# 1NC---Triples

### 1NC

#### ‘Prohibition’ must ban all instances of anticompetitive behavior

James Lane Buckley 91, Judge on the United States Court of Appeals for the District of Columbia Court, BA and JD from Yale University, Former Undersecretary for Security Assistance at the State Department, Former United States Senator from New York, “Hazardous Waste Treatment Council v. Reilly”, United States Court of Appeals for the District of Columbia Circuit, 938 F.2d 1390, 1395-1396, 1991 U.S. App. LEXIS 16095, 7/26/1991, Lexis

Petitioners claim that the EPA considers a state law to "act as a prohibition" under the regulation only when it bans all treatment, storage, and disposal within a State, and they point to the ALJ's statement, based on his reading of the preamble to the regulations, 45 Fed. Reg. at 33,395, that the EPA "appears to have construed the phrase 'act as a prohibition' in [paragraph (b)] as equivalent to an outright ban or refusal to accept hazardous waste for treatment, storage, or disposal." ALJ Decision at 112. Petitioners contend that the regulation must embrace any law that would even indirectly, as in the instant case, prohibit any treatment facility; otherwise, a State could accomplish a total ban one facility at a time. Senate Bill 114, they charge, epitomizes the "NIMBY" syndrome: In response to the needs of the nation for treatment of hazardous waste, North Carolina has simply said, "Not in my backyard." By refusing to respond, petitioners urge, the EPA ignores its duty to monitor state programs.

Although, at oral argument, government counsel [\*\*13] attempted to defend the "ban on all treatment" position that petitioners ascribe to the EPA, that is not the basis on which the agency concluded that Senate Bill 114 did not act as a prohibition within the meaning of section 271.4(b). In explaining why the second condition of paragraph (b) had not been met, the Regional Administrator emphasized that of the 485 riparian miles available in North Carolina for a facility of the kind proposed by GSX, 333 remained available under the Act, and noted that a smaller plant could be built at the Laurinburg site. Final Decision at 2. We therefore construe the EPA's decision to mean that a state law "acts as a prohibition" on the treatment of hazardous wastes when it effects a total ban on a particular waste treatment technology within a State, and nothing more.

[\*1396] Such a construction is reasonable and merits deference. The language of paragraph (b), which uses the word "prohibit[]" rather than "impede[]" or "restrict[]" as in the case of paragraph (a), suggests that the former allows States greater latitude in regulating particular treatment facilities before a prohibition is found to exist. This is consistent with the preamble's expression of [\*\*14] a desire to encourage the development of state programs by avoiding the establishment of "very tight standards." See 45 Fed. Reg. at 33,385. Second, defining prohibition in terms of the ban of a particular technology falls well within the language of paragraph (b). Finally, we see nothing inconsistent between this construction and the language of the underlying statute, 42 U.S.C. § 6926(b), which merely asserts that a state program may not be authorized if "such program is not consistent with the Federal and State programs applicable in other States." This language allows the agency enormous latitude in structuring its own implementing regulations and in interpreting them.

#### That means the only topical mechanism is to apply per se illegality

John Paul Stevens 90, Justice, Supreme Court of the United States, “FTC v. Superior Court Trial Lawyers Ass'n,” 493 U.S. 411, Lexis

LEdHN[3C] [3C]LEdHN[14] [14]Equally important is the second error implicit in respondents' claim to immunity from the per se rules. In its opinion, the Court of Appeals assumed that the antitrust laws permit, but do not require, the condemnation of price fixing and boycotts without proof of market power. 15 The opinion further assumed that the per se rule prohibiting such activity "is only a rule of 'administrative convenience and efficiency,' not a statutory command." 272 U.S. App. D. C., at 295, 856 F. 2d, at 249.This statement contains two errors. HN10 [\*\*\*\*42] The per se [\*433] rules are, of course, the product of judicial interpretations of the Sherman Act, but the rules nevertheless have the same force and effect as any other statutory commands. Moreover, while the per se rule against price fixing and boycotts is indeed justified in part by "administrative convenience," the Court of Appeals erred in describing the prohibition as justified only by such concerns. The per se rules also reflect a long-standing judgment that the prohibited practices by their nature have "a substantial potential for impact on competition." Jefferson Parish Hospital District No. 2 v. Hyde, 466 U.S. 2, 16 (1984).

[\*\*\*\*43] LEdHN[15] [15]As we explained in Professional Engineers, HN11 the rule of reason in antitrust law generates

"two complementary categories of antitrust analysis. In the first category are agreements whose nature and necessary effect are so plainly anticompetitive that no elaborate study of the industry is needed to establish their illegality -- they are 'illegal per se.' In the second category are agreements whose competitive effect can only be evaluated by analyzing the facts peculiar to the business, the history of the restraint, and the reasons why it was imposed." 435 U.S., at 692.

[\*\*\*873] "Once experience with a particular kind of restraint enables the Court to predict with confidence that the rule of reason will condemn it, it has applied a conclusive presumption that the restraint is unreasonable." Arizona v. Maricopa County Medical Society, 457 U.S. 332, 344 (1982).

[\*\*781] LEdHN[16] [16] [\*\*\*\*44] The per se rules in antitrust law serve purposes analogous to per se restrictions upon, for example, stunt flying in congested areas or speeding. Laws prohibiting stunt flying or setting speed limits are justified by the State's interest in protecting human life and property. Perhaps most violations of such rules actually cause no harm. No doubt many experienced drivers and pilots can operate much more safely, even at prohibited speeds, than the average citizen.

[\*434] If the especially skilled drivers and pilots were to paint messages on their cars, or attach streamers to their planes, their conduct would have an expressive component. High speeds and unusual maneuvers would help to draw attention to their messages. Yet the laws may nonetheless be enforced against these skilled persons without proof that their conduct was actually harmful or dangerous.

In part, the justification for these per se rules is rooted in administrative convenience. They are also supported, however, by the observation that every speeder and every stunt pilot poses some threat to the community. An unpredictable event may overwhelm the skills of the best driver or pilot, even if the [\*\*\*\*45] proposed course of action was entirely prudent when initiated. A bad driver going slowly may be more dangerous that a good driver going quickly, but a good driver who obeys the law is safer still.

#### Vote:

#### 1) GROUND---key to link uniqueness and a unidirectional topic. Fringe standards dodge topic links, AND they can pick a broader but more permissive standard, making the topic bidirectional.

#### 2) LIMITS---too many possible standards, each requiring distinct answers, makes the topic unmanagbly large.

### 1NC

#### The United States federal government should issue a policy memorandum that establishes a presumption against mergers and acquisitions among agribusiness firms.

#### The CP competes because it’s not legally binding BUT solves by shifting antitrust policy

Theodore Voorhees 17, Senior Litigator and Member of the Antitrust and Competition Law Practice Group at Covington & Burling LLP, JD from the Catholic University of America, Columbus School of Law, AB from Harvard University, and Leah Brannon, Partner at Cleary Gottlieb Steen & Hamilton LLP, JD from Harvard Law School, BA with Highest Distinction from the University of Virginia, ABA 2016 Presidential Transition Task Force, “Presidential Transition Report: The State of Antitrust Enforcement”, American Bar Association Section of Antitrust Law, January 2017, http://cartelcapers.com/wp-content/uploads/2017/01/ABA-SAL-Presidential-Transition-Report-1-18-17-FINAL-2.pdf

III. ENFORCEMENT MATTERS

A. Agency Enforcement and Policy

1. Guidance

Where there are uncertainties in the Agencies' enforcement policies or priorities, it is often essential for the Agencies to provide guidance. The formal guidance can take the form of formal guidance documents (such as the Horizontal Merger Guidelines of 2010) or FTC opinions. Informal guidance can take the form of agency reports, speeches by key agency personnel, amicus briefs, decisions to litigate, or closing statements. Agency guidance is important and beneficial for multiple reasons, such as providing clarity for businesses, moving competition policy in the right direction, and ensuring a U.S. perspective on the international arena. Agency guidance is also particularly useful to communicate a shift in enforcement policy or practice.3

[FOOTNOTE] 3 The recent guidance issued by the Division and the FTC communicating the decision to treat wage-fixing and no-poaching agreements as criminal violations going forward provides an excellent example of this. See DEP’T OF JUSTICE, ANTITRUST DIV., FED. TRADE COMM’N, ANTITRUST GUIDANCE FOR HUMAN RESOURCE PROFESSIONALS (Oct. 2016), available at www.ftc.gov/system/files/documents/ public\_statements/992623/ftc-doj\_hr\_guidance\_final\_10-20-16.pdf. [END FOOTNOTE]

Furthermore, uncertainty as to the boundaries of antitrust laws may chill potentially procompetitive conduct or enable potentially anticompetitive behavior to continue unchecked. Businesses may be less willing to engage in novel business activities that could benefit consumers. Moreover, agency guidance and enforcement not only define the boundaries of how the Agencies view and enforce the law, but may also impact how courts rule in litigation.

Guidance also ensures a place for the U.S. perspective on the international stage. Because so many foreign antitrust authorities look to the Agencies for leadership and study U.S. enforcement decisions and cases, clearly articulated guidance helps achieve uniformity across jurisdictions. Moreover, an international presence and influence as to antitrust policy is particularly critical in an era in which some foreign competition agencies use the pretense of antitrust enforcement as a cover to mask decisions that are actually based on industrial policy or protectionism.

Speeches, while not binding on the Agencies or as long-lasting as more formal agency documents, can give advance notice of enforcement priorities and the views of agency leadership regarding how best to analyze certain forms of conduct. For instance, in her first speech as Acting Assistant Attorney General, Renata Hesse offered important insights into the use of bargaining models in analyzing vertical mergers and the Division's skepticism of procompetitive claims in horizontal mergers. Indeed, for changes in agency thinking, an agency speech or other non-enforcement guidance can be the fairer approach, at least in the first instance, than initially embarking on litigation.

Business review letters from the Division and advisory opinions from the FTC serve as another avenue for providing guidance on novel conduct. More important, by setting forth the respective agency's reasoning for how it views proposed conduct, these documents in effect make a policy statement as to what characteristics of the conduct are considered to be beneficial or harmful for consumers.

#### It avoids politics AND the DOJ da

Dr. Nicholas R. Parrillo 19, Professor of Law and Professor of History at Yale Law School, JD from Yale Law School, PhD in American Studies from Yale University, AB in History and Literature from Harvard University, “Should the Public Get to Participate Before Federal Agencies Issue Guidance? An Empirical Study”, Administrative Law Review, 71 ADMIN. L. REV. 57, Winter 2019, Lexis

II. BURDEN OF PUBLIC COMMENT ON GUIDANCE LESS THAN LEGISLATIVE RULEMAKING

If the agency is going to solicit public comment on guidance, why not just go the whole nine yards and proceed by legislative rulemaking, which unlike guidance is genuine binding law? The reason is that the actual taking of public comment is only a fraction of the burden that legislative rulemaking imposes, and even if one focuses on the taking of comment alone, it is often less burdensome for guidance than for rulemaking. Thus, for most agencies at least, "notice-and-comment guidance" is considerably faster and less expensive than notice-and-comment rulemaking.

In discussing why legislative rulemaking takes the amount of time and resources that it does, interviewees prominently cited five aspects of the process, all of which are either absent or less costly when the process is voluntary notice-and-comment for guidance. I discuss these in roughly descending order of prominence.

A. Mandates for Cost--Benefit Analysis

Before significant legislative rules can be proposed or finalized by executive agencies, they are reviewed by the President's Office of Management and Budget to ensure, inter alia, that the agency engaged in appropriate cost--benefit analysis. OMB also reviews executive agencies' "significant" guidance documents. The relevant Executive Order's definition of "significant" is, in many ways, open-ended. According to an official at the [\*80] EPA's Office of General Counsel, the decision on which guidance documents to submit to OMB for review is made at the senior management level of the agency, by political appointees, and the handling of the question changes depending on who is in the relevant agency-manager and OMB positions.

Generally, interviewees thought OMB review was less likely for guidance than for legislative rules and, when it occurred, less time-consuming. A former senior official at the EPA's Air Program office said he thought OMB review of guidance took less time than that of legislative rules. Lynn Thorp of Clean Water Action observed that OMB scrutiny of the EPA guidance was less than that for legislative rules. A former senior FDA official noted that OMB was not much engaged with the agency's day-to-day scientific guidance, while a former senior FDA career official said many FDA guidance documents did not go through OMB at all. William Schultz, former HHS General Counsel, in discussing differences between the notice-and-comment process for rulemaking and the notice-and-comment process for guidance, cited OMB delays, which he said can be severe. Daniel Troy, general counsel of GlaxoSmithKline and former chief counsel of the FDA, said one reason for FDA personnel's preference for guidance over legislative rulemaking was that it avoided OMB review. At [\*81] USDA NOP, which does notice-and-comment on "most" of its guidance, the head of the program cited OMB review as one of a few factors that makes legislative rulemaking generally slower than guidance. Richardson, the former chair of the NOSB, said legislative rulemaking was greatly delayed by agency economic analysis in contemplation of OMB review, which was not done for guidance; and whereas OMB was a focal point for private lobbying regarding legislative rules, causing further delay, this was not true of guidance. The result was that legislative rulemaking took "much longer" than guidance even when the latter went through public comment. At the Department of Transportation (DOT), said the former general counsel Kathryn Thomson, guidance, even with public comment, was "much faster" than legislative rulemaking, mainly because it was not necessary to do cost--benefit analysis in contemplation of OMB review; OMB would accept a fast process for guidance more than it would for a legislative rule. At the DOE appliance standards program, recalled a former Department division director, OMB could delay or accelerate legislative rulemaking depending on the administration's calendar and politics, but guidance was not subjected to OMB review.

In banking regulation, where most of the agencies are independent and therefore not subject to OMB review, economic analysis can still cause legislative rulemaking to take longer than guidance, as such analysis may be required on some matters by statute or agency practice. An interviewee who held senior posts at CFPB and other federal agencies said that at the independent banking agencies (i.e., those not funded with tax revenues and not subject to OMB review), where cost--benefit analysis may be required by statute, that analysis would be done for legislative rulemaking but not for guidance, which helped explain why the former took longer. A former senior Federal Reserve official noted that, while the Federal Reserve's legislative-rulemaking-specific cost--benefit analysis was "sometimes a bit skippy," [\*82] the CFPB did voluminous cost--benefit analysis because of its fear of D.C. Circuit case law striking down SEC action for violating cost--benefit requirements.

B. Building a Record and Responding to Comments in Anticipation of Judicial Review

The advent of "hard look" judicial review in the 1970s, ratified by the Supreme Court in Motor Vehicles Manufactures Ass'n v. State Farm, pushed agencies to develop voluminous administrative records to support their legislative rules and to devote countless hours to writing long preambles responding minutely to public comments. An EPA official--in comparing legislative rulemaking (which he said took an "excruciatingly" long time) with guidance (on which he said the agency was "much more nimble")--said that a "huge" difference between the two was the time spent developing the administrative record and replying to comments, both of which he placed under the heading of "judicial review accountability," that is, the agency's "fear" of investing in a legislative rule only to have it struck down in court. EPA lawyers, he explained, were "vigilant" about ensuring that the administrative record was "all there," including the development of supporting documents, with all data gathered and analyzed, which took a "ton of time." Likewise, lawyers were vigilant in making sure the agency accounted for all comments. By contrast, "very little" of this was required for EPA guidance. There might be some accompanying materials, but it was "very rare" to do a full supporting foundation, in part because much of the necessary information would already have been gathered for a prior relevant legislative rulemaking, or would have bubbled up from the implementation process for that prior legislative rule. And even if the EPA took public comment on a guidance document and responded (which it sometimes did), "we're coasting along the surface" compared to what is done for a legislative rulemaking preamble. A former senior official at the EPA Air Program Office concurred that, for guidance, supporting material did not need to be gathered because it had already been assembled in prior legislative rulemakings, and public comments did not need to be addressed [\*83] at the same level of detail as for legislative rulemaking.

There is a similar dynamic at the FDA, which, per the GGPs, takes public comment on a very large proportion of its guidance documents. A former senior FDA official explained the difference. Legislative rulemaking required support for everything in the record and a time-consuming response to comments, and the costs of this process had been part of the agency's drive since the 1990s to rely more upon guidance, for which the process, even with public comment, was much more "abbreviated." Whereas legislative rules were "law" and had to be supported, the agency in issuing guidance felt freer not to develop a voluminous record, and the comments on guidance did not require the kind of response that was required on legislative rules. The fact that the FDA was sued much more on legislative rules than on guidance, he said, was surely part of this. Similarly, a congressional staffer observed that, although the FDA took public comment on guidance, it generally did not give any response to comments, meaning there was not the same kind of " State Farm obligation" as for legislative rulemaking, and so the process did not ensure the same careful consideration of stakeholder views. A former senior FDA official thought the lack of a requirement to respond to comments was a crucial and salutary feature of the FDA's process for guidance: if you required a preamble, you might as well do legislative rulemaking, and the whole thing would become "unworkable." A former senior FDA career official, discussing the difference between legislative rulemaking and guidance, said responding to all substantive comments in a rulemaking in writing for publication added "significantly" to the time spent. Overall, said an FDA Office of Chief Counsel official, whereas legislative rulemaking was criticized for being "ossified," it was possible to issue guidance "pretty quickly."

[\*84] Elsewhere, too, the research and analytic demands are less for guidance than for legislative rulemaking. At OSHA, said the former deputy solicitor of the Department of Labor (DOL), guidance was faster than legislative rulemaking in part because of judicial decisions requiring that the agency in each rulemaking make a showing of significant risk and technological and economic feasibility. By contrast, headquarters might have a regional office draft a guidance document, noted John Newquist, a former assistant administrator of OSHA's Region V (headquartered in Chicago).

C. Taking Comments in Itself

The actual publication of the draft rule/guidance and the taking of comments on it (as distinct from the work of responding to those comments) takes time and effort in itself, but this time and effort did not figure nearly as prominently in the interviews as did cost--benefit analysis, record-building, or responding to comments. And in any event, the burden of taking comment per se tends to be less for guidance documents than for legislative rules. At the banking agencies, said an interviewee who held senior posts at the CFPB and other federal agencies, the comment period tends to be shorter for guidance, and the comments fewer. The comment period was also said to be shorter for guidance at the USDA NOP, and in EPA clean water regulation. Comments were said to be less voluminous on guidance compared to legislative rules at the FDA.

D. Drafting Challenges

Legislative rules are typically harder to draft than guidance, which adds further to the time and resources they demand. Because legislative rules are mandatory, said an EPA official, you "sweat each detail," seeking to account for all factors and contingencies, since once the rule is promulgated, "we can't go back to it for 15 years." Guidance, he said, does not involve the same sweating of details. As to the FDA, a former senior career official [\*85] there said that, in writing guidance, you need not be as careful on wording as on a legislative rule because the language is not binding and is described as reflecting the current thinking of the agency; you are therefore more free to put in details, use narrative form, Q&A form, and plain language, since the document is not "set in stone." He recalled one subject on which he and his colleagues initially sat down to write a legislative rule and found it impossible to start with "codified language," given the complexity of the matter; he therefore suggested handling the problem by writing guidance, as a "dry run," before drawing up binding requirements. In banking regulation, an interviewee who held senior posts at the CFPB and other federal agencies said that guidance was "easier" to write and could be written "faster" than a legislative rule because "you don't need to nail everything down," as the aim is to warn regulated parties to pay attention to certain risks, not prescribe mandatory requirements.

E. Dealing with Mobilized Stakeholders

The length, officially-binding status, and public salience of legislative rulemaking make it a focal point for the mobilization of interest groups to pressure the agency and enlist political allies in Congress, the White House, and elsewhere. This, in turn, makes legislative rulemaking expensive to the agency in terms of political capital. An official at a public interest organization working on immigrants' rights said that, in his experience seeking favorable policies from DHS, he had found that legislative rulemaking tended to "exhaust all [the agency's] political capital," more than issuing guidance did. Legislative rulemaking allowed time for the opponents of an initiative to marshal their forces. If an agency and its stakeholder allies sought to proceed by legislative rulemaking, he said, they were "declaring a grand war" and had to be prepared for greater opposition. A former DOE division director, explaining why there was "no comparison" between the processes for legislative rulemaking and guidance, emphasized that the "politics" of the former process "slowed it down," for whenever the proceeding seemed to veer in a direction that one interest group did not like, [\*86] that group would marshal evidence and political support to stop the process, enlisting friendly members of Congress or the White House. With respect to the USDA NOP, the president of an organic certifier, in discussing factors that slowed legislative rulemaking, immediately cited the agency's internal process for economic analysis (not applicable to guidance), which he said could become a "pawn" in political clashes between different parts of the industry, in which members of Congress might be involved.

### 1NC

#### The plan’s uncertainty and disruption to capacity for tech innovation decimates growth of the ag sector

Dr. Don Racheter 17, President of the Public Interest Institute, Master's Degree and Ph.D. in Political Science from the University of Iowa, Taught at the University of Iowa and Central College, “Upcoming Mergers Benefit America's Farmers”, Des Moines Register, 8/6/2017, https://www.desmoinesregister.com/story/opinion/columnists/iowa-view/2017/08/06/upcoming-mergers-benefit-americas-farmers/537250001/

America’s farmers are being challenged to prepare for a global, growing population and a robust international trade market.

Not only has every farmer had to increase the number of people that he or she is responsible for feeding by almost 130 people since 1960, but international markets also are eager for Iowa’s soybeans and other agricultural products.

These market-based problems need specific market-centric solutions. By leaning on the power of an innovative and dynamic private sector, we can ensure our farmers have the tools to compete in any economic climate.

Industry leaders such as Bayer, Monsanto, Dow and DuPont are meeting these challenges head-on with a commitment to developing the latest technologies that make America’s farms both more efficient and effective. These efforts have filled the gap in public investment to groundbreaking agricultural research and development. According to the USDA Economic Research Service, government investment in agricultural R&D dropped to just 30 percent of total agricultural R&D funding since 2013.

Today, the private sector is responsible for many of the innovations that are currently shaping the future of farming in America, and more resources in the private sector means farmers can expect these advances in technology faster. The latest breakthroughs in precision farming techniques are helping farmers target their crop treatments, saving small farms money while also limiting their environmental footprint. For example, John Deere tractors use GPS sensors so that farmers don’t cover the same area twice, which can reduce their fuel input by up to 40 percent.

More permanent partnerships, such as the potential merger between Bayer and Monsanto, will ensure that leading ag companies are able to invest additional resources to bring advanced solutions to farmers. Farmers will be able to spend less time and resources on daily challenges, enabling them to meet the international demand for Iowa’s ag products.

As opponents to mergers pop up as frequently as weeds after a strong rain, we should examine what might possibly be driving their motivation. Rather than truly believing that these mergers harm consumers, many are driven by political motivations. Case in point is the July 21 commentary by Austin Frerick ["To save rural Iowa, oppose Monsanto-Bayer mega-merger"], a little-known former U.S. Treasury economist under the Obama Administration. One can’t help but question Mr. Frerick’s perspective given his support for greater government interference in the marketplace while government investment in R&D has continued to decline.

Cloaking a progressive agenda behind a call for consumers to reject private sector investment by two leading ag companies with a stake in America’s farming future is both disingenuous and harmful. Anyone who has spent any real time in a farmer’s field knows that what agriculture really needs is to attract, not reject, more investment in innovative agricultural technologies.

What critics fail to highlight is that the Bayer-Monsanto merger is the perfect example of bringing together two companies that operate in largely complementary fields to develop new tools and products with more capital. In fact, Bayer focuses mostly on crop protection, while Monsanto is known for seeds and traits capabilities. Alone, it can take each company more than a decade to create a new product for farmers, but together, the time could shorten significantly.

In an ever-changing free market, it is natural for businesses to seek to maintain a competitive advantage over their rivals by expanding their offerings to the consumers they serve. Bayer-Monsanto’s focus on finding the next generation of farming technology will spur their competitors to do the same to keep up.

Farmers are constantly battling uncertainty in their line of business and don’t have time for political posturing. The benefits from greater private sector investment in innovation from these upcoming mergers are clear and demonstrable and are necessary for the future of American farming.

#### Ag innovation’s necessary to prevent new crop diseases, especially Ug99

Dr. David Clark 10, Professor of Microbiology at Southern Illinois University, David, Germs, Genes, and Civilization, p. 250-251

One way to combat resistance is to replace old antibiotics with newly invented ones. Soon after they were first discovered, there was a big rush to discover new antibiotics or modify old ones chemically, yielding new variants. When most known bacterial diseases had cures, complacency set in. Recently, drug resistance has hit the headlines and research has picked up again. Although some new antibiotics are now in the pipeline, it takes several years to get a new drug from laboratory to hospital. As new antibiotics are deployed, resistance will inevitably appear. We can look forward to a permanent cold war between bacteria and pharmaceutical companies.

Where do the resistance genes on plasmids come from? They are gifts from Mother Nature, like most antibiotics. Long before humans isolated penicillin from the mold Penicillium, or streptomycin from the bacterium Streptomyces, these antibiotics were deployed to wage biological warfare in the soil. Bacteria and molds have been slugging it out for eons before humans joined in the fray. Not only did microorganisms develop antibiotics to kill each other, but they developed resistance mechanisms to counter each other’s attacks. Some bacterial cultures stored before penicillin was discovered already had resistance genes. Thus, resistance to most antibiotics probably predates their use by humans. Increased use has led to the spread of these resistance genes.

Disease and the food supply

We have focused on human disease, but remember that livestock and crop plants suffer from infections, too. Modern farmers tend to rely heavily on a few main crops, with little crop rotation. Large areas of a single crop provide the same opportunities for plant diseases that overcrowded cities provide for human infections. The warmer, wetter weather that is becoming more prevalent favors fungal infections that attack plants. For example, wheat scab outbreaks in the United States and Canada caused massive losses in the 1990s.

Decreased surpluses in the major grain exporters undermine the safety net for overpopulated third world nations. If major drought in tropical areas such as Africa or India coincides with major crop losses in the grain exporters, the result could be widespread famine. In 2006-2007, world grain reserves fell to 57 days of consumption, the lowest since 1972.

Perhaps the most serious current threat to our food supply is the wheat rust fungus (Puccinia graminis). A new and highly virulent strain emerged from Uganda in 1999 and was, therefore, named Ug99. It is presently in Africa and parts of Asia. Because the spores are airborne, this fungus will inevitably spread worldwide. Breeding resistant wheat varieties is in progress but takes several years.

Overpopulation and microbial evolution

Overpopulation does not merely threaten starvation; it sets the scene for the evolution of new infectious diseases. The more people there are—and the more crowded, unhygienic, and malnourished they are—the greater the opportunity for some new and virulent plague to emerge. So far, we have kept ahead.

#### Extinction

Elwyn Grainger-Jones 20, Executive Director of the CGIAR System Organization, a Global Agricultural Research Partnership, Over 25 Years of Experience in Agriculture and International Development, Having Previously Worked for the Overseas Development Institute, the U.K.’s Department for International Development (DFID), the World Bank, and International Fund for Agricultural Development, “The World Will Starve If We Keep Ignoring Disease Outbreaks”, The Hill, 6/4/2020, https://thehill.com/opinion/energy-environment/501192-the-world-will-starve-if-we-keep-ignoring-disease-outbreaks

The world will starve if we keep ignoring disease outbreaks

The global coronavirus pandemic is exposing vulnerabilities in many of the systems we normally take for granted. Hospitals in New York, northern Italy and other disease epicenters have been overwhelmed with patients, putting doctors in the grim position of having to ration medical supplies and care.

Food systems are also under strain, as panic buyers empty store shelves of staple products like flour and eggs, and lockdowns lead to farm labor shortages and slower international trade. In low-income countries, the situation is even more critical — business shutdowns and movement restrictions are leaving millions without any source of income, and without government safety nets, many are at risk of hunger and sliding deeper into poverty.

Epidemiologists and public health experts had long warned that a devastating pandemic was possible, and still we weren’t prepared. By working together, humanity will eventually weather this crisis. It is exceedingly important that when we do, we learn from our experience and pay attention to other alarm bells that are still sounding. Case in point: diseases aren’t just a problem for human health — they also pose giant risks to crops and livestock, with the potential to upend our agricultural systems and threaten local and global food supplies.

How Diseases Spread

In our modern world, diseases have abundant opportunities to spread. Human populations are increasingly expanding into wild areas, creating potential for transmission between humans, wild animals and livestock. About 60 to 75 percent of emerging infectious diseases are zoonotic, meaning that they can jump between animals and humans, according to the World Health Organization. Recent examples include a strain of H1N1 swine flu, which killed several hundred thousand people globally in 2009 and 2010.

Climate change also enables plant diseases and pests to spread more easily. For example, yellow rust, a fungal disease that attacks wheat, has been making inroads in the U.S. as temperatures warm. The disease, which commonly reduces crop yields by 40 percent, was not present in the U.S. Great Plains wheat belt until 30 years ago, according to research from my organization, CGIAR.

