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PREDICTING THE FUTURE: OUR FOOD SYSTEM IN 2025

*Susan A. Schneider**

INTRODUCTION

It has been inspiring participate in the development of food law and policy as a recognized discipline. Over the last ten years, the *Journal of Food Law & Policy* and the LL.M. Program in Agricultural & Food Law have each played a significant role in that development. And, the landscape continues to evolve. The impact of changing attitudes toward our food system, environmental challenges, public health concerns and other integrated influences are certain to cause a continued evolution in our food system and the legal system that frames it. My task with this essay is to consider our food system ten years forward. I propose a list of seven projections—not necessarily to describe our food system in 2025—but to describe the trends that will guide us toward that date.

PROJECTIONS

1) There will be a greater integration of food and agriculture by consumers, farmers, policymakers, and academics.

All trends point to a greater integration of food and agriculture. The illusion that the two could be addressed separately is but a temporary and impractical approach. For consumers, this means re-learning the lesson that food comes from agriculture. By this, I mean that food comes from the farm. Consumers will again develop the fundamental understanding that most food comes from the biological processes involved in growing a living plant or animal, it is closely tied to the land, and it is dependent upon natural resources and natural processes. There will be a recognition that the growing process that is undertaken has a profound impact on the food that is produced.

For farmers, this means policies will focus more on food production. I envision a decrease in non-food production such as bio-fuels and a greater emphasis on the production of safe food.¹

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For policymakers, discussions of food policy and farm policy will become more entwined.² This has already begun, but the discussion will become more sophisticated, more complex, and less adversarial as the inherently common goals of food security, food safety, and environmental sustainability converge.

In academia, there will be more classes like our Food Law & Policy class,³ that integrate issues of food and farm policy with a systemic approach.

2) Climate disruptions will impact food production.

Within ten year's time, the last of the climate change deniers will be silenced by the uncontroverted fact of global warming and the associated extreme weather disruptions.⁴ Crop production will be negatively impacted, often in erratic patterns that will make for difficult planning.⁵

It is my hope that we will take actions soon to forestall the worse case scenarios, but it seems apparent that we will not act soon enough to avoid

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1. Estimates indicate that in 2010-11 approximately 40 percent of the U.S. corn crop and 14 percent of the U.S. soybean oil production was used in the biofuel industry. U.S. ENERGY INFORMATION ADMIN., *Biofuels Issues and Trends*, 1 (Oct. 2012) available at: <http://www.eia.gov/biofuels/issuestrends/pdf/bit.pdf>.

2. See, e.g., Mark Bittman, Michael Pollan, Ricardo Salvador and Olivier De Schutter, *How A National Food Policy Could Save Millions Of American Lives*, WASH. POST (Nov. 7, 2014).

3. The LL.M. Program in Agricultural & Food Law was one of the first law schools (along with Neil Hamilton at Drake Law School) to teach Food Law & Policy as a course, and it is now a required course for the Program. For more on the development of food law and policy in an academic setting, see Baylen Linnekin and Emily Broad Lieb, *Food Law & Policy: The Fertile Field's Origins & First Decade*, 2014 WIS. L. REV. 557 (2014) (exploring the development of food law and policy as a discipline and crediting the LL.M. Program at the University of Arkansas School of Law for its leadership role).

4. See, generally, R.K. Pachauri, L.A. Meyer, et. al., *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, IPCC, Geneva, Switzerland, (2014) (finding that the future impacts of climate change will include the continued rise in sea level, the contoured warmth and acidity in the ocean, more frequent and longer heat waves, and more intense and frequent extreme precipitation events).

5. Hatfield, J., G. Takle, R. Grotjahn, P. Holden, R. C. Izaurralde, T. Mader, E. Marshall, and D. Liverman, 2014: *Ch. 6: Agriculture. Climate Change Impacts in the United States: The Third National Climate Assessment*, 150-174. doi:10.7930/J02Z13FR (projecting that climate disruptions to agricultural production are likely to become more extreme over the next 25 years).

the effects already beginning to be felt. So, ten years from now, we will be grappling with the best ways to adapt.⁶

3) Water scarcity will impact food production and food processing.

