4048288.html.

¹⁹⁷ Jesse Kline, *Free Trade and the Deregulation of Genetically Modified Foods* (2010).

¹⁹⁸ Jonathan Jones, *Fussy eaters—what's wrong with GM food?* BBC News (2010), available at <http://news.bbc.co.uk/2/hi/science/nature/8789279.stm>.

¹⁹⁹ Heller, *supra* at 83-84.

pursuing answers to regulatory questions in the GMO controversy. As Jasanoff asserts, one justification that has been used for judicial intervention in science disputes is “the supposedly unique qualification of courts to weigh conflicting values.”²⁰⁰ The courts’ expanding role as policymakers as well as science regulators—whether real or perceived—has made them a pathway for GMO regulation; but further, it has created an arena where the underlying discourse of the GMO debate comes into play. The U.S. regulatory process for GMOs is almost entirely absent of the incorporation of social values, committed instead to narrow interpretations of harm and impact based in traditional understandings of science. Courts are a space that allows for social values to be brought into the discussion, providing a forum that can open the messy GMO legislation, the vague definitions, and the narrow criteria to new understandings. Courts provide a pathway for the introduction of social values to the debate over GMO regulation and—as I will explore in the next chapter through the lens of *Monsanto v. Geertson Seed Farms*—sometimes an avenue by which the regulatory process is adjusted to include these values.

²⁰⁰ Jasanoff, *Science at the Bar*, *supra* 190.

Chapter 4

Monsanto v. Geertson Seed Farms: Social Values in Action

Background of the Case

Monsanto v. Geertson Seed Farms began in November 2004²⁰¹ when Monsanto, one of the largest GM corporations, and Forage Genetics, a licensee of Monsanto that develops its seeds, submitted a petition to the Animal and Plant Health Inspection Service seeking nonregulated status for their Roundup Ready Alfalfa, a type of alfalfa genetically engineered to be resistant to the Monsanto-produced herbicide Roundup.^{202 203} In October 2004, the Animal and Plant Health Inspection Service (APHIS) released an Environmental Assessment (EA) assessing the potential environmental impacts of three alternatives: continuation as a regulated article, determination that the alfalfa plants are no longer regulated articles in whole, or determination that the alfalfa plants are no longer regulated articles in part.^{204 205} In June 2005, APHIS announced their Finding of No Significant Impact, based on the EA, and thus their determination that the alfalfa plants were no longer considered regulated articles—meaning that they could be commercially produced and sold without any regulatory

²⁰¹ *Monsanto Co. and Forage Genetics International; Availability of Petition and Environmental Assessment for Determination of Nonregulated Status for Alfalfa Genetically Engineered for Tolerance to the Herbicide Glyphosate*, 69 Fed. Reg. No. 226. (2004), available at http://www.aphis.usda.gov/brs/fedregister/BRS_20041124a.pdf.

²⁰² *Monsanto*, 130 S. Ct. at 3.

²⁰³ *Monsanto Company History*, available at <http://www.monsanto.com/whoweare/Pages/monsanto-history.aspx>.

²⁰⁴ USDA/APHIS Environmental Assessment. *Monsanto Company and Forage Genetics International Petition 04-110-01p for Determination of Non-regulated Status for Roundup Ready Alfalfa Events J101 and J163* (2004), available at http://www.aphis.usda.gov/brs/aphisdocs/04_11001p_pea.pdf.

²⁰⁵ See Chapter 2, p. 33 for an explanation of these alternatives.

oversight.²⁰⁶ About eight months later, Geertson Seed Farms, an Oregon business; Trask Family Seeds, a South Dakota business; and several environmental organizations including the Center for Food Safety and the Sierra Club,²⁰⁷ sued Mike Johanns in his position as Secretary of the USDA for improperly deregulating the alfalfa due to violations of the National Environmental Policy Act (NEPA), the Plant Protection Act (PPA), and the Endangered Species Act of 1973,²⁰⁸ asserting that the agency had disregarded significant potential environmental impacts of a deregulation decision in its EA and was required to prepare a full Environmental Impact Statement (EIS).²⁰⁹

In February 2007, the United States District Court for the Northern District of California heard the case, decided that APHIS had violated NEPA by deregulating the alfalfa with only an environmental assessment and not the more in-depth environmental impact statement, and ordered both parties to “meet and confer and submit a proposed Judgment to the Court,” meaning that both parties would submit suggestions for what action to take on the alfalfa and the judge would make a decision based on that input.²¹⁰ In March, the district court submitted a preliminary injunction,²¹¹ forbidding any further planting of the alfalfa until a decision was reached on a permanent injunction. In April, the district court held a hearing on a permanent injunction, during which Monsanto

²⁰⁶ USDA/APHIS, Docket No. 04-085-3, *Monsanto Co. and Forage Genetics International; Availability Determination of Nonregulated Status for Alfalfa Genetically Engineered for Tolerance to the Herbicide Glyphosate*. 70 Fed. Reg. 12, 27 (2005).

²⁰⁷ *Geertson Seed Farms v. Monsanto* No. 07-16458 D.C. No. CV-06-01075-CRB, 4, 7868.

²⁰⁸ *Geertson v. Monsanto*, *supra*.

²⁰⁹ *Geertson*, No. C 06-01075 CRB, 4.26 and 5.22

²¹⁰ *Id.*

²¹¹ *Monsanto v. Geertson*, No. 07-16458 D.C.

became an intervenor-defendant,²¹² meaning that because they had stake in the outcome of the case, they were allowed to join the defense alongside Johanns. In May, based on the evidence submitted in the April hearing, the district court entered a permanent injunction, allowing farmers who had already bought or planted Roundup Ready Alfalfa to harvest and sell it but preventing further planting and sales until APHIS had completed an Environmental Impact Statement.²¹³ ²¹⁴ The defendants, now including not just USDA and APHIS officials but also Monsanto and Forage Genetics as defendant-intervenors,²¹⁵ appealed the district court's decision to enter a permanent injunction²¹⁶—but not the decision that APHIS violated NEPA by deregulating the alfalfa.²¹⁷ The Court of Appeals for the Ninth Circuit heard the case in June 2008 and affirmed the district court's decision.²¹⁸ Monsanto submitted a petition for a writ of certiorari in the Supreme Court—essentially appealing the court of appeals' decision—and the Supreme Court granted certiorari²¹⁹—meaning they agreed to

²¹² *Geertson v. Johanns Memorandum and Order Re: Permanent Injunction*, No. C 06-01075 CRB, 1 (2007). http://www.aphis.usda.gov/brs/pdf/Alfalfa_Ruling_20070503.pdf.

²¹³ *Id.*

²¹⁴ This is a slight simplification of the sequence of events for the sake of clarity. In the March decision, the court actually implemented a preliminary injunction *pending* the permanent injunction. Thus, the permanent injunction the court entered in May simply maintained the *status quo* of the preliminary injunction. Essentially, this means that the preliminary injunction was implemented assuming that a permanent injunction would be implemented shortly afterward. The April hearings on the permanent injunction were held to establish whether or not the permanent injunction *would* be implemented, thus upholding the March decision, or would *not* be implemented, thus reversing it. I chose to include this explanation in a footnote rather than in the text due to concerns that the language implies the district court had a bias that a permanent injunction was necessary before holding a hearing on entering a permanent injunction. This is not the case; this is simply the process for entering an injunction.

²¹⁵ *Geertson v. Monsanto*, No. 07-16458 D.C., 7868-7869

²¹⁶ *Id.* at 7875.

²¹⁷ *Id.* at 7876. “The existence of the NEPA violation is not disputed on appeal.”

²¹⁸ *Id.* at 7889.

²¹⁹ *Monsanto*, 130 S. Ct., 7

hear the case. The Supreme Court heard the arguments in April 2010 and decided the case in June, reversing the permanent injunction.

On its surface, this case seems to be about some very nitty gritty legal details; did the district court have the right to impose a permanent injunction on the planting and selling of Roundup Ready alfalfa until APHIS had completed the EIS or was such a permanent injunction an “abuse [of] its discretion?”²²⁰ Despite this technical focus, though, much more significant questions for the GMO debate are at play in this case. In this chapter, I will explore the ways *Monsanto v. Geertson Seed Farms* expanded the regulation of GMOs to include social values, reinterpreting the definition of key terms in the legislation in ways that require APHIS to consider social impacts when deregulating a GMO.

Before I begin, it is necessary to explain one scientific concept that is essential to understanding much of this case: gene flow. Gene flow is the movement of genes from one population to another²²¹—in this case, the unintentional movement of the gene engineered to be resistant to the herbicide Roundup from the GM alfalfa population to the conventional (non-GM) alfalfa population. Gene flow is often referred to as “genetic contamination”²²² or “biological contamination”²²³ in the decisions of the district court, court of appeals, and Supreme Court in this case because of the concept “that

²²⁰ *Id.* at 24

²²¹ Evolution 101: Gene Flow, available at <http://evolution.berkeley.edu/evosite/evo101/IIC4Geneflow.shtml>.

²²² *Geertson v. Monsanto*, No. 07-16458 D.C., 7877

²²³ *Geertson*, No. C 06-01075 CRB, 7.

conventional and organic alfalfa will become ‘contaminated’ with the engineered gene that makes Roundup Ready alfalfa tolerant to glyphosate.”²²⁴ Geertson Seed Farms and the other plaintiffs (defendants in the Supreme Court case) allege that such genetic contamination is likely if Roundup Ready alfalfa is approved for nonregulated status due to pollination of alfalfa by bees.²²⁵ Monsanto, APHIS, and the other defendants (petitioners in the Supreme Court case) maintain that such contamination is unlikely and even if such contamination does occur, it does not necessarily impose a threat to organic farmers’ livelihood²²⁶ or constitute an environmental impact.²²⁷ Much of the courts’ discussion of social values revolves around the concept of gene flow, as we will see.

***Geertson Seed Farms v. Johanns* (U.S. District Court Decision)**

In its decision, the district court laid out the socioeconomic harms Geertson Seed Farms and the other plaintiffs alleged they would face if Roundup Ready Alfalfa was deregulated. Asserting that gene flow from the GM alfalfa to conventional alfalfa was possible, the plaintiffs said that they would suffer economic injuries even if gene flow did not occur, simply because of the *risk* of it occurring. If their product were actually contaminated, they would lose the consumer base they market to because these consumers desire GM-free products. Even if their product were not *actually* contaminated, though, they

²²⁴ *Id.* at 3.

²²⁵ *Id.* at 7.

²²⁶ *Id.* at 8.19-27 and 9.1-7.

²²⁷ *Id.* at 12.19-24.

would lose money in paying for testing to prove that it is GM-free. In the court's words, the plaintiffs alleged that:

Organic farmers will no longer be able to market their seed as non-genetically engineered, rendering their crops less valuable; consumers pay a premium for organic and non-genetically engineered food. Similarly, organic livestock farmers will have a more difficult time purchasing non-genetically engineered alfalfa as food for livestock and thus will be unable to market their livestock as organic or at least fed with non-genetically engineered food. All of these farmers may be required to test their crops and livestock for traces of the genetically-engineered alfalfa. Even non-organic farmers who want to raise genetically-engineered free plants and livestock will be impacted.²²⁸

The court held that these allegations were legitimate, albeit in a bit of a roundabout way; rather than asserting that the plaintiffs were correct, the court asserted that APHIS fails to prove the plaintiffs *incorrect*.²²⁹ Because APHIS failed to show that genetic contamination would not occur²³⁰ and that organic farmers would not suffer economically if such genetic contamination did occur, the court agreed with the plaintiffs.²³¹ But the court took it one step further than what even the plaintiffs alleged; it asserted that "most importantly," APHIS "simply

²²⁸ *Id.* at 8.5-12.