The Devastating Effects of Plant and Livestock Diseases

History has shown time and again the disastrous effects that crop and livestock diseases can have. In the 19th century, about 1 million people died due to the Great Famine in Ireland, after a blight infested the country’s potatoes. Rinderpest, a cattle disease similar to measles, decimated livestock herds in East Africa in the 1880s, causing the starvation of about one-third of Ethiopia’s human population. More recently, an outbreak of the H5N2 strain of avian influenza in the U.S. Midwest in 2014-2015 led to the death and destruction of 50 million poultry, costing more than $3 billion.

A whole host of transboundary diseases continue to threaten farm livelihoods and increase food prices for consumers, with climate change driving new and more ferocious outbreaks. The World Organization for Animal Health estimates that diseases cause the loss of at least 20 percent of the world’s livestock production every year, representing at least 60 million metric tons of meat and 150 million tons of milk valued at $300 billion. In the past two years, African swine fever has killed more than 100 million pigs in China, the world’s largest pork consumer, and has now entered Europe. There is no treatment or vaccine, and experts warn it is only a matter of time before it reaches the U.S. and its multi-billion-dollar pork industry.

Developing countries are especially at risk, because food is often produced by small-scale farmers who depend on their harvests for survival. Multiple staple food crops face serious threats from pests and diseases. Fall armyworms, an invasive pest native to North America, have been spreading recently across Africa due to climate change, annually destroying as much as 18 million metric tons of corn, enough to feed tens of millions of people, according to the United Nations’ Food & Agriculture Organization. Wheat crops in Africa and the Middle East have been affected by a highly destructive fungus known as UG99 — a particularly bad outbreak in 2007 was responsible for cutting wheat yields by 80 percent in parts of Kenya.

### 1NC

T subsets

#### ‘Antitrust’ applies to the entire economy---targeting single industries isn’t topical

Dr. Babette Boliek 11, Associate Professor of Law at Pepperdine University School of Law, J.D. from the Columbia University School of Law, and Ph.D. in Economics from the University of California, Davis, “FCC Regulation Versus Antitrust: How Net Neutrality is Defining the Boundaries”, Boston College Law Review, 52 B.C. L. Rev. 1627, November 2011, Lexis

Although the two regimes share a commonality of purpose--to protect consumers and to promote allocative efficiencies in production--the two have quite distinct, predominately opposing, means of securing social benefits. As Justice Stephen Breyer stated when serving [\*1629] as a judge on the U.S. Court of Appeals for the First Circuit, although regulation and the antitrust laws "typically aim at similar goals--i.e., low and economically efficient prices, innovation, and efficient production methods"--regulation looks to achieve these goals directly "through rules and regulations; [but] antitrust seeks to achieve them indirectly by promoting and preserving a process that tends to bring them about." The battle between these two regimes may be broadly summarized in a single issue thusly: in the face of the industry-specific regulator, what is (or what should be) the role of antitrust law?

Antitrust law preserves the process of competition across all industries by condemning anticompetitive conduct when it occurs. In contrast, industrial regulation by its nature is a public declaration that, in a given industry, market forces are too weak or underdeveloped to produce the consumer benefits that are realized in competitive markets--regulated industries are carved out from the rest of the economy and are subject to proactive, regulatory intervention that goes above and beyond antitrust enforcement measures. Not surprisingly, regulatory agencies were historically created as substitutes for market forces in the few markets that, by the nature of the product or technology, were natural monopolies or severely prone to monopoly. In the vast majority [\*1630] of markets, however, the antitrust law is the default government control, designed to supplement market forces to inhibit or prevent the growth of monopoly.

Again, although the goals of the two regimes may be similar, the means by which each can achieve those goals are in opposition. Therefore, the threshold determination of which industries are to be singled out for industry-specific regulation, and to what degree, is of vital importance as it simultaneously determines the predominance of the regulator versus the antitrust authority in securing the social good.

#### Vote neg:

#### Limits---they devolve into infinite specific subsets like aviation, ag, defense or rail AND allow thousands of cases that deny single mergers OR regulate individual companies like Facebook or Amazon

#### Ground---economy-wide change ensures links to core generics like biz con and politics by forcing the aff to structurally change antitrust AND be big enough to deviate from the background noise of daily enforcement actions

### 1NC

#### The 50 state governments and relevant sub-federal territories should establish a presumption against mergers and acquisitions among agribusiness firms.

#### State action solves, won’t be preempted, and causes federal follow-on

Juan A. Arteaga 21, Partner at Crowell & Moring LLP, Former Senior Official in the Antitrust Division of the US Department of Justice, JD from Columbia Law School, and Jordan Ludwig, Counsel in the Antitrust Group at Crowell & Moring LLP, JD from Loyola Law School, “The Role of US State Antitrust Enforcement”, Private Litigation Guide – Second Edition, Global Competition Review, 1/28/2021, https://globalcompetitionreview.com/guide/private-litigation-guide/second-edition/article/the-role-of-us-state-antitrust-enforcement

Prior to the enactment of the first federal antitrust law – the Sherman Act – in 1890, state antitrust enforcement was quite robust in the United States because at least 26 states had already enacted some form of antitrust prohibition.[2] In addition, state enforcers had often used general corporation law and common law restraint of trade principles to regulate anticompetitive business practices and transactions.[3] This well-established state antitrust enforcement infrastructure – coupled with the fact that the Antitrust Division and FTC had only recently been created – permitted state attorneys general to continue playing a leading enforcement role for the first 30 years after the Sherman Act’s passage.[4] Indeed, state attorneys general successfully prosecuted a number of the most consequential antitrust enforcement actions during this period.[5]

In the early 1920s, however, state antitrust enforcers began playing a less prominent role because ‘the national dimension of the most important trusts, . . . as well as their ability to restructure in order to evade problematic state laws’, made clear that the federal government needed to step forward in order to adequately protect consumers and the competitive process.[6] As a result, the DOJ and FTC – whose national jurisdiction and greater resources enabled them to tackle the most pressing competition issues of the time – displaced state attorneys general as the primary source of government antitrust enforcement within the United States.[7] This largely remained true until the mid-1970s when Congress, in response to the DOJ and FTC’s perceived inactivity, passed two laws that expanded the authority of state attorneys general to enforce the federal antitrust laws and provided them with financial resources to do so.[8]

In 1976, Congress passed the Hart-Scott-Rodino Antitrust Improvement Act, which, among other things, authorised state attorneys general to bring *parens patriae* suits (i.e., legal actions brought on behalf of natural persons residing within their states) seeking monetary (treble damages) and injunctive relief for Sherman Act violations.[9] Congress also passed the Crime Control Act of 1976, which, among other things, provided state attorneys general with tens of millions in federal grants as ‘seed money’ for the creation of antitrust bureaus within their offices.[10] These laws had their intended effect of reinvigorating state antitrust enforcement.

During the 1980s, for example, state attorneys general once again emerged as vigorous antitrust enforcers, especially with respect to the prosecution of resale price maintenance practices and other vertical restraints.[11] The rise in the level and prominence of state antitrust enforcement during this period was largely due to a perceived enforcement void at the federal level, where the DOJ and FTC had mostly limited their focus to ‘prohibiting cartels and large horizontal mergers’.[12] No longer content with ceding antitrust enforcement to federal enforcers, state attorneys general expanded their antitrust dockets from prosecuting purely ‘local matters, such as bid-rigging on state contracts’, to actively investigating and litigating matters with multistate and national implications.[13] To help ensure that they had a larger seat at the antitrust enforcement table, state attorneys general also increased the coordination of their enforcement efforts and competition advocacy through organisations such as the National Association of Attorneys General (NAAG), which created a Multistate Antitrust Task Force and issued state Vertical Restraints and Horizontal Merger Guidelines during this period.[14]

Since the reawakening of state antitrust enforcement nearly 30 years ago, state attorneys general have continued to play an important role in the enforcement of both state and federal antitrust laws. During periods of lax federal antitrust enforcement, state attorneys general have often ramped up their enforcement activity in order to protect consumers from anticompetitive transactions and business practices.[15] During periods of vigorous federal antitrust enforcement, they have often served as strong partners for the DOJ and FTC by, among other things, offering valuable insights about competitive dynamics in local markets, assisting with obtaining information from key market participants (including state governmental entities that are direct purchasers of goods and services), and helping develop and implement litigation strategies for cases being tried before federal judges presiding in their states.[16]

Since January 2017, state attorneys general have increasingly played a leading and independent antitrust enforcement role. State antitrust enforcers have significantly increased their enforcement activity and willingness to act separately from their federal counterparts because many of them believe that there has been ‘under-enforcement’ by the DOJ and FTC.[17] State antitrust enforcers have also been able to enhance their influence over key competition policy issues and the antitrust enforcement agenda within the United States because there appears to have been a significant decline in the coordination and relationship between the DOJ and FTC.[18]

In once again flexing their enforcement muscle, state attorneys general have shown a willingness to publicly disagree with the DOJ and FTC on both policy and enforcement decisions, and have also sought to pressure their federal counterparts into more aggressively policing certain industries. Recent examples of the increased independence and assertiveness of state antitrust enforcers include:

* The DOJ, FTC and several state attorneys general have been actively investigating and prosecuting ‘no-poach’ agreements (i.e., where competitors for employees agree not to recruit or hire each other’s employees) in recent years. However, the DOJ and state attorneys general have taken directly opposing positions in private litigation challenging the legality of ‘no-poach’ clauses in corporate franchise agreements. The DOJ has argued that courts should review these clauses under the rule of reason whereas various state attorneys general have argued that these clauses should be deemed per se unlawful.[24]
* In their joint investigation into the T-Mobile/Sprint merger, nearly 20 state attorneys general sued to block the transaction in September 2019 even though the DOJ, along with seven state attorneys general, approved the deal after securing certain structural and behavioural remedies.[19] After the DOJ announced its proposed settlement with the companies, the Attorney General for New York, who led the states’ challenge to the merger, issued a press release dismissing the adequacy of the remedies negotiated by the DOJ: ‘The promises made by [the divestiture buyer] and [the merging companies] in this deal are the kinds of promises only robust competition can guarantee. We have serious concerns that cobbling together this new fourth mobile [phone] player, with the government picking winners and losers, will not address the merger’s harm to consumers, workers, and innovation.’[20] Thereafter, the DOJ opposed the states’ enforcement action by, among other things, moving to disqualify the private counsel hired by the states to represent them[21] and filing submissions that argued against the states’ requested injunction.[22] Ultimately, the state attorneys general were unsuccessful in their bid to block the deal.[23]
* None of the more than 20 state attorney general offices that actively investigated the AT&T/Time Warner merger joined the DOJ’s unsuccessful challenge to the transaction despite the DOJ’s concerted effort to secure their support.[25] In fact, nine state attorneys general filed an amicus brief opposing the DOJ’s appeal of the trial court’s decision.[26]
* After the FTC declined to seek any Colorado-related remedies in connection with Optum’s acquisition of DaVita Medical Group, the Attorney General for Colorado required the merging companies to lift the exclusivity provisions in contracts with certain healthcare providers and to extend their existing contracts with certain health insurers. In announcing this settlement, the Colorado Attorney General stated: ‘I recognize that this case marks an important step in state antitrust enforcement . . . . I am committed to protecting all Coloradans from anticompetitive consolidation and practices, and will do so whether or not the federal government acts to protect Coloradans.’[27]

After voicing displeasure with federal antitrust enforcement in the technology sector, numerous state attorneys general launched their independent investigations into ‘Big Tech’ companies even though the DOJ and FTC have ongoing investigations into these companies.[28]

### 1NC

#### Infrastructure will pass but PC’s key

Matt Reese 9-14, Columnist for Ohio’s Country Journal, BA from Ohio State University, and Dale Minyo, General Manager for Ag Net Communications, LLC, Farm Broadcaster for the Ohio Ag Net, BA from Ohio State University, “Infrastructure Bill Moving Forward”, Ohio’s Country Journal, 9/14/2021, https://ocj.com/2021/09/infrastructure-bill-moving-forward/

From the local bridge just around the corner to the locks and dams on the nation’s river system, agricultural viability depends heavily on infrastructure. After months of across-the-aisle negotiations, the Senate voted to pass the bipartisan infrastructure package (H.R. 3684) in August.

“This is a very notable move forward. It passed through the Senate with a very bi-partisan vote of 69-30, 19 Republican Senators voted for the legislation. Early on this year, the topic of infrastructure was really expansive. There were a lot of things being discussed that really don’t have a lot to do with what most Americans regard as infrastructure. It has tightened up and we think that is a good thing,” said Mike Steenhoek, executive director of the Soy Transportation Coalition. “We appreciate there are a number of categories within this legislation that, if they come to fruition, would be beneficial to agriculture. There is funding directed at roads and bridges, many in rural areas. There is some funding for our inland waterways and ports. For an industry like soybeans, we rely on robust exports and we have got to have the multi-modal transportation system that can connect our supply with that demand. We think there are some very favorable things in this legislation.”

With Senate passage, attention now shifts to the House on this legislation.

“Very little proceeds on time in Washington, D.C., but it is moving forward. The big question is: does the House adhere to Speaker Pelosi’s stated desire that this bill only gets passed if that $3.5 trillion reconciliation package which involves much more social spending also gets passed? There is still a lot of uncertainty related to this. Clearly there are Democrats and Republicans who support this legislation and it is clearly a priority of the president. It is a big bill. Hopefully it won’t get polluted by some of these more controversial topics.”

If the infrastructure package does get passed, it will hopefully build on existing progress.

“This bill would amplify what is already happening. We have a 5-year Highway Bill that was passed in 2015 and is scheduled to be re-authorized this year,” Steenhoek said. “Last year we had the Water Resources Development Act that paved the way for more funding for the inland waterway system. This is not our only shot for moving the needle on infrastructure. Things are getting done. You could argue that more needs to be done and that is what this bill aspires to do.”

Along with the big picture infrastructure items, there are also some smaller provisions in the legislation that could benefit agriculture, including support for biobased products.

“There is a provision that calls attention to biobased products that have infrastructure implications,” Steenhoek said.“Soy-based asphalt sealants and soy-based concrete sealants that are made largely from soil oil are a sustainable way to elongate the life of roads and bridges and provide another market opportunity for soybeans.”

There is plenty to watch as this continues to move forward.

“This is not a perfect piece of legislation, but we do think when you look at the links in the supply chain that are important to farmers, there are certain investment levels and actions that will improve the supply chain. Overall we look at this legislation favorably,” Steenhoek said. “I think there is a good chance that this does get passed, but as the days progress toward an election year, then the probability of anything getting passed goes down.”

#### The plan trades-off

Peter C. Carstensen 21, Fred W. & Vi Miller Chair in Law Emeritus at the University of Wisconsin Law School, LL.B. from Yale Law School, MA in Economics from Yale University, “The “Ought” and “Is Likely” of Biden Antitrust”, Concurrences – Antitrust Publications & Events, February 2021, https://www.concurrences.com/en/review/issues/no-1-2021/on-topic/the-new-us-antitrust-administration-en

14. Similarly, despite bipartisan murmurs about competitive issues, the potential in a closely divided Congress that any major initiatives will survive is limited at best. In part the challenge here is how the Biden administration will rank its commitments. If it were to make reform of competition law a major and primary commitment, it would have to trade off other goals, which might include health care reform or increases in the minimum wage. It is likely in this circumstance the new administration, like the Obama administration’s abandonment of the pro-competitive rules proposed under the PSA, would elect to give up stricter competition rules in order to achieve other legislative priorities.

15. Another key to a robust commitment to workable competition is the choice of cabinet and other key administrative positions. Here as well, the early signs are not entirely encouraging. In selecting Tom Vilsack to return as secretary of agriculture, the president has embraced a friend of the large corporate interests dominating agriculture who has spent the last four years in a highly lucrative position advancing their interests. Given the desperate need for pro-competitive rules to implement the PSA and control exploitation of dairy farmers through milk-market orders, the return of Vilsack is not good news. Who will head the FTC and who will be the attorney general and assistant attorney general for antitrust is still unknown, but if those picks are also centrists with strong links to corporate America the hope for robust enforcement of competition law will further attenuate!

16. In sum, this is a pessimistic prognostication for the likely Biden antitrust enforcement agenda. There is much that ought to be done. But this requires a willingness to take major enforcement risks, to invest significant political capital in the legislative process, and to select leaders who are committed to advancing the public interest in fair, efficient and dynamically competitive markets. The early signs are that the new administration will be no more committed to robust competition policy than the Obama administration. Events may force a more vigorous policy—I will cling to that hope as the Biden administration takes shape.

#### Big infrastructure’s key to climate mitigation and adaptation---extinction

Reynard Loki 9-8, Senior Writing Fellow and Chief Correspondent for Earth | Food | Life, a Project of the Independent Media Institute, Former Environment, Food and Animal Rights Editor at AlterNet and Reporter for Justmeans/3BL Media, “Extreme Weather Devastating US Raises Calls to Pass Biden’s Infrastructure Bill”, Nation of Change, 9/8/2021, https://www.nationofchange.org/2021/09/08/extreme-weather-devastating-us-raises-calls-to-pass-bidens-infrastructure-bill/

In their latest climate report published in August, the United Nations’ Intergovernmental Panel on Climate Change (IPCC) found that human activity, particularly the combustion of fossil fuels, is the likely driver behind the increase in both the frequency and intensity of hurricanes over the past four decades. “The alarm bells are deafening, and the evidence is irrefutable: greenhouse gas emissions from fossil fuel burning and deforestation are choking our planet and putting billions of people at immediate risk,” UN Secretary-General António Guterres said in a statement on the report. “Global heating is affecting every region on Earth, with many of the changes becoming irreversible.” Linda Mearns, a senior climate scientist at the U.S. National Center for Atmospheric Research and one of the report’s co-authors, meanwhile, offered a stern warning: “It’s just guaranteed that it’s going to get worse,” she said, adding that there is “[n]owhere to run, nowhere to hide.”

Adding to the concern is the fact that the end of hurricane season is still far from over, as meteorologists at the U.S. National Oceanic and Atmospheric Administration (NOAA) monitor Hurricane Larry’s path across the Atlantic Ocean. Moreover, Hurricane Ida is just one of the several extreme weather events that have caused death and destruction across the nation. Massive wildfires, fueled by extreme heat and dry conditions, are ripping through California, where more than 1 million acres have been burned in 2021. These are unprecedented times: Only twice in the history of California have wildfires raged from one side of the Sierra Nevada mountain range to the other, and both of those wildfires took place in August.

The National Interagency Fire Center has reported that more than 5 million acres have been charred this year nationwide as of September 7. Nearly half of the land area of the lower 48 states is currently experiencing drought, with the NOAA warning in August that these extremely dry conditions—with precipitation at below-average levels and temperatures at above-average levels—are likely to “continue at least into late fall,” according to the New York Times. As a whole, the United States experienced its hottest June in the 127 years since temperature records have been maintained, while July was Earth’s hottest month on record.

“Climate scientists were predicting exactly these kinds of things, that there would be an enhanced threat of these types of extreme events brought on by increased warming,” said Jonathan Martin, an atmospheric scientist at the University of Wisconsin-Madison. “It’s very distressing. These are not encouraging signs for our immediate future.”

The increase in both the frequency and intensity of extreme weather events like hurricanes, wildfires, droughts and heat waves is providing a fitting backdrop for amplified calls to pass Biden’s infrastructure bill, which would help mitigate the impacts of the climate crisis by repairing 20,000 miles of aging roads and 10 of the country’s most economically crucial bridges to make them more resilient to extreme weather. The bill also seeks to accelerate the nation’s shift toward clean energy to achieve the Paris climate agreement’s goal of reducing global greenhouse gas emissions in order to limit the planet’s surface temperature increase in this century to 2 degrees Celsius above preindustrial levels. (The agreement’s hope to limit the increase to 1.5 degrees Celsius now seems unlikely, given the findings of the new IPCC climate report.) The bill seeks to utilize a combination of federal spending and tax credits to improve transportation, broadband internet, housing and the electric grid, as well as financial support to advance the nation’s manufacturing capabilities, specifically those industries that the administration believes will help the United States compete economically with China.

The White House issued a fact sheet describing the president’s infrastructure plan, saying that it would “create a generation of good-paying union jobs and economic growth, and position the United States to win the 21st century, including on many of the key technologies needed to combat the climate crisis.” The bill would be the first to earmark spending specifically for climate resilience, including $6.8 billion for the Army Corps of Engineers to address federal flood control and ecosystem restoration projects, with an eye toward environmental justice, and calling for 40 percent of all climate-related investments to happen in disadvantaged communities.

“Mr. Biden’s pledge to tackle climate change is embedded throughout the plan,” reports Jim Tankersley for the New York Times. “Roads, bridges and airports would be made more resilient to the effects of more extreme storms, floods and fires wrought by a warming planet. Spending on research and development could help spur breakthroughs in cutting-edge clean technology, while plans to retrofit and weatherize millions of buildings would make them more energy efficient.”

In August, Schumer said that the bipartisan infrastructure bill and Democrats’ reconciliation spending package would cut the United States’ carbon dioxide emission levels by 45 percent by 2030 compared to 2005 levels. He added, “When you add administrative actions being planned by the Biden administrative and many states—like New York, California, and Hawaii—we will hit our 50 percent target by 2030.” That is the goal that Biden set for the nation after he rejoined the Paris climate accord.

“In order to avoid the worst long-term consequences of the climate crisis, we need to put the U.S. on the path to 100 percent clean energy—otherwise, this summer may just be a preview of the disasters to come,” Brooke Still, senior director of digital strategy at the nonprofit League of Conservation Voters (LCV), told Earth | Food | Life recently in an email. “We know what a transition to clean energy will take: We need to stop using oil and coal and go big on clean energy. It’s clear the public agrees—71 percent of the public supports making the investments in climate, justice, and jobs that President Biden proposed. But climate deniers, fossil fuel interests, and obstructionist members of Congress are slowing things to a crawl.” LCV has launched a public petition urging Congress to “invest in clean energy and… in people and communities who too often have been left behind.”

## CASE

### Adv 1

#### They don’t solve that have already gone through---Bayer MonSanto, Dow-DuPont, and Syngenta means the impacts still happen.

#### Innovation is driving down environmental damage from farming BUT is only feasible with concentrated farming

Dr. Jayson Lusk 16, Professor of Agricultural Economics at Oklahoma State University, “Why Industrial Farms Are Good for the Environment”, The New York Times, 9/23/2016, Lexis

There is much to like about small, local farms and their influence on what we eat. But if we are to sustainably deal with problems presented by population growth and climate change, we need to look to the farmers who grow a majority of the country’s food and fiber.

Large farmers — who are responsible for 80 percent of the food sales in the United States, though they make up fewer than 8 percent of all farms, according to 2012 data from the Department of Agriculture — are among the most progressive, technologically savvy growers on the planet. Their technology has helped make them far gentler on the environment than at any time in history. And a new wave of innovation makes them more sustainable still.

A vast majority of the farms are family-owned. Very few, about 3 percent, are run by nonfamily corporations. Large farm owners (about 159,000) number fewer than the residents of a medium-size city like Springfield, Mo. Their wares, from milk, lettuce and beef to soy, are unlikely to be highlighted on the menus of farm-to-table restaurants, but they fill the shelves at your local grocery store.

There are legitimate fears about soil erosion, manure lagoons, animal welfare and nitrogen runoff at large farms — but it’s not just environmental groups that worry. Farmers are also concerned about fertilizer use and soil runoff.

That’s one reason they’re turning to high-tech solutions like precision agriculture. Using location-specific information about soil nutrients, moisture and productivity of the previous year, new tools, known as “variable rate applicators,” can put fertilizer only on those areas of the field that need it (which may reduce nitrogen runoff into waterways).

GPS signals drive many of today’s tractors, and new planters are allowing farmers to distribute seed varieties to diverse spots of a field to produce more food from each unit of land. They also modulate the amount and type of seed on each part of a field — in some places, leaving none at all.

Many food shoppers have difficulty comprehending the scale and complexity facing modern farmers, especially those who compete in a global marketplace. For example, the median lettuce field is managed by a farmer who has 1,373 football fields of that plant to oversee.

For tomatoes, the figure is 620 football fields; for wheat, 688 football fields; for corn, 453 football fields.

How are farmers able to manage growing crops on this daunting scale? Decades ago, they dreamed about tools to make their jobs easier, more efficient and better for the land: soil sensors to measure water content, drones, satellite images, alternative management techniques like low- and no-till farming, efficient irrigation and mechanical harvesters.

Today, that technology is a regular part of operations at large farms. Farmers watch the evolution of crop prices and track thunderstorms on their smartphones. They use livestock waste to create electricity using anaerobic digesters, which convert manure to methane. Drones monitor crop yields, insect infestations and the location and health of cattle. Innovators are moving high-value crops indoors to better control water use and pests.

Before “factory farming” became a pejorative, agricultural scholars of the mid-20th century were calling for farmers to do just that — become more factorylike and businesslike. From that time, farm sizes have risen significantly. It is precisely this large size that is often criticized today in the belief that large farms put profit ahead of soil and animal health.

But increased size has advantages, especially better opportunities to invest in new technologies and to benefit from economies of scale. Buying a $400,000 combine that gives farmers detailed information on the variations in crop yield in different parts of the field would never pay on just five acres of land; at 5,000 acres, it is a different story.

These technologies reduce the use of water and fertilizer and harm to the environment. Modern seed varieties, some of which were brought about by biotechnology, have allowed farmers to convert to low- and no-till cropping systems, and can encourage the adoption of nitrogen-fixing cover crops such as clover or alfalfa to promote soil health.

Herbicide-resistant crops let farmers control weeds without plowing, and the same technology allows growers to kill off cover crops if they interfere with the planting of cash crops. The herbicide-resistant crops have some downsides: They can lead to farmers’ using more herbicide (though the type of herbicide is important, and the new crops have often led to the use of safer, less toxic ones).

But in most cases, it’s a trade-off worth making, because they enable no-till farming methods, which help prevent soil erosion.

These practices are one reason soil erosion has declined more than 40 percent since the 1980s.

Improvements in agricultural technologies and production practices have significantly lowered the use of energy and water, and greenhouse-gas emissions of food production per unit of output over time. United States crop production now is twice what it was in 1970.

That would not be a good change if more land, water, pesticides and labor were being used. But that is not what happened: Agriculture is using nearly half the labor and 16 percent less land than it did in 1970.

Instead, farmers increased production through innovation. Wheat breeders, for example, using traditional techniques assisted by the latest genetic tools and information, have created varieties that resist disease without numerous applications of insecticides and fungicides. Nearly all corn and soybean farmers practice crop rotation, giving soil a chance to recover. Research is moving beyond simple measures of nitrogen and phosphorus content to look at the microbes in the soil.

New industrywide initiatives are focused on quantifying and measuring soil health. The goal is to provide measurements of factors affecting the long-term value of the soil and to identify which practices — organic, conventional or otherwise — will ensure that farmers can responsibly produce plenty of food for our grandchildren.

#### Transitioning to small farming causes devasting land conversion AND worse fill-in abroad

Ted Nordhaus 21, Founder and Executive Director of the Breakthrough Institute and Co-Author of An Ecomodernist Manifesto, and Dan Blaustein-Rejto, Director of Food and Agriculture at the Breakthrough Institute, Conducted Research with the Environmental Defense Fund, International Center for Tropical Agriculture, and Farmers Market Coalition, “Big Agriculture Is Best”, Foreign Policy, 4/18/2021, https://foreignpolicy.com/2021/04/18/big-agriculture-is-best/

Moreover, organic farms, large and small, don’t actually outperform large conventional farms by many important environmental measures. Scale, technology, and productivity make good environmental sense and economic sense. Because organic farming requires more land for every calorie or pound produced, a large-scale shift to organic farming would entail converting more forest and other land to farming, resulting in greater habitat loss and more greenhouse gas emissions. And while organic farming doesn’t use synthetic pesticides or fertilizers, it often results in greater nitrogen pollution because manure is a highly inefficient way to deliver nutrients to crops.

Another benefit of large-scale U.S. farms is that because they are so efficient, economically and environmentally, they are also able to produce vastly more food than Americans can consume, making the country the world’s largest agricultural exporter as well.

That benefits the U.S. economy, of course, but it also comes with an environmental benefit for the world. In the contemporary environmental imagination, highly productive, globally traded agriculture is a bad thing—poisoning the land at home and undermining food sovereignty abroad. But in reality, a pound of grain or beef exported from the United States almost always displaces a pound that would have been produced with more land and greenhouse gas emissions somewhere else.

#### Farming is rapidly becoming sustainable---all environmental metrics are improving

Michael Shellenberger 20, Founder and President of Environmental Progress, Former President of the Breakthrough Institute, Apocalypse Never: Why Environmental Alarmism Hurts Us All, ISBN: 0063001705,9780063001701

As farms become more productive, grasslands, forests, and wildlife are returning. Globally, the rate of reforestation is catching up to a slowing rate of deforestation.19

Humankind’s use of wood has peaked and could soon decline significantly.20 And humankind’s use of land for agriculture is likely near its peak and capable of declining soon.21 All of this is wonderful news for everyone who cares about achieving universal prosperity and environmental protection.

