The two women turned and saw each other at almost exactly the same time. “Eeeeeeeek!” screamed the one with the scarf and wiry salt and pepper hair. “Oh my Gaahhh…!” shouted the slightly younger woman with ski jacket-turned-barn coat. But she didn’t get to finish because, like magnets, the two of them hurled and crashed into each other, locking in a fiercely electric bear hug.

And that was pretty much how I found the whole weekend to be during the 33rd Annual Summer Conference put on by the Northeast Organic Farming Association — old friends from the far corners of NOFA running into each other for the first time in a year or two or more. New friendships were wrought over discussions about food, farming, and fuel prices. Old friendships were re-energized by the buzz of activity and the pleasure of seeing so many newcomers excited to learn all they could about organic food in three short days.

By late afternoon, the cold drizzle had stopped and there seemed to be a high-pressure system forming directly over Hampshire College in Amherst. This front may have been powered (continued on page 35)
Dear Barbara,
I received your letter to the editor of the Natural Farmer and I thought I would respond briefly to you. I encourage us to have a phone conversation, or meet in person to discuss our views. We might find it more interesting and thought provoking what we can put in an email.

First, thank you for your letter. I appreciate much of what you say and understand your frustrations. Unfortunately I look at earth stewardship a little differently than you do.

The invasive plant issue is very complex and can get peoples blood boiling, so I won’t get into my views over email, I would be writing all night anyway.

You have so few shade-tolerant nitrogen-fixing plants (and therefore just must retain the Eleagnus) just doesn’t cut it. Apparently they are unaware of the difficulties of trying to eradicate autumn olive when toxic herbicides—which do work on this one, by the way—are off-limits to organic gardeners. I don’t think the existence of autumn olive jelly (insipid, the ones I’ve tasted) justifies helping its spread by bird-borne berries.

I think that deliberately growing this invasive pest plant is irresponsible, and ultimately damaging to the environment—hardly in keeping with the goals of the organic movement. Read this website and weep: http://www.umext.maine.edu/onlinepubs/htmpubs/2525.htm

Barbara Schlein
Woodbridge, CT

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Climate Change and Organic Agriculture

This issue is devoted to confronting the reality of climate change. As the two plant hardiness zone maps above show, within a decade and a half growing conditions in the United States have changed significantly. We need to understand this change, and the processes behind it, both as citizens and producers (so we can act intelligently to help shape policies which can slow and ultimately reverse it) and as farmers (so we can adopt strategies that will enable us to continue to produce healthy food into an uncertain future).

It is fitting that we not only focus the articles of our special supplement on this topic, but that we also reprint the keynote speech given by Bill McKibben at the 2007 NOFA Summer Conference. He spoke passionately about the urgency of humanity coming to terms with global warming if we are to have the time and space to make any of the social changes that the organic movement is incubating.

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The NOFA Exchange - this is a free bulletin board service (for subscribers or NOFA members who get the TNF) for occasional needs or offerings. Send in up to 100 words and we’ll print it free in the next issue. Include a price (if selling) and an address. E-mail or phone number so readers can contact you directly. If you don’t get the paper yourself you can still send in an ad - just send $5 along too! Send NOFA Exchange ads directly to The Natural Farmer; 411 Sheldon Rd., Barre, MA 01005 or (preferably) E-mail to TNF@nofa.org.

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Deadlines: We need your ad copy one month before the publication date of each issue. The deadlines are: January 31 for the Spring issue (mails Mar. 1) April 30 for the Summer issue (mails Jun. 1) July 31 for the Fall issue (mails Sep. 1) October 31 for the Winter issue (mails Dec. 1)

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Then after three years of tremendous growth I found it dead this spring. I have no idea why it died. Some speculations are: it was in full shade under a 50 foot tall Norway Maple; it got some kind of disease or pest; the winter was too hard for it this year; the soil is too dry; it got out competed? I learned a lot from this tree in those three years and I am sad to see it go. There aren’t any other autumn olives growing in our garden and we don’t plan on planting any.

So, I hope this story was interesting. If you would like to talk more about autumn olives, or the invasive plant issue in general give me a call. I have lots of experience in the organic garden, landscapes, and food movements, and like to talk with other passionate people. What are some of your stories?

Jonathan Bates

Hi Jack! I just finished the Summer 2007 issue and I really enjoyed it. Damn, now I want a couple of acres with some sun and some shade so I can grow a whole pile of minor fruit - especially paw paws!

You’ve probably gotten a lot of answer to your “What is a Lenticel” question, but in case no one’s replied, there’s a pretty good definition at http://en.wikipedia.org/wiki/Lenticle:

A lenticel is a spongy area present in the cork surfaces of the stems, roots, and other parts of vascular plants. These structures allow for the exchange of gases between the internal tissues and atmosphere to occur across the periderm, which would otherwise prevent this exchange of gases.

Lenticel formation begins during the development of the first periderm. In the stem, they usually appear below a stoma or group of stomata. Lenticels are found as raised circular, oval, or elongated areas on stems and roots. As stems and roots mature lenticel development continues in the newly forming periderm found at the bottom of cracks in the bark. It should also be noted that lenticels can be present on fruits such as apples and pears.

In relation to apples/pears, it seems to be those off-color dots or patches on the skin of the fruit...but I’d have to look close at an apple to be sure.

Thanks - and keep up the good work! There’s a lot of quality content in the TNF.

Paul Kittredge

Hi Paul,

Talk about a devoted son! I’m not sure how many people actually read the whole issue, down to the book reviews, but I’m impressed!