²²⁹ The court summarizes this method of deciding that plaintiffs' complaints are valid at the conclusion of the decision: "APHIS failed to answer these substantial questions, concluding instead that any environmental impact is insignificant because gene transmission is the problem of the organic and conventional farmers and weeds always develop resistance to herbicides. As such reasons are not 'convincing' and do not demonstrate that the agency took a 'hard look' at the potential environmental impacts of its deregulation decision, plaintiffs' motion for summary judgment on its NEPA claim that APHIS is required to prepare an EIS is GRANTED." *Id.* at 9.22-28

²³⁰ *Id.* at 10.15-24.

²³¹ *Id.* at 10.25-28 and 11.1-5

ignored that these farmers did not *want* to grow or feed to their livestock genetically engineered alfalfa, regardless of how such alfalfa could be marketed.”²³² The court ruled that not only must any financial impact on the farmers—a socioeconomic value—be taken into consideration, but the farmers’ freedom of choice (about the products they want to produce and the type of lifestyle they wish to live²³³)—social values—must as well.

The district court rejected APHIS’ claim that these social and socioeconomic harms did not count as the “physical environmental impacts”²³⁴ that NEPA intended agencies to examine using C.F.R. § 1508.14, which states:

‘Human environment’ shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. (See the definition of “effects” (Sec. 1508.8).) This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.²³⁵

²³² *Id.* at 11.5-7, italics mine

²³³ This concept of “life choices related to philosophical attitudes” is one that the EIS later addresses, as I discuss in Chapter 5, p. 89.

²³⁴ *Id.* at 11.21

²³⁵ *Council on Environmental Quality Regulations*, Sec. 1508.14 Human environment, available at <http://ceq.hss.doe.gov/nepa/regs/ceq/1508.htm#1508.14>

The decision explained that gene flow is the “physical environmental effect” with which these social and economic impacts are interrelated.²³⁶ Because the farmers could suffer financial injury and lose their ability to choose which crops to grow if gene flow occurred, those effects are encompassed by the “human environment.”

The court did not limit the social impacts to those on farmers; in fact, as the decision continued, the social value of consumer choice became encompassed in the impacts of deregulation. The decision explained that a consumer’s right to choose what food products to purchase and eat would be limited by the genetic contamination of alfalfa. Yet it was not just the interrelation of this social impact to the environmental impact of gene flow that made this outcome unacceptable; it was also because the deprivation of consumer choice is an “undesirable consequence,” the prevention of which, according to the Congressional Declaration of National Environmental Policy, is one of NEPA’s goals:

[I]t is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may attain the widest range of beneficial uses of the environment without degradation, risk to health or

²³⁶ *Geertson*, No. C 06-01075 CRB, 12.11-14.

safety, or other undesirable and unintended consequences.²³⁷

Additionally, another of NEPA's goals according to the same declaration is to maintain "an environment which supports diversity and variety of individual choice,"²³⁸ which the court interpreted to include consumer choice. By eliminating or limiting choice—both a consumer's choice to eat what they want and a farmer's choice to grow what they want—the potential genetic contamination of alfalfa constituted a "significant effect on the human environment."²³⁹ The social value of freedom of choice, the district court asserted, must be taken into consideration when regulating genetically modified organisms; the social impacts of an environmental decision are significant impacts nonetheless.

Indeed, the court even seemed to imply that the government's reliance on science is not always enough; the science, it suggested, can only go so far:

The government's apparent belief that the farmers' and consumers' choice is irrational because the engineered gene is similar in all biological respects to a gene found in nature (although never in alfalfa) is beside the point. An action which potentially eliminates or at least greatly reduces the availability of a particular plant—here, non-engineered alfalfa—has a significant effect on the human environment. See 40 C.F.R. § 1508.27(b) ('A

²³⁷ 42 U.S.C. § 4331(b)(3)

²³⁸ 42 U.S.C. § 4331(b)(4)

²³⁹ *Geertson*, No. C 06-01075 CRB, 14.2

significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial').²⁴⁰

The use of this Council on Environmental Quality regulations quote was—intentionally or unintentionally—somewhat subversive. The implication here was: even if your science shows that there are no impacts that you believe to be negative, if there are negative social impacts—i.e., upon farmers' and consumers' freedom of choice—those must be accounted for as well. Essentially, the court was suggesting that the government's belief that objective science can always provide a solution is not necessarily true; what the government may see as a beneficial scientific impact may have social impacts that are negative for some stakeholders. The court's insinuation that the objectivity of science is not as reliable as the government wants to believe is pretty powerful—more so than even the court itself may have realized. As described in Chapter 2, the belief in the power of objective science for shaping policy has been definitive of our government throughout our nation's history; the court's suggestion that that belief might be flawed is noteworthy.

The decision summed it up perfectly:

The Court cautions that it is not ruling that Roundup Ready alfalfa is harmful to consumers or livestock. Rather, the significant impact that requires the preparation of an EIS is the possibility that the deregulation of Roundup Ready alfalfa will degrade the human environment by eliminating a farmer's choice to

²⁴⁰ *Id.* at 13.26-28 and 14.1-4

grow non-genetically engineered alfalfa and a consumer's choice to consume such food.²⁴¹

To the court, it was not the science that was the problem—it was the social impacts.

This interpretation of the term “human environment” dramatically expanded the definition. Never before had APHIS included in its approval of a petition for nonregulated status any discussion of social values.²⁴² In fact, in one 2005 EA for the deregulation of a type of GM cotton produced by Syngenta, APHIS explicitly stated that it had no obligation to consider such values:

[A] commenter . . . suggested that the EA should address economic issues. Broadly defined economic issues are beyond the scope of an EA. However, when a genetically modified organism is no more a plant pest risk than its non-genetically modified progenitor strain, the impacts of the genetically modified strain, itself, on the environment are then not significantly different than the progenitor strain. If a plant is no more a plant pest risk than the progenitor strain then it has no more economic impact as a plant pest than the progenitor strain. To enter into a discussion of the socio-political or economic impacts of granting nonregulated status goes beyond the intent of an EA and the authority of APHIS.²⁴³

²⁴¹ *Id.* at 14.19-23

²⁴² This statement is based on an examination of the final determination documents of the 89 petitions for nonregulated status of GMOs APHIS has granted. USDA/APHIS, *Petitions for Nonregulated Status Granted or Pending by APHIS* (2012), available at http://www.aphis.usda.gov/biotechnology/not_reg.html (last visited April 11, 2012)

²⁴³ USDA/APHIS, *Environmental Assessment and Finding of No Significant Impact* (2005), available at http://www.aphis.usda.gov/brs/aphisdocs2/03_15501p_com.pdf.

What APHIS translated into determining whether a GMO presented a ‘plant pest risk’ before the district court’s decision now included much more than objectively scientific understandings of human, plant, and animal health; it included social and socioeconomic effects. A year after this decision, it played a central role and was quoted extensively in the outcome of a similar case, *Center for Food Safety v. Vilsack*.²⁴⁴ The *Geertson* district court’s interpretation of the impacts APHIS is required to examine became part of the regulatory definition; the *Center for Food Safety* decision cited the *Geertson* decision just as it cited the actual legislation governing the regulatory process.

Geertson Seed Farms v. Monsanto (U.S. Court of Appeals Decision)

Monsanto, APHIS, and the other defendants appealed the district court’s decision to enter a permanent injunction on the planting and sale of Roundup Ready alfalfa and in June 2008 the Court of Appeals for the Ninth Circuit heard the case, reviewing to see if the lower court had abused its discretion in entering the injunction. For the first time in this case, we see not only an acknowledgement that social values play a role in the regulation of GMOs but an actual dispute over such values—socioeconomic impact pitted against socioeconomic impact. The appellate court observed:

Monsanto and Forage Genetics contend that the district court disregarded their financial losses, but the district court considered those economic losses and simply concluded that the harm to growers and consumers

²⁴⁴ *Center for Food Safety v. Vilsack*, No. C 08-00484 JSW, 3.7-11, 12.19-28 and 13.1-6, 13.9-16

who wanted non-genetically engineered alfalfa outweighed the financial hardships to Monsanto and Forage Genetics and their growers.²⁴⁵

Not only do we see judges openly discussing the role socioeconomic impacts play in determining the status of a GMO, but the defendants—the same defendants who had previously argued that socioeconomic impacts were not part of what NEPA directs agencies to regulate²⁴⁶—used socioeconomic impacts to argue their side. Indeed, this paragraph acknowledged that the district court had made a decision by comparing socioeconomic impacts; it considered the financial impact on the defendants and the financial impact on the plaintiffs and judged that the latter was greater.

Further, the court of appeals explicitly acknowledged the role of social values in serving the public interest.

The district court finally considered the public interest, the fourth factor in the framework for injunctive relief . . . The court, while recognizing that agricultural biotechnology has *social value*, held that it would be in the public interest to enjoin the expanded use of Roundup Ready alfalfa before its impact was studied, because failing to do so could potentially eliminate the availability of non-genetically engineered alfalfa.²⁴⁷

Here, the court explicitly framed the discussion as one that considers what we as a society value. By distinguishing the district court’s consideration of “the public

²⁴⁵ *Geertson v. Monsanto*, No. 07-16458 D.C., 7884.

²⁴⁶ *Geertson*, No. C 06-01075 CRB, 11.20-22.

²⁴⁷ *Geertson v. Monsanto*, No. 07-16458 D.C., 7884. (italics mine)

interest”²⁴⁸ from its consideration of “the balance of hardships,”²⁴⁹ noting that they are separate “factor[s] in the framework for injunctive relief,”²⁵⁰ the court of appeals separated the consideration of social and socioeconomic values. Where the previous paragraph on the balance of hardships was focused on economic harm, this paragraph explicitly focused on social value. The court’s discussion of these values removed them from the framework of financial impact, emphasizing the social values—and not just the socioeconomic values—present in this case. Although both of the values mentioned have financial components—agricultural biotechnology products can be sold and the elimination of non-genetically engineered alfalfa can threaten farmers’ incomes—the court addressed the non-financial side. It asserted that we see inherent value in both technology (for the sake of innovation) and the continued existence of non-GM crops (because we value the freedom of choice—the right to at least *have access* to all forms of a product). Emphasis on the terms “social value” and “availability” implied understandings of the value of biotechnology and the loss of choice separate from purely economic impacts. The court acknowledged the inherent value we see in expanding technologies and scientific research, but it also acknowledged that our society deeply values the freedom of choice.

While the court of appeals decision did not expand the definition of “human environment” further or introduce new social values to be considered in

²⁴⁸ *Id.* at 7884.

²⁴⁹ *Id.* at 7883.

²⁵⁰ *Id.* at 7884.

the regulation of GMOs, it reconfigured the district court's decision to show the true social dimension. Not only did the court of appeals lay out the impacts the district court asserted as clear social values and affirm their significance, the court of appeals actually became an arena for the weighing of one social value against another. By changing the regulatory process for agencies, the court also sets itself up as a forum for potential independent judicial review in the future.

***Monsanto v. Geertson Seed Farms* (U.S. Supreme Court Decision)**

It may seem that by appealing only the district court's injunction on planting and selling alfalfa and not the decision that APHIS had violated NEPA by deregulating the Roundup Ready alfalfa without preparing an EIS, Monsanto had implicitly accepted that social impacts are part of the effects on the "human environment" APHIS must examine in order to deregulate a GM product. But it is not quite that simple.