The key is producing more food on less land. While the amount of land used for agriculture has increased by 8 percent since 1961, the amount of food produced has grown by an astonishing 300 percent.22

Though pastureland and cropland expanded 5 and 16 percent, between 1961 and 2017, the maximum extent of total agriculture land occurred in the 1990s, and declined significantly since then, led by a 4.5 percent drop in pastureland since 2000.23 Between 2000 and 2017, the production of beef and cow’s milk increased by 19 and 38 percent, respectively, even as total land used globally for pasture shrank.24

The replacement of farm animals with machines massively reduced land required for food production. By moving from horses and mules to tractors and combine harvesters, the United States slashed the amount of land required to produce animal feed by an area the size of California. That land savings constituted an astonishing one-quarter of total U.S. land used for agriculture.25

Today, hundreds of millions of horses, cattle, oxen, and other animals are still being used as draft animals for farming in Asia, Africa, and Latin America. Not having to grow food to feed them could free up significant amounts of land for endangered species, just as it did in Europe and North America.

As technology becomes more available, crop yields will continue to rise, even under higher temperatures. Modernized agricultural techniques and inputs could increase rice, wheat, and corn yields five-fold in sub-Saharan Africa, India, and developing nations.26 Experts say sub-Saharan African farms can increase yields by nearly 100 percent by 2050 simply through access to fertilizer, irrigation, and farm machinery.27

If every nation raised its agricultural productivity to the levels of its most successful farmers, global food yields would rise as much as 70 percent.28 If every nation increased the number of crops per year to its full potential, food crop yields could rise another 50 percent.29

Things are headed in the right direction regarding other environmental measures. Water pollution is declining in relative terms, per unit of production, and in absolute terms in some nations. The use of water per unit of agricultural production has been declining as farmers have become more precise in irrigation methods.

High-yield farming produces far less nitrogen pollution run-off than lowyield farming. While rich nations produce 70 percent higher yields than poor nations, they use just 54 percent more nitrogen.30 Nations get better at using nitrogen fertilizer over time. Since the early 1960s, the Netherlands has doubled its yields while using the same amount of fertilizer.31

High-yield farming is also better for soils. Eighty percent of all degraded soils are in poor and developing nations of Asia, Latin America, and Africa. The rate of soil loss is twice as high in developing nations as in developed ones. Thanks to the use of fertilizer, wealthy European nations and the United States have adopted soil conservation and no-till methods, which prevent erosion. In the United States, soil erosion declined 40 percent in just fifteen years, between 1982 and 1997, while yields rose.32

#### The overall environment is resilient---‘existential’ threats are false

Ronald Bailey 20, Science Correspondent at Reason, Member of the Society of Environmental Journalists and the American Society for Bioethics and Humanities, “The Global Environmental Apocalypse Has Been Canceled”, Reason Magazine, 8/1/2020, <https://reason.com/2020/08/01/the-global-environmental-apocalypse-has-been-canceled/> [grammar edit]

According to these activists and politicians, humanity is beset on all sides by catastrophes that could kill off civilization, and maybe even our species. Are they right?

Absolutely not, answers the longtime environmental activist Michael Shellenberger in an engaging new book, Apocalypse Never: Why Environmental Alarmism Hurts Us All. "Much of what people are being told about the environment, including the climate, is wrong, and we desperately need to get it right," he writes. "I decided to write Apocalypse Never after getting fed up with the exaggeration, alarmism, and extremism that are the enemy of positive, humanistic, and rational environmentalism." While fully acknowledging that significant global environmental problems exist, Shellenberger argues that they do not constitute inexorable existential threats. Economic growth and technological progress, he says, can ameliorate them.

Shellenberger's analysis relies on largely uncontroversial mainstream science, including reports from the Intergovernmental Panel on Climate Change (IPCC) and the Food and Agriculture Organization. And as a longstanding activist, Shellenberger is in a good position to parse the motives behind the purveyors of doom.

Shellenberger's activism is the real deal. To raise a donation to the Rainforest Action Network, he charged his friends $5 to attend his 16th birthday party. At 17 he went to Nicaragua to experience the Sandinista revolution. In the 1990s he worked with the Landless Workers' Movement in Brazil.

In 2003, Shellenberger and allies launched the New Apollo Project to jumpstart a no-carbon energy revolution over the next 10 years. In 2008, Time named him "A Hero of the Environment." He co-founded the ecomodernist Breakthrough Institute, which advocates the use of advanced technologies such as nuclear power and agricultural biotechnology to decouple the economy from the ecology, allowing both humanity and the natural world to flourish. More recently, he founded Environmental Progress, which campaigns for, among other things, the deployment of clean modern nuclear power. He is an invited expert reviewer of the Intergovernmental Panel on Climate Change's next assessment report.

Ohio Passes Controversial Conscience Clause for Doctors

So what does he say about climate change? "On behalf of environmentalists everywhere, I would like to formally apologize for the climate scare we created over the last 30 years," he wrote in an essay to promote his new book. "Climate change is happening. It's just not the end of the world. It's not even our most serious environmental problem." Needless to say, there are environmentalists everywhere who do not believe they have anything to apologize for. A group of six researchers assembled by the widely respected Climate Feedback fact-checking consortium rated his article as having low scientific credibility.

Shellenberger doesn't devote much of Apocalypse Never to the science behind man-made climate change. He basically accepts the consensus that it's a significant problem and instead focuses on various claims about the harms it is supposedly already causing. In that promotional essay, he argues that (1) human[s] being are not causing a "sixth mass extinction," (2) the Amazon rainforests are not the "lungs of the world," (3) climate change is not making natural disasters worse, and (4) fires have declined 25 percent around the world since 2003.

Shellenberger isn't denying the reality of man-made climate change. He's arguing that humanity is already adapting to the ways climate change has been making weather patterns evolve, and that we will continue to adapt successfully in the future. His book is ultimately a sustained argument that poverty is world's most important environmental problem, and that rising prosperity and increasing technological prowess will ameliorate or reverse most deleterious environmental trends.

#### Monocultures are stable and sustainable

Tim Durham 20, Associate Professor at Ferrum College, Degree in Plant Medicine, Operator of Deer Run Farm, “Perspective: Why Monocultures are a Deceptively Simple Solution in Agriculture”, Ag Daily, 4/29/2020, https://www.agdaily.com/crops/row-crop-redemption/

It’s a humble, if one-sided goal. But what’s often in the crosshairs of activists is the philosophy of the planting system — the “dreaded” monoculture.

Row crops are a relic, say self-styled pundits in the sustainability debate.

Indian activist Vandana Shiva touts her surreally titled book “Monocultures of the Mind,” defying the prevailing mindset and conformity of row crops.

In the closing segment of the BBC’s acclaimed Reith Lecture Series, Prince Charles agreed, proposing that we work “with the grain of nature” and follow the “genius of nature’s clearly defined boundaries.”

After straying too far from nature’s bosom, they say it’s time to square up with polyculture, a mosaic inspired by the rainforest. What does this mean? Grow multiple crops in a shared space. Shun that one-dimensional simplification for a more intricate ecosystem. The selling points are perennial stability, productivity, and built-in checks and balances that keep pests and diseases at bay.

Certainly sounds appealing. In their view, it’s naive to think something so elegantly simple can sustainably provide. If monoculture is a 100 level basket-weaving class for unambitious and shortsighted, polyculture is an all-out doctoral dissertation for the studious and eco-aligned.

Seems like a Rube Goldberg complex though — insufferable complexity just for the sake of it. Ironically, nature’s model is best suited to provide food and fiber — only salvation isn’t the miracle system the Prince is peddling.

Though no farm can ever hope (nor should they want to) faithfully replicate a wild ecosystem, current methods seem to be well grounded. In fact, researcher David Wood thinks Mother Nature would be flattered at the lengths we’ll go to mimic her.

Questioning the theory that cereals (not the milk in a bowl kind, at least not directly!) first arose as weeds on the outskirts of human settlements, Wood found that they exist today as vast monocultures along ancient waterways. Frequent floods would flush these stands with nutrient rich sediment; much in the same way a farmer spreads fertilizer in the field.

For centuries, wild rice was widely harvested as a staple crop from southern Sudan to the Atlantic. Wood suggests that early farmers had a working knowledge of this system and adapted it, realizing the precedents set in nature’s fields.

Even though wet rice has been sustained on the same land for millennia, Miguel Altieri of UC-Berkeley claims that monocultures are inherently unstable because they “provide optimal conditions for the unhampered growth of weeds, insects, and diseases because ecological niches are not filled by other organisms.”

The alternative is to model our ambitions on the rainforest. Hosting perhaps 25 million of the Earth’s 30 million wild species, it remains a hotspot of biodiversity. With limited resources, organisms effectively keep the peace by filling the least intrusive niches and avoiding competition at all costs. Skirmishes for resources are just too costly. Though productivity (in terms of sheer plant biomass) remains high, few of those gains are edible or of economic value to a farmer.

Indeed, the rainforest’s treasure trove of life is largely a last ditch effort to survive.

Suggesting such a model for food production is counterintuitive. Blistering heat robs the soil of nutrients and tilth, and yields suffer. In the Amazon, growers are resigned to slash and burn, while U.S. farmers still tend the land that their forefathers cleared centuries before.

They didn’t know it, but early pioneers extended the historical reign of monodominance by selecting the best land, leaving the marginal areas (which host a much broader spectrum of life) as a last resort. This is the polyculture (and often by association, organic) paradox.

It’s also a textbook case in ecology. When resources are plentiful, a few species dominate. Opportunists need not be pests, as Altieri claims. Nobel Laureate Norman Borlaug capitalized on this principle to develop high-yielding wheat strains responsive to fertilizer and other inputs. In the process he saved a billion lives and 12 million square miles of wildlife habitat.

The Green Revolution taught us that the key to averting human misery and wildlife loss is properly pairing land with practice. We can be intentional by conscripting the “best” land (which tends to trend monodominant anyway), and spare the rich biodiversity in poor(er) real estate. This land sparing ensures maximum productivity on the smallest footprint, sustaining us and leaving more land for nature.

Far from failing the eco-palatability taste test, the take home message is to embrace a monoculture in both mind and practice — using nature’s forgotten fields as inspiration. Farmers can (and should) still leverage crop rotation and fallowing to keep pests and pathogens from building to intolerable levels. No one is suggesting they grow the same crop year in, year out, in the same space. That’s the definition of insanity — not monoculture.

Turns out the deceptively simple monoculture playbook has been right all along. As an eco-foray in conservation, food security, and social justice, polyculture is a recurring fad that’s doomed to fail.

#### Genetic diversity is increasing AND gene banks solve

Colin Khoury 18, Research Scientist at the International Center for Tropical Agriculture (CIAT), Colombia and at the USDA National Laboratory for Genetic Resources Preservation, “Evaluating Claims GMOs and Modern Agriculture have Led to a 75% Drop in Crop Diversity”, Genetic Literacy Project, 12/14/2018, https://geneticliteracyproject.org/2018/12/14/myth-busting-modern-agriculture-really-led-75-drop-crop-diversity/

One of the central concepts that unifies those concerned with biodiversity is the belief that diversity is being lost, piece by piece, to a greater or lesser degree, globally.

The same goes for the biodiversity of what we eat. Scientists and activists have worried about the loss of crops and their many traditional varieties for at least a hundred years, since botanist N. I. Vavilov traveled the world in search of plants useful for cultivation in his Russian homeland. He noticed that diversity was disappearing in the cradles of agriculture – places where crops had been cultivated continuously for thousands of years. The alarm sounded even louder 50 years ago, during the Green Revolution, when farmers in some of the most diverse regions of the world largely replaced their many locally adapted wheat, rice, and other grain varieties with fewer, more uniform, higher yielding professionally bred varieties.

Economic development, human migration, urbanization, and globalization have further affected the diversity of food crops cultivated and consumed around the world. Most modern farmers seem to want uniform, mechanized production. Most eaters seem to want unblemished vegetables of known shapes and sizes, and inexpensive processed food products. In most of the decisions producers, food distributors, and consumers make, crop diversity inadvertently gets the short end of the stick.

This is ironic, since modern productive crop varieties are bred by wisely mixing and matching diverse genetic resources. The disappearance of old varieties thus reduces the options available to plant breeders, including those working to produce more nutritious and resilient crops. Genebank collections, such as the beans, cassava, and other staples conserved at CIAT, which were originally built to provide access for plant breeders to genetic resources, have therefore taken on increasingly important conservation roles.

In many regions of the world, the loss of crop diversity also has profound cultural and spiritual significance, with seeds no longer handed down through generations and no longer connecting people as closely to the places they call home. What people cultivate and what they eat are important to how they identify themselves, both as cultures and as individuals. “We are what we eat.”

Taking stock

Being a food biodiversity scientist, I grew up (in the professional sense) with the loss of crop diversity looming over my head, providing both a raison d’être and an urgency to my efforts. Somewhere along the line, I became interested in understanding its magnitude. That is, counting how many crops and how many varieties have been lost.

And that’s where it started to become complicated, and also more interesting. Because, when I went looking for signs of the loss of specific crops, I couldn’t find any. Instead, I found evidence of massive global changes in our food diversity that left me worried, but at the same time hopeful.

A bit of background. Most of the numbers seen in the news on how much crop diversity has been lost go back to a handful of reports and books that reference a few studies: for example, the changing number of vegetable varieties for sale in the U.S. over time. The results are estimations for a few crops at local to national levels, but they somehow have been inflated to generalized statements about the global state of crop diversity, the most common of which is some variation of “75% of the diversity in crops has been lost.”

Putting true numbers on diversity loss turns out to be a complicated and contested business, with no shortage of strong opinions. One big part of the problem is that there aren’t many good ways to count the diversity that existed before it disappeared. Researchers have done some work to assess the changes in diversity in crop varieties of Green Revolution cereals, and to some degree on the genetic diversity within those varieties. The results indicate that, although diversity on farms decreased when farmers first replaced traditional varieties with modern types, the more recent trends are not so simple to decipher.

Reviewing what had been researched, it was particularly surprising to me that very little work had been done to understand the changes in what is probably the simplest level to measure: the diversity of crop species in the human diet, that is, how successful is maize versus rice versus potato versus quinoa and so on. I realized that data on the contribution of crops to national food supplies were available for almost all countries worldwide via FAOSTAT, with information for every year since 1961. Perhaps these were the data that could show when a particular grain, or legume, or vegetable, fell off the world map, and just how diverse our global food supply is now compared to half a century ago.

Fast forward through a couple of years of investigation. To my surprise, I found that not a single crop was lost over the past 50 years! There was no evidence for extinction. What was going on? Was I missing something or was the loss of food biodiversity narrative wrong?

It turns out that my failure to see any loss of crops was due in large part to the lack of sufficient resolution in the FAO food supply data. Only 52 meaningful crop species-specific commodities are measured and a number of these are general groupings such as “cereals, other.” Because of this lack of specificity, the data couldn’t comprehensively assess the crops that have been most vulnerable to changes in the global food system over the past 50 years.

Related article: Viewpoint: 'Heritage' of emotional decision-making fuels EU's opposition to biotech crops

In FAO data, these plants are either thrown into the general categories or they aren’t measured at all, especially if they are produced only on a small scale, for local markets or in home gardens. This is, in itself, sign enough that they may be imperiled. We need better statistics about what people eat (and grow) around the world. But, enough is known to be confident that many locally relevant crops are in decline.

But that’s not to say that the data weren’t useful to the question at hand. With some further analysis, they eventually provided what I think is a powerful argument for further concern about the loss of crop diversity globally. Yet, at the same time, they also offer some hope.

Over the past 50 years, almost all countries’ diets actually became more diverse, not less, for the crops that FAO statistics do report. We found that traditional diets that were primarily based on singular staples a half century ago, for instance rice in Southeast Asia, had diversified over time to include other staples such as wheat and potatoes. The same was true for maize-based diets in Latin America, sorghum- and millet-based diets in sub-Saharan Africa, and so on. Diets around the world were balancing out with regard to the contribution of these foods.

Not that there weren’t plant winners and losers. Wheat, rice, and maize, the most dominant crops worldwide 50 years ago, became more important globally. Other crops emerged as widespread staples, particularly oilcrops such as soybean, palm oil, sunflower, and rapeseed oil. And, as the winners came to take more precedence in food supplies around the world, alternative staples such as sorghum, millets, rye, cassava, sweet potato, and yam were marginalized. They haven’t disappeared (at least not yet), but they have become less important to what is eaten every day.

As countries’ food supplies became more diverse in the winner crops reported by FAO, and the relative abundance of these crops within diets became more even, food supplies worldwide became much more similar. If we are what we eat, then it seems that we are quickly becoming very much the same type of human being ‒ modern people eating globalized food crops.

The publication of our findings of increasing homogeneity in global food supplies generated substantial scientific and public interest. This wasn’t, I think, because the main finding was a big shocker. It’s easy to see how pizza is now available in Tokyo, bread available in traditional maize and potato regions of Latin America, and McDonalds, Subway, and Starbucks available, well, almost everywhere. Rather, I think it’s because we were able to examine the food supplies of virtually all the countries of the world, over a relatively long time period, and put some real numbers to the change we saw. On average, for instance, the amount of variation between food supplies in different countries decreased by 68.8% from 1961 to 2009.

This is why, although we could see no absolute loss in crops consumed over the past 50 years, I am concerned. For even in the relatively small list of crops reported in the FAO national food supply data, . That doesn’t seem like a good thing for the long-term resilience of our agricultural areas, nor for human health, although it’s important to remember that such changes are the collateral damage resulting from the creation of highly productive mega-crop farming systems, which have increased the affordability of these foods worldwide, leading to less stunting and other effects of undernutrition worldwide. On the other hand, global dependence on a few select crops equates to expansive monocultures, with more lives riding on the outcome of the game of cat and mouse between pestilence and uniform varieties grown over large areas. Moreover, cheaply available macronutrients sourcing from these crops have contributed to the negative effects of the nutrition transition, including obesity, heart disease, and diabetes.

So why then am I hopeful? Because the data, and some literature, and my own direct experience also indicate that diets in recent years, in some countries, are beginning to move in different directions, reducing the excessive use of animal products and other energy-dense and environmentally expensive foods, and becoming more diverse, particularly with regard to fruits and vegetables, and even healthy grains. This seems good, both for human health and for the sustainability of agricultural production. Change is still occurring, and the future does not appear to be fixed. What better evidence than quinoa, which was relatively unknown outside the Andes a couple of decades ago, and is now cultivated in 100 countries and consumed in even more?

#### U.S. farm emissions are a drop in the bucket AND already declining---other GHGs thump

Dr. Frank Mitloehner 19, PhD, Professor and Air Quality Specialist in Cooperative Extension in the Department of Animal Science at UC Davis, “It’s Time to Stop Comparing Meat Emissions to Flying”, 11/13/2019, https://ghgguru.faculty.ucdavis.edu/2019/11/13/its-time-to-stop-comparing-meat-emissions-to-flying/

I can appreciate how having a sound bite is tempting and even useful like the recent Bloomberg assertion “… that the humble hamburger is a bigger contributor to the warming of the planet than the jumbo jet,” for example. The problem is, it’s not as simple as all that. Animal agriculture’s impact is overstated when speaking to an American audience, and aviation’s effect is understated when speaking to any audience.

U.S. livestock farmers have – and continue to – reduce GHGs

Globally, animal agriculture accounts for 14.5 percent of GHG emissions, the number that tends to be used to support the claim that eating meat is a bigger planetary enemy than the combustion of the fossil fuels used in aviation. But in the United States, isn’t it more helpful to look at U.S. animal agriculture statistics, especially when they’re vastly different from the global picture?

Here in the U.S., animal agriculture makes up a far smaller percentage of total GHG emissions than worldwide: 3.9 percent, according to the U.S. Environmental Protection Agency (EPA). Granted, the lower U.S. percentage is due in some part to the fact that the United States is highly industrialized and wealthy, and we are major users of energy, fossil fuels and transportation. So as those percentages swell, animal agriculture takes up a smaller piece of the pie.

Even so, our farmers are the most efficient in the world. Case in point: In Mexico, it takes up to five cows to produce the same amount of milk as one U.S. cow, and in India, it takes up to 20. These statistics point to the United States having the lowest GHG emissions per unit of milk of any country in the world. It’s a similar story for other ruminant and non-ruminant animals that produce meat in the United States. In fact, emissions from all U.S. livestock species are much lower than those in Brazil, China, India and countries in the European Union, among others.

Americans fly more – much more – than people in any other country

Consistent with using a global number for animal agriculture is the tendency to do the same thing with the GHG emissions of air travel, and that likewise distorts the picture for the United States. Whereas the global animal agriculture figure is inflated for a U.S. audience, the global aviation figure downplays the role air travel plays in the United States’ GHG emissions.

That’s because Americans fly much more than people in other countries, including China, the United Kingdom, Germany and Japan, other top consumers of air travel. According to Bureau of Transportation Statistics, there were 1 billion passengers on U.S. airlines and foreign airlines serving the U.S. in 2019, a record and yet another year-over-year increase since the global recession of 2008-2009.

Aviation is two to three times more damaging to the environment than is often reported

In our hamburger-airplane example, aviation is assigned a GHG emissions number of 2 percent, giving most readers reason to have a clear conscience when boarding a plane. But that number doesn’t capture a plane’s full emissions footprint.

A 2 percent “GHG emissions” figure for aviation accounts only for the amount of carbon dioxide (CO2) air travels puts in the atmosphere. It ignores, the other GHGs that come from planes (for example, nitrous gases, water vapor, soot, particles and sulphates).

In addition, the 2 percent number is a tailpipe assessment, meaning what is being measured are the direct CO2 emissions from the jet fuel that is combusted in the planes’ turbines. The figure fails to consider things such as the manufacture of materials for parts used in the aircraft, the transportation of materials and parts to factories where planes are made, wear and tear on roads and runways, and many more.

Life-cycle assessments and tailpipe emissions are GHGs’ apples and oranges

When we look at our metaphorical burger, we’re taking into account pretty much every GHG that is emitted by the activities and processes required to get the proverbial burger on a dinner table. Called a life-cycle assessment (LCA), it provides a more accurate and total picture of GHG emissions than does a direct (tailpipe) assessment.

In the same example, air travel gets a huge break by being subjected only to a measurement of its (direct (i.e. tailpipe) emissions. To make a fair comparison, the same system of quantification must be used for both the burger and the airplane ride, and ideally, a life-cycle assessment would provide the figures. The thing is, we don’t have life-cycle assessment numbers for planes, or other parts of the transportation sector.

Methane is a short-lived GHG; carbon dioxide might be forever

When we talk about the GHG emissions of livestock or the carbon footprint of meat, methane is often at the heart of the matter. Ruminant animals such as cows emit methane. As far as global warming potential, methane is a powerful GHG, with about 28 times the warming potential of carbon dioxide over a period of 100 years.

But methane doesn’t hang around for a century; it’s a short-lived GHG. In about a decade’s time, it’s converted to water vapor and carbon dioxide, which is part of the cycle whereby plants take CO2 out of the atmosphere and convert it into feed via photosynthesis. Animals eat the non-human edible vegetation and upcycle it to meat and dairy products that provide efficient sources of protein and other essential nutrients to humans. It’s a cyclical process, also referred to as the biogenic carbon cycle, that’s been around as long as life itself.

Given the advances American farmers have made in animal agriculture, today we are producing as much food as we did 50 years ago from cattle herds that are far smaller. All told, the U.S. herd is contributing *less methane* to the environment as a result.

On the other hand, our voracious appetite for fossil fuels has resulted in an enormous glut of carbon dioxide in the atmosphere. According to the EPA’s GHG inventory, CO2 accounted for 82 percent of GHGs in 2017, with industry, transportation and electricity contributing nearly 80 percent of the total. It’s so much more emissions than oceans, rainforests and plants can absorb, by conservative accounts, it will hang over the planet for a thousand years. Realistically, it could be forever.

#### Warming won’t be catastrophic

Dr. Benjamin Zycher 21, Senior Fellow at the American Enterprise Institute, Doctorate in Economics from UCLA, Master in Public Policy from the University of California, Berkeley, and Bachelor of Arts in Political Science from UCLA, Former Senior Economist at the RAND Corporation, Former Adjunct Professor of Economics at the University of California, Los Angeles (UCLA) and at the California State University Channel Islands, and Former Senior Economist at the Jet Propulsion Laboratory, California Institute of Technology, “The Case for Climate Change Realism”, 6/21/2021, https://www.aei.org/articles/the-case-for-climate-change-realism/

CLIMATE TRENDS

Beyond exhibiting extreme overconfidence in a cherry-picked analysis of climate-change causes, politicians and activists frequently ground their alarmism in frightening predictions about consequences that are likewise far from certain. This is not only true within the very new (and still quite unreliable) field of predictive climate science; it is true even in the context of ongoing climate phenomena. Indeed, politicians and journalists frequently characterize dramatic or unusual climate phenomena as the product of anthropogenic climate change, yet there is little evidence to support those claims.

For one thing, there is no observable upward trend in the number of “hot” days between 1895 and 2017; 11 of the 12 years with the highest number of such days occurred before 1960. Since 2005, NOAA has maintained the U.S. Climate Reference Network, comprising 114 meticulously maintained temperature stations spaced more or less uniformly across the lower 48 states, along with 21 stations in Alaska and two stations in Hawaii. They are placed to avoid heat-island effects and other such distortions as much as possible. The reported data show no increase in average temperatures over the available 2005-2020 period. In addition, a recent reconstruction of global temperatures over the past 1 million years — created using data from ice-sheet formations — shows that there is nothing unusual about the current warm period.

Rising sea levels are another frequently cited example of impending climate crisis. And yet sea levels have been rising since at least the mid-19th century. This rise is tied closely with the end of the Little Ice Age that occurred not long before, which led to a rise in global temperatures, some melting of sea ice, and a thermal expansion of sea water. There is some evidence showing an acceleration in sea-level rise beginning in the early 1990s: Satellite measurements of sea levels began in 1992 and show a sea-level rise of about 3.2 millimeters per year between 1993 and 2010. Before 1992, when sea levels were measured with tidal gauges, the data showed an increase of about 1.7 millimeters per year on average from 1901 to 1990.

But because the datasets are from two different sources — satellite measurements versus tidal gauges — they are not directly comparable, and therefore they cannot be interpreted as showing an acceleration in sea-level rises. Moreover, the period beginning in 1993 is short in terms of global climate phenomena. Since sea levels have risen at a constant rate, remained constant, or even fallen during similar relatively short periods, inferences drawn from them are problematic. It is of course possible there has been an acceleration in sea-level rise, but even still, it would not be clear whether such a development stemmed primarily from anthropogenic or natural causes; clearly, both processes are relevant.

A study of changes in Arctic and Antarctic sea ice yields very different inferences. Since 1979, Arctic sea ice has declined relative to the 30-year average (again, the degree to which this is the result of anthropogenic factors is not known). Meanwhile, Antarctic sea ice has been growing relative to the 30-year average, and the global sea-ice total has remained roughly constant since 1979.

Extreme weather occurrences are likewise used as evidence of an ongoing climate crisis, but again, a study of the available data undercuts that assessment. U.S. tornado activity shows either no increase or a downward trend since 1954. Data on tropical storms, hurricanes, and accumulated cyclone energy (a wind-speed index measuring the overall strength of a given hurricane season) reveal little change since satellite measurements of the phenomena began in the early 1970s. The number of wildfires in the United States shows no upward trend since 1985, and global acreage burned has declined over past decades. The Palmer Drought Severity Index shows no trend since 1895. And the IPCC’s Fifth Assessment Report, published in 2014, displays substantial divergence between its discussion of the historical evidence on droughts and the projections on future droughts yielded by its climate models. Simply put, the available data do not support the ubiquitous assertions about the causal link between greenhouse-gas accumulation, temperature change, and extreme weather events and conditions.

Unable to demonstrate that observed climate trends are due to anthropogenic climate change — or even that these events are particularly unusual or concerning — climate catastrophists will often turn to dire predictions about prospective climate phenomena. The problem with such predictions is that they are almost always generated by climate models driven by highly complex sets of assumptions about which there is significant dispute. Worse, these models are notorious for failing to accurately predict already documented changes in climate. As climatologist Patrick Michaels of the Competitive Enterprise Institute notes:

During all periods from 10 years (2006-2015) to 65 (1951-2015) years in length, the observed temperature trend lies in the lower half of the collection of climate model simulations, and for several periods it lies very close (or even below) the 2.5th percentile of all the model runs. Over shorter periods, such as the last two decades, a plethora of mechanisms have been put forth to explain the observed/modeled divergence, but none do so completely and many of the explanations are inconsistent with each other.

Similarly, climatologist John Christy of the University of Alabama in Huntsville observes that almost all of the 102 climate models incorporated into the Coupled Model Intercomparison Project (CMIP) — a tracking effort conducted by the Lawrence Livermore National Laboratory — overstate past and current temperature trends by a factor of two to three, and at times even more. It seems axiomatic to say we should not rely on climate models that are unable to predict the past or the present to make predictions about the distant future.