Thanks for the lenticel definition. Yours is the first entry I’ve received, actually. (But farmers are pretty busy this time of year, I figure.) Now I know how to pick our pears at the right time, which has been a constant mystery to me -- they don’t soften on the tree like peaches, plums, etc., and seem to take forever to ripen in the root cellar even after they fall off the trees by themselves. I’ll watch for the change in lenticel color!

Thanks for the kind words about the paper!

– Jack

Please help us thank these Friends of Organic Farming for their generous support!

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I am writing from South Africa and I am head hunting for staff with organic farming experience for the start-up Farmco. Those selected will work in the African tropics, trailblazing the organic revolution. In case you might know someone with this experience, I will be very grateful if you send him/her a note to let them know. I will then send detailed specifications if they are interested. There are various positions on offer. Trymore Chamwada, 1748 Langeberg Street, Actonville, Benoni, Johannesburg, South Africa, Tel. +27 84 750 9499

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Organic Farm For Rent In Groton, MA - 3 Bedroom, 2 Bath, passive solar house on 10 cleared sunny acres available Sept 1, 2007 (9 rooms total include kitchen, solarium, dining room, living room, and two offices) Currently has several raised beds, pond, stream, etc. Barn, poultry, large animals and pasture possible. Solar heated barn and greenhouses planned. Co-operative ventures with owner encouraged. Terms flexible. Please email interest to: bradbigelow@verizon.net

I have back copies of the “Land Institute” Journal to give. I have about 24 published between 1998 and 2007. It has wonderful stories as well as descriptions of the research. landorbun@yahoo.com.
Live-In Caretaker needed immediately at the Natick Community Organic Farm in Natick, MA. One bedroom apartment on 22-acre working, educational organic farm. Individual or couple welcome to apply. Reduced rent in exchange for weekend chores and night security. Must be able to interact with the public, help with farm maintenance and work with staff and board of directors. Send cover letter and resume with references to NCOF, 117 Elliot Street, Natick, MA 01760 or email us at ncorganic@verizon.net.

Landscapers - We have openings for Planting/Construction Foreperson & Gardening Foreperson, min 3 yrs exp. Organic landscaping company in Fairfield, CT offering F/E, year-round positions w/ tons of benefits, respect, a healthy work environment, good pay & interesting work. Start immediately. Company president is a founding member of the Organic Land Care (OLC) program, developed first standards to OLC, and teaches an OLC course. Projects focus on wetland restoration, lawn replacement, native plantings, etc. Resumes to dina@healthwithnature.com or fax 203-382-0777.

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Fall/Winter Farming Apprenticeship: Crabapple Farm is looking for help through the winter, and beyond, starting as soon as possible. We’ll be doing some winter hoop house production, forestry, building projects, livestock chores, etc. Learn about farming the other half of the year! Contact Tevis or Rachel, 413-296-0310; crabapplefarm@verizon.net.

Save Gaza is dedicated to community mobilization, emergency humanitarian relief, and capacity building. We’re proud to announce gardening projects initiating the promotion of agricultural sustainability. Small-scale gardens tailored to the available resources of Gaza will supply basic nutritional needs for a family in the short term, while laying the foundation for long term poverty reduction. Even a minimal garden with low maintenance once a week can sustain up to 5 years worth of output. Organic gardening will serve to overcome economic distress in exchange for economic sustainability. For more information please visit www.savegaza.org or http://gazagardens.blogspot.com.

Shetland Sheep for Sale: We are retiring and need to find good homes for our small flock of very friendly, hand raised, Shetland sheep. Willing to negotiate for the whole flock of 4 ewes, 4 lambs, and beautiful (easy to handle) Moorit ram. Or will negotiate for the whole flock of 4 ewes, 4 lambs, and beautiful (easy to handle) Moorit ram. Or will sell individually. Also see ad for Livestock Guard Dog: Willing to sell all as a package to the right person. Call Fritz and Pat Vohr, 401-364-0050. Or email patvohr@verizon.net.

Looking for Unused Hoophouse. Will dismantle and take away to a loving home, and leave a generous gift basket of home-made goodies (meat, wine, eggs, fruits and veggies – whatever is in season). Not particular about size, will build ends to suit as needed. Call Jack at 978-355-2853 or Email Jack@mhof.net.

Rockpile farm in Westminster MA has decided to give away free of charge a comfortable 25’ Avion travel trailer, vintage 1966. We have used this trailer to house summer help on the farm for the last 10 or so years. The trailer has a stove, shower, hot water, refrigerator etc. Three rooms, (living, bed and bathroom). Looks like an Airstream. Call Dick or Jacqui Marsh 978-874-0244.

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Fall, 2007
USDA to Allow 38 New Non-Organic Ingredients in Products Labeled “USDA Organic”

After heavy lobbying from industry, the USDA proposed in late May to allow 38 conventionally grown ingredients in foods labeled as organic. One of those ingredients, fish oil, has never undergone review, a violation of federal law. Regarding another, the brewer Anheuser-Busch pressured the USDA into allowing them to use hops grown with pesticides and chemical fertilizers in their “Organic Wild Hop Lager” beer. Although industry was given the better part of two years to work with the USDA in developing this proposal, the agency only gave the public a brief 7-day comment period. During that short time, over 6,000 respondents told the USDA to back off on allowing non-organic hops, factory-farmed animal intestines, tainted fish oil, and other problematic ingredients in organic products. 

source: http://www.organicconsumers.org/articles/article_5225.cf

NH State Law Makes Homemade Goods Safer, Easier to Sell

Selling and buying homemade products that don’t require refrigeration will be easier and safer this year thanks to a new, two-tiered state law that regulates home production in most communities across New Hampshire. The law affects sales of products sold at farmers markets and farm stands. The new regulation was designed to protect the public from food-borne illnesses while encouraging the development of small businesses, said Jack Potter, a Sanbornton farmer who helped write the law. 