Many areas will experience water stresses that will impact our food system, literally from farm to fork. Much has been said about the dependency of modern agriculture on fossil fuels; this is certainly true. But in most areas of the country, it is far more dependent on water.⁷

With the historic drought now impacting California⁸ and serious concerns about the rates of depletion of the Ogallala aquifer—the water source for a huge section of the great plains that now produces extensive crops—we are beginning to understand the fragile underpinnings of our current production methods and locations.⁹

I predict that in 2025, we will have experienced serious water scarcity in a number of regions, impacting the price of production and the price of food. Additionally, we will become more familiar with the concept of “virtual water”—the water that it takes to produce a product.¹⁰

What comes to mind most often is growing a product. There have long been aquifer depletion concerns such as those that have plagued rice producers in the Grand Prairie region of southern Arkansas.¹¹ There has been a recent media firestorm over the amount of water that it takes to produce

6. See, Nicole M. Civita, *Resilience: The Food Policy Imperative for Volatile Future*, 45 ENVTL. L. REP. (forthcoming 2015).

7. Agriculture consumes 80 percent of the U.S. water supply and 90 percent of the global water supply. See U.S. Dep’t of Agric. Econ. Research Serv., *Irrigation & Water Use* (2013) available at: <http://www.ers.usda.gov/topics/farm-practices-management/irrigation-water-use.aspx>; Amit Kohli, et. al., *Disambiguation of water statistics*, *Aquastat Programme* FAO, 5 (2012).

8. Cali. Exec. Order No. B-29-15 (Apr. 1, 2015), available at: http://gov.ca.gov/docs/4.1.15_Executive_Order.pdf.

9. Steward et. al., *Tapping unsustainable groundwater stores for agricultural production in the High Plains Aquifer of Kansas, projections to 2110*, 110 37 PROC. NATL. ACAD. SCI. USA, E3477-E3486 (2013), available at: <http://www.pnas.org/content/110/37/E3477.abstract>.

10. Tony Allan, *Virtual Water: Tackling the Threat to Our Planet’s Most Precious Resource* (2011); *Virtual Water Trade*, Water Footprint Network, available at: <http://waterfootprint.org/en/water-footprint/national-water-footprint/virtual-water-trade/>.

11. See, Douglas Jehl, *Arkansas Rice Farmers Run Dry, and U.S. Remedy Sets Off Debate*, N.Y. TIMES (Nov. 11, 2002) available at: <http://www.nytimes.com/2002/11/11/us/arkansas-rice-farmers-run-dry-and-us-remedy-sets-off-debate.html>.

almonds.¹² One pound of beef is said to require 1,799 gallons of water to produce.¹³ And, another water-dependent aspect of our food system is processing. Chicken processing plants surveyed use an average of 9 gallons per bird.¹⁴ One survey reported water use per day averaged 1,200,000 gallons with some plants using in excess of 2,500,000 gallons per day.¹⁵

Water scarcity will force us to reconsider how we farm, what we produce, and where we produce it, ultimately leading to greater conservation efforts, an increase in regional food systems in areas that do not require significant irrigation, and a reconsideration of food choices for price and policy reasons.

4) A new appreciation for agro-ecology and environmentalism in food production.

Many involved in agricultural production are threatened by environmentalists, offended at the accusation that they are not practicing good stewardship, and resentful of regulation. I do not predict that farmers will embrace regulation in year 2025.

However, farmers are pragmatists. And, when there is widespread recognition that that treating the soil better—for example, having increased organic matter in the soil—is by far the best solution to withstanding drought, they will embrace this approach.¹⁶

I predict that as a direct outcome of our strained resources and climate challenges, we will develop a new appreciation for how integrated our natural environment is to our food system, with farmers embracing the benefits of a more ecologically centered production system.

12. James Hamblin, *The Dark Side of Almond Use*, *The Atlantic Magazine* (Aug. 28, 2014), available at: <http://www.theatlantic.com/health/archive/2014/08/almonds-demon-nuts/379244/>.

13. *The Hidden Water We Use*, National Geographic, available at: <http://environment.nationalgeographic.com/environment/freshwater/embedded-water/>.

14. Wendy C. Jackson, *Pollution Prevention Pays in Food Processing: Survey Shows That Poultry Processors Can Save Money by Conserving Water*, N.C. Coop. Extension Serv., CD-23, available at:

http://fbns.ncsu.edu/extension_program/documents/poultry_conserve_water.pdf.