The overall temperature trend is not the only parameter the models predict poorly. As an example, every CMIP climate model predicts that increases in atmospheric concentrations of greenhouse gas should create an enhanced heating effect in the mid-troposphere over the tropics — that is, at an altitude over the tropics of about 30,000-40,000 feet. The underlying climatology is simple: Most of the tropics is ocean, and as increases in greenhouse-gas concentrations warm the Earth slightly, there should be an increase in the evaporation of ocean water in this region. When the water vapor rises into the mid-troposphere, it condenses, releasing heat. And yet the satellites cannot find this heating effect — a reality suggesting that our understanding of climate and atmospheric phenomena is not as robust as many seem to assume.

The poor predictive record of mainstream climate models is exacerbated by the tendency of the IPCC and U.S. government agencies to assume highly unrealistic future increases in greenhouse-gas concentrations. The IPCC’s 2014 Fifth Assessment Report, for example, uses four alternative “representative concentration pathways” to outline scenarios of increased greenhouse-gas concentrations yielding anthropogenic warming. These scenarios are known as RCP2.6, RCP4.5, RCP6, and RCP8.5. Since 1950, the average annual increase in greenhouse-gas concentrations has been about 1.6 parts per million. The average annual increase from 1985 to 2019 was about 1.9 parts per million, and from 2000 to 2019, it was about 2.2 parts per million. The largest increase that occurred was about 3.4 parts per million in 2016. But the assumed average annual increases in greenhouse-gas concentrations through 2100 under the four RCPs are 1.1, 3.0, 5.5, and an astounding 11.9 parts per million, respectively.

The studies generating the most alarmist predictions are the IPCC’s Special Report on Global Warming of 1.5°C and the U.S. government’s Fourth National Climate Assessment, both of which were published in 2018. Both assume RCP8.5 as the scenario most relevant for policy planning. The average annual greenhouse-gas increase under RCP8.5 is over five times the annual average for 2000-2019 and almost four times the single biggest increase on record. Climatologist Judith Curry, formerly of the Georgia Institute of Technology, describes such a scenario as “borderline impossible.”

RCP6 is certainly more realistic. It predicts a temperature increase of 3 degrees Celsius by 2100 in the average of the CMIP models. But on average, those CMIP models overstate the documented temperature record by a factor of at least two. Ultimately, models with a poor record of successfully accounting for past data and highly unrealistic future greenhouse-gas concentrations should not be considered a reasonable basis for future policy formulation.

#### Dead zones are inevitable, not caused by ag runoff, and have no impact

Dennis Avery 5, Director of Global Food Issues at the Hudson Institute, “It’s Time To Tell The World How High-Yield Farming Saves Nature”, 2/9/2005, http://www.cgfi.org/tag/farm-productivity/

During the Clinton Administration, a White House Task Force recommended a 30 percent cut in Midwest fertilizer use because of a so-called “dead zone” in the Gulf of Mexico. Fortunately, the task force admitted in its report that it could find no evidence of either ecological or economic harm to the Gulf from the summer algae bloom that causes the “dead zone.” The first reports of such algae blooms in the Gulf go back into the 19th century. Fisheries experts say that most of the nutrients for the Gulf’s vast, rich fishery come down the Mississippi River. Such hypoxic zones are a common feature at the mouths of 40 major rivers around the world, where fresh, nutrient-laden water hits salt water. Under such conditions, the laws of biology and physics guarantee periodic algae blooms. Know also that Midwest fertilizer use has not risen since 1980, while the yields from the corn that gets most of the N fertilizer have risen 25 percent. Obviously, more of the farm fertilizer is being harvested as corn. More of the Midwest’s poultry and livestock have been moved indoors, where their wastes are carefully collected and spread on growing crops. If the “dead zone” is expanding, which is in serious doubt, where is the additional N coming from? The sewage treatment plants of St. Louis and Kansas City? Don’t forget either, that before farmers settled the Great Plains, the grasslands there had 60 million bison, 100 million antelope, billions of birds and grasshoppers, all eating the grass and defecating. The N may have taken longer to reach the Gulf, but it’s likely that Cortez could have found an algal bloom in the Gulf of Mexico when he invaded Mexico in 1520.

#### Runoff is inevitable from any type of farming---organics make it worse by expanding farming’s footprint

Ted Nordhaus 21, Founder and Executive Director of the Breakthrough Institute and Co-Author of An Ecomodernist Manifesto, and Dan Blaustein-Rejto, Director of Food and Agriculture at the Breakthrough Institute, Conducted Research with the Environmental Defense Fund, International Center for Tropical Agriculture, and Farmers Market Coalition, “Small Farms, Big Pollution”, Foreign Policy, 6/2/2021, https://foreignpolicy.com/2021/06/02/big-agriculture-pollution-small-farms-inefficient/

A reader could be excused for concluding from Matthew R. Sanderson and Stan Cox’s criticism of our recent essay, “Big Agriculture Is Best,” that virtually all environmental impacts associated with the production of food in the United States and globally can be laid at the feet of “industrial agriculture.” But it is a definitional sleight of hand, not “empirical evidence,” as they claim, that does most of the work here. Sanderson and Cox define “industrial agriculture” so capaciously as to be basically synonymous with “agriculture.”

In the United States, that is arguably true. Most agricultural output—and hence environmental impacts—comes from large-scale, industrial production. Globally, it is not true. In both cases, there is no free lunch. Agriculture, unavoidably, has environmental impacts for the simple reason that growing food requires the conversion of forests, grasslands, and other ecosystems into fields whose biocapacity is then monopolized to produce food for people.

As human populations have grown enormously over the last two centuries, from about a billion people globally in 1800 to nearly 8 billion today, and as those populations have become wealthier and able to eat higher on the food chain, the impacts associated with food production have grown as well. But that has little to do with the prevalence of industrial versus nonindustrial agriculture. Instead, it reflects the basic realities associated with scaling agriculture globally to meet those enormous new demands.

Consider the negative impacts that nitrogen pollution from the American corn belt has had on the Gulf of Mexico. Most of that runoff comes from industrial farms for the simple reason that large-scale, intensive production is the dominant form of agriculture across the region. Shifting production to organic practices, though, wouldn’t much change the situation. Organic farms are typically associated with higher rates of runoff per calorie of food produced, even as they require more land. So unless total production were very substantially scaled back, a corn belt dominated by organic farms rather than conventional ones would require more land while having similar or even greater impacts on waterways and biodiversity.

Sanderson and Cox blame industrial agricultural in the corn belt not only for the dead zone in the Gulf of Mexico but for rendering “entire landscapes uninhabitable” across the region. Millions of Americans still comfortably living in such places would beg to differ. Yes, as Sanderson and Cox note, there are more hogs in the state of Iowa than people. So what? Insofar as the claim is relevant at all, it regards the question of why Iowa has so few people, not why it has so many hogs. And while the expansion of hog farming in the state in recent decades is attributable to industrial production methods, the decline of the human population is not, as large-scale rural outmigration has been underway in Iowa for over a century. As we note in our essay, rural depopulation has been much more the cause of the consolidation and industrialization of American agriculture than it is the result of those farming practices.

#### Marine biodiversity is resilient

David Nield 17, Freelance Journalist Who Has Been Writing About Technology, Science, Apps, Gadgets and the Web Since 2002. Extensively citing "Impact of the Late Triassic Mass Extinction on Functional Diversity and Composition of Marine Ecosystems," written by Alexander M. Dunhill, William J. Foster, James Sciberras, and Richard J. Twitchett. “Marine Ecosystems Can Survive The Worst Mass Extinction Events, Study Shows”, Science Alert, 10/23/2017, <https://www.sciencealert.com/marine-ecosystems-cling-on-to-life-through-some-of-the-worst-mass-extinction-events>

Researchers have studied fossil records from the Late Triassic mass extinction, which happened around 201.3 million years ago, and found that marine life did not fundamentally change, even though the vast proportion of species were killed off.

The international team of researchers says that while marine species were still badly affected by the event, enough life survived underwater to keep the ecosystems functioning. The findings could help us understand more about how the changing climate of today could affect the planet.

"While the Late Triassic mass extinction had a big impact on the overall number of marine species, there was still enough diversity among the remaining species that the marine ecosystem was able to function in the same way it had before," says lead researcher Alex Dunhill from the University of Leeds in the UK.

It's thought that huge volcanic eruptions, and the subsequent warming of the planet caused by the greenhouse gases produced, was behind the Late Triassic extinction event.

At least half the species on Earth at that time were wiped out by the rise in temperatures, and in the event's aftermath, dinosaurs came to dominate life on our planet.

The researchers analysed fossils dated between the Middle Triassic to the Middle Jurassic periods, a time span of around 70 million years, covering life before and after the mass extinction event.

Ocean-dwelling animals were classified by how they moved, where they lived, and how they fed, and the study showed that none of these categories of life completely disappeared after the extinction event.

That said, there were major impacts on different regions and the environment as a whole, and some specific marine ecosystems were badly damaged.

"We're not saying nothing happened," says one of the researchers, palaeontologist William Foster from the University of Texas at Austin. "Rather, global oceans in the extinction's aftermath were a bit like a ship manned by a skeleton crew – all stations were operational, but manned by relatively few species."

The idea of a skeleton crew of lifeforms keeping the lights on in an ecosystem was first raised by Foster and his colleague Richard J. Twitchett in 2014, after another study focussed on the Late Permian mass extinction event about 252 million years ago.

The current study found one of the hardest-hit underwater organisms were corals, and the fossil record shows it took some 20 million years before tropical reef ecosystems recovered from the Late Triassic extinction, even though the ecosystem as a whole carried on functioning.

With corals again under threat from rising temperatures in the modern day, the new research could provide a blueprint for the potential damage we're going to see – and perhaps give us some clues for how to prevent it.

On a more positive note, it shows life underwater is incredibly resilient, and capable of surviving through even the worst times of environmental upheaval on our planet.

#### No chance of peak phosphorus

Eliza Barclay 13, Reporter and Editor at NPR, “Should You Be Worried About Your Meat's Phosphorus Footprint?”, NPR, 2/17/2013, http://www.npr.org/sections/thesalt/2013/02/14/172009950/should-you-be-worried-about-your-meats-phosphorus-footprint

But not everyone agrees phosphorus needs to be a top concern for food security.

"Phosphorus is pretty far down the list of things we're going to suddenly run out of," Steven Van Kauwenbergh, principal scientist and leader of the Phosphate Research and Resources Initiative at IFDC, an international food security and agriculture organization, tells The Salt.

So what is this phosphorus stuff, you say? It's an element that's mostly locked up in rocks in the ground – in this inorganic form, it's called phosphate.

It's an essential nutrient for humans and plants, and much of the world's phosphate gets processed into phosphoric acid to make fertilizer that helps plants grow quickly. Mining more of it from deposits around the world has helped fuel the huge increase in global food production. Phosphate production in 2012 was 220 million tons, up from 165 million tons in 1994.

In the last decade or so, inspired by the conversation about peak oil, a few environmental researchers began talking about the possibility of peak phosphorus and the dangers that a decline in such a critical resource would pose to food production. But even those researchers acknowledged that the estimates of global phosphate reserves — and how long they'll last — were fuzzy.

So the IRDC, which helps farmers in developing countries improve their harvests with fertilizer and other technologies, asked Van Kauwenbergh to do a thorough assessment of world reserves. His report, released in 2010, offered radically higher estimates of how much phosphate was available, and estimated that with current rates of production, phosphate rock reserves will be available for 300 to 400 years.

Other industry analysts agree that there's plenty of phosphate to go around for a long while.

"Peak phosphorus is a total myth, and I don't think it's anything to worry about in our lifetime," says Juan von Gernet, a senior consultant on fertilizers for CRU, a commodities research and consulting firm in London. "There is a huge amount of phosphate in the land, and if we run out of that, there are a lot of unexplored areas on the seabed which can be extracted if required."

Van Kauwenbergh also takes issue with Metson's suggestion that using lots of phosphorus to feed people is a bad thing.

"The people in countries with high [phosphorous] footprints have the opportunity to choose lifestyles and healthy diets," he says, and those diets mean more meat. "Now it seems these scholars would have us believe this approach is wrong."

#### ‘Insectageddon’ is garbage science

Teresa Carr 19, MA in Science Writing from Johns Hopkins University, Award-Winning, Texas-Based Journalist with a Background in both Science and Writing, Former Consumer Reports Editor and Writer, and 2018 Knight Science Journalism Fellow at MIT, “Science, Sensationalism, and the Lessons of ‘Insectageddon’”, Undark, 5/15/2019, https://undark.org/2019/05/15/science-sensationalism-and-the-lessons-of-insectageddon/

I had this all in mind when I recently read about a review of studies published in the journal Biological Conservation charting a catastrophic decline of insect populations worldwide. I was primed to take it at face value, and apparently, other journalists were, too, with sensational headlines ricocheting around the globe. Some called it “insectageddon.” Others wrote of a looming “insect apocalypse.” The Guardian, one of the first news outlets to cover the story, declared that “plummeting insect numbers threaten ‘collapse of nature.’”

Meanwhile, entomologists and ecologists around the world took to Twitter, blog posts, and editorials to point out serious methodological flaws in the research, and to refute the study’s doomsday findings. Among these was Atte Komonen, a senior lecturer in the department of biological and environmental science at the University of Jyväskylä in Finland. In a response published in the journal Rethinking Ecology, Komonen and colleagues worried that the unsubstantiated claims pinballing across the globe could diminish public faith in science, and even undermine efforts to address the real stressors that many of the planet’s insects face.

“The problem is real, insects are declining in many regions,” Komonen told me. But, he added, insects are not going to vanish globally in 40 years. “It’s dramatic, over-exaggerated, and it reduces the credibility of … conservation science — or any other science for that matter.”

Indeed, according to Manu Saunders, an ecologist at the University of New England in Australia, the flawed review and poorly considered media hype gave the false impression that we have a handle on the state of the world’s insect populations when, in fact, we really don’t. “Widespread, consistent insect declines are a real concern,” Saunders noted in a critical analysis published in the May/June issue of American Scientist. “Yet there is little published evidence that worldwide decline of all insects is happening.”

Journalists ignore these nuances at the peril of everyone, she and other experts told me. That’s because when the real picture eventually emerges — a picture inevitably filled with boring things like caveats, counter-evidence, and a good deal of lingering uncertainty — the public’s understanding of science, along with their faith in its practitioners, will have once again been undercut.

THE FIRST WAVE of Insectageddon stories hit in late 2017 after publication of a study suggesting a 70 percent reduction in flying insect biomass — the total volume of such insects — over 27 years at nature reserves in Germany. The next round came a year later in response to a study that discovered a precipitous drop in insects the Luquillo rainforest in Puerto Rico between 1976 and 2012, accompanied by reductions in the populations of the lizards, frogs, and birds that feed on them.

That was followed by the Biological Conservation review published earlier this year, in which two Australian researchers — Francisco Sánchez-Bayo, a research associate in the school of life and environmental sciences at the University of Sydney, and Kris Wyckhuys a professor of biology at the University of Queensland — analyzed data drawn from the Germany and Puerto Rico studies, along with 71 other studies of insect decline.

“As each study came out, the surrounding hype grew,” Saunders wrote, “filling broadcast and online platforms for popular-science news with a heady mix of hyperbole, anecdote, and speculation.”

With its global scope and unusually dramatic language, the Sánchez-Bayo and Wyckhuys review was a natural catalyst for sensationalist headlines. Based on their analysis, the authors characterized the state of insect biodiversity in the world as “dreadful.” “Almost half of the species are rapidly declining,” they wrote, “and a third are threatened with extinction.” The main driver of the decline, according to the researchers, is loss of habitat to intensive agriculture and urbanization. Other contributors include pollution from sources such as pesticides, fertilizers, and industrial chemicals; biological threats from pathogens and invasive species; and climate change.

They concluded that unless humanity changes its ways, “insects as a whole will go down the path of extinction in a few decades.”

Absent change, the authors of a recent study suggested insects were doomed worldwide. And yet, experts I talked to expressed surprise that the study passed peer review. Visual: Cavan via Getty

Lead author Sánchez-Bayo said he and his co-author were concerned that scientists who reviewed the study prior to publication would ask them to tone it down. But they didn’t. “That means to us that they agreed with us,” he said. To him, the impending collapse of insect life and the ecosystems they support warrants all the drama he can muster, so that both researchers and the public sit up and take notice. “[We need to] make them realize that it is a problem and we’ve got to handle it.”

And yet, experts I talked to expressed surprise that the study passed peer review. Many of the earlier studies examined in the Sánchez-Bayo meta-analysis were “localized and skewed toward particular taxa,” Saunders wrote in her critique. Several critics also noted that in reviewing the scientific literature, the authors deliberately sought out papers on insect declines, quite possibly overlooking research showing stable or increasing populations. (Sánchez-Bayo said that he and his colleague included other research as well, but the criteria for selection wasn’t clear.)

“The problem to me is that they are mixing really miscellaneous studies,” said Komonen. You could use that information to do a qualitative overview, he said, “but if you want to do this exact prediction of the extinction rate and what are the reasons behind [it], it’s just — you can’t do that. It’s impossible.”

The other key issue, Saunders suggested, is that the researchers based global predictions on limited data from just a few regions, predominantly Europe and parts of the U.S. She also pointed out that the review covered about 2,900 species — a tiny fraction of the estimated five million species of insects on Earth. “The most studied groups are bees, beetles, and butterflies,” she said. “For the vast majority of the rest of the species of insects in the world, there’s just no data and no one’s studied them.”

Biological Conservation later published a letter critical of the study, as well as the authors’ rebuttal to that criticism. In an email, the journal’s editor in chief Vincent Devictor credited the study with initiating a “very useful debate.” But, he wrote, “the merits of the study were unfortunately overshadowed by the critics (most of them justified).”

CHRIS THOMAS, a highly regarded expert on biodiversity loss and species decline at the University of York in the U.K. and one of authors of a critique of the Sánchez-Bayo and Wyckhuys meta-analysis, was unequivocal in his assessment: “It is a dreadful piece of science,” he told me. “It’s really bad.”

#### Bee populations are growing AND ag doesn’t kill them

Jon Entine 21, Senior Fellow at the World Food Center Institute for Food and Agricultural Literacy, University of California-Davis, Founder and Executive Director of the Genetic Literacy Project, Former Lecturer at Columbia University, the University of Michigan, Arizona State University, New York University, and most recently Miami (Ohio) University, “Beepocalypse Myth Handbook: Assessing Claims of Pollinator Collapse”, Genetic Literacy Project, 1/22/2021, https://geneticliteracyproject.org/2021/01/22/beepocalypse-myth-handbook-dissecting-claims-of-pollinator-collapse/

Myths and truths about bees: There is no ‘catastrophic decline’ in the global honeybee population and the use of pesticides is not driving health problems challenging wild bees, as many environmental groups continue to claim. In fact, honeybee hive populations are rising in North America and globally, and they have been growing in number for years. The companion claim — that a class of pesticides known as neonicotinoids (or neonics for short) are fostering a global honeybee pollinator crisis is also not accurate. However, honeybees and perhaps bumble bees (whose wild nature make them difficult to catalogue) do face a range of health threats that are serious cause for worry, and those issues need to be addressed.

What are the facts?

Colony Collapse Disorder

The honeybee population did face what appeared to be a crisis in the mid-2000s when some United States’ beekeepers, mostly in California, began discovering that their honeybees had mysteriously abandoned many of their colonies, leaving behind the queen bee, attended by too few, immature worker bees to sustain the colony, yet with ample viable brood and stored food. The first report classified as CCD was in mid-November 2006 by a Pennsylvania beekeeper overwintering in Florida. By February 2007, large commercial migratory beekeepers wintering in California, Florida, Oklahoma, and Texas had reported heavy losses associated with CCD, with losses ranging from 30% to 90% of their bee colonies. This phenomenon was dubbed Colony Collapse Disorder (CCD). What made CCD’s appearance in the United States stunning and alarming was that episodes were being reported from widely separated states across the continent.

At first, genetically modified crops and later neonicotinoid pesticides were fingered by environmental groups and some entomologists as the presumed causal agents. But when the bee colonies were examined, the CCD diagnosis emerged, scientists quickly dispensed of the GMO argument, as each GM crop is different and there is no plausible explanation why a phenomenon noted in one region of the US would not also show up in other regions or countries using similar modified crops.

Did the use of pesticides or neonics in particular cause or contribute to CCD in 2006? The scientific consensus now firmly says ‘no.’ CCD is a historically common occurrence that predated the introduction of genetically modified crops and modern pesticides. Upon further investigation, CCD was shown to be a centuries-old, periodic phenomenon that, by other names, has occurred periodically for centuries. in specific locales. Limited occurrences resembling CCD were fully documented as early as 1869 and on the Isle of Wight in the UK in 2006, and also in other parts of Europe and in Egypt. There were reports of similar bee behavior in hives in the US in 1918 and 1919, and thereafter. It eventually became more widely known as “disappearing disease.”

The focus on neonicotinoids as a contributing factor is more complicated. Neonics are a class of systemic pesticide introduced in the early 1990s and popular in the US, Australia, Europe and elsewhere to protect corn, soy, cotton and canola farmers. They have been embraced as a less toxic replacement of organophosphate pesticides (which can be either natural of synthetic), which are known to kill bees and wildlife, and have been linked to health problems in workers. Applied to the soil, sprayed on the crop or, most commonly, used as a seed treatment, neonics are absorbed into the plant, which is ingested by insects, discouraging pests from wreaking havoc on crops. The seed treatment lowers the amount of the neonic used 10- to 20- fold, decreasing the need for open spraying of the plant, a genuine sustainability benefit.

Many in the media and activist critical of conventional agriculture often conflate bee health problems linked to CCD with the health issues encountered by the wild honeybee population. From 1972 to 2006, serous reductions in hives were documented among feral honey bees in the US, and recent studies, though fragmentary, appear to show scattered declines among wild bees.

The precise causes of the most recent CCD incident remains undetermined. Most likely, the combinations of factors that affect honeybee colony health more generally (discussed below) are involved. But CCD has now come and gone, as it has many times over the centuries. According to the University of Maryland’s Dennis van Engelsdorp (who was part of the team that coined the modern term “CCD”), no case of CCD has been reported from the field for the last eight years.

Are honeybees in decline?

Said simply: Honeybees are not on the verge of extinction or irreversible decline and the world will not face mass starvation. That’s scare rhetoric. As the Washington Post reported in two separate features in 2015 — ‘Call Off the Bee-pocalypse: U.S. Honeybee Colonies Hit a 20-Year High’ and ‘Believe It of Not, the Bees Are Doing Just Fine’ — advocacy group claims amplified in thousands of news stories, but not all, are wrong. But the direction of the media narrative, like the path of a 250,000 ton ocean liner, was established in the late 2000s, and does not turn that around easily, particularly when the it serves an ideological conclusion that conveniently helps in fundraising for those who promote it. Despite claims to the contrary, according to the independent Bee Informed Partnership, overseen by van Englesdorp, overwinter mortality of honeybees has steadily declined since the 2006 CCD peak.

In fact, honeybee populations aren’t declining anywhere in the world, despite many media headlines; they’re rising. According to statistics kept by the US Department of Agriculture, Statistics Canada and the UN Food and Agriculture Organization, honeybee populations in the United States, Canada and Europe have been stable or growing for the two decades neonics have been on the market. Furthermore, the worldwide trajectory for bee colonies has been on an upward trajectory for over half a century. Here are a few charts that illustrate the upward global trends that overlap the introduction and use since the mid 1990s of neonics, the central target of anti-chemical environmental groups.

#### No extinction---even with collapse of all pollinators

Dr. Toby Ord 20, Senior Research Fellow in Philosophy at Oxford University, DPhil in Philosophy from the University of Oxford, The Precipice: Existential Risk and the Future of Humanity, Hachette Books, Kindle Edition, p. 118

And while extinction is a useful measure of biodiversity loss, it is not the whole story. It doesn’t capture population reductions or species disappearing locally or regionally. While “only” 1 percent of species have gone extinct on our watch, the toll on biodiversity within each region may be much higher, and this may be what matters most. From the perspective of existential risk, what matters most about biodiversity loss is the loss of ecosystem services. These are services—such as purifying water and air, providing energy and resources, or improving our soil—that plants and animals currently provide for us, but we may find costly or impossible to do ourselves.

A prominent example is the crop pollination performed by honeybees. This is often raised as an existential risk, citing a quotation attributed Einstein that “If the bee disappeared off the surface of the globe then man would only have four years of life left.” This has been thoroughly debunked: it is not true and Einstein didn’t say it.109 In fact, a recent review found that even if honeybees were completely lost—and all other pollinators too—this would only create a 3 to 8 percent reduction in global crop production.110 It would be a great environmental tragedy and a crisis for humanity, but there is no reason to think it is an existential risk.

### Adv 2

#### Food disruptions are temporary and adaptable AND war turns the case

Gene Tunny 12, Economic Consultant, Trading as Adept Economics, Former Consultant with the Commonwealth Treasury, “Should We Worry About Food Security?”, Queensland Economy Watch, 7/9/2012, https://queenslandeconomywatch.com/2012/07/09/should-we-worry-about-food-security/

The push for greater local food production in urban and peri-urban areas makes no economic sense in a country where there is abundant farm land, and hence I was pleased to learn about the views of a University of Queensland expert on food security, Michael D’Occhio, in Queensland Country Life today (Food security ‘overblown’):

…with Australia producing a huge surplus of food relative to its population, “I think we’re a little bit indulgent when we talk about food insecurity in Australia”.

But a combination of fears about food security and food miles (how far the food travels before it gets to the table and hence how much greenhouse gas is created) is driving urban planners to promote inefficient agriculture within and close to our cities. For example, in a piece at the Conversation today, Griffith University Professor of Urban Management and Planning Paul Burton writes (Grow your own: Making Australian cities more food secure):

A significant opportunity exists to support the re-localisation of food production, processing, and consumption. While cities historically grew as places where local food surpluses were traded, urban food supply lines have become increasingly long, complex, and vulnerable to disruption by a number of factors, including climate change but also by natural disasters and by wars and other conflicts. By growing more of our food within our cities and in their immediate peri-urban hinterlands we can become less dependent on these vulnerable supply lines.

I find it hard to worry about supply lines getting disrupted, as any disruption is likely to be temporary and there are still other supply lines to ensure our cities won’t starve. The risk of all the potential supply lines – roads, rail, shipping, air freight – getting knocked out at the same time for an extended period seems very remote to me, outside of a nuclear war, in which case a bunker full of baked beans and pop tarts would be the best contingency.

Hence I agree that concerns about food security domestically are overblown. All the discussions I’ve had with people in rural communities in Queensland suggest there is clear potential to grow more food, but economics dictates it isn’t feasible (e.g. it can’t economically be grown at current prices, or it can’t economically be taken to the port because there isn’t a rail line nearby).

#### Ag is competitive, with tons of incentive to innovate

Torsten Kurth 20, Managing Director & Senior Partner at the Boston Consulting Group, Berlin, et al., “Reviving Agricultural Innovation in Seeds and Crop Protection”, Boston Consulting Group, 2/24/2020, https://www.bcg.com/publications/2020/reviving-agricultural-innovation-seeds-crop-protection

Increasing Competition from New ­Entrants and Nimble Startups. Thanks to shifts in consumer demand, the advent of several emerging technologies, and the growing attractiveness of the agriculture market, a variety of nimble startups and new competitors from outside the traditional agriculture sector have risen to compete against the big agricultural-­input companies.

Bringing their own expertise in areas such as consumer usability, biotechnology, ­robotics, and data analytics to bear on the challenges the industry faces, numerous ­so-called agtech companies are taking ­advantage of agile product development techniques and new ways of working to focus on specific challenges and bring their innovations to market quickly. As a result, they are threatening to outcompete the big agricultural-input players in several areas.

Investment in these young agricultural-­technology companies has risen rapidly in recent years, with these companies receiving a larger and larger proportion of funding. (See Exhibit 3.) The number of acquisitions in the sector is increasing as well. Just to take one example, Blue River Technology, which uses computer vision and artificial intelligence to apply crop protection products on a plant-by-plant basis, was acquired by John Deere in 2017 for $305 million, one of the largest agtech deals in the past five years.

Chart

Description automatically generated with medium confidence

Several large technology companies have also begun looking carefully at the agriculture industry, bringing their competencies in consumer-facing technology infrastructure and data science to bear. IBM’s Watson Decision Platform for Agriculture, for example, analyzes information gathered by sensors in the field along with weather and other data to optimize farm operations. Similarly, FarmBeats, Microsoft’s IoT platform for agriculture, collects and analyzes data from sensors, cameras, and drones. While these companies lack the deep agronomic experience and access to growers of the traditional players, their track record in disrupting other industries, including retail, transport, travel, and financial services, should be a wake-up call for the entire agriculture sector.