FDA to Allow Irradiated Foods to be Sold without Labeling

The Food and Drug Administration has proposed new federal regulations that will allow manufacturers and retailers to sell irradiated foods without labeling them, as previously required by law. Irradiation destroys essential vitamins and nutrients, creates unique radiolytic chemical compounds never before consumed by humans, and generates carcinogenic byproducts such as formaldehyde and benzene. Although irradiation, except for spices, is banned in much of the world, and prohibited globally in organic production, U.S. corporate agribusiness and the meat industry desperately want to be able to “nuke” foods in order to reduce the deadly bacterial contamination that is now routine in industrial agriculture and meat production. Rather than clean up the nation’s filthy slaughterhouses and feedlots, however, the FDA has apparently decided, with the backing of the nuclear power and weapons industry, to take away consumers’ rights to know if their food has been irradiated or not. 

source: http://www.organicconsumers.org/rd/irrad-label.cfm

Growers Can Make More Money By Going Organic

Minnesota grain farmers could make more money by switching from conventional to organic grain crops, shows a four-year study announced at the American Agricultural Economics Association’s annual meeting in Long Beach, Calif. The study, by David W. Archer, an Agricultural Research Service (ARS) economist, and Hillarius Kludze, an ARS soil scientist, analyzed both economic risks and transition effects of switching to organic farming. 

source: http://www.gmswatch.org/archive2. asp?arcid=8094

U.S. Farmers Plant Largest Corn Crop in 63 Years

U.S. farmers planted 92.9 million acres of corn in 2007, exceeding last year’s planted area by 19 percent, according to the Acreage report released by the U.S. Department of Agriculture’s National Agricultural Statistics Service (NASS). The actual planted acreage is the highest since 1944, when farmers planted 95.5 million acres corn. Driven by favorable prices, growing ethanol demand and strong export sales, farmers in nearly all states increased their corn acreage. They set state records in Illinois, Indiana, Minnesota and North Dakota, while Iowa continued to lead all states in total corn planted acreage. 

source: Regional Farm & Food Project Summer 2007 News

Law Would Allow Interstate Shipment of State-Inspected Meat

Currently 28 states have state-inspected meat and poultry processing plants. About 2.100 meat and poultry establishments are inspected under state programs and are required to enforce requirements “at least equal to” those imposed under the Federal Meat Inspection Act and the Poultry Products Inspection Act. However, product produced under state inspection is limited to intrastate commerce. On June 27, Rep. Zach Space (OH) introduced H.R. 2876 which would allow interstate sales of state-inspected meat and poultry. The bill would require USDA to verify that state inspection programs are indeed equal to the federal inspection program. If USDA determines that an individual state plant does not meet the “equal to” federal inspection requirements, then that state plant would not be eligible to ship meat and poultry in interstate commerce.

source: Regional Farm & Food Project Summer 2007 News

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source: Regional Farm & Food Project Summer 2007 News

The Invisible Hand

cartoon from The Ram’s Horn

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acres. The increase in corn is offset mainly by fewer acres of soybeans in the Corn Belt and Great Plains, and fewer acres of cotton in the Delta and Southeast. Nationwide, NASS estimates planted soybean area at 64.1 million acres, down 15 percent from last year’s record high. Area planted to cotton totals 11.1 million acres, marking a 28 percent drop from 2006 and the lowest level since 1989. The Acreage report shows that the nation’s farmers continue to embrace biotechnology. Corn growers planted 73 percent of their acres with biotech seed varieties, an increase of 12 percent from 2006. Cotton farmers planted 87 percent of their acres with biotech varieties, up 4 percent from 2006, and soybean producers planted 91 percent of their acres with biotech seed, up 2 percent from 2006.

source: Regional Farm & Food Project Summer 2007 News

Eco-Impact of Food: Focus on ‘Food Miles’ Is Too Narrow
Researchers at the University of Wales Institute in Cardiff have carried out a detailed analysis of the ecological costs associated with food. They argue that consumers need more information about the environmental impact of the food they buy, but the focus on “food miles” is missing the bigger picture and may be counter-productive. Only around 2 percent of the environmental impact of food comes from transporting it from farm to shop. The vast majority of its ecological footprint comes from food processing, storage, packaging and growing conditions. So food grown locally could have a considerably bigger footprint than food flown halfway around the world.

“I’m a bit worried about the food miles [debate] because it is educating the consumer in the wrong way. It is such an insignificant point,” said Ruth Fairchild at the University of Wales Institute in Cardiff. A better system, she argues, would be to consider all environmental impacts from beginning to end and I nearly quit on a few occasions.”


Ikm swim at North Pole highlights the effects of climate change
Lewis Gordon Pugh, 37, swam for 18 minutes and 50 seconds in temperatures of -1.8C (28.7F), the coldest waters a human has swum in. The London lawyer said the swim was a triumph but it was “a tragedy that it’s possible to swim at the North Pole. I hope my swim will inspire world leaders to take climate change seriously.”

He took the plunge at 0200 BST on Sunday, July 15, and swam along a crack in the ice to the geographic North Pole. Describing the moment he jumped in, he said: “The pain was immediate and felt like my body was on fire. I was in excruciating pain from beginning to end and I nearly quit on a few occasions.”