15. *Id.*

16. Alexandra Bot & Jose Benites, *The importance of soil organic matter: key to drought-resistance soil and sustained food production*, 80 *FAO Soils Bulletin* (2005), available at: <http://www.fao.org/docrep/009/a0100e/a0100e.pdf>.

5) A new appreciation for the value of good food on the part of consumers.

There is nothing like concerns about scarcity to enhance appreciation. For a generation, we have explored food as a convenience, a cheap commodity, a throw-away. I predict a future that recognizes the value of food. This prediction is based on three very divergent trends that coalesce to that end:

(1) We have those in popular culture that are successfully promoting the value of good food, such as Michael Pollan¹⁷, Mark Bittman¹⁸, Alice Waters,¹⁹ and many others, along with popular initiatives such as the Slow Food Movement that promotes an appreciation for “real” food.²⁰

(2) We have a rapidly advancing public health and medical science movement that is recognizing the scientific connection between nutrition and health.²¹ This trend will continue and advance.

(3) We have food production challenges associated with climate change, water scarcity and a generation of unsustainable food production practices. There are few things that increase appreciation more than the thought that you may no longer have something.

What might be the consequences of this new appreciation?

- There may be societal consequences, such as a change in educational focus. Food courses may return to the school curriculum—perhaps not like the Home Economics courses that

17. See Michael Pollan, *available at*: <http://michaelpollan.com>.

18. See Mark Bittman, *available at*: <http://markbittman.com>.

19. Ruth Reichl, *The 100 Most Influential People Alice Waters*, TIME (Apr. 23, 2014), *available at*: <http://time.com/70811/alice-waters-2014-time-100/>.

20. Slow Food USA, *available at*: <https://www.slowfoodusa.org>.

21. See, e.g., Joint WHO/FAO Expert Consultation, *Diet, Nutrition and the Prevention of Chronic Diseases*, 916 WHO technical Report Series (2003), *available at*: http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf?ua=1 (evaluating the connection between nutrition and chronic diseases impacting human health and diseases); *A Series of Systematic Reviews on the Relationship Between Dietary Patterns and Healthy Outcomes*, U.S. DEP'T OF AGRIC. (March 2014), *available at*: <http://www.nel.gov/vault/2440/web/files/DietaryPatterns/DPRptFullFinal.pdf> (evidencing the scientific relationship between diet and health).

some of us are old enough to remember—but courses that promote a new appreciation of food.²²

- The farm-to-school movement will continue and expand.²³
- Home gardens, hydroponic gardens, and rooftop gardens will expand as more people value their connection and their ability to produce their own food.²⁴
- Urban agriculture will expand dramatically in many different forms occupying a part of the city landscape as much as the city park.²⁵
- Food waste will be looked upon like we consider littering today.²⁶

22. For examples of some recent agriculture, food and nutrition classes added to school curriculums see Alexandra Pannoni, *Agriculture Education Blooms in Urban, Rural High Schools*, U.S. NEWS (Mar. 31, 2014), available at: <http://www.usnews.com/education/blogs/high-school-notes/2014/03/31/agriculture-education-blooms-in-urban-rural-high-schools>; Alexandra Pannoni, *High School Food and Nutrition Classes Serve Up Skills for Life*, U.S. NEWS (June 16, 2014), available at: <http://www.usnews.com/education/blogs/high-school-notes/2014/06/16/high-school-food-and-nutrition-classes-serve-up-skills-for-life>.

23. NATIONAL FARM TO SCHOOL NETWORK, available at: <http://www.farmtoschool.org>.

24. Urban Farming, available at: <http://www.urbanfarming.org>; Brian Clark Howard, *Urban Farming Is Growing a Green Future*, *National Geographic*, available at: http://environment.nationalgeographic.com/environment/photos/urban-farming/#/earth-day-urban-farming-new-york-rooftop_51631_600x450.jpg; Michaelen Doucleff, *Vertical 'Pinkhouses': The Future Of Urban Farming?*, NPR (May 21, 2013), available at:

<http://www.npr.org/blogs/thesalt/2013/05/21/185758529/vertical-pinkhouses-the-future-of-urban-farming>.