#### Food security is strong BUT requires maintaining large producers

Ted Nordhaus 21, Founder and Executive Director of the Breakthrough Institute and Co-Author of An Ecomodernist Manifesto, and Dan Blaustein-Rejto, Director of Food and Agriculture at the Breakthrough Institute, Conducted Research with the Environmental Defense Fund, International Center for Tropical Agriculture, and Farmers Market Coalition, “Big Agriculture Is Best”, Foreign Policy, 4/18/2021, https://foreignpolicy.com/2021/04/18/big-agriculture-is-best/

In some ways, it is not surprising that many of the best fed, most food-secure people in the history of the human species are convinced that the food system is broken. Most have never set foot on a farm or, at least, not on the sort of farm that provides the vast majority of food that people in wealthy nations like the United States consume.

In the popular bourgeois imagination, the idealized farm looks something like the ones that sell produce at local farmers markets. But while small farms like these account for close to half of all U.S. farms, they produce less than 10 percent of total output. The largest farms, by contrast, account for about 50 percent of output, relying on simplified production systems and economies of scale to feed a nation of 330 million people, vanishingly few of whom live anywhere near a farm or want to work in agriculture. It is this central role of large, corporate, and industrial-style farms that critics point to as evidence that the food system needs to be transformed.

But U.S. dependence on large farms is not a conspiracy by big corporations. Without question, the U.S. food system has many problems. But persistent misperceptions about it, most especially among affluent consumers, are a function of its spectacular success, not its failure. Any effort to address social and environmental problems associated with food production in the United States will need to first accommodate itself to the reality that, in a modern and affluent economy, the food system could not be anything other than large-scale, intensive, technological, and industrialized.

Not so long ago, farming was the principal occupation of most Americans. More than 70 percent labored in agriculture in 1800. As late as 1900, some 40 percent of the U.S. labor force still worked on farms. Today, that figure is less than 2 percent.

The consolidation of U.S. agriculture has been underway for more than 150 years. First came irrigation and ploughs, then better seeds and fertilizers, and then tractors and pesticides. With each innovation, farmers were able to produce larger harvests with fewer people and work larger plots of land. Better opportunities drew people to cities, where they could get jobs that provided higher wages and, thereby, produced greater economic surplus—that is, profits and ultimately societal wealth. The large-scale migration of labor from farms to cities pushed farmers to invest even more in labor-saving and productivity-enhancing practices and technologies in a virtuous cycle of urbanization, agricultural intensification, and economic growth that is the hallmark of all affluent societies.

It is not a stretch to say that the United States is wealthy today because most of its people work in manufacturing, services, technology, and other sectors of the economy. In this, the country is not alone. No nation has ever succeeded in moving most of its population out of poverty without most of that population leaving agriculture work.

That transition often isn’t easy. Millions of Black Americans made the difficult journey from tenant farming in the South to factory work in the North, where they faced new forms of racism even as they escaped the tyranny of sharecropping. More recently, small farmers have struggled to survive as increasingly high agricultural productivity and falling commodity prices tilted the playing field toward large farms. Rural communities have likewise suffered as dramatic improvements in labor productivity have shrunk employment in agriculture.

But over the long term, the living standards and life opportunities offered in the modern knowledge, service, and manufacturing economies have proved vastly greater than anything possible under the agrarian social and economic arrangements that most Americans over the last two centuries happily abandoned—and that too many Americans today romanticize.

Modern life required not only liberating most Americans from agrarian labor but also the development of a food system capable of getting food from farms to the cities where increasing numbers of Americans lived and worked. A food system that lost much of its harvest to pests and spoilage needed to dramatically cut losses even as its bounty needed to travel farther and farther. For this reason, the rise of modern agriculture is as much a story of railways and highways as combines and tractors, refrigeration and grain elevators as pesticides and fertilizer.

The development and growth of feedlots followed a similar path. As the historian Maureen Ogle recounts in her magnificent history of the beef industry, In Meat We Trust, the first feedlots grew out of the stockyards of Chicago and Kansas City in the late 19th century. The most efficient way to get beef to burgeoning markets in America’s cities was to drive cattle to these new rail centers, where they were finished, slaughtered, and then shipped throughout the country by rail. After World War II, beef production and feedlots expanded massively, driven not so much by corporate greed as by rising demand for beef from the United States’ newly prosperous middle class and by a scarcity of labor as ranch hands returning from the battlefields of Europe and the Pacific chose to pursue better economic opportunities in the postwar economy.

Debates about the social and environmental impacts of America’s food system cannot be disentangled from the basic reality that in a modern industrialized society, most people will live in cities and suburbs and will not work in agriculture. As a result, most food will need to be produced by large farms, with little labor, far away from the people who will consume it.

Many sustainable agriculture advocates tout the recent growth of organic agriculture as proof that an alternative food system is possible. But growing market share vastly overstates how much food is actually produced organically. In reality, organic production accounts for little more than 1 percent of total U.S. agricultural land use. Meanwhile, only a bit more than 5 percent of food sales come from organic producers, mostly because organic sales are overwhelmingly concentrated in high-value sectors of the market, namely produce and dairy, and fetch a premium from well-heeled consumers.

#### Merger ban will be circumvented to continue consolidation

James M. MacDonald 1, Economic Research Service at the USDA, and Marvin Hayenga, Iowa State University, “Concentration, Mergers, and Antitrust”, Economic Research Service Report, https://www.iatp.org/sites/default/files/Concentration\_Mergers\_and\_Antitrust.htm

Prohibit mergers among large agribusiness firms

Some recent Congressional proposals would place temporary or permanent moratoria on mergers between large agribusiness firms. Such actions would eliminate two types of mergers that can bring overall benefits to the economy. First, mergers that allow firms to realize economies of scale would not occur. Second, some mergers effectively allow for the replacement of one poorly performing management team by another. In each case, the merger would allow for lower costs and product prices and expanded output. Expanded output, in turn, would lead to higher demand for agricultural inputs. Merger prohibition could eliminate those gains.

A prohibition on large mergers would also eliminate those mergers that create market power, but that would not have been stopped by antitrust authorities. In those cases, the prohibition will lead to lower product prices to consumers or higher prices paid to farm producers. Finally, some mergers do not lead to market power, but they create no new cost efficiencies--rather, they lead to inefficiency by simply making the merged firm more complicated, without any attendant advantages. An agribusiness merger moratorium might also limit those types of mergers and their attendant costs.

Agribusiness mergers are one strategy for large firms, and they could respond to a ban with other strategic steps. Those seeking scale economies could grow internally, by building bigger facilities instead of merging. Because firms have that alternative, a merger prohibition will not necessarily halt increases in concentration based on scale economies. Second, firms could respond to a prohibition on the purchase of large agribusiness firms by purchasing other large firms in the economy and becoming conglomerates. Such moves might be particularly inefficient (cost-raising).

#### Global food supply strong

Indur Goklany 15, PhD from Michigan State, Assistant Director of Programs, Science and Technology Policy at the DOI, represented the United States at the Intergovernmental Panel on Climate Change (IPCC) and during the negotiations that led to the United Nations Framework Convention on Climate Change, “CARBON DIOXIDE: The good news”, The Global Warming Policy Foundation, GWPF Report 18

Crop yields have increased (see Figure 3) and global food production, far from declining, has actually increased in recent decades. Between 1990–92 and 2011–13, although global population increased by 31% to 7.1 billion, available food supplies increased by 44%. Consequently, the population suffering from chronic hunger declined by 173 million despite a population increase of 1.7 billion.112 This occurred despite the diversion of land and crops from production of food to the production of biofuels. According to one estimate, in 2008 such activities helped push 130–155 million people into absolute poverty, exacerbating hunger in this most marginal of populations. This may in turn have led to 190,000 premature deaths worldwide in 2010 alone.113 Thus, ironically, a policy purporting to reduce AGW in order to reduce future poverty and hunger only magnified these problems in the present day.

#### Squo solves urbanization

Alicja Grzadkowska 19. Currently a news editor at Insurance Business, worked as a broadcast associate at the Business News Network before joining Key Media, taught a course on documentary study at the University of Guelph. 1-22-2019. "The rapid spread of smart cities exchanges old risks for new ones." Insurance Business. https://www.insurancebusinessmag.com/us/news/technology/the-rapid-spread-of-smart-cities-exchanges-old-risks-for-new-ones-122885.aspx

Smart cities are entering a new phase, as not only are city leaders readily installing digital solutions to improve efficiencies, such as cutting down the minutes spent on a daily commute, but residents are now able to use their smartphones as the keys to the city that unlock further capabilities by injecting additional data into the ‘smart’ ecosystem, according to a 2018 report from the McKinsey Global Institute.

Smart cities are also spreading from the major metropolitan areas where they’ve typically originated, to smaller locales.

“What we’ve seen is this funnel down from large metropolitan, high density, urban areas. The projects that they have in New York, Boston, Jakarta – really large global cities – have started to come down to some of the more medium-sized urban environments – Arlington, Texas, Kansas City – where you’re seeing deployment of certain technology that’s getting them used to the process needed to cooperate between the public and private entities,” said Thom Rickert, vice president and emerging risks specialist of Trident Public Risk Solutions.

Toronto, Singapore, Amsterdam, and Paris are just a few of the other cities across the globe getting attention for their smart city initiatives, though they’re far from the only ones. Some, like Copenhagen, are also employing sustainability models and going ‘green’ through, for example, the replacement of street lights with LED lighting, which brings an almost immediate benefit in terms of maintenance and electricity costs, explained Rickert. Citizens in turn see improvements from walking in better lit areas.

# 2NC

## CP---Memo

## Adv 1

### Presumption

#### Sanderson says its Already happening

BLUE!

Matthew R. Sanderson and Stan Cox 21, social scientist at Kansas State University, research scholar in ecosphere studies at The Land Institute, 05/17/21, Big Agriculture Is Leading to Ecological Collapse, https://foreignpolicy.com/2021/05/17/big-industrialized-agriculture-climate-change-earth-systems-ecological-collapse-policy/#:~:text=Forest%20loss%20and%20species%20extinctions,has%20scaled%20up%20in%20Brazil.&text=In%20August%202019%2C%20smoke%20blocked,planet's%20capacity%20to%20support%20life.

Today, there is more carbon dioxide in the atmosphere than at any point in the past 3.6 million years. On April 5, atmospheric carbon dioxide exceeded 420 parts per million—marking nearly the halfway point toward doubling the carbon dioxide levels measured prior to the Industrial Revolution, a mere 171 years ago. Even amid a pandemic-induced economic shutdown—during which global annual emissions dropped 7 percent—carbon dioxide and methane levels set records in 2020. The last time Earth held this much carbon dioxide in its atmosphere, sea levels were nearly 80 feet higher and the planet was 7 degrees Fahrenheit warmer. The catch: Homo sapiens did not yet exist.

Change is in the air. U.S. Director of National Intelligence Avril Haines announced climate change is “at the center of the country’s national security and foreign policy.” Business-as-usual is no longer a viable strategy as more institutions consider a future that will look and feel much different. In this context, it is striking to read a recent piece in Foreign Policy arguing “big agriculture is best.”

“Big agriculture is best” cannot be an argument supported by empirical evidence. By now, it is vitally clear that Earth systems—the atmosphere, oceans, soils, and biosphere—are in various phases of collapse, putting nearly one-half of the world’s gross domestic product at risk and undermining the planet’s ability to support life. And big, industrialized agriculture—promoted by U.S. foreign and domestic policy—lies at the heart of the multiple connected crises we are confronting as a species.

The litany of industrial agriculture’s toll is long and diverse. Consider the effects of industrial animal agriculture, for example. As of this writing, animal agriculture accounts for 14.5 percent of total anthropogenic greenhouse gas emissions annually. It is also the source of 60 percent of all nitrous oxide and 50 percent of all methane emissions, which have 36 times and 298 times, respectively, the warming potential of carbon dioxide. As industrial animal agriculture has scaled up, agricultural emissions of methane and nitrous oxide have been going in one direction only: up.

Efforts to scale industrial agriculture are undermining the planet’s capacity to support life at more local scales too. Consider Brazil, home to the Amazon Rainforest, which makes up 40 percent of all remaining rainforest and 25 percent of all terrestrial biodiversity on Earth. Forest loss and species extinctions have only increased as industrial agriculture has scaled up in Brazil. Farmers are burning unprecedented amounts of forest to expand their operations in pursuit of an industrial model. In August 2019, smoke blocked the sun in São Paulo, Brazil, 2,000 miles away from the fires in the state of Amazonas.

In India, the pace of agricultural industrialization is hastening as indicated by rising agricultural production and declining employment in agriculture, which now accounts for less than one-half of India’s workforce. Agriculture has been scaled with all the tools of the Green Revolution: a high-input farming system comprised of genetically modified seeds and accompanying synthetic fertilizers and pesticides. As agriculture has industrialized in India, the use of pesticides and fertilizers has risen as well.

Although it has become more difficult to breathe the air in Brazil, it has become harder to find clean freshwater in India, where pesticide contamination is rising. There, the costs of the industrial agriculture model are plainly ecological and human: Unable to drink the water or pay back the loans they took out to finance their transition to industrial farming, an alarming number of Indian farmers are drinking pesticides instead. Almost a quarter-million Indian farmers have died by suicide since 2000, and 10,281 farmers and farm laborers killed themselves in 2019 alone. In Punjab, the country’s breadbasket, environmental destruction coexists with a raging opioid epidemic ensnaring nearly two-thirds of households in the state.

If the events in Brazil and India sound familiar to U.S. readers, it is because there are analogous stories in the United States—where industrial agriculture is rendering entire landscapes uninhabitable.

#### This is getting embarassing

Shama E. Haque 21, Associate Professor in Civil & Environmental Engineering, 06/09/21, How Effective Are Existing Phosphorus Management Strategies in Mitigating Surface Water Quality Problems in the U.S.?, Sustainability Vol. 13, Issue 12, https://doi.org/10.3390/su13126565

\*\*\*edited for ablist language

Eutrophication is a natural process. Nonetheless, it can be enhanced by changes in land use and land cover pattern of a drainage basin. The hydrology, geology, soil type and topography of a drainage basin can exert major influences on its transport capacity, and subsequently, impact mobilization and transport of nutrients to a water body [1,10]. Numerous researchers connected the development and proliferation of algal blooms to nutrient loading resulting from activities related to agriculture, industry, and sewage disposal [11,12]. Subsequently, bacterial decomposition of the excess biomass results in oxygen consumption, which can lead to depletion of dissolved oxygen throughout the water body. Low or depleted oxygen in a water body can lead to hypoxic conditions, which is informally referred to as a “dead zone” because such an environment is unable to sustain life. Dead zones have been identified in many freshwater lakes, including the central Lake Erie region during the summer season [13]. Enhanced algal growth can also threaten biodiversity, lead to increased sedimentation and ~~impairment~~ [harm] in navigational and recreational use, and cause ancillary economic impacts to fisheries and the tourism industry along with property devaluation of waterfront homes. In America, the estimated annual value loss associated with human-induced eutrophication is around 2.2 billion USD [14]. Human-induced eutrophication of inland waters is of particular interest in lakes, reservoirs, and rivers that are sources of water for drinking purposes. Although eutrophication cannot be easily quantified, the overall impact of excessive nutrient input on lakes is reasonably well understood [15]. Our understanding of how eutrophication develops in rivers is still limited [16]. The effects of nutrient loading on rivers are complex due to their dynamic nature where plant communities respond to flow, sediment type and underlying geology surpassing any temporary changes in dissolved nutrient levels resulting from external inputs [16–18]. Additionally, dilution tends to restrict both the magnitude and extent of impacts of nutrient input in flowing bodies of water [15].

In the aquatic environment, increased growth of macrophytes, algae, and cyanobacterial blooms can result in dangerous toxins and taste-and-odor compounds, which can cause serious economic and public health concerns. For many years, farmers in the U.S. produced the majority of agricultural products through industrial agriculture, a system that promoted planting the same crop in the same field season after season, using large quantities of agrochemicals (e.g., fertilizers, plant-protection chemicals or pesticides) that threatened the surrounding environment. The American agricultural system is governed by taxpayer subsidies, private investment by agricultural business enterprises and relevant policies and regulations, which have given rise to even larger farms and more industrialized practices [19]. This unsustainable system consumes and degrades the natural resources

### Consolidation Good---Tech---2NC

#### Industrial-scale production unlocks precision farming---empirics prove that’s the best way to cut pollution---turns every environment impact

Dan Blaustein-Rejto 18, Director of the Food and Agriculture Program at the Breakthrough Institute, Masters of Public Policy from University of California, Berkeley, BA in Environmental Studies from Brown University, “Eating Environmentally Requires Embracing Technology and Industry”, The Breakthrough Institute, 5/1/2018, https://thebreakthrough.org/issues/food/eating-environmentally-requires-embracing-technology-and-industry

Since then, thought leaders such as writer Michael Pollan and chef Alice Waters have carried the torch forward, diagnosing the ills of our food system. US agriculture generates as much greenhouse gas as all of Britain. Excess farm nutrients pollute rivers, lakes, and coastal areas such as the Gulf of Mexico to the point that fish can’t survive. And pesticide use harms farmworkers, children, and wildlife.

The solutions, according to many advocates, lie in cutting back on modern indulgences and supporting alternatives to the conventional food system. These include buying food from local farmers, shopping organic, eating less meat or at least eating free-range meat, and avoiding processed foods. One of the most well-known rules of thumb in this school of thought is, as Pollan writes, to eat only what your great-grandmother would recognize as food.

While these recommendations have merit, and certainly intuitive appeal for many, the reality of sustainability is far more complicated. For instance, locally produced food often has a greater environmental footprint than imported food. Organic farming typically requires more land use and contributes more to nutrient pollution of water bodies. Most free-range beef emits substantially more greenhouse gas emissions than beef from a feedlot, or factory farm as it’s commonly called. And many types of food processing have reduced food waste by increasing shelf life — just think of how long a bag of frozen fruit or loaf of sliced bread lasts.

Recent research into sustainable agriculture has given rise to a new paradigm. I call it Ecomodern Eating. Ecomodern Eating challenges many widespread assumptions, highlighting the importance of agricultural productivity and innovation in building an eco-friendly and delicious food future.

Historically, increasing agricultural productivity has been key to growing more environmentally friendly food. Advances in livestock production, such as nutritionally-optimized feed, have enabled North American chicken, beef, and dairy producers to emit less greenhouse gas emissions per pound of meat, eggs, or milk produced than most other regions in the world.

The same is true in crop production: the high levels of productivity and efficiency often derisively likened to industrial production has enabled North American crop production to emit less greenhouse gases per unit calorie than any other part of the world.

Agricultural productivity continues to advance and drive sustainability forward. A suite of new “precision agriculture” technologies such as GPS-driven tractors and drone imagery enable farmers to grow more food while using less fertilizer and pesticides. And advances in indoor farming are enabling companies like Plenty and AeroFarms to grow many times more food than traditional farms while using a fraction of the water and land.

In addition, we also need substitutes for foods with the largest environmental footprints. Many of the greatest environmental successes of the past have involved finding replacements for ecologically harmful practices. For instance, when wild sturgeon were on the precipice of extinction, the caviar industry found ways to raise and harvest farmed fish instead. And today, plant-based and cultured meat start-ups are developing hamburgers, fish, and other animal products that taste like the original thing, but with fewer of some important environmental impacts (especially compared to beef).

#### It's net-offense---productivity is the biggest variable for conservation AND trends solve their internal link

Alex Smith 20, Food and Agriculture Analyst at the Breakthrough Institute, MA/MSc in International and World History from Columbia University and the London School of Economics and Political Science, “To Combat Pandemics, Intensify Agriculture”, The Breakthrough Institute, 4/13/2020, https://thebreakthrough.org/issues/food/zoonosis

Alongside reducing deforestation and land-use change and improving food access and security, sustainably intensifying agriculture across the globe would benefit biodiversity by protecting habitats and keeping them from agricultural development. While monoculture means less biodiversity on farmland, the productivity gains of monocropping — and other intensive agricultural practices — allow for the sparing of far greater land that can be used as habitat for wild flora and fauna. Certainly, agricultural intensification alone is not enough to maximize land-sparing benefits, as improved conservation and land policy is needed to minimize rebound effects. But greater productivity is likely the longest lever for achieving ambitious conservation goals.

The spread of intensive agriculture has come with rising nitrogen run-off, methane emissions, and other environmental impacts. These are real problems, but their solution is the continued improvement of intensive systems. In fact, we are already seeing reductions in many environmental impacts from agriculture in countries where intensive agriculture is prevalent, such as the US.

### Consolidation Good---Land Conversion---2NC

#### Downsizing requires massive land expansion AND it’s unique: there’s gradual re-wilding because of high-intensity improvements

Ted Nordhaus 15, Founder and Executive Director of the Breakthrough Institute, “The Environmental Case for Industrial Agriculture”, The Breakthrough Institute, 6/8/2015, https://thebreakthrough.org/issues/food/the-environmental-case-for-industrial-agriculture

Debates about specific agricultural technologies and environmental impacts often lose sigh of the forest through the trees in terms of the relationship between food production and the environment. Low-productivity food systems have devastating impacts on the environment. As much as three-quarters of all deforestation globally occurred prior to the Industrial Revolution, almost entirely due to two related uses, clearing land for agriculture and using wood for energy. Indeed, many places that we now think of as vast wilderness were once farmed. Even the Amazon basin, long thought to have been a primeval Eden turns out to have been the site of extensive agriculture prior to the decimation of the pre-Columbian population due to conquest and disease. Today, forests have come back in New England and many other parts of the world not due to disease, privation, or genocide but rather because agricultural productivity has risen so dramatically that many marginal agricultural lands have been abandoned.

Meanwhile, everywhere that people depend upon bushmeat for protein, forests and other habitat continue to be defaunated. Moreover, low-intensity pasturing of livestock represents the largest single human land use, larger even than cropland. When leading public intellectuals and chefs like Michael Pollan and Alice Waters decry feedlot meat and rhapsodize about the culinary and environmental benefits of grass-fed beef, what they are really proposing is a vast expansion of human impacts on the land.

Even with much lower levels of per-capita beef consumption, there is no way that American beef consumption, much less global consumption, could be met with pastured beef without dedicating much more land to pasture. Even accounting for the immense amount of grain needed to feed cattle, feedlot beef is more land efficient than grass-fed.

In short, were such a thing even possible, attempting to feed a world of seven-going-on-nine billion people with a preindustrial food system would almost certainly result in a massive expansion of human impacts through accelerated conversion of forests, grasslands, and other habitat to cropland and pasture.

#### It’s the single largest cause of biodiversity loss

Dr. Angela Logomasini 12, Senior Fellow at the Competitive Enterprise Institute, Ph.D. in American Government from The Catholic University of America, “Rachel Was Wrong: Agrochemicals’ Benefits to Human Health and the Environment”, Competitive Enterprise Institute, Issue Analysis, Number 8, November 2012, <https://cei.org/sites/default/files/Angela%20Logomasini%20-%20Rachel%20Was%20Wrong.pdf>

Environmental Conservation Benefits

While many environmental advocacy groups suggest that chemicals have tremendously adverse impacts on the environment and wildlife, the fact is that these products have substantial environmental benefits. We consider a few here, such as the impacts on habitats and water quality.

Researcher Roger Sedjo of Resources for the Future notes: “Almost certainly the primary cause of contemporary biodiversity decline is habitat destruction and the degradation that results from the expansion of human populations and activities.”40 Clearing land for agriculture is surely one of those human activities, as is clearing land for living space.

Many people assume that any deforestation is bad. They forget that deforestation has made it possible for developed nations to provide an abundant food supply for domestic and international markets. As populations grow and people switch from gathering food to farming, some deforestation becomes necessary. History shows that once enough agricultural land is set aside and farming practices become sustainable, forests stabilize.

Steven Hayward of the Ashbrook Center at Ashland University documents such trends in his Environmental Almanac 2011, showing how deforestation has declined in recent years in many parts of the world and in some cases reforestation has begun. He notes:

Although data on the global scale are inconsistent and incomplete, the rate of deforestation appears to be steadily declining. Between 1995 and 2005, Asia dramatically reversed its deforestation trends; it is now reforesting rapidly. Africa and South America still experience the highest rates of deforestation.

Brazil, which along with Indonesia had the highest net loss of forests in the 1990s, has significantly reduced its rate of loss. Recent data suggest that Indonesia’s rate of deforestation is also slowing.41

Such reforestation would not be possible without high-yield agriculture and the chemicals that are part of that process.

From a conservationist perspective, the problem is not deforestation and habitat destruction, per se, but mismanagement of resources. This is true for both the developed and developing world. A large part of the problem stems from the tragedy of the commons—the fact that much of the world’s forests are owned by central governments that do not exercise any management or control over the lands. As a result, much of the forests are an open resource lacking a steward, which leads to serious abuse as everyone takes from the forest, yet no one has an interest in maintaining the resource. In addition poverty contributes as clearing more and more land for agriculture becomes necessary to produce food.

There is much debate as to the extent of rainforest deforestation. It is clear that high-yield farming helps reduce encroachment into wildlife habitat, and the measured impact is substantial. If farmers continued to use 1950s technology—when most of the world did not use pesticides and fertilizers— they would have to plant 10 million square miles of additional land to generate the food that is produced today, notes researcher Dennis Avery of the Hudson Institute.42 That is more land than all of North America (about 9.4 million square miles) and almost as much as all the land in Africa (about 11.7 million square miles). Researcher Indur Goklany has also quantified these conservation gains. He explains:

If U.S. agricultural technology had been frozen at 1910 levels— i.e. if cropland per capita had stayed at 1910 levels—then to produce the same output as achieved in 2004, U.S. farmers would have had to utilize 1,007 million acres rather than the 305 million acres that were actually harvested that year. That’s more than four times the total amount of land and habitat under special protection in the U.S. in 1999— including National Parks, National Wildlife Refuges, and National Wilderness Areas. Quite possibly, the increase in land productivity averted a potential catastrophe for U.S. wildlife and perhaps even biodiversity more generally.43

### Consolidation Good---Land Conversion---Impact---Zoonotic Disease

#### Conversion causes zoonotic disease outbreaks

Alex Smith 20, Food and Agriculture Analyst at the Breakthrough Institute, MA/MSc in International and World History from Columbia University and the London School of Economics and Political Science, “To Combat Pandemics, Intensify Agriculture”, The Breakthrough Institute, 4/13/2020, https://thebreakthrough.org/issues/food/zoonosis

There is broad agreement in the epidemiological and virological studies of zoonoses that the most important factor in the development of new zoonotic diseases is land-use change. The development of wild lands, whether caused by agricultural extensification, mining, or other factors, simultaneously shrinks the habitat of wildlife and brings that wildlife in close proximity to human settlements. The combination of shrinking habitats, human-wildlife interactions, and food insecurity is a recipe for zoonosis. In West Africa, these three factors combined were responsible for HIV/AIDS and the slew of recent Ebola outbreaks.

Even when food insecurity and the consumption of wildlife are taken out of the equation, land-use change is a powerful driver of zoonotic disease, and has resulted in outbreaks of zoonotic diseases like malaria, yellow fever, dengue fever, Nipah virus, West Nile virus, Zika virus, and Lyme disease. Often, these diseases are transmitted from animals to humans through an intermediary, sometimes an insect (mosquitoes or ticks) and sometimes through livestock that live too close to wildlife populations, as was the case with Nipah.

Because the biggest driver of land-use change is agriculture, “intensive” high-yield agriculture often takes the blame, but the alternative — extensive, low-yield farming — would be worse. To prevent further pandemics, we must do as much as we can to stop land-use change while improving food security. We must, in other words, improve agricultural yields, allowing us to grow more food on less land. So, contrary to what many have asserted, a vital lever for limiting land-use change and providing cheap food for all is not to abandon intensive agriculture, but to intensify it further, especially in the developing world where food insecurity is greatest and where growing populations means rising food demand.

It is thanks to rising yields that farmers, globally, produce about three times the amount of crops while only using 13% more land than in 1950. For example, if yields from cereal production hadn’t increased since 1961, the global agricultural footprint would be 24% larger than it is today — increasing from roughly 50% at current levels to 62% of total habitable land — and would likely have resulted in even deadlier zoonotic outbreaks.