Organic Farming Can Feed the World - Study
Organic farming can yield up to three times as much food on individual farms in developing countries as conventional farming techniques. Organic farming can yield up to three times as much food on individual farms in developing countries as conventional farming techniques. But for this study researchers used data from a long-term project in which standardized farming techniques were used to reveal trends in crop productivity. The team believes that the different levels of flavonoids in tomatoes are due to the absence of fertilizers in organic farming. Plants produce flavonoids as a defense mechanism; they are triggered by nutrient deficiency. Feeding a plant with too many nutrients, such as inorganic nitrogen commonly found in conventionally grown produce, can increase its defenses, said Alyson Mitchell, a food chemist, who led the research at the University of California, believes that flavonoids can also help to stave off some forms of cancer and dementia. She found that levels of quercetin and kaempferol, both flavonoids, were on average 79 and 97 per cent higher, respectively, in organic tomatoes. Her findings are due to be published in full in the Journal of Agricultural and Food Chemistry.

The Food Standards Agency has commissioned a three-year study into the benefits of flavonoids. It said: “There is accumulating evidence that dietary flavonoids may in large part explain the cardiovascular disease benefits of increased fruit and vegetable intake.”

source: The Times UK, 05 July 2007

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Many of our products that are not OMRI listed may be allowed for use on a certified organic farm. Check with your certification representative to be sure.
Organic Farming Combats Global Warming

According to data from the Rodale Institute’s long-running comparison of organic and conventional cropping systems, converting the US’s corn and soybean acres to organic production would sequester enough carbon to satisfy 73 percent of the Kyoto targets for CO2 reduction in the US.

source: http://www.gmwatch.org/archive2.asp?arcid=809

Organic Farming Beats No-Till

Organic farming can build up soil organic matter better than conventional no-till farming, according to a long-term study by US Agricultural Research Service (ARS) scientists. Organic farming, despite its emphasis on building organic matter, was previously thought by some to endanger soil because it relies on tillage and cultivation - instead of herbicides - to kill weeds. But the ARS study showed that organic farming’s addition of organic matter in manure and cover crops more than offset losses from tillage. Rodale Institute yields for no-till organic corn were 160 bushels to the acre as opposed to 143 for tilled organic plots. Comparable chisel-till non-organic plots yielded 113 bushels per acre.


First Hemp Milk in North America

Manitoba Harvest has introduced “Hemp Bliss”, an organic milk that is lactose, soy, nut and cholesterol-free. It has 1200 milligrams of omega-3 fatty acids and 5 grams of protein per serving.

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source: Acres, USA, June, 2007

New Potato Resists Potato Beetles

MOFGA-certified Wood Prairie Farm has introduced a hybrid potato called King Harry, developed by Cornell University. The early white round spud’s hairy leaves are said to repel Colorado potato beetles, leaf hoppers and flea beetles.


Whole Foods Market’s Launches a Local Producer Loan Program

Whole Foods Market is supporting local communities and food producers through a new initiative called the Local Producer Loan Program. Annually, Whole Foods Market will make available $10 million for low-interest loans to small, local agricultural producers. The loan can be used to address capital improvements such as a new truck, oven or a greenhouse. Operating expenses such as debt repayment are not eligible uses for the loan.

To qualify, producers must meet Whole Foods Market’s quality standards - and animal compassion program if raising livestock - have a viable business plan and adequate cash flow to service debt. More information about their quality standards and animal compassion program is available on the website http://www.wholefoodsmarket.com/products/acceptablefoddingredients.html

Priority for awarding a loan is given to current vendors to Whole Foods Market. For additional information, as well as an application, contact Susan Phinney, Local Products Forager for the North Atlantic Region of Whole Foods Market, at 617-492-5500 ext. 3987 or email at susan.phinney@wholefoods.com.


Searchable Biopesticide and Organic Pest Management Database Launched

The Interregional Research Project No. 4, at New Jersey’s Rutgers University, has announced the launch of its Biopesticides / Organic database. The database, searchable by crop, pest, and state, will assist growers of specialty crops including fruits, vegetables, ornamentals and turf. Locate the database at www.ir4.rutgers.edu/Biopesticides/LabelDatabase/index.cfm. Once opened, the database enables growers to input their crop, pest and state and it responds by providing a list of EPA registered product labels that fit their criteria. It also supplies the manufacturer contact information and other pertinent data. The database can limit the search to organically approved pest management products.


“Organic” Factory Dairy Shuts Down

The Case Vander Eyk Jr. Dairy in Pixley, California, 10,000-cow feedlot dairy, was found to be operating outside of the organic law and has had its certification to produce organic milk suspended. The dairy received a notice of suspension from its USDA-accredited certifier, Quality Assurance International (QAI), for serious questions surrounding record-keeping -- such as assuring that cows are actually managed organically (without antibiotics and hormones), led organically produced feed (without toxic pesticides and herbicides), and are allowed to graze rather than being confined in a feedlot.

“It’s excellent to see QAI fulfilling their responsibility under the organic law and protecting the interest of farmers and consumers,” said Lisa McCrory, a certification expert with 13 years of experience for Northeast Organic Farming Association of Vermont. “This is an example of the system working as it was designed—organic inspectors uncovering problems and protecting the public by shutting down farmers or processors if problems are discovered.”

source: June 7, 2007 Cornucopia Institute press release

MOFGA Executive Director Tested for Industrial Pollution

Russell Libby, the Executive Director of the Maine Organic Farmers and Gardeners Association (MOFGA), was among 13 Maine citizens whose hair, blood and urine were recently tested for 71 different industrial chemicals. The Alliance for a Clean and Healthy Maine, of which MOFGA is an active member, conducted the study. Researchers found toxic industrial chemicals in every person tested. On average, each participant had measurable levels of 36 toxic chemicals in their bodies. The chemicals found can cause learning disabilities, cancer, birth defects, infertility and hormone disruption. Details about the study are posted online at the Alliance for a Clean and Healthy Maine website: www.cleanealthy.me.org. Among the participants tested, Libby was tied for the most chemicals detected (41 of the 71 that were tested).