25. Trish Popovitch, *10 American Cities Lead the Way With Urban Agriculture Ordinances*, Seedstock (Mar. 27, 2014), available at: <http://seedstock.com/2014/05/27/10-american-cities-lead-the-way-with-urban-agriculture-ordinances/>.

26. Buzby, Jean C., Hodan F. Wells, and Jeffrey Hyman. *The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States*, EIB-121, U.S. Dep't of Agric. Econ. Research Serv. (Feb. 2014). This report found that an estimated 31 percent of the available food supply goes uneaten. The estimated value of this food loss is \$160 billion. For examples of current states' laws that prevent or restrict food waste see Katherine Perry, *Mass. To Make Big Food Wasters Lose The Landfill*, NPR (Aug. 6, 2014), available at: <http://www.npr.org/blogs/thesalt/2014/08/06/338317224/mass-to-make-big-food-wasters-lose-the-landfill>; Seattle Food Waste Requirements, available at: <http://www.seattle.gov/util/MyServices/Garbage/AboutGarbage/SolidWastePlans/AboutSolidWaste/BanOrdinance/FoodBanFAQs/index.htm>. See also, FoodRecoveryProject.com (providing updates on the Food Recovery Project at the University of Arkansas School of Law).

6) Animal agriculture

In the past 30 years, we have rapidly moved in two opposite directions. On one hand, we have moved toward an agricultural system that viewed livestock as manufactured commodities, the more that could be produced at the cheapest cost, the better. This has led to an agricultural system that has degraded the physical conditions that we provide to animals. We have figured out how to raise them more cheaply by confining them in small spaces and giving them antibiotics and other pharmaceuticals.²⁷

On the other hand, scientific studies produce increasingly persuasive results that show that animals have more intelligence, sentience, and even emotion than we ever thought possible.²⁸

We are going in opposite directions. This presents increasing conflict and the trends are irreconcilable.

Looking forward, animal agriculture welfare conditions will improve. There are moral and ethical reasons for why it is unacceptable to confine a female pig to a crate that prevents her from being able to move about or even turn around. But, even if one does not accept the morality of that situation, farmers will be persuaded by the market place. The more consumers know about animal sentience, the less they will accept treatment that is deemed cruel.²⁹

As a third generation farmer, it is my hope and my prediction that within the next ten years, the majority of farmers will get on the right side of this issue and begin advocating with integrators for animal welfare standards rather than asking for special legal protections.

27. See, Susan A. Schneider, *Beyond the Food We Eat: Animal Drugs in the Livestock Industry*, 25 DUKE ENV'T L. & POL'Y FORUM (forthcoming, Spring 2015).

28. See, e.g., Philip Low, et. al., *The Cambridge Declaration on Consciousness*, Francis Crick Memorial Conference on Consciousness in Human and Non-Human Animals (Jan. 7, 2012), available at:

<http://fcmconference.org/img/CambridgeDeclarationOnConsciousness.pdf>

(acknowledging that “humans are not unique in possessing the neurological substrates that generate consciousness. Nonhuman animals, including all mammals and birds. . . also possess these neurological substrates).

29. See, *2014 Humane Heartland Farm Animal Welfare Survey*, American Humane Association (2014), available at: <http://www.americanhumane.org/humane-heartland/2014-humane-heartland-farm-survey.pdf> (finding that 95 percent of the people surveyed were concerned about farm animal welfare); See also, *Consumer Perceptions of Farmed Animal Welfare*, Animal Welfare Institute, available at: https://awionline.org/sites/default/files/uploads/documents/fa-consumer_perceptionsoffarmwelfare_-112511.pdf. (listing consumer perceptions of farm animal welfare).

The sensibility of this approach is further reflected in the companion issues involving public health, the wise use of natural resources, and the associated environmental considerations.³⁰ The production and consumption of as much meat as we can produce as cheaply as possible is an unsustainable and flawed approach. Meat prices will rise to reflect the true cost of production, the value of the product, and the cost to society.

7) Technology

In 2025, we will continue to look to new technology to solve our problems. However, unanticipated consequences from our current use will give rise to increased skepticism and the fragility of our environment may give rise to greater caution.

The over-use of glyphosate provides a current example. The pervasive use of genetically modified herbicide resistant crops has led to the production of a new generation of “super weeds” that are resistant to glyphosate.³¹ The promise of reduced pesticide use because of this technology has been broken as producers need to rely on ever-stronger pesticides to produce the same results.