#### Extinction

Dennis **Pamlin 15** & Stuart Armstrong. Pamlin, Executive Project Manager Global Risks, Global Challenges Foundation; Stuart Armstrong, James Martin Research Fellow, Future of Humanity Institute, Oxford Martin School, University of Oxford. February 2015. “Global Challenges: 12 Risks that threaten human civilization: The case for a new risk category.” Global Challenges Foundation. https://api.globalchallenges.org/static/wp-content/uploads/12-Risks-with-infinite-impact.pdf

Here only worldwide events are included. A widespread endemic disease that is stable in terms of how many people become sick from it is not a pandemic. 260 3.1.4.1 Expected impact Infectious diseases have been one of the greatest causes of mortality in history. Unlike many other global challenges pandemics have happened recently, as we can see where reasonably good data exist. Plotting historic epidemic fatalities on a log scale reveals that these tend to follow a power law with a small exponent: many plagues have been found to follow a power law with exponent 0.26.261 These kinds of power laws are heavy-tailed262 to a significant degree.263 In consequence most of the fatalities are accounted for by the top few events.264 If this law holds for future pandemics as well,265 then the majority of people who will die from epidemics will likely die from the single largest pandemic. Most epidemic fatalities follow a power law, with some extreme events – such as the Black Death and Spanish Flu – being even more deadly.267 There are other grounds for suspecting that such a high impact epidemic will have a greater probability than usually assumed. All the features of an extremely devastating disease already exist in nature: essentially incurable (Ebola268), nearly always fatal (rabies269), extremely infectious (common cold270), and long incubation periods (HIV271). If a pathogen were to emerge that somehow combined these features (and influenza has demonstrated antigenic shift, the ability to combine features from different viruses272), its death toll would be extreme. Many relevant features of the world have changed considerably, making past comparisons problematic. The modern world has better sanitation and medical research, as well as national and supra-national institutions dedicated to combating diseases. Private insurers are also interested in modelling pandemic risks.273 Set against this is the fact that modern transport and dense human population allow infections to spread much more rapidly274, and there is the potential for urban slums to serve as breeding grounds for disease.275 Unlike events such as nuclear wars, pandemics would not damage the world’s infrastructure, and initial survivors would likely be resistant to the infection. And there would probably be survivors, if only in isolated locations. Hence the risk of a civilisation collapse would come from the ripple effect of the fatalities and the policy responses. These would include political and agricultural disruption as well as economic dislocation and damage to the world’s trade network (including the food trade). Extinction risk is only possible if the aftermath of the epidemic fragments and diminishes human society to the extent that recovery becomes impossible277 before humanity succumbs to other risks (such as climate change or further pandemics).

### Consolidation Good---Land Conversion---Impact---Turns Warming

#### It turns the environment

Dr. Christian Folberth 20, Researcher at the Ecosystem Services and Management Program at the International Institute for Applied Systems Analysis, PhD from the Swiss Federal Institute of Aquatic Science and Technology (EAWAG) and ETH Zurich, BSc in Horticultural Sciences and MSc in Environmental Planning and Engineering Ecology from Technical University of Munich, et al., “The Global Cropland-Sparing Potential of High-Yield Farming”, Nature Sustainability, Volume 3, https://www.nature.com/articles/s41893-020-0505-x

The global expansion of cropland exerts substantial pressure on natural ecosystems and is expected to continue with population growth and affluent demand. Yet earlier studies indicated that crop production could be more than doubled if attainable crop yields were achieved on present cropland. Here we show on the basis of crop modelling that closing current yield gaps by spatially optimizing fertilizer inputs and allocating 16 major crops across global cropland would allow reduction of the cropland area required to maintain present production volumes by nearly 50% of its current extent. Enforcing a scenario abandoning cropland in biodiversity hotspots and uniformly releasing 20% of cropland area for other landscape elements would still enable reducing the cropland requirement by almost 40%. As a co-benefit, greenhouse gas emissions from fertilizer and paddy rice, as well as irrigation water requirements, are likely to decrease with a reduced area of cultivated land, while global fertilizer input requirements remain unchanged. Spared cropland would provide space for substantial carbon sequestration in restored natural vegetation. Only targeted sparing of biodiversity hotspots supports species with small-range habitats, while biodiversity would hardly profit from a maximum land-sparing approach.

### Environment---U---Ag---2NC

#### Sustainability is increasing

Alison McGrew 20, Writer for Illinois Farm Families, “3 Myths About Sustainable Agriculture”, March 2020, https://www.watchusgrow.org/2020/03/02/3-myths-about-sustainable-agriculture/

Myth #1: Today’s farms are less sustainable than they used to be.

Fact: Simply put, farmers today are doing more with less. Here are a few examples:

* Compared to 1977, today’s beef farmers produce the same amount of beef with 33% fewer cattle.
* Pig farms now use 75.9% less land than in 1960.
* Over the last 40 years, soybean farmers have nearly doubled how much they grow while using 8% less energy.
* Dairy farmers have reduced greenhouse gas (GHG) emissions by 63% over the past 60 years.
* Corn farmers have increased yields while reducing pesticide and fertilizer use, thanks in part to biotechnology.

Sustainable agriculture may look different on each farm, but the goal is always the same: make the farm better for tomorrow and for future generations while providing a safe, sustainable food supply.

### Monocultures---Sustainable---2NC

#### Monocultures are efficient AND easily managed---no mass crop failure

Andrew Porterfield 18, MS in Biotechnology from the University of Maryland, BA from the University of Pennsylvania, Owner of Porterfield Marketing and Communications, Writer, Editor and Communications Consultant for Academic Institutions, Companies and Non-Profits in the Life Sciences, “Is monoculture a bad thing? It’s time to revise simplistic ideological narrative”, Genetic Literacy Project, 5/4/2018, https://geneticliteracyproject.org/2018/05/04/is-monoculture-a-bad-thing-its-time-to-revise-simplistic-ideological-narrative/

In a Nebraska field, thousands of acres of winter wheat stretch to the horizon. In California, workers pick strawberries in a field that has grown no other crop for the past eight years. And in Maryland, a single tomato plant grows in a single pot.

What do these have in common?

They could all fall under the phrase “monoculture.” Okay, that last one with the tomato is a bit of a stretch, but it’s an example that underscores how simplistic this discussion often plays out. Many critics of modern agriculture, including anti-GMO activists, point to monoculture as what Michael Pollan calls the “great evil of modern agriculture” and a major reason for the loss of biodiversity in agriculture. They say that biotech crops encourage monocultural farming.

So, what is “monoculture” and is it bad or is the issue more complicated?

Andrew Kniss, a plant scientist and weed expert at the University of Wyoming, is one of many scientists who think that the word doesn’t do the practices justice. On the surface, all monoculture means is that a farmer is growing just one crop in an area. By that definition, all crops are grown in monocultures except for those grown in the tiniest of farms or home gardens.

So, how big an area defines what is “monoculture”? And how many years must a crop be grown in a given field before it’s considered “monoculture”? Does monoculture actually reduce biodiversity?

What does the science say?

Most critics appear to use the term to suggest that something bad happens in single crop areas: blight, crop failure, or loss of biodiversity (in the form of native plants, pollinating insects, or microorganisms).

The Union of Concerned Scientists, under the leadership of its prior agricultural sciences director Doug Gurian-Sherman—who left UCS two years ago and now lobbies against crop biotechnology for the Center of Food Safety [read GLP profile of Gurian-Sherman here]—has argued in a post entitled “Expanding Monoculture: 8 Ways Monsanto Falls at Sustainable Agriculture”, that monoculture reduces diversity and leads to a host of other problems.

Monsanto’s emphasis on limited varieties of a few commodity crops contributes to reduced biodiversity and, as a consequence, to increased pesticide use and fertilizer pollution. Large-acreage field crops—corn, cotton, soybeans, canola, and now alfalfa—make up the bulk of Monsanto’s products, in part because of the high cost of developing engineered traits. And the approach to agriculture that this product line encourages—monoculture, the production of only one crop in a field year after year—is not a sustainable one.

The piece is short of an understanding of the basic science of farming and long on ideology, say agricultural experts.

Consider crop rotation. Most organic food supporters point to crop rotations, which are required for organic certification, as an alternative to the ‘dangers’ of monoculture. But that’s a deceptive argument. Most large farms now rotate their crops as well, so rotating in an of itself does not address the question of the impact of monoculture. And just switching between crops in alternate years doesn’t bring the kind of genetic diversity that can prevent the downsides of mechanized farming.

Monoculture, incorporating crop rotation, can also have positive impacts. Just having one crop in the field allows mechanization of agriculture. Mechanized farming allows faster, efficient planting, weeding, and harvesting, which reduces the destruction of habitats–organic and agro-ecological farming has a yield lag averaging 15-45%. Scaled up to meet the growing global demand for food, smaller scare farming would result in clear cutting of forests and dramatically reduce biodiversity, leading to a sharp increase in greenhouse gases. Intensive farming also frees humans to discover other ways to spend our time and make a living.

Kniss also has made the point that a focus on genetic biodiversity in farming can help reduce the problems of monoculture while preserving its benefits. Examples such as the Irish Potato Famine shows what can happen when farmers depend not only on just one crop but on a crop that is genetically very, very narrow; they are vulnerable to disease. Planting genetically diverse potatoes (or any other crop) can help protect against the potentially negative impact of monoculture. And newly developed genetically modified crops, such as the Simplot Innate potato, have been specifically engineered to protect against the genetically narrowly focused potato blight. Other conventional and organically-grown potatoes are still vulnerable to the blight.

### Gulf Dead Zones---Inevitable---2NC

#### Runoff is inevitable, even with fully optimized agriculture

Eileen McLellan 15, Senior Scientist in the Ecosystems Program for Environmental Defense Fund, 10/23/2015, “Commentary: Fertilizer Runoff Is Just One Piece Of The Dead Zone Puzzle.” http://www.agprofessional.com/news/commentary-fertilizer-runoff-just-one-piece-dead-zone-puzzle

It’s true that fertilizer runoff, sewage, and other pollutants from the Corn Belt have significantly boosted dead zones in the Gulf of Mexico. That’s because up to half of the fertilizer applied isn’t absorbed by crops, and in order to grow more food we’re using 20 times more fertilizer in the Corn Belt today than in the 1950s.

But even if we optimize fertilizer use on all cropland in the Upper Mississippi and Ohio River Basins, nutrients will still be lost to rivers and streams and carried into the Gulf of Mexico. Some of this loss is inevitable given factors like unpredictable weather, but my colleagues and I set out to quantify other reasons for why the Corn Belt exports so much nitrogen.

We discovered that an increase in fertilizer inputs is only one part of the problem. Three other distinct but interconnected factors also contribute to water pollution and the Gulf dead zone: the loss of perennial cover, the construction of artificial drainage systems, and the loss of wetlands.

In our latest paper in the Journal of the American Water Resources Association, we examine these factors in detail and explain how this new knowledge can help develop solutions.

1. Loss of perennials

In the past century, as Midwestern grasslands and prairies were converted to farmland and crop rotations were simplified to maximize yield and profit, the amount of perennial crop cover decreased significantly. Shifting from perennial to annual vegetation reduces evapotranspiration, which accelerates the delivery of nitrate into rivers.

By reintroducing perennial plants such as alfalfa, we could improve soil and water quality across the Corn Belt. And perennials could grow alongside annuals such as corn and soybeans without affecting current yields. Cover crops also have a role to play in reducing the delivery of nitrate to rivers.

2. Artificial drainage systems

The hydrology of row crop landscapes has been further altered by the development of artificial drainage systems. While these systems are beneficial to crop production, they prevent any filtration of nitrogen-rich waters and instead hasten transport into streams. This is a key factor in the contentious Des Moines Water Works lawsuit – a situation that could become the norm unless we can reduce nutrient runoff.

Improving runoff management and capturing or diverting the nitrogen-rich water would greatly limit its effects on people and animals living downstream.

3. Loss of wetlands

Wetlands are one effective way to filter nitrate-rich water and prevent runoff, but by 1984, over half of all U.S. wetlands were either drained or filled in for farmland or development.

Restoring wetlands in strategic positions on just 1 to 3 percent of the region’s cropland will combat nitrogen runoff and help bring the Gulf of Mexico dead zone to a manageable size.

Practical Solutions

We need a comprehensive approach to address high levels of nitrogen in the Corn Belt. Our study offers solutions that would not drastically alter current farming conditions or upset the economic system on which modern agriculture depends. For example, we need to tailor different conservation and mitigation efforts by region since each landscape has unique attributes and challenges.

### Phosphorus---2NC

#### Tech solves

Ronald Bailey 10, Science Correspondent for Reason Magazine, “Peak Everything?”, Reason Magazine, 4/27/2010, http://reason.com/archives/2010/04/27/peak-everything

In the 1840s, scientists discovered that plants need the element phosphorus to grow. The phosphorus fertilizer industry grew rapidly, initially by exploiting vast deposits of seabird guano left on oceanic islands. Today phosphate rocks are mined to produce the fertilizer. The Global Phosphorus Research Initiative (GPRI) notes that modern agriculture is dependent on continual inputs of phosphorus fertilizer and that known reserves could be depleted within the next 50 to 100 years. The current issue of Foreign Policy ominously warns that failing to meet the challenge of “peak phosphorus” would mean that “humanity faces a Malthusian trap of widespread famine on a scale that we have not yet experienced.” But unlike petroleum or natural gas, phosphorus, as an element, is not destroyed when it’s used and so could be recovered and recycled. The folks at the GPRI point out that the phosphorus in just one person’s urine would be close to the amount needed to fertilize the food supply for one person. So why not recycle urine? In fact, NoMix toilets have been invented which allow for the collection of urine separate from solid wastes, allowing phosphorus and nitrogen to be recovered and used as fertilizer. In addition, crop biotechnologists are exploring ways to produce plants that dramatically increase the efficiency with which they use phosphorus, which would reduce the amount fertilizer needed to grow a given amount of food. Stanford University economist Paul Romer has observed, "Every generation has perceived the limits to growth that finite resources and undesirable side effects would pose if no new recipes or ideas were discovered. And every generation has underestimated the potential for finding new recipes and ideas. We consistently fail to grasp how many ideas remain to be discovered. The difficulty is the same one we have with compounding: possibilities do not merely add up; they multiply.” The above examples show that while the production of physical supplies of resources may peak, there is no sign that human creativity is about to peak.

### Insects

#### Insect populations are stable and resilient---their ev is total bullshit

Rob Lyons 19, Science and Technology Director at the Academy of Ideas, Convenor of the AoI Economy Forum, Postgraduate Diploma in Information Studies at Edinburgh Napier University, “Insectageddon: Another Eco Scare Story”, Spiked Online, 2/14/2019, https://www.spiked-online.com/2019/02/14/insectageddon-another-eco-scare-story/

Earlier this week, the Guardian reported on a new study which claims that insect numbers are in precipitous decline globally, which could lead to the ‘collapse of nature’. ‘Unless we change our ways of producing food, insects as a whole will go down the path of extinction in a few decades’, the report’s authors write. ‘The repercussions this will have for the planet’s ecosystems are catastrophic to say the least.’ If your first response to such dramatic claims is ‘bullshit’, you’re not alone.

According to the study, a ‘comprehensive review of 73 historical reports of insect declines from across the globe’ published in the journal Biological Conservation, over 40 per cent of the world’s insect species are threatened with extinction. Three orders of insects are said to be particularly at risk: Lepidoptera (moths and butterflies), Hymenoptera (flying insects like bees, wasps and ants), and Coleoptera (especially dung beetles). In addition, four groups of aquatic insects have ‘already lost a considerable proportion of species’. However, it’s not all bad news. According to the paper, ‘the abundance of a small number of species is increasing; these are all adaptable, generalist species that are occupying the vacant niches left by the ones declining’.

Insects far outnumber all other animals on the planet. Scientists have identified about a million different species, but there could be anything between two and 10 times more species that we haven’t got round to recording. Compare that to the mere 5,400 mammal species that have been identified. Many insects provide benefits to humans, from pollinating plants to keeping down the numbers of problem pests and providing food for larger animals up the food chain. If there were to be a dramatic decline in insect numbers, it could make life harder for humanity.

However, the claims made in this paper seem every bit as overblown as those made by WWF in its Living Planet Report last year. While the expansion of agriculture and cities has in some respects had a negative impact on insects and other animals, to present this in such catastrophic terms as a potential ‘collapse of nature’ is ludicrous.

First, what exactly is being measured? Given that insects are pretty much everywhere in astonishing numbers and variety, it can only be possible to study a tiny subset of them. Which ones get studied? Perhaps the ones that are already under threat or are particularly niche and unusual. Extrapolating from the current state of these species must surely be done with extreme caution, especially when trying to glean the state of millions of species in many thousands of locations from just 73 papers, many of which will themselves be ‘snapshots’.

Moreover, when we are talking about millions of different species, an awful lot of them will be highly adapted to very specific conditions and localities. Any change, even very small, in those conditions could provide a boost to a different species that could win out in the competition for food and resources. Moreover, those changes could be very short-lived, so some neighbouring species could be successful for a short period, before the ‘normal’ conditions return and they get squeezed out again. These processes are particularly rapid among insects because they reproduce very quickly and, with so many different species in competition, quite minor changes could have dramatic effects.

As a result, while the ‘core’ insect populations in a particular place and period may be stable, other species may be prone to bursts of boom and bust. We need to be careful not to equate local declines in a particular time and place, no matter how dramatic, with global trends towards species being permanently wiped out. In fact, confirmed extinctions are surprisingly rare.

Some perspective is required. Human development has not suddenly interfered with a previously settled, eons-old state of nature in harmony and equilibrium. Change in nature is rapid and constant. To attempt to preserve nature at one particular state would be a fool’s errand. Changes brought about by humans are not merely negative, either – they create new niches and possibilities for other living things, too. For every species forced out by a change in land use, like the expansion of a city, another can come in to take advantage of warm buildings or plentiful rubbish.

But rather than take a step back to appreciate these realities, the researchers instead provide a list of familiar demands for change: ‘A rethinking of current agricultural practices, in particular a serious reduction in pesticide usage and its substitution with more sustainable, ecologically based practices, is urgently needed to slow or reverse current trends, allow the recovery of declining insect populations and safeguard the vital ecosystem services they provide. In addition, effective remediation technologies should be applied to clean polluted waters in both agricultural and urban environments.’

The result is a familiar demand that we make life far more difficult for ourselves in the short to medium term – using less efficient food production, cutting back on greenhouse-gas emissions at the expense of economic development, and so on – simply on the off chance that if we don’t, disaster will ensue later. In fact, economic development and rising above the day-to-day struggle for survival has put humanity in a far better position to worry about conservation and has provided the resources to pursue it.

This is not to suggest that humanity hasn’t made plenty of mistakes – both conscious and unconscious – that have had a negative impact on nature. For example, the flora and fauna of islands have been devastated on occasion by sloppily introducing invasive species. We could make more remedial efforts to reintroduce areas of hedgerows, wild flowers and other habitats alongside large-scale agriculture. On balance, the very small amount of food production we might lose could well be worth it. It would undoubtedly be better to find better ways to control pests than spraying fields with chemicals, no matter how carefully we select the pesticides we use and their application. (It is perverse that the most modern attempts to do just that, through using genetic modification to build resistance into plants themselves, are still an even greater target of eco-warriors’ ire than the loss of species.)

But while these may be sensible long-terms aims, attempting to do these things at the expense of human welfare in the here and now, justified by wild stories about ‘insectageddon’, could be far more disastrous than the loss of a few, niche insect species. Scaremongering is not the answer.

## Adv 2

### Food Security---No Disruptions---2NC

#### Farmers will adapt AND the COVID shock spurred preparedness and redundancy

David Green 20, Director of the U.S. Sustainability Alliance, “How Innovation is Helping U.S. Farmers Rise to the Challenges of COVID-19”, Open Access Government, 9/18/2020, https://www.openaccessgovernment.org/how-innovation-is-helping-u-s-farmers-rise-to-the-challenges-of-covid-19/94589/

Consumers are used to buying the food they want, where and when they want it. So, imagine their shock and distress when, in the early days of the COVID-19 pandemic, they were confronted with aisles of empty shelves at their local supermarket or grocery store.

Equally shocking were the scenes of vegetable farmers ploughing surplus produce back into the ground while dairy farmers poured milk on their fields.

This is what unprecedented supply chain disruption looks like. When consumers panic buy, and schools, offices and foodservice businesses close, where and how food is bought and consumed – and the type of food consumed – changes and the food system is forced to play catch up.

Despite the upheaval, U.S. farmers have managed to adapt and find ways to keep putting food on our tables while protecting their own livelihoods. Innovation is one such way.

Labour shortages

In the United States, and elsewhere, one of the biggest challenges for the food supply chain has been the availability of labour. Like many industries, farming and food production need people – skill and dexterity are important for picking and preparing certain produce. However, virus outbreaks among workers and a reduced seasonal workforce due to travel restrictions and COVID fears have depleted resources.

Meat and poultry processing plants have been particularly hard hit. According to the U.S. Centers for Disease Control and Prevention, among 23 states reporting COVID-19 in April and May 2020, 16,233 cases in 239 facilities occurred, including 86 COVID-19–related deaths. Temporary closures and meat shortages ensued – at one point fast-food chain Wendy’s ran out of hamburgers at some of its restaurants.

Nor are farmworkers immune. Initially, the concern was that not enough seasonal workers would be able to travel to farms to harvest the fruit and vegetable crops. Now that harvest is underway, the virus continues to spread despite safety precautions. The risk is that crops won’t get picked, leading to wastage, shortages and higher prices for consumers.

The robots are coming

Some U.S. farmers are using technology to plug gaps in the workforce. American farmers have been early adopters of AgTech, from variable rate technologies that enable them to manage the inputs for their crops more accurately to GM crops that mean less herbicide and insecticide, but better yields, and they have made substantial sustainability and productivity gains as a result. So, it is hardly surprising that they should turn to the latest innovations to create efficiencies at a critical time such as this.

FarmWise, a San Francisco company that makes robots to help with farming tasks such as picking weeds and harvesting vegetables, reports seeing increased demand from farmers in California and Arizona for robotic helpers to maintain production levels.

And dispelling the myth that machines can’t mimic human skill, this summer, some U.S. farmers have been using the new Virgo harvesting robot from Somerville, Massachusetts, start-up Root AI, which the company claims is capable of doing anything a person can. Leveraging artificial intelligence (AI) and an advanced 3D vision system, Virgo automates the picking of tomatoes – and could potentially be used for other delicate produce.

Meeting future food demand

Could technology play an even greater role in helping farmers meet future food demand?

Arzum Akkas, a professor of operations and technology management at Boston University and an expert in food supply chain management, believes that a trend for automation and mechanisation was already in motion even before the pandemic “and the extra labour shortage risks due to COVID-19 will accelerate automation adoption.”

Increased automation is something food company Tyson Foods, a processor and marketer of chicken, beef, and pork has been working on at its Manufacturing Automation Centre in Springdale, Arkansas.

Over the past three years, the company has invested $500 million in tech and automation. One innovation in progress is an automated deboning system that will be able to handle the millions of chickens processed at its facilities every week. Meat giants JBS US Holdings and Cargill are also working on robotic technologies. They aren’t quite there yet, but the pandemic has served to speed up their development.

According to Erik Pekkeriet, Programme Manager Agro Food Robotics at Wageningen University, in the Netherlands, robots are set to become even more commonplace, performing all of the menial, repetitive work in farming 10 to 20 years from now.

An automated future

So, yes, the future could well be innovation-driven. Science and technology innovations are already helping farmers create efficiencies, helping them to reduce their inputs, boost yields and conserve natural resources such as land and water. Why shouldn’t other areas of the supply chain benefit, too?

The ability for farmers and producers to cut their reliance on manual labour, which is hard to come by at the best of times, is pretty compelling.

Up until now, the costs of robotics and automation have been prohibitive for some, but Root AI co-founder and CEO John Lessing believes this is changing: “The underlying costs of building a robot have massively dropped. We’re now able to deploy these systems for growers in a way that their cost structure doesn’t go up.”

The pandemic has also opened people’s eyes to the importance of science and technology and removed the stigma of something new often being viewed as ‘scary’ or mystifying.

This is good news for farmers. With the right innovations in place, they are better equipped than ever to respond to future crises to maintain a sustainable, future food supply.

#### Supply is structurally decentralized and resilient

Saktipada Maity 18, Practice Head of Engineering & Operations Analytics at Cap Gemini, MTech from the Indian Statistical Institute, BE from Jadavpur University, “Debunking the Myths—the MNC Monopoly”, Cap Gemini, 3/30/2018, https://www.capgemini.com/2018/03/debunking-the-myths-the-mnc-monopoly/

The Digital Agriculture and Smart Farming trend continues to thrive in this age of technology transformation and disruption. With every passing month, we read news like the Bayers and the Monsantos of the world merging, or cooperatives like FrieslandCampina going bold with acquisitions. While consolidation of some parts of the food chain is certainly happening, such news tends to paint an inaccurate picture of food being a global, highly consolidated business. Misconstrued perceptions lead to different myths and, food being controlled by multinational giants, is one such myth.

Perception though, is not always reality. Food, unlike many other industries, is a very local and extremely fragmented business. Food production involves stakeholders sitting in plush offices at multi-billion dollar conglomerates, down to local operating small landholders. Consolidation isn’t consistent across all segments and in all geographies of the agricultural industry. In fact, while grain trading represents only a relatively limited part of the whole value chain, it’s interesting to watch four giant transnational companies dominate this global grain trade. The four companies account to an indicative and staggering 75% to 90% of the global grain trade. It is this extraordinary concentration of money and power that is a structural flaw in the system. Large players automatically extract as much value possible, but transfer as much of the cost and risk onto the weakest links—the farmers and laborers —in this food chain. Currently, the Fairtrade movement is working on resolving this problem. France has taken a legal stance wherein French law prohibits food waste by supermarkets. The rationale behind is that, this will have a positive effect on the economic position of the farmers.

The fragmentation of the agricultural industry stems from constraints resulting from food security. Control over one’s land and food security is enough for any government to get finicky over allowing MNCs to exert control over their food chains. In developing countries, agriculture is still the primary driver of the economy, and agriculture results in jobs for several hundred thousand people. Governments constantly need to balance the move to disenfranchise such a large segment, and not in the process, risk political turmoil. Land ownership is a sovereign function, and corporates cannot win this battle any time soon. With anti-monopoly regulations, with registration rules of the land, and with strict monitoring of water and types of crops grown in an area, food production is unlikely to be a consolidated industry in the near future.

### Food Security---No Disruptions---AT: Food Prices

#### Food spikes are temporary AND will resolve as supply bottlenecks clear up---worst case, the Fed will intervene, controlling inflation

Scott Horsley 21, Chief Economics Correspondent at NPR, MBA from San Diego State University, AB from Harvard University, “Consumer Prices Jumped. Should You Worry? That's Sparking A Heated Debate”, NPR All Things Considered, 4/13/2021, https://www.npr.org/2021/04/13/986475513/consumer-prices-jumped-should-you-worry-thats-sparking-a-heated-debate

Prices for some of your favorite things are going up. The big question is how long the price hikes will last.

Consumer prices rose 0.6% in March, according to the Labor Department — the sharpest increase in nearly nine years. Higher gasoline prices account for nearly half the increase, but prices for hotel rooms, baseball tickets and haircuts were also higher.

Over the past 12 months, the department's consumer price index has risen 2.6%. Excluding volatile food and energy prices, inflation was 0.3% in March and 1.6% over the past year.

The March price increase is somewhat exaggerated by the point of comparison. Prices fell a year ago when the pandemic first took hold in the United States, dropping 0.4% in March 2020 and another 0.8% in April.

But fundamentally, the jump in prices is coming at a time when businesses are still struggling to keep pace with unexpectedly strong demand.

Shoppers are likely spending more freely as pandemic restrictions ease, helped by $1,400 relief payments passed by Congress last month, as well as accumulated savings from a year of reduced travel and entertainment.

That is further straining supply networks that were already stretched thin, with traffic tie-ups at West Coast ports and shortages of steel, lumber and computer chips.

A survey of manufacturers last month found more than 70% were paying higher prices for raw materials and other supplies. Less than 1% had seen their costs decline.

Some of those extra costs will continue to be passed along to consumers, in the form of higher prices for everything from Cheerios to Huggies diapers.

The big question is how long it will last. Both the Biden administration and the Federal Reserve say the uptick in inflation is likely to be temporary.

The central bank expects inflation this year to exceed the Fed's long-run target of 2%, but officials also believe the increase will recede.

Fed Chairman Jerome Powell stressed that as the economy recovers from its pandemic slump, businesses will adjust to meet consumer demand, meaning this year's price increases need not lead to an inflationary spiral.

"The nature of a bottleneck is that it will be resolved and the supply side will adapt," Powell said last week at a forum sponsored by the International Monetary Fund. "Whatever cost people have to bear because supplies are temporarily tight as the economy reopens, those won't be repeated next year."

Powell added that if price hikes were to continue unexpectedly, the central bank has the tools to control inflation, typically by raising interest rates.

### Food Security---Yes Competition---2NC

#### Farming is decentralized AND a wave of competition’s coming

Sara Spaventa 20, MA from Durham University, BA in Applied Science from the University of California, San Diego, “Myths Debunked About Farmland”, Farm Together, 8/18/2020, https://farmtogether.com/learn/blog/myths-debunked-about-farmland

Myth #1: Farmland is controlled by big corporations and the wealthy.

Historically, farmland hasn’t always been available to anyone as an investment opportunity. But, that’s not due to a stigma tied to risk or wealth. Instead, it’s because of a lack of access. Farmland has traditionally stayed within the family, being handed down from generation-to-generation.