source: June 12, 2007 MOFGA press release

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Happy Spring!!
Organic Milk Glut?
So many conventional dairies converted to organic to qualify under the old 80-20 feed rule, which expired June 9, that there is a glut of organic milk in the once drastically-undersupplied market. Horizon Organic Milk said the increase over last year was between 20 and 25%. As a result it has had to drop retail prices and its stock has suffered a 36% loss in value since late March. Others estimate that the supply will increase 40% this year, while demand will rise 25%. Experts expect the current 25 million gallon over-supply situation to be short term, however, as fewer new farms will be making the organic transition without the help of the 80-20 rule.


USDA Contemplates Pharma Crop Ban
Released in mid-July, the U.S. Department of Agriculture’s (USDA’s) long-awaited draft environmental impact statement (EIS) on the regulation of genetically engineered (GE) organisms presents a ban on food crops as one option for overseeing pharmaceutical (pharma) and industrial crops. If the option is adopted by the USDA, it will become the basis for pharma/industrial crop regulation in the new GE crop rules expected in 2008. But that outcome is far from assured. The EIS also presents a weaker option that the USDA currently prefers over the ban. In the works since 2004, the comprehensive rule making including the EIS is the most significant regulatory initiative on GE crops to come out of the USDA in the last two decades. The new rule making will replace the USDA’s regulation of GE crops for many years to come.

source: Union of Concerned Scientists’ Digest, August, 2007

Organic Sales Top $16.9 Billion
According to the Organic Trade Association, 2006 U.S. organic food sales reached $16.9 billion, a 22.1% increase over the previous year. Organic accounts for only 3% of food and beverage sales in the U.S.


Heart disease occurs much less among inhabitants of the Mediterranean island of Crete than among U.S. citizens. Researchers attributed much of the difference to a diet high in fruits, vegetables, legumes, grains and olive oil, with more fish than red meat; and with a moderate amount of wine. Researchers at Columbia University later found that New Yorkers whose diets most resembled the Mediterranean pattern had a 40% lower rate of Alzheimer’s Disease than those whose diets least resembled it. Other studies had varying results.


Anti-NAIS lawsuit filed in Pennsylvania
A lawsuit has been filed against the Pennsylvania Department of Agriculture for its attempts to force a Mennonite farmer, James Landis, to submit to having a federal identification number in order to continue to do business, in violation of Landis’ religious beliefs. Landis has raised ducks on his Lebanon County farm for export in live bird markets in New York for the past 20 years. In April Landis received a letter from the Pennsylvania Department of Agriculture requiring him to register for a federal identification number. This federal number, or “premises identification number,” is the first step in a program called the National Animal Identification System, or NAIS. A copy of the complaint filed with the Commonwealth Court of Pennsylvania in the case Landis v. Wolf can be read at www.telladf.org/UserDocs/LandisComplaint.pdf.

source: ADF press release, June 21, 2007

Rural Areas Lack Food
“Food Deserts” have been defined as areas where residents must travel more than 10 miles to the nearest supermarket. In the US, 418 counties meet this condition, which often results in inadequate fresh fruits and vegetables in the diet.

source: Growing for Market, June, 2007

New Jersey Gets Accredited
The state of New Jersey’s Department of Agriculture recently gained accreditation from the USDA to offer organic certification services. Previously NOFA-NJ offered the service, but now will provide education, technical support, and training for farmers. NIDA expects to have at least 52 certified farms and about 18 food processors and handlers this year.


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Organic Meat Sales Growing
Organic meat sales jumped 32.6% in 2006, with natural meat sales going up 18.2%. Organic beer and wine sales increased 31.2%, with such beverages in the natural category going up 17%. Organic pet foods rose 31%, coffee and tea went up 23%, and nutrition bars 21%.

Weston A. Price Foundation Launches Farm-to-Consumer Legal Defense Fund
The FTCLDF, a non-profit foundation, will be an advocate for both farmer and consumer rights on issues such as:
- Sale of raw milk
- NAIS (National Animal Identification System)
- On-farm processing and sale of products
- Cow, herd or farm-share agreements
- Medical, educational or governmental interference with the transport, purchase or consumption of raw milk.
The FTCLDF has been modeled after other legal defense associations. To learn more, visit http://eont.groundspring.org/EmailNow/pub.php?module=URLTracker&cmd=track&j=153767339&u=1491872 or email info@farmtoconsumer.org.

Organic Feed Shortage Looming?
Organic poultry and eggs are among the products hardest hit by a growing shortage of organic feed. “We will run out of the 2006 crop before we get the 2007 crop in”, says Lynn Clarkson, president of Clarkson Grain, one of the largest organic corn and soybean suppliers. Less acreage is being planted to organic corn because of the high prices commanded by conventional corn for ethanol. It is far simpler to put in conventional corn, spray it, and be done with it than to plant and tend organic corn. Organic Valley is experimenting with other grains like wheat or barley for its growers, and incorporating alfalfa and field peas into the dairy diet. As a result of higher feed costs, prices for organic eggs have jumped 17% this summer to $3.10 to $3.25 a dozen, and organic whole fryers have gone up 12% to $2.79 a pound.