When Monsanto and the other defendants (now the petitioners) brought the case to the Supreme Court, they challenged Geertson Seed Farms and the other plaintiffs' (now the respondents) standing²⁵¹ to seek an injunction in the first place. Monsanto used the assertion that the respondents lacked standing to once again argue that socioeconomic impacts are not within the scope of what NEPA was designed to protect. This time, however, instead of using this argument to contend that APHIS did not improperly deregulate Roundup Ready

²⁵¹ "Standing" is the "right to file a lawsuit or make a particular legal claim." See Nolo's Plain-English Law Dictionary, *Standing* (2012), available at <http://www.nolo.com/dictionary/standing-term.html>.

alfalfa without drafting an EIS, they used it to assert that the respondents did not have a right to assert socioeconomic impacts as an injury in the first place because such impacts do not fall within the “zone of interests” NEPA was enacted to protect:

Petitioners appear to suggest that respondents fail to satisfy the “zone of interests” test we have previously articulated as a prudential standing requirement in cases challenging agency compliance with particular statutes.²⁵²

The Supreme Court refused to accept this assertion, instead quoting the district court’s decision that the interrelation of the environmental impact (gene flow) and the socioeconomic impact applies to the zone of interests test:

That argument is unpersuasive because, as the District Court found, respondents’ injury has an environmental as well as an economic component. In its ruling on the merits of respondents’ NEPA claim, the District Court held that the risk that the RRA gene conferring glyphosate resistance will infect conventional and organic alfalfa is a significant environmental effect within the meaning of NEPA. Petitioners did not appeal that part of the court’s ruling, and we have no occasion to revisit it here. Respondents now seek injunctive relief in order to avert the risk of gene flow to their crops—the very same effect that the District Court

²⁵² *Monsanto*, 130 S. Ct., 13

determined to be a significant environmental concern
for purposes of NEPA.²⁵³

Indeed, despite the fact that Monsanto attempted to use the same argument for a different purpose—challenging the respondents’ standing to seek an injunction rather than challenging the assertion that APHIS made a mistake—the Supreme Court saw the purpose as essentially the same. Because socioeconomic impacts fall within the effects APHIS is required to look at when deregulating a GMO—and the petitioners (i.e., Monsanto) did not challenge this—the respondents (i.e., Geertson Seed Farms) clearly had standing to seek an injunction for a violation of that expectation. If the petitioners did not challenge the decision that APHIS violated NEPA, the respondents had a right to seek an injunction for that violation.

The Supreme Court emphasized that socioeconomic impacts, as the district court determined, counted as “environmental injury:”

A substantial risk of such gene flow injures respondents in several ways that are sufficiently concrete to satisfy the injury-in-fact prong of the constitutional standing analysis. Moreover, those harms are readily attributable to APHIS’s deregulation decision.²⁵⁴

This decision not only confirmed the district court’s ruling but cemented the expansion of criteria for deregulating a GMO to consider socioeconomic values. While the district court ruled that socioeconomic impacts constitute a part of the “human environment,” the Supreme Court explicitly stated that such impacts

²⁵³ *Id.* at 13.

²⁵⁴ *Id.* at 3.

count as “injury,” allowing those who are affected by such impacts to seek compensation for that injury.

Although the Supreme Court ultimately ruled that the district court did abuse its discretion in entering a permanent injunction, its affirmation that Geertson Seed Farms had standing to seek that injunction affirmed the expansion of the regulatory process for GMOs to take socioeconomic values into consideration.

It is worth noting that although the Supreme Court upheld the lower courts’ inclusion of socioeconomic effects in the impacts that the USDA must examine when deregulating a GMO, it avoided mentioning the social effects that both the district court and the court of appeals had asserted. Although this does not appear to have made any dramatic difference in the inclusion of social values in GMO regulation immediately afterward—the EIS for Roundup Ready Alfalfa mentions both socioeconomic and social values²⁵⁵ and recent EAs for GM crops have all featured a section on the “social environment”²⁵⁶—it is possible that at some point, this will play out in the regulatory process. The Supreme Court might take another case where purely social values are more explicitly questioned and rule that they had determined in *Monsanto* that only socioeconomic impacts matter, not social ones. APHIS might assert that they are

²⁵⁵ *Events J101 and J163 Environmental Impact Statement, supra* at x, 38 § III.C, 59 § III.C.4, 60 § III.C.4, 162 § IV.D.1, 170 § IV.D.5, 172 § IV.D.5

²⁵⁶ This statement is based on an examination of the Environmental Assessments APHIS has prepared for GMO deregulation petitions since it completed the EIS for Roundup Ready Alfalfa. USDA/APHIS, *Petitions for Nonregulated Status Granted or Pending by APHIS* (2012), available at http://www.aphis.usda.gov/biotechnology/not_reg.html (last visited April 11, 2012). For a specific example, see USDA/APHIS, *Monsanto Improved Fatty Acid Profile MON 87705 Soybean*, Petition 09-201-01p (2011), available at http://www.aphis.usda.gov/brs/aphisdocs/09_20101p_fea.pdf (last visited April 11, 2012).

obligated to examine only socioeconomic impacts, not social ones, when they approve a deregulation petition for a GMO. No such assertion has yet been made, and for now it seems that social values, alongside socioeconomic values, must be taken into consideration by APHIS. Nonetheless, the conclusions of this thesis require an acknowledgement that there is a possibility that this will change in the future.

As I discussed in Chapter 1, part of the lure of analyzing this case was the huge debate surrounding its outcome. There was a bit of a media frenzy in the GMO world following the Supreme Court's decision; it seemed that no one could determine who actually *won* the case.^{257 258 259} According to some sources, including the Los Angeles Times and the New York Times, Monsanto were clearly the victors.^{260 261} According to others, Geertson Seed Farms, the Center for Food Safety, and the other farmer and environmental groups had defeated Monsanto.^{262 263} So, who actually won? And why was there so much confusion in the first place? The difficulty traces back to the district court's decision.

As I described at the beginning of this chapter, the district court made two separate, important decisions: first, that APHIS had violated NEPA by deregulating Monsanto's Roundup Ready Alfalfa without performing an EIS and

²⁵⁷ Froeb, *supra*.

²⁵⁸ Tom Laskawy, *Supreme Court's ruling on Monsanto's GE alfalfa: Who won?*, Grist (2010), available at <http://grist.org/politics/food-supreme-court-ruling-on-monsanto-alfalfa/> (last visited April 11, 2012)

²⁵⁹ Helena Bottemiller, *Supreme Court Rules on GMO Alfalfa*, Food Safety News (2010), available at <http://www.foodsafetynews.com/2010/06/supreme-court-decides-monsanto-case-lifts-gmo-alfalfa-ban/> (last visited April 11, 2012)

²⁶⁰ Oliphant and Huffstutter, *supra*.

²⁶¹ Pollack, *supra*.

²⁶² Center for Food Safety Press Release, *supra*.

²⁶³ Kimbrell, *supra*.

second, that a permanent injunction on planting and growing alfalfa until APHIS completed the EIS was necessary to prevent the harms Geertson Seed Farms and the other plaintiffs established. Monsanto and APHIS did not appeal the first decision; they appealed only the injunction. The court of appeals upheld the injunction. When Monsanto and APHIS brought their appeal of the injunction to the Supreme Court, they made the argument that Geertson Seed Farms and the other respondents lacked standing to pursue an injunction because they did not prove that they may actually face a “constitutionally cognizable injury”²⁶⁴ if the alfalfa were deregulated. The Supreme Court’s decision reversed the permanent injunction on the basis that the district court had acted preemptively when it entered the injunction on *all* planting and sales of Roundup Ready alfalfa; if APHIS performed another EA evaluating the effects of *partial* deregulation rather than *whole* deregulation, the limitations that the partial deregulation required may be enough to prevent the harms that Geertson and the other respondents claimed. Even if it didn’t, the Court argued, “if and when APHIS pursues a partial deregulation that arguably runs afoul of NEPA, respondents may file a new suit challenging such action and seeking appropriate preliminary relief.”²⁶⁵ In the fact that the injunction was reversed and planting of Roundup Ready alfalfa was allowed to continue, Monsanto undeniably had a victory.

But the Supreme Court did *not* agree with Monsanto’s assertion that Geertson and the other respondents lacked standing; in fact, the Supreme Court asserted that the socioeconomic injuries the farmers alleged they would face

²⁶⁴ *Monsanto*, 130 S. Ct., 11.

²⁶⁵ *Id.* at 4.

were “sufficiently concrete”²⁶⁶ to justify seeking an injunction. This is where the victory for Geertson Seed Farms and the other farming and environmental groups lies; the Supreme Court ruled that the socioeconomic harms farmers might face if GM crops are deregulated—“even if their crops are not actually infected with the Roundup ready gene”²⁶⁷—constitutes sufficient “injury” to allow them to pursue injunctions. This reinterpretation of the legislation provided farmers with a legitimacy in preventing the deregulation of GMOs that they had never had before.

Over the course of one case concerning the regulation of Roundup Ready Alfalfa, the requirements and criteria for regulating GMOs was expanded to include social values; not only did courts serve as the arena for such values to enter the debate, they actually served as the mode by which these values were incorporated into the regulatory process, requiring APHIS to examine values it never had before in the regulatory process for GMOs. The changed definition of “human environment” and “injury” had a visible impact on the regulation of GMOs in the U.S. Indeed, after this case, for the first time in the history of APHIS’ regulation of GMOs, a document concerning the deregulation of a GM product included a section on “socioeconomic impacts”²⁶⁸ and addressed ‘purely’ social values such as “life choices.”²⁶⁹ But to what extent the inclusion of such terms and categories actually made a difference—that is, how much the decisions in *Monsanto v. Geertson Seed Farms* affected the regulatory structure—is not as

²⁶⁶ *Id.* at 13.

²⁶⁷ *Id.*

²⁶⁸ *Events J101 and J163 Environmental Impact Statement, supra* at vii.

²⁶⁹ *Id.* at 173.

clear as the court decisions make it seem. In the next chapter, I will examine in detail the inclusion of social values in the EIS for Roundup Ready alfalfa to determine how much of an impact *Monsanto* made, evaluate the ability of courts to effect such changes, and examine whether courts should be the agents introducing social values to our regulatory structure.

Chapter 5

What role can—and *should*—the courts play?

As the last two chapters have shown, federal courts can and do play a large role in the regulation of GMOs in the U.S. Not only do they provide an arena in which social values can be brought to the table, but they sometimes become the agents that expand the regulatory process to include those social values. Following *Monsanto v. Geertson Seed Farms*, not only the final Environmental Impact Statement (EIS) for Roundup Ready alfalfa²⁷⁰ but also Environmental Assessments (EA) for the deregulation of other GMOs²⁷¹—as well as other court cases²⁷²—incorporated socioeconomic values into their regulation. As discussed in Chapter 2, the U.S. regulatory system for GMOs is constrained by its dependence on a belief in objective scientific solutions; if courts can serve as the agents to move us away from this model toward one that incorporates social values, it seems logical that this is beneficial. Yet whether or not the courts *should* play such a large role in the regulatory process—and how much change they can truly initiate—is a multi-faceted and controversial question. In this chapter I will explore the limitations of courts in introducing social values into the regulatory process as well as the disadvantages of relying on courts to enact such change.

²⁷⁰ *Events J101 and J163 Environmental Impact Statement, supra.*

²⁷¹ *Petitions for Nonregulated Status Granted or Pending by APHIS as of February 27, 2012*, USDA/APHIS, available at http://www.aphis.usda.gov/biotechnology/not_reg.html

²⁷² See Chapter 4, page 69 footnote 244

Although the shift from no discussion of social or socioeconomic values in the regulatory process of GMOs to the inclusion of such values in environmental impact statements and petitions for nonregulated status is undeniably dramatic, the actual impact of this shift is not so clear. The change is in fact much more linguistic than substantial. Despite the terms “social” and “socioeconomic impact” appearing on the EIS for Roundup Ready alfalfa after the *Monsanto v. Geertson Seed Farms* ruling, the Animal and Plant Health Inspection Service (APHIS) molded those terms to match the outcome they wanted, picking and choosing which impacts to focus on. After all the discussion in the courts of financial harms for farmers and the right of both farmers and consumers to choose what they eat and purchase, APHIS once again approved Monsanto’s petition for fully nonregulated status of Roundup Ready alfalfa. Less than a year after the Supreme Court decision, APHIS completed the EIS ordered by the district court and in January 2011 announced that the alfalfa lines were “no longer considered to be regulated articles.”²⁷³ Despite the courts’ decision that social impacts are part of the “human environment” and constitute injury, APHIS interpreted those impacts in a way that allowed them to once again reach a conclusion of deregulation, as I will explore below.