With growing concerns over factory farming and a continuous decrease in arable land, the question of who owns America’s farmland often arises: families own 97% of US farmland. However, with the average age of farmers approaching 60, and younger generations exploring different career routes other than the taking over the family business, more farmland is entering the market. Experts anticipate 25% of farmers and ranchers will retire by 2030 and roughly one-third of US farmland and ranch land will likely change hands in the next 15 years.

This boom in land ownership transfers and the introduction of investing technology like FarmTogether allow for the democratization of farmland ownership. With modern farmland investing, anyone can invest in farmland and have a say in what practices are being used.

### Food Security---Squo Antitrust Solves---1NC

#### The current antitrust process is robust, guaranteeing sufficient competition without squelching innovation

Dr. Robert Young 18, Former Chief Economist for the American Farm Bureau Federation, Served as Chief Economist of the U.S. Senate Committee on Agriculture, Ph.D. in Agricultural Economics from the University of Missouri, “Regulators Did Their Job, Now Let Agriculture Merger Go Through”, The Hill, 1/31/2018, <https://thehill.com/opinion/energy-environment/371673-regulators-did-their-job-now-let-agriculture-merger-go-through> [language modified]

There is no denying the U.S. farming economy is in a constant state of flux. If ever there was a sector that is attuned to technology, it must be American agriculture. Farmers have to be financers of the first order to work in the kind of high-capital, low-margin business in which they chose to make a living.

To do this, farmers must rely on a competitive marketplace that embraces innovation and maintains consumer choice. As agricultural companies, big and small, work to meet the needs of their farming customers, they too are constantly fighting an uphill battle against regulatory challenges and funding issues that affect the odds of bringing successful products to market.

One way to meet the growing demands of farming customers while overcoming obstacles to agricultural innovation is through thoughtful alliances between key agricultural companies with strong capabilities in two complementary offerings. While there are some well-founded concerns regarding industry consolidation, there are some business partnerships that will also be the key to ensuring American farmers maintain their competitive edge in the global marketplace. Consumers and farmers will see positive results from the collaboration of agricultural powerhouses on new products and tools to make America’s farms more efficient.

However, many [ignore] ~~turn a blind eye~~ to the positives of industry consolidation and mergers between companies such as Dow-Dupont and the upcoming acquisition of Monsanto by Bayer. Recently, Bayer’s proposed acquisition of Monsanto has been met with both blunt and thinly veiled opposition driven by both politics and competitors, even as the deal goes through a very rigorous and methodical antitrust review process in countries around the world.

In fact, all evidence points to the fact that the process is working. Consider a study released by Texas A&M in 2016. Researchers at A&M concluded the Bayer-Monsanto deal as originally constructed had the potential to raise cotton seed costs by 18.2 percent generating a company with a 70 percent market share for cotton seed. Not surprisingly, the prospect of such market concentration raised the alarm among farmers, ranchers and regulators alike.

However, since the study’s release, and as a result of the regulatory process, Bayer has agreed to divest $6.98 billion of its Crop Science business including the majority of their global cotton seed business, as well as much of their canola and soybean seed business. This transaction also includes the sale of Bayer’s LibertyLink technology for herbicide tolerance to proactively reduce overlap with Monsanto’s own offerings.

In short, American farmers have been right to raise their concerns about a perceived anti-competitive marketplace during a time when agricultural input costs are increasing. And regulators have been correct in responding. But they should also be informed of the facts. Bayer and Monsanto have two complementary offerings, crop chemical protection and plant genetics. Combining these two companies will allow them to reduce inefficiencies and advance new products to farmers faster. Following free market based policies, regulators have taken appropriate steps to balance market and consumer concerns without stifling business ambitions that help the greater good.

Let us also recognize that the Dow-Dupont merger is happening. We have already created a joint crop chemical/seed technology company. Having only one with that combination of attributes at this point in time would also be anti-competitive. In short, if you are going to have one, you had better have two.

While there should always be tough scrutiny of any major companies merging, the antitrust process both here and abroad carefully examines steps that companies should take during the merger process in order to not harm competition, or drive prices up for farmers. By requesting companies, including Bayer, Dow and ChemChina, to divest certain businesses and make certain changes, consumers and farmers have the best of both worlds: protection and innovation.

Let’s not be short-sighted on the positives of the Bayer-Monsanto deal and be sure all of the facts are on the table. Everyone wants to see American farmers succeed and continue to lead in the global agriculture marketplace, but placing further restrictions on the free market and stifling innovation is not the way forward.

### Urbanization

#### Their impact card is about rising urbanization in Africa and Asia---that’s awkward for them b/c they didn’t read a spillover card

Liotta 12 – Dr. Peter H. Liotta, Professor of Humanities and Executive Director of the Pell Center for International Relations and Public Policy, Salve Regina University, and Dr. James F. Miskel, PhD from the State University of New York, Adjunct Professor at the Naval War College, Norwich University, and Long Island University, Senior Fellow at Homeland Security Management Institute, “Megacities: The Past, Present and Predictions for the Future”, UTNE Reader, September, <https://www.utne.com/politics/megacities-ze0z1209zwar>

--

WE ARE BLUE!!!!

By 2025, at least 27 cities will have populations greater than 10 million and more than 600 cities will have populations greater than one million. Specific megacities, intimately connected to globalization, pose the most significant security and environmental threat to our existence. Drawing on the authors’ three decades of international fieldwork and seasoned policy analysis, The Real Population Bomb (Potomac Books, 2012) by P.H. Liotta and James F. Miskel discusses the effects these underserved megacities have on foreign, military, environmental and economic policies. Explore the historical dilemmas of megacities and how these problems are shaping the global, economic and environmental landscape of our world. This excerpt is taken from Chapter 1, “Introduction: Welcome to the Urban Century.”

We live in the age of the city. The City is everything to us—it consumes us, and for that reason we glorify it. —Onookome Okome

There was a time when the city was the dominant political identity. Centuries and even millennia ago, the most advanced societies in the Mediterranean, the Near East, and South America revolved around cities that were either states in themselves or were the locus of power for larger empires and kingdoms. The time of the city is coming again, though now in a considerably less benign way.

-Advertisement-

With the rise of massive urban centers in Africa and Asia, cities that will matter most in the twenty-first century are located in less-developed, struggling states. A number of these huge megalopolises—whether Lagos or Karachi, Dhaka or Kinshasa—reside in states often unable or simply unwilling to manage the challenges that their vast and growing urban populations pose. There are no signs that their governments will prove more capable in the future. These swarming, massive urban monsters will continue to grow and should concern the world.

By 2015 there will be six hundred cities on the planet with populations of 1 million or more, and fifty-eight with populations over 5 million. By 2025, according to the National Intelligence Council, there will be twenty-seven cities with populations greater than 10 million—the common measure by which an urban population constitutes a “megacity.” If measures are not taken soon, some of these megacities will pose the most significant security threat in the coming decades. They will become havens for terrorists and criminal networks, as well as sources of major environmental depletion. They will serve as freakish natural laboratories where all the elements most harmful to international and human security are grown. If crowded masses within these unaccommodating spaces are left to their own devices by inept or uncaring governments, their collective rage, despair, and hunger will inevitably erupt. And when inhabitants tire of the lawlessness, poverty, and instability of the megacities, they will leave—those that can—bringing violence with them. In the face of rising expectations that globalization inevitably entails, these petri dishes of despair and danger will spill over municipal boundaries and international borders with rapidly spreading contagion.

#### Cribb also says its global

---BLUE

Cribb 17 – Julian Cribb, Principal of Julian Cribb & Associates, Founding Editor of ScienceAlert, Author, Journalist, Editor and Science Communicator, “The Urbanite (Homo Urbanus)”, Surviving the 21st Century, pp. 147–169. link.springer.com, doi:10.1007/978-3-319-41270-2\_8.

By the mid-twenty-first century the world’s cities will be home to approaching eight billion inhabitants and will carpet an area of the planet’s surface the size of China. Several megacities will have 20, 30, and even 40 million people. The largest city on Earth will be Guangzhou-Shenzen, which already has an estimated 120 million citizens crowded into in its greater metropolitan area (Vidal 2010). By the 2050s these colossal conurbations will absorb 4.5 trillion tonnes of fresh water for domestic, urban and industrial purposes, and consume around 75 billion tonnes of metals, materials and resources every year. Their very existence will depend on the preservation of a precarious balance between the essential resources they need for survival and growth—and the capacity of the Earth to supply them. Furthermore, they will generate equally phenomenal volumes of waste, reaching an alpine 2.2 billion tonnes by 2025 (World Bank)—an average of six million tonnes a day—and probably doubling again by the 2050s, in line with economic demand for material goods and food. In the words of the Global Footprint Network “The global effort for sustainability will be won, or lost, in the world’s cities” (Global Footprint Network 2015). As we have seen in the case of food (Chap. 7), these giant cities exist on a razor’s edge, at risk of resource crises for which none of them are fully-prepared. They are potential targets for weapons of mass destruction (Chap. 4). They are humicribs for emerging pandemic diseases, breeding grounds for crime and hatcheries for unregulated advances in biotechnology, nanoscience, chemistry and artificial intelligence. Beyond all this, however, they are also the places where human minds are joining at lightspeed to share knowledge, wisdom and craft solutions to the multiple

# 1NR

## Innovation DA

### Impact---2NC

#### Specifically Ug99---it causes nuclear war

David Bennett 9, Associate Editor for Delta Farm Press, “Ug99 — Threat to World’s Wheat”, Delta Farm Press, 4-17, http://www.deltafarmpress.com/wheat/ug99-threat-world-s-wheat

On the destabilizing potential of Ug99…

“There are two things we focus on. Take Ethiopia — 1.5 million hectares of wheat with the average farm size being 1 hectare. Most of those 1.5 million farmers exist on $1 per day, or less, of family income. If their wheat crops fail, the elderly and babies will be dying. That’s the first concern: the humanitarian costs.

“Many people — although not your readers, I suspect — believe there are years’ worth of wheat and other commodities in storage. When you tell them it’s actually only a couple of months, they ask, ‘How the hell did we get into this situation?’

“It’s a delicate balance we’re involved with here. A major disease that hits yield would have devastating consequences.

“China is also vulnerable. Eventually derivatives of Ug99 will reach China. China and India combined represent over half the world’s population. China, India and Pakistan are three nuclear powers.

“If India’s government is facing dramatic civil unrest because of escalating wheat prices — or they don’t have the wheat — it is unlikely U.S. or Australian wheat will simply be airlifted over. It could take a year to fill a shortfall by diverting ships.

“And only 10 percent of the world’s wheat crop is traded internationally, anyway. The vast majority of wheat is consumed in-country.”

### Impact---Turns Case---Solvency---2NC

#### Industry decline turns the case---agencies will cease enforcement during the downturn

Anika Dandekar 21, Political Science at University of California, San Diego, “Politics of Antitrust Enforcement: The Influence of Ideology and Party Control on Regulatory Behavior”, Senior Thesis, 3/29/2021, https://polisci.ucsd.edu/undergrad/departmental-honors-and-pi-sigma-alpha/A.Dandekar\_Senior-Honors-Thesis.pdf

1.3.3 Bureaucratic Approach

Some scholars have tried to explain varying antitrust by changing makeup or preferences of regulatory agencies themselves.

Some suggest that the agencies respond to external factors. Amacher et al. (1985) examined FTC enforcement of the Robinson- Patman Act and found that it was influenced by economic conditions, decreasing during business contractions and increasing during periods of expansion. They suggested that this means "the FTC moves to cushion producer losses" during hard economic times, but transfers "wealth to consumers" during economic upswings. Lewis-Beck (1979) found that while small increases in the division's budget did not reduce anticompetitive behavior, a major increase in the division's budget might significantly stem merger activity because of a "threshold effect”.

#### Turns Food

John Castellaw 17, National Security Lecturer at the University of Tennessee, Founder and CEO of Farmspace Systems LLC, Former President of the Crockett Policy Institute, Retired Lieutenant General in the United States Marine Corps, “Food Security Strategy Is Essential to Our National Security”, Agri-Pulse, 5/1/2017, https://www.agri-pulse.com/articles/9203-opinion-food-security-strategy-is-essential-to-our-national-security

The United States faces many threats to our National Security. These threats include continuing wars with extremist elements such as ISIS and potential wars with rogue state North Korea or regional nuclear power Iran. The heated economic and diplomatic competition with Russia and a surging China could spiral out of control. Concurrently, we face threats to our future security posed by growing civil strife, famine, and refugee and migration challenges which create incubators for extremist and anti-American government factions. Our response cannot be one dimensional but instead must be a nuanced and comprehensive National Security Strategy combining all elements of National Power including a Food Security Strategy.

An American Food Security Strategy is an imperative factor in reducing the multiple threats impacting our National wellbeing. Recent history has shown that reliable food supplies and stable prices produce more stable and secure countries. Conversely, food insecurity, particularly in poorer countries, can lead to instability, unrest, and violence.

Food insecurity drives mass migration around the world from the Middle East, to Africa, to Southeast Asia, destabilizing neighboring populations, generating conflicts, and threatening our own security by disrupting our economic, military, and diplomatic relationships. Food system shocks from extreme food-price volatility can be correlated with protests and riots. Food price related protests toppled governments in Haiti and Madagascar in 2007 and 2008. In 2010 and in 2011, food prices and grievances related to food policy were one of the major drivers of the Arab Spring uprisings. Repeatedly, history has taught us that a strong agricultural sector is an unquestionable requirement for inclusive and sustainable growth, broad-based development progress, and long-term stability.

The impact can be remarkable and far reaching. Rising income, in addition to reducing the opportunities for an upsurge in extremism, leads to changes in diet, producing demand for more diverse and nutritious foods provided, in many cases, from American farmers and ranchers. Emerging markets currently purchase 20 percent of U.S. agriculture exports and that figure is expected to grow as populations boom.

Moving early to ensure stability in strategically significant regions requires long term planning and a disciplined, thoughtful strategy. To combat current threats and work to prevent future ones, our national leadership must employ the entire spectrum of our power including diplomatic, economic, and cultural elements. The best means to prevent future chaos and the resulting instability is positive engagement addressing the causes of instability before it occurs.

This is not rocket science. We know where the instability is most likely to occur. The world population will grow by 2.5 billion people by 2050. Unfortunately, this massive population boom is projected to occur primarily in the most fragile and food insecure countries. This alarming math is not just about total numbers. Projections show that the greatest increase is in the age groups most vulnerable to extremism. There are currently 200 million people in Africa between the ages of 15 and 24, with that number expected to double in the next 30 years. Already, 60% of the unemployed in Africa are young people.

Too often these situations deteriorate into shooting wars requiring the deployment of our military forces. We should be continually mindful that the price we pay for committing military forces is measured in our most precious national resource, the blood of those who serve. For those who live in rural America, this has a disproportionate impact. Fully 40% of those who serve in our military come from the farms, ranches, and non-urban communities that make up only 16% of our population.

Actions taken now to increase agricultural sector jobs can provide economic opportunity and stability for those unemployed youths while helping to feed people. A recent report by the Chicago Council on Global Affairs identifies agriculture development as the core essential for providing greater food security, economic growth, and population well-being.

Our active support for food security, including agriculture development, has helped stabilize key regions over the past 60 years. A robust food security strategy, as a part of our overall security strategy, can mitigate the growth of terrorism, build important relationships, and support continued American economic and agricultural prosperity while materially contributing to our Nation’s and the world’s security.

### Impact---Leadership---2NC

#### Ag innovation cements U.S. tech leadership and lets us counter the BRI

Dr. Gordon M. Goldstein 21, Adjunct Senior Fellow at the Council on Foreign Relations, Graduate of Phillips Academy Andover and Columbia University, where he was an International Fellow and awarded a BA, MIA, M.Phil and Ph.D in Political Science and International Relations, and Erik R. Oken, Managing Director, Global Head of Consumer Retail Investment Banking at JPMorgan Chase & Co., “America’s New Challenge: Confronting the Crisis in Food Security”, Council on Foreign Relations Blog, https://www.cfr.org/blog/americas-new-challenge-confronting-crisis-food-security

The United States has historically used food policy to strengthen its relationship with friends and allies through initiatives such as the U.S. Food for Peace Program, the 1960’s “Green Revolution” or the so-called “Third Agricultural Revolution” which featured research and technology transfers that significantly increased agricultural production globally while feeding millions and increasing U.S. influence worldwide.

The United States is once again poised to use its rich history of innovation in foreign agricultural policy to both enhance its influence with friends and allies where food insecurity is a major issue—the Middle East, Africa, and emerging economies in Asia. These include some of the same countries that China is courting through its “Belt and Road” initiative, which seeks to construct a massive infrastructure network around the world.

The United States should leverage its private and public sources of capital and innovation, in partnership with new and incumbent players in the corporate community, to accelerate the transition to global food sustainability.

Advances in emerging technologies hold the promise to both alleviate the food crisis and amplify American influence abroad. The next era of food sustainability will be influenced by breakthroughs in global technology such as fifth generation telecommunications, robotics, artificial intelligence, and nanotechnology. Specific areas of technology investment that will contribute to higher levels of productivity and efficiency in food generation with a decreased impact on the environment encompass initiatives in agricultural biotechnology, such as genetics, microbiome, breeding and animal health; alternative food products, including plant-based forms of alternative protein, which are surging in popularity and adoption; farm management systems, including sensing and data analytics software; farm robotics, including automation and drone based monitoring; and new farming structures, such as indoor farming and aquaculture.

#### Nuclear war

Nouriel Roubini 17, Professor at NYU’s Stern School of Business and Chairman of Roubini Macro Associates, was Senior Economist for International Affairs in the White House's Council of Economic Advisers during the Clinton Administration, ““America First” and Global Conflict Next”, Project Syndicate, 1/2/2017, <https://www.project-syndicate.org/commentary/trump-isolationism-undermines-peace-worldwide-by-nouriel-roubini-2017-01>

Today, too, a US turn to isolationism and the pursuit of strictly US national interests may eventually lead to a global conflict. Even without the prospect of American disengagement from Europe, the European Union and the eurozone already appear to be disintegrating, particularly in the wake of the United Kingdom’s June Brexit vote and Italy’s failed referendum on constitutional reforms in December. Moreover, in 2017, extreme anti-Europe left- or right-wing populist parties could come to power in France and Italy, and possibly in other parts of Europe.

Without active US engagement in Europe, an aggressively revanchist Russia will step in. Russia is already challenging the US and the EU in Ukraine, Syria, the Baltics, and the Balkans, and it may capitalize on the EU’s looming collapse by reasserting its influence in the former Soviet bloc countries, and supporting pro-Russia movements within Europe. If Europe gradually loses its US security umbrella, no one stands to benefit more than Russian President Vladimir Putin.

Trump’s proposals also threaten to exacerbate the situation in the Middle East. He has said that he will make America energy independent, which entails abandoning US interests in the region and becoming more reliant on domestically produced greenhouse-gas-emitting fossil fuels. And he has maintained his position that Islam itself, rather than just radical militant Islam, is dangerous. This view, shared by Trump’s incoming National Security Adviser, General Michael Flynn, plays directly into Islamist militants’ own narrative of a clash of civilizations.

Meanwhile, an “America first” approach under Trump will likely worsen the longstanding Sunni-Shia proxy wars between Saudi Arabia and Iran. And if the US no longer guarantees its Sunni allies’ security, all regional powers – including Iran, Saudi Arabia, Turkey, and Egypt – might decide that they can defend themselves only by acquiring nuclear weapons, and even more deadly conflict will ensue.

In Asia, US economic and military primacy has provided decades of stability; but a rising China is now challenging the status quo. US President Barack Obama’s strategic “pivot” to Asia depended primarily on enacting the 12-country Trans-Pacific Partnership, which Trump has promised to scrap on his first day in office. Meanwhile, China is quickly strengthening its own economic ties in Asia, the Pacific, and Latin America through its “one belt, one road” policy, the Asian Infrastructure Investment Bank, the New Development Bank (formerly known as the BRICS bank), and its own regional free-trade proposal to rival the TPP.

If the US gives up on its Asian allies such as the Philippines, South Korea, and Taiwan, those countries may have no choice but to prostrate themselves before China; and other US allies, such as Japan and India, may be forced to militarize and challenge China openly. Thus, an American withdrawal from the region could very well eventually precipitate a military conflict there.

As in the 1930s, when protectionist and isolationist US policies hampered global economic growth and trade, and created the conditions for rising revisionist powers to start a world war, similar policy impulses could set the stage for new powers to challenge and undermine the American-led international order. An isolationist Trump administration may see the wide oceans to its east and west, and think that increasingly ambitious powers such as Russia, China, and Iran pose no direct threat to the homeland.

But the US is still a global economic and financial power in a deeply interconnected world. If left unchecked, these countries will eventually be able to threaten core US economic and security interests – at home and abroad – especially if they expand their nuclear and cyberwarfare capacities. The historical record is clear: protectionism, isolationism, and “America first” policies are a recipe for economic and military disaster.

### U---Yes Ag Innovation---2NC

#### Innovation is rapid in key areas

Linly Ku 21, Manager, Content Marketing at Plug and Play Tech Center, BA from the University of California, Santa Barbara, “New Agriculture Technology in Modern Farming”, Plug and Play Tech Center, 6/2/2021, https://www.plugandplaytechcenter.com/resources/new-agriculture-technology-modern-farming/

Innovation is more important in modern agriculture than ever before. The industry as a whole is facing huge challenges, from rising costs of supplies, a shortage of labor, and changes in consumer preferences for transparency and sustainability. There is increasing recognition from agriculture corporations that solutions are needed for these challenges. In the last 10 years, agriculture technology has seen a huge growth in investment, with $6.7 billion invested in the last 5 years and $1.9 billion in the last year alone. Major technology innovations in the space have focused around areas such as indoor vertical farming, automation and robotics, livestock technology, modern greenhouse practices, precision agriculture and artificial intelligence, and blockchain.

### AT: Aff Solves

#### Splitting ag companies wrecks the capacity for innovation because it costs hundreds of millions with uncertain returns over decades---only mergers make it viable

Ed Wiederstein 17, Iowa View Contributor, Former President of the Iowa Farm Bureau and Audubon-Area Farmer, “Ag Mergers Could Lead To New Advancements For Farmers”, Des Moines Register, 4/10/2017, https://www.desmoinesregister.com/story/opinion/columnists/iowa-view/2017/04/10/ag-mergers-could-lead-new-advancements-farmers/100290696/

In a world where Twitter is becoming an accepted form of language, we are reminded daily of how advancements in technologies are driving our nation’s future. In Iowa, the agricultural community has long understood and embraced this fact.

As an example, Iowa is one of the largest soybean producers in the U.S., and farming continues to evolve to maintain a key role in the global food supply chain. The demand for our nation’s soybeans is climbing, as diets around the world continue to improve and as soy is used for other products including plastics and biodiesel fuel.

Every year we continue to face many of the same challenges in Iowa and across the nation. Unpredictable weather patterns make it difficult for farmers to forecast revenues. Protecting crops against pests while sustaining a healthy environment is a challenge. And as the global dietary demands change, farmers must be appropriately equipped and knowledgeable on how to evolve along with it.

While farmers have been facing these challenges for centuries, recent advancements in innovation have helped us take leaps and bounds towards the most protected high-quality crops in history. With the development of more innovative pesticides and advanced sustainability measures for soil protection, we now have the ability to grow more robust crops even in less than ideal conditions. In fact, the USDA has reported U.S. farm output has increased steadily over the 20th century — with an increase of more than 170 percent from 1948 to the late 2000s.

These advancements are enabling farmers and ranchers to increase their operation’s efficiency and produce a more sustainable harvest. This not only enables higher yields from less land, but also allows for greater diversification in crop production.

We must remember the importance of supporting innovation and advancement in solving new challenges. When funding was more plentiful, land-grant universities and extension offices were able to dedicate more resources to fostering ag innovation. Now, private industry plays a greater role in this arena, and farmers have proven willing to invest in technologies companies are producing through private research and development.

For private companies working on these advancements, staying ahead can be difficult. Innovative new technologies can require over a decade and hundreds of millions of dollars to develop and approve, and private companies are willing to take the risk for these advancements that may or may not yield a return.

However, it can be argued this amount of time and money can be significantly reduced when leaders in the industry work together towards a common goal. That may be one of the driving factors behind why several major ag companies like Bayer and Monsanto and Dow and DuPont are looking to collaborate more through merging operations.

As ag companies, including those with significant presence in Iowa and around the Midwest, move towards merging operations, we should consider the challenges they now face in developing new tools to make our farms more productive. The costs and time to market for their products are getting greater and longer for a number of reasons. With their collective experience in crop protection and plant biology, we in the agricultural community may see the next generation of innovative new solutions sooner should these companies come together.

With innovation as the foundation of our future, we will and should see change that can help quicken the pace of new solutions reaching farmers in the field. There is a great need for inventions in the agricultural world that will significantly impact the way we farm with results that will support our economy. Several of the ag companies looking to merge are on the front lines of these issues, seeking impactful solutions for our ever changing needs and challenges.

As details of the mergers come forth, the industry and lawmakers will continue examining potential outcomes. It will be important for those in Iowa agriculture to not only consider those potential outcomes that give us pause, but also think critically on the benefits we could see from greater collaboration between ag’s power players.

#### Ag innovation requires maximizing R&D by vertically combining specialized pieces---antitrust makes it impossible

Geoffrey A. Manne 17, Executive Director of the International Center for Law & Economics, JD and AB degrees from the University of Chicago, Former Law Professor at Lewis & Clark Law School, Member of the American Law and Economics Association, the Canadian Law and Economics Association, and the Society for Institutional & Organizational Economics, Contributor at Wired, “Innovation-Driven Market Structure in the Ag-Biotech Industry”, Truth on the Market, 3/31/2017, https://truthonthemarket.com/2017/03/31/innovation-driven-market-structure-in-the-ag-biotech-industry-ag-biotech-symposium/?\_ga=2.224261467.1358836601.1625753050-1434150735.1625342725

The pending mergers

Today’s pending mergers are consistent with this characterization of a dynamic market in which structure is being driven by incentives to innovate, rather than monopolize. As Michael Sykuta points out,

The US agriculture sector has been experiencing consolidation at all levels for decades, even as the global ag economy has been growing and becoming more diverse. Much of this consolidation has been driven by technological changes that created economies of scale, both at the farm level and beyond.

These deals aren’t fundamentally about growing production capacity, expanding geographic reach, or otherwise enhancing market share; rather, each is a fundamental restructuring of the way the companies do business, reflecting today’s shifting agricultural markets, and the advanced technology needed to respond to them.

Technological innovation is unpredictable, often serendipitous, and frequently transformative of the ways firms organize and conduct their businesses. A company formed to grow and sell hybrid seeds in the 1920s, for example, would either have had to evolve or fold by the end of the century. Firms today will need to develop (or purchase) new capabilities and adapt to changing technology, scientific knowledge, consumer demand, and socio-political forces. The pending mergers seemingly fit exactly this mold.

As Allen Gibby notes, these mergers are essentially vertical combinations of disparate, specialized pieces of an integrated whole. Take the proposed Bayer/Monsanto merger, for example. Bayer is primarily a chemicals company, developing advanced chemicals to protect crops and enhance crop growth. Monsanto, on the other hand, primarily develops seeds and “seed traits” — advanced characteristics that ensure the heartiness of the seeds, give them resistance to herbicides and pesticides, and speed their fertilization and growth. In order to translate the individual advances of each into higher yields, it is important that these two functions work successfully together. Doing so enhances crop growth and protection far beyond what, say, spreading manure can accomplish — or either firm could accomplish working on its own.

The key is that integrated knowledge is essential to making this process function. Developing seed traits to work well with (i.e., to withstand) certain pesticides requires deep knowledge of the pesticide’s chemical characteristics, and vice-versa. Processing huge amounts of data to determine when to apply chemical treatments or to predict a disease requires not only that the right information is collected, at the right time, but also that it is analyzed in light of the unique characteristics of the seeds and chemicals. Increased communications and data-sharing between manufacturers increases the likelihood that farmers will use the best products available in the right quantity and at the right time in each field.

Vertical integration solves bargaining and long-term planning problems by unifying the interests (and the management) of these functions. Instead of arm’s length negotiation, a merged Bayer/Monsanto, for example, may better maximize R&D of complicated Ag/chem products through fully integrated departments and merged areas of expertise. A merged company can also coordinate investment decisions (instead of waiting up to 10 years to see what the other company produces), avoid duplication of research, adapt to changing conditions (and the unanticipated course of research), pool intellectual property, and bolster internal scientific capability more efficiently. All told, the merged company projects spending about $16 billion on R&D over the next six years. Such coordinated investment will likely garner far more than either company could from separately spending even the same amount to develop new products.

Controlling an entire R&D process and pipeline of traits for resistance, chemical treatments, seeds, and digital complements would enable the merged firm to better ensure that each of these products works together to maximize crop yields, at the lowest cost, and at greater speed. Consider the advantages that Apple’s tightly-knit ecosystem of software and hardware provides to computer and device users. Such tight integration isn’t the only way to compete (think Android), but it has frequently proven to be a successful model, facilitating some functions (e.g., handoff between Macs and iPhones) that are difficult if not impossible in less-integrated systems. And, it bears noting, important elements of Apple’s innovation have come through acquisition….