Organic Price Index Online
The New Farm Organic Price Index (OPX) enables buyers and sellers to plan their business strategies for more than 70 products in 11 markets around the country. Updated weekly, the OPX compares organic and conventional prices using a variety of data sources. Offered free with the support of the USDA’s Risk Management Agency, OPX is online at www.newfarm.org/opx.
source: Organic Processing, July-September, 2007

Hannaford Certified by QAI
Hannaford Bros. Company, which operates 159 supermarkets in the Northeast, has been certified as an organic retailer by Quality Assurance International. The retailer now carries 160 organic produce items, 150 organic dairy products, and 115 organic baby food items. Organic sales last year increased more than 20%, the retailer, owned by Delhaize Group of Brussels, Belgium, says.
Organic Farmers Positioned to Win Big in 2007 Farm Bill

by Tracy Lerman, Zach Baker, and Mark Lipson, Organic Farming Research Foundation and Aimee Wittman, Sustainable Agriculture Coalition

Every five or so years, as the Farm Bill is being reauthorized, organic farmers and sustainable agriculture advocates have the opportunity to steer US agricultural policy in a more favorable direction. With the 2002 Farm Bill set to expire at the end of September, advocates and farmers have been working around the clock to influence the writing of the 2007 Farm Bill. Organizations such as the Organic Farming Research Foundation and the Sustainable Agriculture Coalition have led the organic community in funding efforts on organic programs and have also managed to make significant gains for organic and sustainable agriculture in House and Senate Representatives’ version of the 2007 Farm Bill. Although some of these provisions are not as far-reaching or do not achieve the level of funding that had been hoped, the 2007 Farm Bill debate is far from over as the Senate has yet to introduce its version of the Farm Bill, which advocates hope will be even better for organic and sustainable agriculture. Nevertheless, through their efforts, organic and sustainable agriculture advocates have positioned themselves to make significant gains for farmers and the environment when all is said and done.

The 2007 Farm Bill process began in May of 2007 in the House of Representatives. On July 27, 2007 after more than two months of debate and numerous versions of the 2007 Farm Bill, the United States House of Representatives passed their final version of the House Farm Bill (H.R. 2419, the Food, Nutrition and Bioenergy Act of 2007) on a vote of 231-191. Due to the engagement of farmers and organizations through every step of the debate, H.R. 2419 includes many of the policy recommendations that OFRF and SAC were jointly advocating for regarding organic agriculture, including increased mandatory funding for organic research, increased funding for certification cost share, a stand alone organic transitions program, and conservation program integration.

Organic Research

Organic farming is a knowledge-intensive endeavor that relies on the understanding and sharing of best management practices to succeed. Many farmers believe lack of knowledge is the biggest limiting factor to the spread of organic agriculture, yet funding for organic research has been limited. New USDA data for FY 2007 shows about $28 million total current spending directly on organic research and education by all USDA research agencies. This is about 1.5% of those agencies’ total budget; the 2006 market share for organics is at 3% and projected to continue growing. As a result OFRF and SAC are advocating for a fair share of the USDA research budget to be spent on organics. A fair share of research dollars would at least match the percentage of the US food retail market that organic represents. Three provisions were included in H.R. 2419 to make progress in addressing this issue.

H.R. 2419 includes language that encourages the USDA Agricultural Research Service to increase its expenditures on organic research to at least a fair share based on organic’s US market share. The language also directs USDA to disseminate research results. The inclusion of this language, instigated by an amendment offered by Rep. Scott Brown (R-MA), provides the organic community with an acknowledgment of the need for a fair share of research dollars and a platform from which to advocate for more funding for organic research.

In addition, USDA’s flagship competitive grants program for organic research and education, the Organic Agriculture Research and Extension Initiative (OREI), received a modest increase in mandatory funding from $3 million per year (in the 2002 Farm Bill) to $5 million per year in mandatory funding, plus $25 million in mandatory appropriations authority in H.R. 2419. At one point in the debate it was unclear that OREI would receive any mandatory funding, so significant progress was made in securing the mandatory funding. Even though the sum is considerably less than the $25 million per year for which we are advocating, having some mandatory funding going into the Senate Farm Bill process and the eventual Conference Committee provides great negotiating power.

Finally, HR 2419 includes $3 million in mandatory funding for collection of organic production and marketing data during the 5 year life of the bill. In addition, the Agriculture Management Assistance program, part of which provides funds for certification cost sharing in 15 states “traditionally underserved” by USDA risk management programs (including Maine, Massachusetts, New Hampshire, New York, New Jersey, Rhode Island, Connecticut, and Vermont) was increased in the 2002 funding levels, expanded to include Virginia and Hawaii, and required to use at least 10% of the AMA annual funds for certification cost sharing in the named states.

Organic Transition Support

Farmers transitioning to organic production incur large financial costs and in most cases need technical and educational assistance to successfully implement the new farming practices. A Farm Bill program to provide this type of assistance has not been existent. To address this need, OFRF and SAC are advocating for a stand alone organic transition program that provides financial assistance and technical and educational assistance to help farmers transition to organic production. In one of the biggest wins so far, H.R. 2419 includes a new, stand alone Organic Conversion, Technical, and Educational Assistance program.

Created through an amendment by Rep. Kirsten Gillibrand (D-NY), the Organic Conversion program will provide technical and financial assistance to conventional farmers who are converting to organic practices. It is authorized for $50 million over the life of the bill and includes cost share and incentive payments for conservation measures as well as technical and education assistance in business and marketing transition planning. Half the funds are set aside for technical and education assistance, with equal emphasis on the needs of socially disadvantaged farmers or rancher for sustainable grazing and crop production. The remaining half of the funds are dedicated to providing a fair share of research dollars and a platform from which to advocate for more funding for organic research.