In fact, in the EIS, APHIS barely recognizes the values that the three court decisions addressed; rather, the agency finds and focuses on positive social impacts and minimizes the focus on negative ones in order to assert that the deregulation of Roundup Ready alfalfa will have many socioeconomic *benefits*.

²⁷³ USDA/APHIS Environmental Assessment. *Petition 04-110-01p., supra*.

Instead of focusing on a consumer's right to choose what they eat, a farmer's right to choose what they grow, or the financial harm farmers will face from having to test their alfalfa or lose their market, the introductory summary on "Socioeconomic Impacts" in the EIS centers on the lower prices GM alfalfa may provide. APHIS lists the possibility that "GT alfalfa can offer alfalfa hay farmers high quality alfalfa hay at relatively lower costs," and the fact that if farmers adopt Roundup Ready alfalfa, the supply curve for alfalfa could shift, also "increasing the quantity of high quality alfalfa hay and decreasing its price" as the first two bullet points of the "Socioeconomic Impacts" summary in the EIS.²⁷⁴ APHIS begins the discussion of socioeconomic values by emphasizing the benefits of deregulation in order to fit such impacts into their desired outcome.

Next, the summary addresses the threat to farmer income due to the market of consumers who prefer non-GM crops:

There is evidence of consumer preference for nongenetically modified foods in the United States. This preference is likely more prevalent among consumers of organic products. However, the extent to which this preference translates to decreased demand (sales) for conventional and organic products under the potential low-level presence of GE content in feed used for dairy and meat cattle in the production chain of organic foods is unclear. The impact of GT alfalfa deregulation on domestic demand might best be analyzed by imagining

²⁷⁴ *Events J101 and J163 Environmental Impact Statement, supra* at vii.

a small GT-sensitive market within the domestic conventional and organic alfalfa markets.²⁷⁵

Despite the acknowledgement by the district court, the court of appeals, and the Supreme Court that Geertson Seed Farms and the other plaintiffs showed with “reasonable probability”²⁷⁶ that the deregulation of Roundup Ready alfalfa threatened their income,^{277 278 279} APHIS asserts that it is “unclear” if the presence of GM alfalfa will actually lead to fewer sales. The agency emphasizes that the presence of GM alfalfa fed to cows (i.e., affecting the dairy and beef markets) will be “low-level” despite having asserted one bullet point before that widespread adoption of Roundup Ready alfalfa is what will spur lower prices. Further, APHIS describes the market of consumers who wish to purchase GM-free products as only “a small . . . market within the . . . organic alfalfa markets.” The implication of this sentence is that a niche market within another niche market is really nothing to worry about for farmers; despite the fact that farmers showed that their income depended on consumers who “pay a premium for . . . non-genetically engineered food,”²⁸⁰ this socioeconomic impact is not only of minor significance, but because “APHIS is unable to locate enough quantitative information to predict the impact of GT alfalfa deregulation on organic markets,”²⁸¹ it does not constitute an impact significant enough to prevent APHIS from deregulating Roundup Ready alfalfa. Intentionally framing the language

²⁷⁵ *Id.* at vii.

²⁷⁶ *Monsanto*, 130 S. Ct., 3.

²⁷⁷ *Geertson*, No. C 06-01075 CRB, 19.14-27.

²⁷⁸ *Geertson v. Monsanto*, No. 07-16458 D.C., 7883.

²⁷⁹ *Monsanto*, 130 S. Ct., 3 and 11.

²⁸⁰ *Geertson*, No. C 06-01075 CRB, 8.6-7.

²⁸¹ *Events J101 and J163 Environmental Impact Statement*, *supra* at 235.

and evidence in a way that makes such an outcome seem unlikely or irrelevant, APHIS essentially discards the significance of the potential for decreased sales. In contrast to the extensive discussion of the significance of financial harm for farmers in the court decisions, APHIS barely touches upon such effects and concludes that they are not very important in order to reach their own ends.

The evidence the courts cite that foreign markets desire GM-free crops²⁸² as well, furthering farmers' claims of financial threat, is similarly disregarded:

Among U.S. main export markets for alfalfa hay and seed, there is evidence of some sensitivity to GE products. As in the case of the domestic organic markets, the GT alfalfa sensitive segment is likely to be only a portion of the existing export market.²⁸⁴

Although on this point APHIS does not claim to have too little knowledge to identify a clear relationship, acknowledging that “there is evidence” (in fact, acknowledging that there is clearer evidence than there is for alfalfa prices lowering, where they only claim that “there is *some* evidence”²⁸⁵), they discard the significance of this impact just as they did with the previous point, by claiming that this market is “only a portion of the existing market.” Once again, APHIS implies this effect is too small to matter.

The fifth bullet point seems almost to pre-empt any dispute about the socioeconomic impacts on farmers that APHIS so easily disregarded in the previous two points. It asserts that “stewardship programs”—standards of

²⁸² *Geertson*, No. C 06-01075 CRB, 3.15-18, 11.3-5.

²⁸³ *Geertson v. Monsanto*, No. 07-16458 D.C., 7877-7878.

²⁸⁴ *Events J101 and J163 Environmental Impact Statement*, *supra* at viii.

²⁸⁵ *Id.* at vii. (italics mine)

geographic isolation placed on alfalfa planting to prevent gene flow²⁸⁶—may prevent any effect on domestic and foreign alfalfa markets.²⁸⁷ APHIS places this point after the points about financial harm for farmers as though to say, ‘Even if you don’t feel reassured that deregulating Roundup Ready alfalfa won’t affect farmers’ incomes, we can still probably prevent contamination from happening at all with stewardship programs.’ APHIS acknowledges that such stewardship programs may increase the cost of alfalfa production but quickly shoos away any worries with the statement that if they do, “any impact on overall demand is likely to be low.”²⁸⁸

The final bullet point under APHIS’ summary of socioeconomic impacts asserts that the organic dairy and meat market will not suffer from the deregulation of Roundup Ready Alfalfa, acknowledging at the very end, though, that testing to make sure crops are GM-free may be necessary.²⁸⁹

While the introductory summary seems to indicate that the bullet point results it presents were reached after extensive research on many avenues of socioeconomic impacts , an examination of the more in-depth analysis within the EIS, “Socioeconomic Impacts on Domestic Non-GT Alfalfa Markets” shows that only specific interpretations of “socioeconomic impacts” were even explored in the first place. The in-depth discussion of the socioeconomic consequences of GT alfalfa seems intent on reaching the conclusions the summary introduces from the very beginning. The very first study the section cites looks to find out how

²⁸⁶ *Id.* at 36, 115, 122.

²⁸⁷ *Id.* at viii.

²⁸⁸ *Id.* at viii.

²⁸⁹ *Id.* at viii.

conventional (non-organic) farmers feel about Roundup Resistant alfalfa.

Unsurprisingly, the study concludes that:

Users of GT alfalfa were generally satisfied with weed control in GT alfalfa. According to this paper, GT alfalfa would reduce the costs of herbicides used while improving the quality of alfalfa hay due to lesser weed content.²⁹⁰

Presenting research on costs of alfalfa, herbicides, and weed content, the EIS stretches to reach its conclusion that Roundup Ready alfalfa can bring farmers more income:

Again, the comparison above should not be interpreted as suggesting that GT alfalfa is necessarily superior to other varieties in the returns it provides farmers. However, under certain circumstances this would likely be the case.²⁹¹

Even if this outcome only happens under very specific circumstances, APHIS feels the need to point out that it is a possibility—even while skimming over the potential for income loss from *other* circumstances.

And skim it does; in fact, APHIS not only devotes far less discussion to the possibility of profit loss, it de-emphasizes the potential impact. Instead of discussing this as a very possible outcome in the way they discuss increased profits, they frame it in terms of being dependent on whether “glyphosate

²⁹⁰ *Id.* at 155.

²⁹¹ *Id.* at 158.

tolerance is seen as an undesirable quality in alfalfa hay by some,” which they claim “is not clear.”²⁹²

The EIS does acknowledge that organic farmers could face negative impacts if Roundup Ready alfalfa is deregulated “to the extent that: a) the demand (sales) of organic products would decrease under the potential AP of genetically engineered content in organic alfalfa; and b) current organic practices and GT alfalfa stewardship are insufficient to minimize the AP of genetically engineered content in non-GT alfalfa.”²⁹³ The EIS recognizes that there are potential costs to avoiding contamination (using measures such as buffer zones between farms and testing of alfalfa crops) and profit loss from being forced to sell contaminated alfalfa to non-organic (and thus lower paying) markets.

Yet shortly after acknowledging this possibility, the EIS repeats the assertion that the chance of this happening is not clear enough to translate into a real possibility:

As in the case of conventional foods, although there is evidence of consumer preference for foods free of genetically engineered content, the extent to which this preference would translate to decreased demand (sales) for organically certified products under a scenario of GT alfalfa deregulation is not clear.²⁹⁴

In fact, the EIS even attempts to spin the one potential negative they mention into a positive, suggesting that organic sales may actually increase once

²⁹² *Id.* at 161.

²⁹³ *Id.* at 163.

²⁹⁴ *Id.*

Roundup Ready Alfalfa is deregulated because organic consumers may have a stronger desire for GM-free products “to the extent that consumers perceive organic products as having less genetically engineered content.”²⁹⁵ So ready to point out the potential positives of deregulating Roundup Ready alfalfa, APHIS seems intent on twisting even the negatives it acknowledges as possibilities into positives as well.

APHIS spends most of the pages focused on potential negative socioeconomic impacts asserting reasons that those potential impacts are either not very likely or not as negative as they seem.²⁹⁶ The EIS treats potential impacts on trade with foreign countries similarly; while it points to examples of countries that may be concerned with importing GM alfalfa, it always offers reasons that this might not have a significant effect.²⁹⁷ APHIS seems intent on minimizing any concern that deregulating Roundup Ready alfalfa will have negative consequences.

Not only does APHIS skim over the financial threat to farmers that the courts acknowledged to be real, but it leaves out almost entirely the right of choice that the district court asserted was “most important.”²⁹⁸ In the one brief mention the EIS gives freedom of choice, it almost skims over the concept; after pages and pages spent analyzing whether GE-contaminated alfalfa can still be marketed as organic,²⁹⁹ whether farmers could simply sell their contaminated

²⁹⁵ *Id.*

²⁹⁶ *Id.* at 164-167.

²⁹⁷ *Id.* at 168-170.

²⁹⁸ *Geertson*, No. C 06-01075 CRB, 11.5-7.

²⁹⁹ *Events J101 and J163 Environmental Impact Statement*, *supra* at 162.

alfalfa to non-organic markets,³⁰⁰ and which foreign markets are sensitive to GM crops,³⁰¹ APHIS devotes a total of one paragraph to acknowledging that even if farmers did not lose profit from contamination of their alfalfa, such contamination may still be seen as negative to farmers and consumers:

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The absence of a GT-sensitive domestic demand (sales) for organic products does not mean GE products are necessarily welcome by organic consumers, but rather that any sensitivity to GE content might not translate into a decrease in sales of organic alfalfa. Organic producers (and consumers) would possibly still be unhappy with the outcome. To the extent that organic farming involves broader life choices related to philosophical attitudes, this discontent would be a negative impact. This situation could conceal a market for non-GE products in need of development.³⁰²

This paragraph almost seems an afterthought; lacking any citations of evidence, any studies, charts, or graphs which the extensive analyses in other sections contain, this paragraph skims over the idea that “producers (and) consumers would still be unhappy with the outcome”—and that this could be considered a “negative impact.”