#### The combination of factors is the only way to create a deep, long-term innovation pipeline

Gary Truitt 16, Farm Broadcaster at Hoosier Ag Today, Most Recognized and Trusted Farm Broadcaster in Indiana, Received Numerous Industry Awards Including Two Oscar in Agriculture Awards and Farm Broadcaster of the Year, “How Bad is Big Ag”, Hoosier Ag Today, 5/30/2016, http://hoosieragtoday.com/how-bad-is-big-ag/

“Big Ag” is a term that has been turned into a pejorative by organic, environmental, and animal activists. With a broad bush, they paint anyone who sees food production differently as “big ag” and demonizes them as greedy, environmentally irresponsible, and cruel. The recent round of high profile mergers by large agricultural companies has caused some of these groups to have an apoplectic fit and has re-energized their calls for downsizing agriculture and food production. Even some farmers are asking if big ag is getting too big.

Consolidation in agriculture is not new and is typically driven by technological innovation. There used to be thousands of little seed companies around the U.S. and several dozen tractor firms. In a box in my closet is a collection of hats from seed and chemical brands that no longer exist. All up and down the food chain, consolidation has been taking place from small farms being combined into large ones to small grocery chains being combined into large national chains. But, the proposed merger of Bayer and Monsanto would create the world’s largest seed, trait, and input company. The upcoming combination of Dow and DuPont would create the third largest such company. This is leading many farmers to worry that things are getting out of hand.

The fear most producers express is higher prices and fewer products. Purdue agricultural economist Mike Gunderson shares farmer concerns and says this consolidation does have the potential to limit competition in the marketplace. But, he also points out that these firms are also heavily involved in research and development of new products and technology, which is very costly and risky. He added these firms are positioning themselves to compete in a global marketplace and, as a result, a large scale of operation and diverse product portfolio are needed.

The force behind these big mergers is not the bottom line but the long term market strategy. If Bayer shells out $62 billion for Monsanto, they will not make their money back by laying people off and hiking the price of Roundup. According to top Bayer officials, their motivation for this deal is to drive R&D and to combine the Monsanto seed and trait technology with the Bayer chemical technology. Gunderson pointed out that farmers are demanding more integration between their seed, chemical, mechanical, and big data products. Companies who can do this will have a competitive advantage.

Farmers will need to have a pipeline of innovation going forward to meet the demands of the world food market and of the changing environment. Only having a few big players can provide this innovation, yet it can also lead to the stifling of invasion. Just look at the oil market. A few big companies control the market and have actively slowed the growth of renewable fuels, which they see as a threat.

### AT: Unsustainable

#### The most rigorous studies using diverse data sets proves the turn---their evidence is systematically biased

Andrew Balmford 18, Professor of Conservation Science at the University of Cambridge, Former Research Fellow at the Institute of Zoology, Fellow of Clare College and Fellow at the Royal Society, et al., “The Environmental Costs and Benefits of High-Yield Farming”, Nature Sustainability, Volume 1, https://www.nature.com/articles/s41893-018-0138-5

How we manage farming and food systems to meet rising demand is pivotal to the future of biodiversity. Extensive field data suggest that impacts on wild populations would be greatly reduced through boosting yields on existing farmland so as to spare remaining natural habitats. High-yield farming raises other concerns because expressed per unit area it can generate high levels of externalities such as greenhouse gas emissions and nutrient losses. However, such metrics underestimate the overall impacts of lower-yield systems. Here we develop a framework that instead compares externality and land costs per unit production. We apply this framework to diverse data sets that describe the externalities of four major farm sectors and reveal that, rather than involving trade-offs, the externality and land costs of alternative production systems can covary positively: per unit production, land-efficient systems often produce lower externalities. For greenhouse gas emissions, these associations become more strongly positive once forgone sequestration is included. Our conclusions are limited: remarkably few studies report externalities alongside yields; many important externalities and farming systems are inadequately measured; and realizing the environmental benefits of high-yield systems typically requires additional measures to limit farmland expansion. Nevertheless, our results suggest that trade-offs among key cost metrics are not as ubiquitous as sometimes perceived.

Main

Agriculture already covers around 40% of Earth’s ice- and desert-free land and is responsible for around two-thirds of freshwater withdrawals1. Its immense scale means that it is already the largest source of threat to other species2, so how we cope with very marked increases in demand for farm products3,4 will have profound consequences for the future of global biodiversity2,5. On the demand side, cutting food waste and excessive consumption of animal products is essential1,5,6,7,8. In terms of supply, farming at high yields (production per unit area) has considerable potential to restrict humanity’s impacts on biodiversity. Detailed field data from five continents and almost 1,800 species from birds to daisies9,10,11,12,13,14 reveal that so many depend on native vegetation that for most the impacts of agriculture on their populations would be best limited by farming at high yields (production per unit area) alongside sparing large tracts of intact habitat. Provided it can be coupled with setting aside (or restoring) natural habitats15, lowering the land cost of agriculture thus appears central to addressing the extinction crisis2.

However, a key counterargument against this land-sparing approach is that there are many other environmental costs of agriculture besides the biodiversity displaced by the land it requires, such as greenhouse gas (GHG) and ammonia emissions, soil erosion, eutrophication, dispersal of harmful pesticides and freshwater depletion5,7,16,17,18. Measured per unit area of farmland, the production of such externalities is sometimes greater in high- than lower-yield farming systems17,18, potentially weakening the case for land sparing. However, while expressing externalities per unit area can help identify local-scale impacts19, it systematically underestimates the overall impact of lower-yield systems that occupy more land for the same level of production20. To be robust, assessments of externalities also need to include the off-site effects of management practices, such as crop production for supplementary feeding of livestock, or off-farm grazing for manure inputs to organic systems20,21,22.

A novel framework for comparing system-wide costs

Here, we argue that comparisons of the overall impacts of contrasting agricultural systems should focus on the sum of externality generated per unit of production10 (paralleling measures of emissions intensity in climate change analyses). This approach has, for the most part, been adopted only for a relatively narrow set of agricultural products8,23 and farming systems (for example, organic versus conventional, glasshouse versus open-field20,24). Here we develop a more general framework, and apply it to a diversity of data on some major farm sectors, farming systems and environmental externalities. Existing data are limited but nevertheless enable us to explore the utility of this new approach, test for broad patterns and make an informed commentary on their significance for understanding the trade-offs and co-benefits of high- versus lower-yield systems.

### Soil Erosion---1NC

#### Industrial ag is soil preserving---no chance of short-term disaster

James Wong 19, Botanist and Science Writer, Trained at the Royal Botanic Gardens, “The Idea That There Are Only 100 Harvests Left Is Just A Fantasy”, The New Scientist, 5/8/2019, https://www.newscientist.com/article/mg24232291-100-the-idea-that-there-are-only-100-harvests-left-is-just-a-fantasy/

When it comes to science reporting, there are some headlines that are so frequently repeated, so intuitively plausible, so closely aligned to our cultural beliefs, that they can seem like incontrovertible truths.

The general public, and indeed many scientists, may fervently believe that these claims reflect the overwhelming scientific consensus. However, sometimes when you dig a little beyond the surface, the evidence underpinning even the most ubiquitous headlines can seem surprisingly shaky.

Perhaps the best example of such an assertion is that of an impending agricultural Armageddon, caused by decades of irresponsible farming practices that have degraded soils across the planet (or so the press narrative goes).

A quick scan of the headlines reveals that despite the confidence with which these forecasts are proclaimed, the actual timescale to D-Day varies rather widely from story to story. While some report that we have 100 years until the end of our soil’s ability to support farming, citing a University of Sheffield study, others claim that this is a mere 60 years away, referencing a speech at the UN’s Food and Agriculture Organization.

Recently, the UK government’s environment secretary even stated that the UK is as little as 30 years away from an “eradication of soil fertility” because we “drench it in chemicals”. If this is indeed a likely end-game scenario, we should probably determine which of these estimates is most plausible as a matter of urgency: 30, 60 or 100 years. So let’s take a closer look at this claim.

Despite dozens of headlines quoting these predictions, surprisingly only one peer-reviewed paper from a scientific journal is ever cited as evidence to back them up. This 2014 study from the University of Sheffield compared the soil quality of a range of sites in the English city, including agricultural, garden and allotment soils.

Now, before we question whether the results of this single, small study can be extrapolated to represent all of England, let alone the whole UK or even the whole world, let us take a look at their findings: basically, some urban soils in Sheffield are higher in carbon and nitrogen than some nearby agricultural ones. OK, but where is the 100-year statistic? It turns out that nowhere in the study was there any calculation, prediction or even passing reference to the claim. None whatsoever. Perhaps not so much shaky evidence to support this assertion as much as non-existent.

“I asked leading soil scientists if they had ever come across such a prediction in published research. Not a single one had”

Maybe this is the result of a typo and the work is in another research paper? After an 8-hour trawl through the academic journals failed to pull up a single study that even attempted to make this calculation, I contacted six leading soil scientists across the world to ask if they had ever come across such a prediction in either the published literature or their work. Not a single one had.

In fact, the words they used to describe this claim were “bold”, “too Malthusian”, “hardly useful”, “almost insulting” and “I have used this in my soil science lectures to show the students to be wary of headlines!”. Ouch.

Does that mean there aren’t real threats to some agricultural soils around the world? Absolutely not. Indeed, all the scientists I spoke to went to great lengths to point these out, where they exist.

However, they also highlighted how incredibly complex the calculations needed to make such predictions would be, based on myriad factors, only some of which can be predicted with any reliability, with generalisations almost impossible. The boring reality is that while soils in some parts of the world might be in decline, others are not.

Furthermore, while agriculture may be one of the factors driving erosion and nutrient depletion, many modern farming practices such as no-till and synthetic fertiliser applications may actually be helping alleviate (rather than drive) this. In fact, according to many objective measures, modern, evidence-based farming techniques are more sustainable than those of an idealised past. Quite a different picture to that painted by the headlines.

Despite the thirst for simple truths in a complicated world, the researchers I contacted agreed that setting such a figure for an agricultural “end-point” would be nigh on impossible, which may explain why no published studies appear to have been able to do so. But this hasn’t stopped the newspapers. Welcome to 2019!

#### ‘Small-scale’ farming has the same effect on soil

Ted Nordhaus 21, Founder and Executive Director of the Breakthrough Institute and Co-Author of An Ecomodernist Manifesto, and Dan Blaustein-Rejto, Director of Food and Agriculture at the Breakthrough Institute, Conducted Research with the Environmental Defense Fund, International Center for Tropical Agriculture, and Farmers Market Coalition, “Small Farms, Big Pollution”, Foreign Policy, 6/2/2021, https://foreignpolicy.com/2021/06/02/big-agriculture-pollution-small-farms-inefficient/

A reader could be excused for concluding from Matthew R. Sanderson and Stan Cox’s criticism of our recent essay, “Big Agriculture Is Best,” that virtually all environmental impacts associated with the production of food in the United States and globally can be laid at the feet of “industrial agriculture.” But it is a definitional sleight of hand, not “empirical evidence,” as they claim, that does most of the work here. Sanderson and Cox define “industrial agriculture” so capaciously as to be basically synonymous with “agriculture.”

In the United States, that is arguably true. Most agricultural output—and hence environmental impacts—comes from large-scale, industrial production. Globally, it is not true. In both cases, there is no free lunch. Agriculture, unavoidably, has environmental impacts for the simple reason that growing food requires the conversion of forests, grasslands, and other ecosystems into fields whose biocapacity is then monopolized to produce food for people.

As human populations have grown enormously over the last two centuries, from about a billion people globally in 1800 to nearly 8 billion today, and as those populations have become wealthier and able to eat higher on the food chain, the impacts associated with food production have grown as well. But that has little to do with the prevalence of industrial versus nonindustrial agriculture. Instead, it reflects the basic realities associated with scaling agriculture globally to meet those enormous new demands.

Consider the negative impacts that nitrogen pollution from the American corn belt has had on the Gulf of Mexico. Most of that runoff comes from industrial farms for the simple reason that large-scale, intensive production is the dominant form of agriculture across the region. Shifting production to organic practices, though, wouldn’t much change the situation. Organic farms are typically associated with higher rates of runoff per calorie of food produced, even as they require more land. So unless total production were very substantially scaled back, a corn belt dominated by organic farms rather than conventional ones would require more land while having similar or even greater impacts on waterways and biodiversity.

Sanderson and Cox blame industrial agricultural in the corn belt not only for the dead zone in the Gulf of Mexico but for rendering “entire landscapes uninhabitable” across the region. Millions of Americans still comfortably living in such places would beg to differ. Yes, as Sanderson and Cox note, there are more hogs in the state of Iowa than people. So what? Insofar as the claim is relevant at all, it regards the question of why Iowa has so few people, not why it has so many hogs. And while the expansion of hog farming in the state in recent decades is attributable to industrial production methods, the decline of the human population is not, as large-scale rural outmigration has been underway in Iowa for over a century. As we note in our essay, rural depopulation has been much more the cause of the consolidation and industrialization of American agriculture than it is the result of those farming practices.

Sanderson and Cox similarly attribute the loss of topsoil across the region to industrial farming. But while it is true that a recent study found that lots of topsoil across the Midwest has been lost, that study compared present-day levels against a baseline that estimated the levels of topsoil in the region prior to its conversion to agriculture. The study did not estimate the contribution of current industrial systems versus earlier, less intensive farming practices across the region. Anyone even slightly familiar with the history of the Dust Bowl, though, can figure out that much of the region’s topsoil was lost long before highly intensive, mechanized agriculture became the norm.

### Link---AT: Motive---2NC

#### Agribusiness is driven by tech change, not cumulative investment---resistance, natural products, dietary changes, disease, population growth, and environmental change guarantee strong motives for R&D

Dr. Nicolas Petit 17, Professor of Law at the University of Liege (Belgium) and Research Professor at the University of South Australia (UniSA), PhD from the University of Liege, LLM in European Law from Europacollege, LLM in Business Law from Université Panthéon Assas (Paris II), MA from KU Lieven, Former Visiting Fellow at the Hoover Institution, “Antitrust Review of Ag-Biotech Mergers: Appropriability Versus Cannibalization”, Truth on the Market, 3/31/2017, https://truthonthemarket.com/2017/03/31/antitrust-review-of-ag-biotech-mergers-appropriability-versus-cannibalization-ag-biotech-symposium/?\_ga=2.224261467.1358836601.1625753050-1434150735.1625342725

Cannibalization, technological change, and drastic innovation

Arrow’s cannibalization theory – namely that a pre-invention monopoly acts as a strong disincentive to further innovation – fails to capture that successful inventions create new technology frontiers, and with them entirely novel needs that even a monopolist has an incentive to serve. This can be understood with an example taken from the ag-biotech field. It is undisputed that progress in crop protection science has led to an expanding range of resistant insects, weeds, and pathogens. This, in turn, is one (if not the main) key drivers of ag-tech research. In a 2017 paper published in *Pest Management Science*, Sparks and Lorsbach observe that:

resistance to agrochemicals is an ongoing driver for the development of new chemical control options, along with an increased emphasis on resistance management and how these new tools can fit into resistance management programs. Because resistance is such a key driver for the development of new agrochemicals, a highly prized attribute for a new agrochemical is a new MoA [method of action] that is ideally a new molecular target either in an existing target site (e.g., an unexploited binding site in the voltage-gated sodium channel), or new/under-utilized target site such as calcium channels.

This, and other factors, leads them to conclude that:

even with fewer companies overall involved in agrochemical discovery, innovation continues, as demonstrated by the continued introduction of new classes of agrochemicals with new MoAs.

Sparks, Hahn, and Garizi make a similar point. They stress in particular that the discovery of natural products (NPs) which are the “*output of nature’s chemical laboratory*” is today a main driver of crop protection research. According to them:

NPs provide very significant value in identifying new MoAs, with 60% of all agrochemical MoAs being, or could have been, defined by a NP. This information again points to the importance of NPs in agrochemical discovery, since new MoAs remain a top priority for new agrochemicals.

More generally, the point is not that Arrow’s cannibalization theory is wrong. Arrow’s work convincingly explains monopolists’ low incentives to invest in substitute invention. Instead, the point is that Arrow’s cannibalization theory is narrower than often assumed in the antitrust policy literature. Admittedly, Arrow’s cannibalization theory is relevant in industries primarily driven by a process of cumulative innovation. But it is much less helpful to understand the incentives of a monopolist in industries subject to technological change. As a result of this, the first question that should guide an antitrust agency investigation is empirical in nature: is the industry under consideration one driven by cumulative innovation, or one where technology disruption, shocks, and serendipity incentivize drastic innovation?

Note that exogenous factors beyond technological frontiers also promote drastic innovation. This point ought not to be overlooked. A sizeable amount of the specialist scientific literature stresses the powerful innovation incentives created by changing dietary habits, new diseases (e.g. the Zika virus), global population growth, and environmental challenges like climate change and weather extremes. In 2015, Jeschke noted:

In spite of the significant consolidation of the agrochemical companies, modern agricultural chemistry is vital and will have the opportunity to shape the future of agriculture by continuing to deliver further innovative integrated solutions.

#### All of this is proven by data---innovative activity is increasing, even as consolidation grows

Geoffrey A. Manne 17, Executive Director of the International Center for Law & Economics, JD and AB degrees from the University of Chicago, Former Law Professor at Lewis & Clark Law School, Member of the American Law and Economics Association, the Canadian Law and Economics Association, and the Society for Institutional & Organizational Economics, Contributor at WIRED, “Innovation-Driven Market Structure in the Ag-Biotech Industry”, Truth on the Market, 3/31/2017, https://truthonthemarket.com/2017/03/31/innovation-driven-market-structure-in-the-ag-biotech-industry-ag-biotech-symposium/?\_ga=2.224261467.1358836601.1625753050-1434150735.1625342725

Dynamic competition in the ag-biotech industry

These dynamics seem to be playing out in the ag-biotech industry. (For a detailed look at how the specific characteristics of innovation in the ag-biotech industry have shaped industry structure, see, e.g., here (pdf)).

One inconvenient truth for the “concentration reduces innovation” crowd is that, as the industry has experienced more consolidation, it has also become *more*, not less, productive and innovative. Between 1995 and 2015, for example, the market share of the largest seed producers and crop protection firms increased substantially. And yet, over the same period, annual industry R&D spending went up nearly 750 percent. Meanwhile, the resulting innovations have increased crop yields by 22%, reduced chemical pesticide use by 37%, and increased farmer profits by 68%.

In her discussion of the importance of considering the “innovation ecosystem” in assessing the innovation effects of mergers in R&D-intensive industries, Joanna Shepherd noted that

In many consolidated firms, increases in efficiency and streamlining of operations free up money and resources to source external innovation. To improve their future revenue streams and market share, consolidated firms can be expected to use at least some of the extra resources to acquire external innovation. This increase in demand for externally-sourced innovation increases the prices paid for external assets, which, in turn, incentivizes more early-stage innovation in small firms and biotech companies. Aggregate innovation increases in the process!

The same dynamic seems to play out in the ag-biotech industry, as well:

The seed-biotechnology industry has been reliant on small and medium-sized enterprises (SMEs) as sources of new innovation. New SME startups (often spinoffs from university research) tend to specialize in commercial development of a new research tool, genetic trait, or both. Significant entry by SMEs into the seed-biotechnology sector began in the late 1970s and early 1980s, with a second wave of new entrants in the late 1990s and early 2000s. In recent years, exits have outnumbered entrants, and by 2008 just over 30 SMEs specializing in crop biotechnology were still active. The majority of the exits from the industry were the result of acquisition by larger firms. Of 27 crop biotechnology SMEs that were acquired between 1985 and 2009, 20 were acquired either directly by one of the Big 6 or by a company that itself was eventually acquired by a Big 6 company.

While there is more than one way to interpret these statistics (and they are often used by merger opponents, in fact, to lament increasing concentration), they are actually at least as consistent with an increase in innovation through collaboration (and acquisition) as with a decrease.

For what it’s worth, this is exactly how the startup community views the innovation ecosystem in the ag-biotech industry, as well. As the latest AgFunder AgTech Investing Report states:

The large agribusinesses understand that new innovation is key to their future, but the lack of M&A [by the largest agribusiness firms in 2016] highlighted their uncertainty about how to approach it. They will need to make more acquisitions to ensure entrepreneurs keep innovating and VCs keep investing.

It’s also true, as Diana Moss notes, that

Competition maximizes the potential for numerous collaborations. It also minimizes incentives to refuse to license, to impose discriminatory restrictions in technology licensing agreements, or to tacitly “agree” not to compete…. All of this points to the importance of maintaining multiple, parallel R&D pipelines, a notion that was central to the EU’s decision in Dow-DuPont.

And yet collaboration and licensing have long been prevalent in this industry. Examples are legion, but here are just a few significant ones:

* Monsanto’s “global licensing agreement for the use of the CRISPR-Cas genome-editing technology in agriculture with the Broad Institute of MIT and Harvard.”
* Dow and Arcadia Biosciences’ “strategic collaboration to develop and commercialize new breakthrough yield traits and trait stacks in corn.”
* Monsanto and the University of Nebraska-Lincoln’s “licensing agreement to develop crops tolerant to the broadleaf herbicide dicamba. This agreement is based on discoveries by UNL plant scientists.”

Both large and small firms in the ag-biotech industry continually enter into new agreements like these. See, e.g., here and here for a (surely incomplete) list of deals in 2016 alone.

At the same time, across the industry, new entry has been rampant despite increased M&A activity among the largest firms. Recent years have seen venture financing in AgTech skyrocket — from $400 million in 2010 to almost $5 billion in 2015 — and hundreds of startups now enter the industry annually.

#### Worst case, innovation will shift to startups and academia. That’s good because they’ll apply unconventional thought AND keeping large firms intact is necessary for commercialization by pooling enough data to make precision ag possible and bridging the valley of death

Stratfor 16 – Stratfor Worldview, The World's Leading Geopolitical Intelligence Platform, “As the Pool of Agribusiness Giants Shrinks, Will Innovation Follow?”, 9/8/2016, https://worldview.stratfor.com/article/pool-agribusiness-giants-shrinks-will-innovation-follow

Potential Benefits of the Mergers

That may end up being a positive turn of events for the agriculture industry, since unconventional thought could become a vital strategy for smaller companies looking to compete. This would be especially true as resource scarcity and labor shortages force many nations to think creatively about adapting food production to changing geopolitical environments. Research areas are more likely to thrive outside the big companies, which could then lead to further acquisitions down the road. For instance, gene-editing techniques such as CRISPR, developed in academia for a variety of purposes, will have a substantial impact on the sector even though they were not developed by major conglomerates. In addition, changes in how crops are protected — by moving from traditional chemicals to biologics, for instance — could also shift power in the industry somewhat.

Innovation will still happen, it just may be more likely to occur outside the walls of the new megamajors. The bigger conglomerates, however, will still have a role in the development of initial discoveries. The high cost of bringing an idea to market may, in fact, necessitate cooperation between smaller innovators and larger players.

Other advances largely outside the hands of the giant firms, such as in robotics and automation, are becoming increasingly important to agricultural operations as well. Precision agriculture, which harnesses big data to increase the efficiency of agricultural operations, will become an even more vital tool in the near term. The field could benefit from the conglomerates' mergers. To get the most useful results, it helps to have as big a pool of data as possible to examine for patterns and trends. Concerns about intellectual property ownership, however, often limit the amount of data that companies are willing to share with one another. Reducing the number of owners of that intellectual property could enable the benefits of big data to be realized more quickly.

The potential implications of the latest round of mergers include the effects that reduced competition will have on the pricing of existing products and the geopolitical consequences of China's growing interest and influence in the sector. Possible limits to innovation — key for an industry that will be forced to cope with a growing number of constraints — have raised concern. But innovation in traditional sectors will continue, even if it comes from elsewhere. And as agriculture as a whole continues to change, the long-term effects of the industry's big mergers may not all be bad.

### Link---Food Price Volatility---2NC

#### Antitrust application causes food price volatility

Dr. Philip Watson 21, PhD in Agricultural Economics from Colorado State University, Professor at the University of Idaho, and Jason Winfree, Professor of Agricultural Economics and Rural Sociology at the University of Idaho, PhD in Economics from Washington State University, “Should We Use Antitrust Policies On Big Agriculture?”, Applied Economic Perspectives & Policy, 5/31/2021, p. 2

In recent years, there has been a movement to use antitrust policy to break up “big ag”.1 The impetus behind this movement seems to stem from a desire to protect small family farms, protect the environment, and “safeguard the US food supply”.2 However, any antitrust intervention will have effects on food prices and the availability of food. From a social welfare standpoint, food prices should be of utmost importance when thinking about these policies since cheaper food helps all consumers and alleviates food security concerns.3 Furthermore, the antitrust policy was designed to prevent higher prices from undue market power, not to protect small producers against competition. In other words, antitrust should not be used to protect producers, rather it should be used to maximize consumer surplus; and any desire to maintain small farms should be done through other policy mechanisms.

Evaluating the economic arguments for and against antitrust interventions in large agricultural firms suggests that the implementation of such policies would result in protectionism. While there has been consolidation for decades in the agricultural industry, much of this is due to changes in the cost structure and does not generally create higher prices due to market power. Certainly there are exceptions to this in various agricultural sectors where market power needs to be curbed, but ultimately this is an empirical question that depends on the changes in food prices. We contend that recent consolidation does not seem to have caused a spike in average food prices, and the proponents of antitrust intervention are implicitly arguing for higher food prices, the exact opposite goal of historical antitrust policy.

First, some historical background and examples of recent proponents of antitrust intervention in agriculture are given. We then consider the economic theory that shows us whether consolidation is due to changes in the cost structure or driven by market power. This is followed by a discussion of the determinants and direction of food prices. Other arguments are then discussed such as income equality, supply chain issues, and food security. We then briefly touch on potential solutions to helping small farms, such as rethinking policies that deal with food standards or output restrictions.

#### That independently kills half the planet

Lester Brown 5, President of the Earth Policy Institute, People and the Planet, “Falling Water Tables 'Could Hit Food Supply'”, 2/7/2005, http://www.peopleandplanet.net/doc.php?id=2424

Many Americans see terrorism as the principal threat to security, but for much of humanity, the effect of water shortages and rising temperatures on food security are far more important issues. For the 3 billion people who live on 2 dollars a day or less and who spend up to 70 per cent of their income on food, even a modest rise in food prices can quickly become life-threatening. For them, it is the next meal that is the overriding concern."

### 7U---Yes Food Supply

#### Food supply is stable and prices are trending down

Dan Charles 20, NPR's Food and Agriculture Correspondent, Graduated Magna Cum Laude from American University with a Degree in Economics and International Affairs, “Food Is Growing More Plentiful, So Why Do People Keep Warning Of Shortages?”, NPR, 8/4/2020, https://www.npr.org/2020/08/04/897804434/food-is-growing-more-plentiful-so-why-do-people-keep-warning-of-shortages

There's a common warning about our planet's future: the risk of food shortages.

"We've got a growing world and a hungry world. We need to make sure we do our part in helping feed that hungry world," said Kip Tom, a farmer from Indiana who's currently the U.S. ambassador to the UN's Food and Agriculture Organization, as he closed a panel discussion in 2018.

"That is totally the mantra," says Catherine Kling, an economist at Cornell University. "I'll bet I've been to 50 talks in the last five, 10 years where the beginning is, 'We have to feed 9 billion people by 2050. This is a crisis situation.' The word 'crisis' gets used regularly."

But, in fact, the long-term trend, for more than a century, has been toward ever more abundant food, and declining prices.

To be sure, every once in a while, it really does seem like a crisis. It certainly did in 2008. Tom Hertel, a economist at Purdue University, remembers it well. "This was right in the thick of the biofuel-driven madness," Hertel says, when government policies drove a surge in demand for corn to make ethanol. Rice and wheat prices were spiking for other reasons.

"People were really panicking," he says. Some economists thought that consumers would always experience chronic food shortages and high prices.

Hertel didn't believe it, though. He and his colleagues have a computer model of long-term trends that drive supply and demand for global food, and their model predicted plenty of food, with lower prices.

"So we wrote this paper, 'Debunking the New Normal,' and it was very unpopular," he recalls. "In fact, we weren't able to publish it!"

Eventually, he did find a journal to publish it. And he turned out to be right. Prices soon came back down.

And in fact, the long-term trend, for more than a century, has been toward ever more abundant food, and declining prices. From 1900 to 2000, Hertel says, the number of people in the world quadrupled, yet food prices at the end of the century were only one-third of their starting level.

"People were really panicking," he says. Some economists thought that consumers would always experience chronic food shortages and high prices.

Hertel didn't believe it, though. He and his colleagues have a computer model of long-term trends that drive supply and demand for global food, and their model predicted plenty of food, with lower prices.