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conservation outcomes for organic and specialty crop production. EQIP program purposes are also amended to include “organic transition,” and the program is made eligible for cost-sharing payments.

§ HR 2419 amends the Conservation Security Program requiring USDA to consider the multiple benefits of conservation-based farming systems, such as organic production, resource-conserving crop rotations, and managed rotational grazing, when ranking applications. In addition, language is included requiring USDA to allow producers to coordinate and simultaneously certify eligibility under CSP and the National Organic Program.

The significant gains for conservation program integration on the House side are included in the working draft of the Senate Farm Bill. This new working lands program melds the ongoing stewardship features of the Conservation Security Program with the financial assistance component of the Environmental Quality Incentives Program (EQQP) and is called the Comprehensive Stewardship Incentives Program (CSI). While the CSP and EQIP components of CSI will maintain separate identities and funding, the application is streamlined and the program as a whole will be available nationwide with continuous enrollment. Melding the two programs into one will better facilitate program delivery and make them less susceptible to post-farm bill funding cuts. SAC and OFRF will be backing the CSI proposal in the Senate version.

Programs supporting local, small scale farming will receive consumer demand for locally-produced, organic produce. Programs supporting local, small scale farming are vital. Domestic supply, the need for programs to support farmers in meeting this demand are vital. The Senate version clarifies the full range of direct marketing options available nationwide with continuous enrollment. Streamlined and the program as a whole will be available nationwide with continuous enrollment. Melding the two programs into one will better facilitate program delivery and make them less susceptible to post-farm bill funding cuts. SAC and OFRF will be backing the CSI proposal in the Senate version.

Even so, the outlook for organic and sustainable agriculture in the 2007 Farm Bill looks very promising. Numerous witnesses testifying in Washington D.C. last week to support farm bill provisions made it much more likely for the organic community to achieve its goals. Organic and sustainable agriculture have been highly successful in the Senate version in order to achieve historic support. Programs that organic advocates haven’t asked for are being created, such as a program to provide grants for the creation of organic community gardens. A lot of effort has been invested in elevating organic and sustainable agriculture to the level it currently holds. The Senate version of the Farm Bill must be kept up if organic agriculture is going to prove victorious. Visit www.ofrf.org and www.sustainableagriculturecoalition.org to get involved.

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Almost everyone seems to have heard about the growing threat of global warming, but almost no one seems to have heard about the important contribution organic farmers are making to help mitigate the damage.

Organic farming’s mitigation contribution and future potential, although well documented here and elsewhere, is receiving little notice from either policymakers or those putting together carbon credit mechanisms that could provide a new source of organic farming income. Attempts to have organic farmers included in these new carbon credit mechanisms have failed to make any headway so far. A much more public, focused, and convincing effort is needed so organic producers will be rewarded in some way for all the credits they are piling up.

Global warming mitigation approaches have gained significant attention in many countries, especially in Europe where governments acknowledge and reward organic farmers for the many other public benefits they provide. But even there, for now at least, organic farmers are still on the outside looking in as carbon credit mechanisms are demonstrated. Potential carbon trade developers getting organized in developing countries may be more inclusive. It is reported, for example, that one potential carbon credit project involves an organic produce initiative in South Africa.

Nearly all countries, unlike our own, are implementing the Kyoto Protocol, an international agreement among industrialized nations to reduce greenhouse gas emissions. This has given them a head start in developing mechanisms for selling “carbon credits” on world trading markets. Buyers of the credits are industrial entities that need to offset excess gas emissions to avoid government penalties.

Although the European carbon trading system was started in 2005, it has had little success involving agriculture and even less success involving organic farming. A climate exchange established in Chicago in 2003 provides a mechanism for buying and selling carbon credit contracts in this country. Both the Iowa Farm Bureau and the North Dakota Farmers Union have pooled conventional acres enrolled in these contracts. The credits are worth roughly $2 an acre for no-till land and $3 for pasture. If these contracts become well enough established to be traded internationally, it is assumed the amount paid for credits would increase.
The Rodale Trial institutes also show that organic systems, which use cover crops and compost and legume-based rotations to build up organic matter levels in the soil, help mitigate global warming by sequestering 15-28 percent more carbon than land farmed with conventional methods. The trials, started in 1981, involve side-by-side 12-acre experiments comparing conventional, legume-based organic and murnen based organic systems.

Research conducted in Europe and elsewhere shows organic systems also help mitigate the adverse impacts of global warming by reducing carbon dioxide emissions by half or more. “Converting the 160 million acres of cropland soybeans in the U.S. to organic production would sequester enough carbon to satisfy 73 percent of the Kyoto targets for CO2 reduction and more than wipe out U.S. agriculture’s massive emission problem,” the Rodale Institute’s announcement said.

Organic farming’s potential contribution to global warming has received little notice in the atmospheric debate about human activity’s impact. Organic agriculture is so far the most promising approach for mitigation and adaptation to global warming benefits organic farmers provide to the public. Benefits of organic farming include increased soil health and fertility, reduced emissions of carbon dioxide and methane and nitrous oxide, and reduced vulnerability of soils to erosion and the sequestration of carbon under organic management.

“Although organic farming performance could be enhanced by more research on problems related to lower yields in some cases, and to soil erosion related to tillage, a report by researchers from Switzerland’s research institute and the World Wildlife Fund concludes that ‘organic agriculture is so far the most promising approach for mitigation and adaptation to climate change.’

Not everyone likes the idea of allowing the worst industrial polluters to buy their way out of trouble with regulatory measures to mitigate their impact. But carbon credit mechanisms don’t necessarily have to involve power plants and other major polluters. These mechanisms also can provide ways for ordinary citizens to buy credits for ‘carbon free’ travel, for example, or other carbon neutral purposes.