In the section “Consumer Demand and Preferences,” the EIS mentions that a study of U.S. consumers shows “a preference for non-GE foods,” but only within the context that “U.S. consumers are more receptive to GE foods than

³⁰⁰ *Id.* at 163-165.

³⁰¹ *Id.* at 168-170.

³⁰² *Id.* at 172.

their European counterparts.”³⁰³ It also acknowledges that Americans show “negative opinions . . . about biotechnology in surveys,”³⁰⁴ but then quickly asserts that the introduction of GM products to the market has had no apparent impact on sales—without any suggestion that this might be because, as the EIS explained only two pages before, “[m]ost U.S. consumers are unaware of the prevalence of GE content in the U.S. food supply” and that one study “found that only one-fourth of U.S. residents believed that they had ever consumed food containing GE ingredients.”³⁰⁵ Not only does the EIS barely emphasize a freedom of choice, it repeatedly tries to downplay the existence of anti-GM sentiment.

Despite all of this minimizing of negative socioeconomic impacts and emphasis of positive socioeconomic impacts, however, the EIS surprisingly does not conclude that deregulation is the only preferred alternative. It does, of course, conclude that full deregulation is *one* preferred alternative “based on the purpose and need for the agency action” which is “to determine if the use of GT alfalfa in the U.S. agricultural environment presents a plant pest risk.”³⁰⁶ But it also concludes that:

The second preferred alternative would approve the petition in part and includes isolation distances and geographic restrictions. This alternative is identified as a preferred alternative because it meets the USDA’s purpose and need to promote programs that support coexistence of all types of agricultural practices and

³⁰³ *Id.* at 64.

³⁰⁴ *Id.* at 64.

³⁰⁵ *Id.* at 62.

³⁰⁶ *Id.* at iv.

addresses concerns expressed by some members of the public about the potential for cross pollination and other related impacts to non-GE alfalfa.³⁰⁷

This seems to indicate that, despite how much the rest of the EIS disregards relevant social values, those values have been successfully incorporated into the EIS; it expresses support for the “coexistence of all types of agricultural practices,” suggesting that the USDA sees the importance of making sure farmers have freedom of choice, and acknowledges that if “other related impacts” concern citizens, they are worth accommodating. Indeed, the acknowledgement that these values can be incorporated—that a compromise between social values and objective science is possible—suggests that *Monsanto v. Geertson Seed Farms*, in fact, *did* have an effect on the regulatory structure for GMOs; the decision led directly to APHIS finding an alternative to complete deregulation that included social values.

Unfortunately, the possibility that a GMO might actually be deregulated with limitations necessitated by potential social impacts was not long lived. One month after the EIS was released, APHIS announced that it had chosen to “grant nonregulated status”³⁰⁸ to Roundup Ready alfalfa—no isolation distances, no geographic restrictions, no compromise. In its explanation for the decision, APHIS returns to the equivocation of the EIS. Under the section discussing socioeconomic reasoning, APHIS once again cites uncertainty: “It is uncertain whether the economic benefits associated with [the partial deregulation

³⁰⁷ *Id.* at iv.

³⁰⁸ Record of Decision, Glyphosate-Tolerant Events Alfalfa Events J101 and J163: Request for Nonregulated Status, APHIS, 1 (2011), available at http://www.aphis.usda.gov/brs/aphisdocs/04_11001p_rod.pdf.

alternative] offset the losses associated with [it].”³⁰⁹ Rather than actually engaging in an attempt to determine which of the alternatives *does* have more benefits, APHIS disregards socioeconomic impacts entirely by asserting that the lack of clarity makes such a comparison impossible.

In the end, it seems, despite the fact that *Monsanto v. Geertson Seed Farms* resulted in APHIS including the categories of social and socioeconomic impacts in their evaluation of Roundup Ready Alfalfa, it did not lead to any meaningful discussion of social values. Instead, the agency used the new category to provide more support for the decision they already knew they were going to make, deemphasizing negative impacts, emphasizing positive ones, and disregarding entirely some impacts that the courts in *Monsanto* had asserted were relevant. Of course, the actual outcome is not the only means by which to judge the success of the inclusion of social values. Although the partial deregulation decision would be a clear indicator of such inclusion, it is also possible that after a truly balanced weighing of social impacts APHIS may still conclude that full deregulation is the best solution. It is worth asking: how would we identify a balanced weighing of social values if we saw one? Does the very nature of social values make their inclusion in regulation inseparable from being manipulated to advance a predetermined end? Further, is it possible that *Monsanto v. Geertson Seed Farms* actually *did* successfully incorporate social values into the regulatory structure in a way that is simply not visible or measurable? I will return to these questions at the end of this chapter and consider them more thoroughly in the

³⁰⁹ *Id.* at 14.

next chapter, but for now, let us return to the discussion of effects that we *can* see. Because the discussion of social impacts in the case of Roundup Ready alfalfa was so clearly unbalanced—APHIS’ intentions of forcing this new category to fit its predetermined decision for the petition are evident, as I discussed above—it seems that *Monsanto v. Geertson Seed Farms*, in terms of directly effecting change in the regulatory process for GMOs, was not a true success.

While *Monsanto v. Geertson Seed Farms* is just one example, it is not, by a longshot, the only example of a Supreme Court case that has failed to truly effect change. As Gerald N. Rosenberg argues, “U.S. courts can almost never be effective producers of social reform.”³¹⁰ Although social change is undeniably different than regulatory change, Rosenberg’s argument is still relevant to this case. Social change and regulatory change are inextricably linked in this case; with courts attempting to serve as introducers of social values excluded from the regulatory process and introduced by citizens, any impact on the regulatory process is inherently a social change. Further, Rosenberg’s explanations of what prevents courts from enacting change apply not just to broad social changes like civil rights and abortion rights but also to more specific changes, like the expansion of “the notion of legally recognizable harm” in environmental cases in the 60s and 70s,³¹¹ that nonetheless reconstitute governmental processes in some way. In this case, although the change of directing a government agency to incorporate social values into decisions about the regulation of GMOs is not nearly as large or

³¹⁰ Gerald N. Rosenberg, *The Hollow Hope: Can Courts Bring About Social Change?*, 338 (1993).

³¹¹ *Id.* at 273.

significant a change as, for example, ending segregation, the controversy over GMOs is still influenced by many similar sources to an institution like segregation (e.g. political structure and popular opinion).

While Rosenberg's argument is very controversial and he does not hesitate to acknowledge that he has many critics,³¹² the constraints that he posits prevent courts from enacting significant social change are worth examining as they can provide possibilities for why *Monsanto v. Geertson Seed Farms* ultimately failed to create a visible change in the regulatory structure for GMOs. The first constraint Rosenberg identifies is the limitation of constitutional and statutory language; courts must work—or at least appear to be working—within the framework of legal culture, which is not nearly as free or unrestrained as other branches of government and areas of affecting change. The second constraint Rosenberg asserts is that courts are often unwilling to go against the “political mainstream”—they are influenced by federal government. Rosenberg's third constraint is that courts cannot force the implementation of change. Even if they rule in revolutionary ways that should theoretically lead to or instigate social change, they lack the tools to see their rulings carried out in action.

While Rosenberg's first two arguments are undoubtedly relevant to *Monsanto v. Geertson Seed Farms*, it is the third that comes most into play in this case. Certainly, how far the courts could go in incorporating social values was constrained by the existing legislation; they were only able to include those impacts that were “interrelated” with the environmental impact of gene flow.

³¹² *Id.* at xi.

The courts were also likely affected to some extent by unwillingness to step outside the political mainstream—the Supreme Court probably more so than the lower courts which are further separated from the politics of Washington. This explanation probably accounts for the lessening linguistic emphasis on socioeconomic values to the reframing of those values as “financial harms” as the decision was appealed from the district court to the court of appeals to the Supreme Court. These arguments offer context for understanding why the courts in *Monsanto v. Geertson Seed Farms* decided the way they did.

Yet it is Rosenberg’s third argument that offers the most comprehensible explanation of the ineffectual decisions of the court. While the courts were undoubtedly limited in what extent they could introduce social values into the regulation of GMOs, they still managed to include in regulatory definitions of “human environment” and “injury” values that had never before been a part of those terms. The decisions were arguably groundbreaking. The district court’s opinion that farmers’ desire not to grow GM alfalfa was not only *as* important as but *more* important than other more strictly financial harms and that all of these socioeconomic harms constituted an impact that APHIS was required to examine on a level it had never examined a GMO before was arguably revolutionary—it dramatically expanded expectations of the regulatory process for GMOs. The Supreme Court’s agreement—especially with a conservative court³¹³—that socioeconomic harm counts as an injury sufficient to constitute standing meant

³¹³ FiveThirtyEight, *Supreme Court May Be Most Conservative in Modern History*, New York Times (2012), available at <http://fivethirtyeight.blogs.nytimes.com/2012/03/29/supreme-court-may-be-most-conservative-in-modern-history/#>.

forcing a government agency to go further than it ever had before; it theoretically added a whole new level of analysis to the required criteria for deregulating a GMO. But in implementation, these new standards set by the court were essentially not followed through. It is the gap between the court's decision and the implementation of that decision where the impact falls apart; the court cannot force APHIS to implement the expanded definition of "human environment," so the extent to which the decision changes the regulatory process for GMOs is fundamentally limited.

Setting aside the limitations of the courts' decisions, though, we must also consider to what extent we *want* the courts to change and expand the regulatory process for GMOs in the U.S. Assuming, for instance, that the district court's expanded definition of "human environment" and the Supreme Court's expanded definition of "injury" had translated directly into APHIS always submitting Environmental Impact Statements for all future GMOs and acknowledging in those EISs the very socioeconomic values the decisions discussed—i.e., explicitly considered the negative impact of farmers not being able to choose to grow GM-free crops and consumers being able to choose to eat GM-free products—would this be desirable? Would we want the courts to play such a large role in determining the regulatory process? Would we want the power to determine how a GM product is regulated to rest, more or less, with whatever judge happens to be hearing a case at the time?

As Richard B. Stewart and James E. Krier assert, there are undoubtedly "costs and potential abuses in unclear procedural requirements that are

enforced 'ad hoc' by judges." The "sweeping yet vague requirements of NEPA" essentially assign a judge the power to force or prevent the implementation of any environmental project.³¹⁴ Should courts, the bodies designed to be impartial, be framing and redesigning the roles and expectations of federal agencies? Stewart and Krier assert that although EISs produced in the early years of NEPA were "plainly inadequate," "NEPA's requirements" have been clarified in the years since, making the decision of determining whether or not an EIS is adequate "much more formidable." Indeed, we can see this challenge in *Monsanto v. Geertson Seed Farms*; does the exclusion of socioeconomic impacts constitute a clear inadequacy of APHIS' decision? And who should truly be determining the answer to that question?

Beyond the specific challenges of judicial review of NEPA and agency EISs, we must also consider what role courts ought to play in decisions that so heavily involve science. Jasanoff argues that judicial review of federal agency decisions is based on a paradigm of deference; in matters where scientific questions are at play, the court, without scientific training, ought to defer to the agency's decision. Yet "in the 1970s, the theory of deference gave place to widespread practice of judicial intervention."³¹⁵ Although reliance on scientific expertise is of course problematic in itself as I have described in previous chapters, the inconsistency created by individual judges having the power to

³¹⁴ Richard B. Stewart and James E. Krier, *Environmental Law and Policy: Readings, Materials and Notes*, (2d Ed. 1978), Assessments of NEPA.