Throughout the next decade, we will need to confront the pervasive impact of pesticide use on the natural environment. Studies will continue to confirm the association between pesticide use and the health of pollinators, as well as other wildlife.³² For science not only brings us new technologies, it also brings us new wisdom in evaluating technology’s effects.

30. See, Roberto A. Ferdman, *Stop Eating So Much Meat, Top U.S. Nutritional Panel Says*, WASH. POST (Feb. 19, 2015) available at: <http://www.washingtonpost.com/blogs/wonkblog/wp/2015/02/19/eating-a-lot-of-meat-is-hurting-the-environment-and-you-should-stop-top-u-s-nutritional-panel-says/>

31. See, Michael Livingston, ET AL, *The Economics of Glyphosate Resistance Management in Corn and Soybean Production*, USDA, Econ. Res. Serv., ERR No. 154 (Apr. 2015) available at: <http://www.ers.usda.gov/media/1832877/err184.pdf> (describing the increasing problem of weed resistance and management efforts); See also, Neil D. Hamilton, *Don't Repeat Mistakes That Led To Superweeds*, DES MOINES REGISTER (June 28, 2014) available at: <http://www.desmoinesregister.com/story/opinion/columnists/iowa-view/2014/06/28/repeat-mistakes-led-superweeds/11652199/> (commenting on the industry approach of promoting new genetically-engineered seeds with resistance to stronger herbicides).

32. See, e.g., Jeffery S. Pettis, Dennis vanEngelsdorp, Josephine Johnson and Galen Dively, *Pesticide Exposure In Honey Bees Results In Increased Levels Of The Gut Pathogen Nosema*, THE SCIENCE OF NATURE, (Jan. 13, 2012) (linking pesticide use to weakened immune systems in bees) available at: <http://link.springer.com/article/10.1007/s00114-011-0881-1/fulltext.html>.

Consider, for example, the recent characterization of glyphosate as a “probable carcinogen.”³³ Glyphosate is widely used in food production, not only in genetically-modified herbicide resistant crops, but as a harvest aid in many food crops, resulting in residues in many different foods.³⁴ There is currently no regular testing for glyphosate residue testing in food products, but this will likely change as increasing concerns are raised.³⁵

Environmental, natural resource, and public health challenges may lead us to a new humility about our ability to successfully control our world through technological improvements. This could lead us toward a technology that works with nature as opposed to against it.

CONCLUSION

Within the next decade, our food system will likely be influenced by unprecedented environmental challenges, many of which can be linked to unsustainable practices we rely upon today. Our food system will similarly be influenced by increasing evidence of the direct link between diet and health and the link between current dietary patterns and public health problems. These critical challenges are ominous, and they will threaten the status quo. Over the next 10 years, we will hear a series of alarms—our “wake-up” calls to improved stewardship and a sustainable food system. It is my hope that we can work together to answer our call to action—all levels of the agricultural community, all sizes and shapes of the food industry, and all categories of consumers—as a sustainable food system should be in everyone’s best long term interests.

33. Guyton, Kathryn Z et al., *Carcinogenicity of tetrachlorvinphos, parathion, malathion, diazinon, and glyphosate*, *The Lancet Oncology* (March 20, 2015) (presenting report conducted by scientists affiliated with the World Health Organization that classifies glyphosate as “probably carcinogenic to humans”) available at:

[http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(15\)70134-8/fulltext](http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(15)70134-8/fulltext).

34. See, e.g., the number of foods that currently have an allowed tolerance for glyphosate residue. 40 C.F.R. § 180.364 (2014). Note that Monsanto, the major manufacturer of glyphosate and glyphosate-resistant seed products, requested an increase in these tolerances. 77 Fed. Reg. 25,954 (May 2, 2012), and some individual levels were increased. 78 Fed. Reg. 25,396 (May 1, 2013) (denying much of the request but establishing separate tolerances at a significant increased level for carrots and sweet potatoes).

35. *EPA May Recommend Testing Food Products for Common Herbicide*, *FOOD SAFETY NEWS* (Apr. 21, 2015), available at: http://www.foodsafetynews.com/2015/04/epa-may-recommend-testing-food-products-for-common-herbicide/#.VUN_SdNViko.