³¹⁵ Jasanoff, *Fifth Branch*, *supra* at 53.

review agency decision is deeply problematic.³¹⁶ The challenge this discretion presents in *Monsanto v. Geertson Seed Farms* is encapsulated perfectly in the Supreme Court's decision:

APHIS and petitioners submitted voluminous documentary submissions in which they purported to show that the risk of gene flow would be insignificant if the District Court allowed limited planting and harvesting subject to APHIS's proposed conditions. Respondents, in turn, submitted considerable evidence of their own that seemed to cut the other way. This put the District Court in an unenviable position. "The parties' experts disagreed over virtually every factual issue relating to possible environmental harm, including the likelihood of genetic contamination and why some contamination had already occurred."³¹⁷

What does the court do when the science itself is unclear? Should a panel of judges with no scientific background be entrusted with determining whose evidence is more believable? In the end, Jasanoff argues, even if judges can institute change, relying on them to do so is not by any means ideal. "Although such activism unquestionably stimulated action, . . . its impact on the quality of scientific decision-making was more equivocal. Judicial review produced a paradigm for resolving science policy disputes, but one that appears in hindsight to have been founded on an overly simplified view of both science and policy."³¹⁸

³¹⁶ *Id.* at 59.

³¹⁷ *Monsanto*, 130 S. Ct., 18, citing *Geertson v. Monsanto*, No. 07-16458 D.C., p. 7879

³¹⁸ Jasanoff, *Fifth Branch*, *supra* at 49.

While I have thus far focused on ideological and methodological issues with relying on courts to enact regulatory change, there is also a much more practical one that is worth noting: pursuing change through courts is incredibly expensive, particularly in cases where science is necessary. “The notorious cost and inefficiency of the judicial process also prompt concern about the role of courts in shaping . . . policy. . . In complex cases, the expense of producing evidence and hiring expert witnesses adds significantly to the already heavy burden of attorneys’ fees and court costs.”³¹⁹ It is also worth considering how these costs affect the democratic role we expect courts to play; if only those who can afford such expenses are able to bring their cases to court, how democratic of an arena can courts be for establishing regulatory change?

This is the question that the arguments in this chapter all come down to: if we want social values to be included in the regulatory process in a democratic way, are courts the best way to pursue that change? As Walter F. Murphy, C. Herman Pritchett, and Lee Epstein assert, the judicial system is inherently adversarial; the “trial judge . . . acts more like a referee than a player in this contest . . . [T]he judge is supposed to sort out truth from falsehood and decide what the ‘real’ facts are.”³²⁰ Courts are, to some extent, undemocratic institutions through which we attempt to create democratic change.³²¹ This brings us back to the questions posed on p. 92—or perhaps gives us a different way of viewing

³¹⁹ Jasanoff, *Science at the Bar*, *supra* at 14.

³²⁰ Walter F. Murphy, C. Herman Pritchett, and Lee Epstein, *Courts, Judges, & Politics: an Introduction to the Judicial Process* § 4.9.

³²¹ William Mishler and Reginald S. Sheehan, *The Supreme Court as a Counter-majoritarian Institution? The Impact of Public Opinion on Supreme Court Decisions*, 87 *Am. Pol. Sci. Rev.* 87 (1993).

them. Instead of asking how we would identify if a federal agency is weighing social values in a balanced way, perhaps we should be asking how we can democratically introduce a structure that will ensure that federal agencies *are* weighing values in a way that we consider balanced. Relying on courts to reinterpret legislation to include social values is bound to create conflicts over the prioritization of values; what the court considers relevant may not correspond at all with what the agency considers relevant. And more importantly, what the public considers relevant may not correspond at all with either the courts or the agencies. While it is possible that the very nature of social values makes them easy to manipulate in regulatory decisions in order to reach a predetermined end, it is also true that, as we saw in Chapter 2, they inherently inform our debates. While we can attempt to rely on “objective” science to inform our policy decisions, social values will inevitably wind their way back in, just as we see in *Monsanto v. Geertson Seed Farms*. Rather than leave various government players to debate and define the social values that matter to them, perhaps we should seek a method for bringing those values into a more democratic realm.

Chapter 6

Conclusion

The previous chapter seems to leave us caught between a rock and a hard place. If the legislative process for regulating GMOs makes no space for the inclusion of social values but courts are ineffective agents for changing the regulatory structure to incorporate social values, what options do we have? Where can we go from here? In this chapter, I review my arguments and consider the possibilities for adjusting our framework for regulating GMOs to include social values despite the obstacles.

United States policy making is based in a deeply rooted tradition of belief in objective scientific solutions determined by unbiased experts; reverence for science as a field that will provide the answers to our nation's problems is a value that has been inherent in our regulatory structure tracing back to the drafting of the Constitution. This belief that objective science should inform all policy decisions is foundational to the GMO regulatory process; APHIS, the agency in charge of regulating herbicide and pesticide-resistant GM crops, approves (or rejects, theoretically, although APHIS has never rejected a petition for nonregulated status) a GMO to be sold based on scientific evidence that it does not present a threat to the "human environment." It interprets the potential impacts a GMO's release could have incredibly narrowly, looking almost exclusively at the extent to which a GMO may be a "plant pest risk." The legislation designated to regulate GMOs—statutes and laws created years before

GMOs even existed that have were modge-podged together by the Coordinated Framework for Regulation Biotechnology—is confusing, vague, and fails to address values outside the realm of scientific expertise.³²²

Despite the portrayal of the GMO controversy as a black and white issue of safety, a much more complex array of values is at play in the debate; we are caught in a liberal science-based regulatory model that refuses to allow “subjective” values to inform policy. Stakeholders who wish to introduce social values into the regulatory process find no means to do so within the dysfunctional, chaotic, narrowly science-based legislative system APHIS follows. Not only does the confusion and vagueness of the legislation make stakeholder participation difficult, but APHIS does not make room for the incorporation of values outside the objective science paradigm. The increasing judicialization of politics, the expanding role of courts in regulating science, and the limitations of the legislative structure for regulating GMOs lead stakeholders into court. Courts, then, become the agents for introducing social values into the regulatory process for GMOs. Following larger trends, judges involved in the GMO controversy assert themselves as policy makers, providing a forum for the introduction of values otherwise excluded from GMO regulation.³²³

Through the lens of the case *Monsanto v. Geertson Seed Farms*, we see three levels of courts introducing social values into the regulatory process for GMOs. The district court introduced ‘purely’ social values to the process by asserting that farmers have the right to choose what they grow and consumers

³²² Chapter 2.

³²³ Chapter 3.

have the right to choose what they eat; the social values of freedom of choice and the right to self determination constitute part of the “human environment” NEPA envisioned, it argued. The court also introduced socioeconomic values to the process when it asserted that effects on farmers’ incomes also constitute an impact on the “human environment.” Deregulating Monsanto’s Roundup Ready alfalfa, the decision argued, presented a threat to farmers’ and consumers’ freedom of choice and farmers’ incomes. The case made its way through the court of appeals and the Supreme Court, each of which reasserted the significance of socioeconomic values, although the emphasis on purely social values was dropped by the Supreme Court. The decision forced APHIS to complete, for the first time, a full EIS, and to include in that EIS an analysis of social and socioeconomic impacts.³²⁴

Unfortunately, the inclusion of the category of social and socioeconomic impacts did not translate into APHIS taking into consideration the same values the courts did. Picking and choosing which social and socioeconomic impacts to focus on, APHIS arrived at precisely the same conclusion after the completion of the EIS that it had after the completion of the original EA: deregulation, in whole, of Roundup Ready Alfalfa. In the end, it seems, despite the courts’ introduction of social values into the regulatory process, no tangible change in outcome was made—leading to the question, what does court-initiated change look like? Political obstacles to courts successfully stimulating change, including courts’ lack of a mechanism for enforcing the implementation of their decisions, as well

³²⁴ Chapter 4.

as the problems with relying on untrained judges to rule on matters of science, indicate that courts may not be an effective agent for introducing social values into the regulatory process for GMOs in a lasting way. Further, if courts are inherently undemocratic institutions, do we want to initiate the inclusion of social values through the judicial system?³²⁵

So, where do we turn from here? If we cannot expect courts to be the incorporators of social values, how can we reframe the regulatory system to include such values? One movement, called the Just Label It! campaign, is currently in the process of trying to do just that. The campaign is not attempting to assert social values through the court system by suing an agency for improperly regulating a GMO, nor is it working within the existing legislative system by, for instance, participating in the public comment period for a GMO (which, as discussed in Chapter 2, is also usually ineffective at creating change). Just Label It! is attempting to assert the same social values the district court did in *Monsanto*—freedom of choice and right to self determination—but in a different way. Rather than attempting to force an agency to take those values into consideration when regulating any given GMO, the campaign is working to require labeling on products that contain GMOs—putting the social value decision in the hands of consumers rather than agencies. On March 27, the campaign submitted to the FDA a petition with over one million signatures asking for “mandatory labeling of genetically engineered foods” and asserting

³²⁵ Chapter 5.

that consumers have a “right to know” what is in their food.³²⁶ Just Label It! is fighting for inclusion of the social value of freedom of choice in the regulatory process but through ensuring consumers have the knowledge that will *provide* them that freedom of choice, not by requiring agencies to include the value of a right to choice in their evaluations of GMOs.

Certainly, such a movement suggests the potential for working outside the agency-based GMO regulation process to include social values. The future of incorporating social values may continue to take this form: movements that put value decisions in the hands of individuals rather than finding ways to force agencies to take those values into account in their regulatory process.

This is not to say, however, that courts must be completely absent from the process of incorporating social values into the regulation of GMOs. Although the courts may not be the most effective agents for such change, they can still play a valuable role. On an individual case basis, like in *Monsanto v. Geertson Seed Farms*, the Supreme Court may not be able to effect dramatic change, but on a more systematic level, courts may very well play a role in reframing the debate. As the final question in the last chapter on p. 92 asked: is it possible that *Monsanto v. Geertson Seed Farms* actually *did* successfully incorporate social into the regulatory structure in a way that is not visible or measurable?

I assert that it is. While court decisions may not lead directly to changed regulatory outcomes like APHIS rejecting a petition for the deregulation of a GMO, they undoubtedly play a significant role in stimulating discourse on

³²⁶ *Right to Know: Why Label?* Just Label It!, available at <http://justlabelit.org/right-to-know/>

controversial topics and the best governmental responses to them. Simply by providing a governmental forum for the discussion of social values surrounding GMOs, they initiate the abandonment of the perspective that social values have no role to play at all in policy debate. Introducing the discussion, even if it does not result in direct change, is valuable in itself.

Jasanoff asserts that courts are in some ways the best actors to initiate this dialogue:

There is much to be gained in a pluralistic society by addressing value-laden technological disputes away from the glare and publicity of national legislation. Courts, for all their weaknesses as policymakers, possess certain offsetting virtues as mediators of conflicting values. The relatively decentralized, small-scale, and ad hoc character of judicial decisionmaking permits a more leisurely consideration of moral and ethical questions than is generally possible in the legislative arena.³²⁷

Courts, when we look at them as forums for introducing and shifting frames of regulatory thought rather than expecting them to initiate direct change, can be important actors. Simply by providing a forum for stakeholders who are otherwise left out of the regulatory structure debate—for instance, farmers and consumers—to participate in it, they open the regulatory process to a wider array of values. As Jasanoff summarizes, “Judicial intervention add[s] a

³²⁷ Jasanoff, *Science at the Bar*, *supra* 217-218.

distinctively populist cast to scientific disputes . . . because the courts [provide] a forum for citizen complaints regarding regulatory science.”³²⁸

Courts, it seems, are not the most effective agents for incorporating social values directly into the regulatory structure for GMOs. Cases like *Monsanto v. Geertson Seed Farms* lead to disappointed hopes; what seems at first like a dramatic expansion of the impacts APHIS is required to evaluate when regulating a GMO in reality creates little direct change. Yet in terms of stimulating dialogue, encouraging discourse on social values in governmental institutions, and empowering stakeholders whose voices may otherwise be left out of the regulatory debate, courts are incredibly valuable. Alongside movements like Just Label It!, courts play a key role in what will likely be a long process of reframing our regulatory structure for GMOs.

³²⁸ Jasanoff, *The Fifth Branch*, *supra* 49.

Bibliography

A note on the bibliography: Because this thesis centered around a Supreme Court case, I used standard legal citations. Typically, legal citations involve footnotes but no bibliography. Thus, while my citations throughout my thesis have a standard format, I had to improvise a bit for this bibliography. I did my best to organize my citations in a logical alphabetical order. Where an author or director was listed, I organized by last name. Where no author was listed, I organized by source: e.g., agency, organization, journal, website title, newspaper. Where no author or source was available, I organized by title. I have kept all citations in standard legal format.

7 CFR § 1b (1983)

7 CFR § 372 (1995)

40 CFR § 1500–1508 (1984)

51 Fed. Reg. 23302, 3

Donald L. Barlett and James B. Steele, *Monsanto's Harvest of Fear*, Vanity Fair (2008), available at <http://www.vanityfair.com/politics/features/2008/05/monsanto200805>.
Silvio A. Bedini, *Jefferson and Science*, 46 (2002).

Jonathan R. Beckwith, *Eli Lilly Award Acceptance Speech*, *The Politics of American Science*, *supra* § 6.II.

Donald F. Boesch, *Climate change is real, and action is needed*, *The Baltimore Sun* (2011), available at http://articles.baltimoresun.com/2011-10-30/news/bs-ed-climate-letter-20111030_1_climate-change-climategate-global-warming.

Christophe Bonneuil, Pierre-Benoit Joly, and Claire Marris, *Disentrenching Experiment: The Construction of GM—Crop Field Trials as a Social Problem*, *Science Technology Human Values* (2008), available at http://www.hks.harvard.edu/sdn/articles/files/Bonneuil_Joly_Marris_STHV2008_final.pdf.

Helena Bottemiller, *Supreme Court Rules on GMO Alfalfa*, *Food Safety News* (2010), available at <http://www.foodsafetynews.com/2010/06/supreme-court-decides-monsanto-case-lifts-gmo-alfalfa-ban/> (last visited April 11, 2012)

Conrad G. Brunk, Lawrence Haworth, and Brenda Lee. *Value assumptions in risk assessment: a case study of the alachlor controversy*, 1 (1995).

Vannevar Bush, *As We May Think*, The Atlantic (1945), available at <http://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/3881/>

Transgenic salmon: coming soon to a store near you?, CBCNews, available at <http://www.cbc.ca/news/interactives/gm-salmon/>.

Agricultural Giant Battles Small Farmers, CBSNews (2011), available at http://www.cbsnews.com/2100-18563_162-4048288.html.

Center for Food Safety v. Vilsack, No. C 08-00484 JW, 2009 WL 3047227 (2009).
J.M. Brogard, J.F. Blickle, and D. Paris-Bockel, *Genetically engineered insulin: five years of experience*, PubMed (1985), available at <http://www.ncbi.nlm.nih.gov/pubmed/3915289>.

Center for Food Safety Press Release, *Farmers and Consumer Groups File Lawsuit Challenging Genetically Engineered Alfalfa Approval*, Center for Food Safety (2011), available at <http://www.centerforfoodsafety.org/2011/03/18/farmers-and-consumer-groups-file-lawsuit-challenging-genetically-engineered-alfalfa-approval/>

Center for Food Safety Press Release, *Supreme Court Ruling in Monsanto Case is Victory for Center for Food Safety, Farmers*, True Food Network (2010), available at <http://truefoodnow.org/2010/06/21/supreme-court-ruling-in-monsanto-case-is-victory-for-center-for-food-safety-farmers/>.

While Congress Debates Climate Science, China and Europe Move Ahead, The Climate Post (2011), available at <http://theclimatepost.wordpress.com/2011/03/10/while-congress-debates-climate-science-china-and-europe-move-ahead/>.

I. Bernard Cohen, *Science and the Founding Fathers*, 20 (1997).

Coordinated Framework for Regulation of Biotechnology, 51 Fed. Reg. 23302 (June 26, 1986).

Council on Environmental Quality Regulations, Sec. 1508.14 Human environment, available at <http://ceq.hss.doe.gov/nepa/regs/ceq/1508.htm#1508.14>

Peter Dizikes, *A difference maker*, MIT News Office (2011), available at <http://web.mit.edu/newsoffice/2011/timeline-bush-0216.html>.

Otto Doering, *Science and Public Policy: Shotgun Wedding or Marriage Made in Heaven?*, 8 Weed Technology 875 (1994).

Soybean, Encyclopaedia Britannica (2012), available at <http://www.britannica.com/EBchecked/topic/557184/soybean>.

Monica Eng, *Anti-GMO Protests Heat Up This Fall*, Chicago Tribune (2011), available at http://articles.chicagotribune.com/2011-10-21/features/chi-food-policy-antigmo-movements-heat-up-this-fall-20111021_1_gmo-fda-food-safety-division.

Monica Eng, *With no labeling, few realize they are eating genetically modified foods*, Los Angeles Times (2011), available at <http://www.latimes.com/health/ct-met-gmo-food-labeling—20110524,0,6084626,full.story>.

David Erickson and Mark Anstoetter, NRDC sues USDA seeking documents related to deregulation of GM plants, Association of Corporate Counsel (2012), available at <http://www.lexology.com/library/detail.aspx?g=639f7064-efe5-478b-b535-c487c52e3934>

Jill Ettinger, *Haiti to Monsanto: "Take Your Seeds and Get Out!"*, Organic Authority (2011), available at <http://www.organicauthority.com/foodie-buzz/haiti-protests-monsanto-genetically-modified-seeds-gmos.html>.

Evolution 101: Gene Flow, available at <http://evolution.berkeley.edu/evosite/evo101/IIC4Geneflow.shtml>.

FDA Issues Final Guidance on Regulating Genetically Engineered Animals, FDA News Release, (2009), available at <http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2009/ucm109066.htm>.

April Forristall, *Genetically Modified Salmon Still Waiting FDA Approval*, Seafood News Aquaculture, available at <http://www.seafoodsource.com/newsarticledetail.aspx?id=2342>.

Ian Froeb, *Monsanto v. Geertson Seed Farms: The Supreme Court Rules, Everyone Claims Victory*, Riverfront Times: News of the World (2010), available at http://blogs.riverfronttimes.com/gutcheck/2010/06/monsanto_v_geertson_seed_farms_supreme_court_ruling_genetically_modified_gmo_alfalfa_st_louis_food_blog_news_062210.php.

The Future of Food. Dir. Deborah Koons Garcia.

Geertson Seed Farms v. Johanns, No. C 06-01075 CRB, 2007 WL 518624, at 3, lines 2-3.

Geertson v. Johanns Memorandum and Order Re: Permanent Injunction, No. C 06-01075 CRB, 1 (2007). http://www.aphis.usda.gov/brs/pdf/Alfalfa_Ruling_20070503.pdf.

Geertson Seed Farms v. Monsanto No. 07-16458 D.C. No. CV-06-01075-CRB, 4.

Stephen Goldberg, *The Constitutional Status of American Science* U. Ill. L.F. 1 (1979), available at <http://heinonline.org/HOL/LandingPage?collection=journals&handle=hein.journals/unillr1979&div=11&id=&page=>.

Ole Peter Grell and Andrew Cunningham, *Medicine and Religion in Enlightenment Europe*, 190.

David H. Guston and Kenneth Keniston, *The Fragile Contract: University Science and the Federal Government*, 22 (1994)

Krista Harper, *The Genius of a Nation Versus the Gene-Tech of a Nation: Science, Identity, and Genetically Modified Food in Hungary*, Anthropology Department Faculty Publication Series, 12 (2004), available at http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1079&context=anthro_faculty_pubs&sei-redir=1#search=%22genius%20nation%20versus%20gene%20tech%20nation%20science%20identity%20genetically%20modified%20food%20hungary%22.

Krista Harper, *Green Carnivores, Mad Cows and Gene Tech: The Politics of Food in Hungarian Environmentalism*, 21.1 *Anthropology of Eastern Europe Review* 103-108 (2003), available at: http://works.bepress.com/krista_harper/7.

Dayle Hayes and Rachel Laudan, *Food and Nutrition: Volume 3*, 466 (2008).

Chaia Heller, *Risky Science and Savoir-Faire: Peasant Expertise in the French Debate over Genetically Modified Crops*, in *The Politics of Food*, Ed. Marianne E. Lien and Brigitte Nerlich, 83 (2004).

Ran Hirschl, *The New Constitutionalism and the Judicialization of Pure Politics Worldwide*, 75 *Ford. L. Rev.* 721 (2006), available at <http://ssrn.com/abstract=951610>.

Mae-Wan Ho and Lim Li Ching, *GMO Free: Exposing the Hazards of Biotechnology to Ensure the Integrity of Our Food Supply* (2004).

Donald L. Horowitz, *The Courts and Social Policy*, 4 (1977).

Kristin Hubbard, *Regulatory Oversight of GE Crops Just Got Weaker*, Organic Seed Alliance (2011), available at <http://blog.seedalliance.org/2011/04/20/regulatory-oversight-of-ge-crops-just-got-weaker/>: "The government largely relies on the manufacturer's own data when putting together an environmental assessment before approving (because they've never denied) a petition."

Sheila Jasanoff, *Designs on Nature: Science and Democracy in Europe and the United States*, 18-19 (2007).

Sheila Jasanoff, *The Fifth Branch: Science Advisers as Policymakers*, vii (1994).

Sheila Jasanoff, *Science at the Bar: Law, Science, and Technology in America*, 1 (1997).

Jonathan Jones, *Fussy eaters—what's wrong with GM food?* *BBC News* (2010), available at <http://news.bbc.co.uk/2/hi/science/nature/8789279.stm>.

Right to Know: Why Label? Just Label It!, available at <http://justlabelit.org/right-to-know/>

Food, Inc. Dir. Robert Kenner.

Daniel J. Kevles, *George Ellery Hale, the First World War, and the Advancement of Science in America*, 59 *Isis* 427 (1968).

Andrew Kimbrell, *Supreme Court Case a Defeat for Monsanto's Ambitions*, HuffPost Food (2010), available at http://www.huffingtonpost.com/andrew-kimbrell/supreme-court-case-a-defe_b_620087.html.

Daniel Lee Kleinman, Abby J Kinchy, and Robyn Autry, *Local variation or global convergence in agricultural biotechnology policy? A comparative analysis* 36 *Sci. and Pub. Pol.* 361, (2009), available at <http://www.dr.s.wisc.edu/documents/articles/kleinman/local-variation.pdf>.

Daniel Lee Kleinman, *Politics on the Endless Frontier: Postwar Research Policy in the United States*, 44 (1995).

Jesse Kline, *Free Trade and the Deregulation of Genetically Modified Foods* (2010).

Bruce Knight, *Catching and Keeping Up*, Agri-Pulse (2011), available at: http://www.agri-pulse.com/Opinion_Knight_CatchingupandKeepingUp_11132011.asp.

Brendan Koerner, *How Much of Our Food is Bioengineered?*, Slate (2003), available at http://www.slate.com/articles/news_and_politics/explainer/2003/05/how_much_of_our_food_is_bioengineered.html.

Jack Landau, *Chevron, USA v. NRDC: The Supreme Court Declines to Burst the EPA's Bubble Concept*, 15 *Envtl. L.* 285 (1984-1985).

Tom Laskawy, *Supreme Court's ruling on Monsanto's GE alfalfa: Who won?*, Grist (2010), available at <http://grist.org/politics/food-supreme-court-ruling-on-monsanto-alfalfa/> (last visited April 11, 2012)

Les Levidow and Joseph Murphy, *Reframing Regulatory Science : Trans-Atlantic Conflicts over GM Crops*, 68-69 *Cahiers d'économie et sociologie rurales* 50 (2003).

Mark Reed Levin, *Men in Black: How the Supreme Court is Destroying America*, 14 (2005).

Christopher Looby, *The Constitution of Nature: Taxonomy as Politics in Jefferson, Peale, and Bartram*, 22 *Early Am. Lit.* 252-253 (1987).

Lucy Madison, *House Republicans reject climate change science*, CBSNews (2011), available at http://www.cbsnews.com/8301-503544_162-20043909-503544.html.

Gregory N. Mandel, *Gaps, Inexperience, Inconsistencies, and Overlaps: Crisis in the Regulation of Genetically Modified Plants and Animals*, 45 *Wm. & Mary L. Rev.* 2167, 2242 (2004).

David Martin, *Group Sues EPA over Popular Weed Killer 2, 4-D*, Organic Consumers Association (2012), available at http://www.organicconsumers.org/articles/article_24953.cfm.

Henry I. Miller and George P. Conko, *The Frankenfood Myth: How Protest and Politics Threaten the Biotech Revolution*, 9-12 (2004).

Monsanto, *Who We Are*, available at http://www.monsanto.com/whoweare/Pages/default.aspx?WT.mc_id=1_wwa

Monsanto Company History, available at <http://www.monsanto.com/whoweare/Pages/monsanto-history.aspx>.

Monsanto v. Geertson Seed Farms, 130 S. Ct. 2743 (2010).

William Mishler and Reginald S. Sheehan, *The Supreme Court as a Counter-majoritarian Institution? The Impact of Public Opinion on Supreme Court Decisions*, 87 Am. Pol. Sci. Rev. 87 (1993).

Walter F. Murphy, C. Herman Pritchett, and Lee Epstein, *Courts, Judges, & Politics: an Introduction to the Judicial Process* § 4.9.

NASA, *Climate change: How do we know?*, available at <http://climate.nasa.gov/evidence/>: "Scientific evidence for warming of the climate system is unequivocal."

National Academy of Sciences Committee on Criteria for Federal Support of Research and Development, *Supplement 1: The Evolution and Impact of Federal Government Support for R&D in Broad Outline*, Allocating Federal Funds for Science and Technology (1995), available at <http://www.ncbi.nlm.nih.gov/books/NBK45556/>.

National Environmental Policy Act (NEPA) Policies & Guidance, EPA, available at <http://www.epa.gov/compliance/resources/policies/nepa/>

Network of Concerned Farmers, available at <http://www.non-gm-farmers.com/>.

FiveThirtyEight, *Supreme Court May Be Most Conservative in Modern History*, New York Times (2012), available at <http://fivethirtyeight.blogs.nytimes.com/2012/03/29/supreme-court-may-be-most-conservative-in-modern-history/#>.

Nolo's Plain-English Law Dictionary, *Standing* (2012), available at <http://www.nolo.com/dictionary/standing-term.html>.

Non GMO Project, available at <http://www.nongmoproject.org/>.

Barack Obama, *Obama's Speech to the National Academy of Sciences*, (2009), available at http://www.realclearpolitics.com/articles/2009/04/27/obama_speech_academy_of_sciences_transcript_96221.html.

James Oliphant and P.J. Huffstutter, *Supreme Court overturns ban on Monsanto's genetically modified alfalfa seeds*, Los Angeles Times (2010), available at <http://articles.latimes.com/2010/jun/22/business/la-fi-court-monsanto-20100622>.

Greenpeace Wins First Round in EPA Lawsuit to Ban Bt Crops, Organic Consumers (2000), available at <http://www.organicconsumers.org/ge/grnpeacesuit.cfm>.

About OSTP, Office of Science and Technology Policy, available at <http://www.whitehouse.gov/administration/eop/ostp/about>.

Robert Paarlberg, *Food Politics: What Everyone Needs to Know*, 167 (2010).

James L. Penick, Jr., Carroll W. Pursell, Jr., Morgan B. Sherwood, and Donald C. Swain, *The Politics of American Science*, § 3.IV (2d ed. 1972).

Pew Initiative on Food and Biotechnology, *Factsheet: Genetically Modified Crops in the U.S.* (2004), available at http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Fact_Sheets/Food_and_Biotechnology/PIFB_Genetically_Modified_Crops_Factsheet0804.pdf.

Pew Initiative on Food and Biotechnology, *Guide to U.S. Regulation of Genetically Modified Food and Agricultural Biotechnology Products* (2001), available at http://www.pewcenteronthestates.org/uploadedFiles/wwwpewtrustsorg/Reports/Food_and_Biotechnology/hhs_biotech_0901.pdf

Title IV—Plant Protection Act, 114 STAT. 438 (2000).

Andrew Pollack, *Justices Back Monsanto on Biotech Seed Planting*, New York Times (2010), available at <http://www.nytimes.com/2010/06/22/business/22bizcourt.html>.

Sean Pool, *House Energy and Commerce Committee Votes for Science Denial* (2011), available at <http://scienceprogress.org/2011/03/house-energy-and-commerce-committee-votes-for-science-denial/>.

Family Farmers Amplify Complaint Against Monsanto's GMOs, Reinforcing their Arguments with Additional Plaintiffs: Monsanto's Failure to Provide Binding Legal Covenant To Protect Family Farmers Threatened by GMO Contamination Necessitates New Complaint, Public Patent Foundation (2011), at <http://www.pubpat.org/osgatavmonsantoamended.htm>.

John Rennie, *House Repubs Vote That Earth Is Not Warming*, Scientific American (2011), available at <http://www.scientificamerican.com/podcast/episode.cfm?id=house-repubs-vote-that-earth-is-not-11-03-16>.

The World According to Monsanto. Dir. Marie-Monique Robin.

Kermit Roosevelt III, *The Myth of Judicial Activism: Making Sense of Supreme Court Decisions* (2008).

Gerald N. Rosenberg, *The Hollow Hope: Can Courts Bring About Social Change?*, 338 (1993).

Say No to GMOs!, available at <http://www.saynotogmos.org/>.

Roddy Scheer and Doug Moss, *Soy Food Products: A \$4 Billion Market*, Business Ethics: The Magazine of Corporate Responsibility (2011), available at <http://business-ethics.com/2011/05/10/soy-food-products-a-4-billion-market/>.

National Survey Shows Americans Are In The Dark Regarding Genetically Modified Foods, ScienceDaily (2005), available at <http://www.sciencedaily.com/releases/2005/01/050131224504.htm>

Jeffrey A. Segal and Harold J. Spaeth, *The Supreme Court and the Attitudinal Model Revisited*, 2 (2002).

Anne Sewell, *Beekeepers & Anti-GMO protesters march in Warsaw*, Digital Journal (2012), available at <http://digitaljournal.com/article/321905>.

Martin M. Shapiro and Alec Stone Sweet, *On Law, Politics, and Judicialization*, 71 (2002).

Paul Slovic, *Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield*, 19 Risk Anal. 689 (1999).

Bruce L.R. Smith, *American Science Policy Since WWII*, 2-3 (1990).

Toddi A. Steelman, *The Public Comment Process: What Do Citizens Contribute to National Forest Management?*, 97 Journal of Forestry 22 (1999). Although this study is focused on the National Forest Service, its conclusions transfer well to other federal agencies.

Richard B. Stewart and James E. Krier, *Environmental Law and Policy: Readings, Materials and Notes*, (2d Ed. 1978), Assessments of NEPA.

Glenn Davis Stone, *Both Sides Now: Fallacies in the Genetic Modification Wars, Implications for Developing Countries, and Anthropological Perspectives*, 43 Cur. Anthro. 614 (2002).

Lynn Thorndike, *L'Encyclopedie and the History of Science*, 362 (1924).

Flavr Savr Tomato, University of Kentucky College of Agriculture Agripedia, available at <http://www.ca.uky.edu/agripedia/glossary/flavr.htm>.

About APHIS, USDA/APHIS, available at http://www.aphis.usda.gov/about_aphis/history.shtml.

USDA/APHIS, Docket No. 04-085-3, *Monsanto Co. and Forage Genetics International; Availability Determination of Nonregulated Status for Alfalfa Genetically Engineered for Tolerance to the Herbicide Glyphosate*. 70 Fed. Reg. 12, 27 (2005).

USDA/APHIS and Idaho Department of Fish and Game, *Draft Environmental Assessment: Gray Wolf Damage Management in Idaho for Protection of Livestock and other Domestic Animals, Wild Ungulates, and Human Safety* (2010), available at http://www.aphis.usda.gov/regulations/pdfs/nepa/idaho_wolf_ea.pdf (last visited Apr. 10, 2012)

USDA/APHIS, *Environmental Assessment and Finding of No Significant Impact* (2005), available at http://www.aphis.usda.gov/brs/aphisdocs2/03_15501p_com.pdf.

USDA/APHIS, *Environmental Assessment In response to Monsanto Petition 06-178-01p seeking a Determination of Non-regulated Status for Roundup RReady2Yield Soybean MON 89788* (2006).

USDA/APHIS, *Environmental Assessment In response to Monsanto Petition 06-178-01p seeking a Determination of Non-regulated Status for Roundup Ready Alfalfa Events J101 and J163* (2004).

USDA/APHIS, *Glyphosate-Tolerant Alfalfa Events J101 and J163: Request for Nonregulated Status Final Environmental Impact Statement* (2010).

USDA/APHIS. *Monsanto Co. and Forage Genetics International; Availability of Petition and Environmental Assessment for Determination of Nonregulated Status for Alfalfa Genetically Engineered for Tolerance to the Herbicide Glyphosate*, 69 Fed. Reg. No. 226. (2004), available at http://www.aphis.usda.gov/brs/fedregister/BRS_20041124a.pdf.

Petitions for Nonregulated Status Granted or Pending by APHIS as of February 27, 2012, USDA/APHIS available at http://www.aphis.usda.gov/biotechnology/not_reg.html

Adoption of Genetically Engineered Crops in the U.S.: Soybeans Varieties, USDA Economic Research Center (2011), available at <http://www.ers.usda.gov/Data/BiotechCrops/ExtentofAdoptionTable3.htm>

USDA National Nutrient Database for Standard Reference Release 18, USDA Nutrient Data Laboratory (2005), available at <http://www.nal.usda.gov/fnic/foodcomp/Data/SR18/sr18.html>.

David versus Monsanto. Dir. Bertram Verhaag.

Tom Vilsack, *Remarks as Prepared for Delivery: Agriculture Secretary Vilsack Speaks Before the House Committee on Agriculture*, USDA (2011), available at http://www.usda.gov/wps/portal/usda!/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os_gAC9-wMJ8QY0MDpxBDA09nXw9DFxcXw2ALU_2CbEdFAF-soRU!/?printable=true&contentidonly=true&contentid=2011%2F01%2F0025.xml

Susan Wright, *Recombinant DNA Technology and Its Social Transformation, 1972-1982*, 2 *Osiris* 303-360 (1986), available at <http://www.jstor.org/stable/301837>.