‘Carbon Free’ Travel Offered Online

Current examples include carbon credit mechanisms offered to travelers who book airline, hotel, rental car and other travel with online travel agencies. Travelocity, for example, makes this online offer: ‘Offset your trip’s carbon emissions. Effectively offset the negative environmental impact of your entire trip here. Go without guilt. Go zero!’”

Offset prices, ranging from $10 to $40, are added to the cost of the trip.

“While air travel is considered a contributor to the carbon dioxide emissions that lead to global warming, now there’s something you can do to offset the negative environmental impact of your travel: by contributing to the Conservation Fund’s ‘Go Zero Program,’ the message continues. ‘Go Zero Travel is the first program of its kind in the nation.’

So what happens to that $10 or more added to the cost of travel purchased online through Travelocity? “Each donation facilitates the planting of native trees, which absorb and reduce the amount of carbon dioxide in the atmosphere. ‘New forests planted with the help of donations like yours will be planted in permanently protected lands across the U.S. and managed by the nation’s leading public agencies.’

This is a consumer-friendly way to offset carbon with why we are the luckiest travelers to direct some of this mitigation money to organic farms as well? The Conservation Fund does make a passing reference to conventional no-till as another possible carbon offset possibility but does not mention organic farms.

Much more needs to be done to educate the Conservation Fund, general farm organizations, and carbon credit plan innovators about the significant carbon sequestration and energy saving practices of organic farms. farmers, who already support organic farmers by buying organic food, to participate in mechanisms that would pass funds through to organic farmers or those in transition.

These mechanisms require an organization like the Farm Bureau or the Farmers Union to assemble all the organic land for contracts and a financial agent like the Conservation Fund or the climate exchange to handle the process of verifying emissions reductions and the carbon sequestration realized, and then collecting and dispersing funds. The potential for putting together a group of organic farmers and providing verification should be explored. Organic farmers, annual conferences, annual reports, a good website that would appear to make it easier for organic farms to meet verification requirements.

The global warming benefits also should be stressed in public statements and testimony requesting more funding for organic research and education from state and federal sources. Global warming benefits were stressed by organic farmer Atina Diffley of Gardens of Eagan last February in urging the Minnesota House Agriculture Appropriations Committee to provide more money for organic research and education funding, organic certification cost sharing, and alternative livestock research and outreach funding.

“While conventional farming typically depletes soil organic matter, organic farming builds it through the use of compost and cover crops. More than 1,000 pounds of captured carbon per acre-foot per year,” she testified. “Or one 320-acre organic farm taking the carbon from 117 cars out of the air. And that’s not even counting the reductions in CO2 emissions represented by the organic system’s lower energy requirements.”

Organic farmer Steve Gilman of Ruckucky Farms in New York State, policy director of the Northeast Organic Farming Association (NOFA), also wants more public attention given to global warming mitigation benefits of organic farming. He feels the time has come for the larger organic community to get behind proposals to reward organic farmers financially for what they do to mitigate the impact of global warming.

“Connecting organic farming to carbon credits through sequestering carbon and saving energy and reducing emissions would provide a steady unsuspended income stream that would directly benefit organic producers, helping them grow their operations and their numbers to meet the growing unfilled demand of the organic industry," he suggested in discussing his vision of the future.

“This sea change in the agricultural system will be even more profound when conventional farmers have to buy carbon credits to offset their own sustainability practices. The most significant potential benefit of carbon offsetting is that it would substantially increase the demand for sustainable agriculture products, a demand that is already surging in the alternative systems and that is growing ever larger.”

For more information on carbon offsetting and the global warming impact of conventional farms compared to organic systems, contact Rodale Press at 610-825-8000.

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Introduction:
Climate changes. It always has and always will. What is unique in modern times is that human activities are now a significant factor causing our climate to change. This is evident in the recent rapid rise of heat trapping gases (that originate primarily from our burning of coal, oil, and natural gas) in the atmosphere, and in the recent increase in global temperatures in the lower atmosphere and in the surface ocean (more information on global climate change is provided by the Fourth Assessment Report of the Intergovernmental Panel on Climate Change: http://www.ipcc.ch/).

To assess how climate in the Northeastern U.S. has changed over the past 100 years, a variety of instrumental and observational data sets have been assembled and analyzed. Despite the considerable variability in weather in the Northeast US, all of the climate change indicators reveal that our region has been warming over the last century, and that this rate of warming has increased over the last thirty-five years.

For more information on these and other indicators you can download the entire Indicators Report from the Clean Air – Cool Planet website (http://www.cleanair-coolplanet.org). In addition, a recent report from the Union of Concerned Scientists investigates how our climate might change in the next 100 years depending on the choices we make over the next decade concerning our emissions of heat trapping gases. The entire report is available online at: http://www.climatechoices.org/. The main conclusion of the report is that our climate future is literally in our hands.

Average Annual and Seasonal Temperature

Temperature is one of most frequently used indicators of climate change and has been recorded at numerous stations in the Northeast United States since 1899. Changes in temperature affect numerous aspects of our daily lives and our region’s economy, including recreation, tourism, transportation, agriculture, emergency management, health, and fuel consumption for heating and cooling. Temperature is the determinant factor in the length of the growing season, it influences the amount of winter snowfall and the comfort of a summer afternoon. The National Oceanographic and Atmospheric Administration’s National Climatic Data Center (NCDC) has maintained temperature records from various stations across the country. In the Northeast there are 56 stations that have been continuously operating since 1899, providing the best record of temperature variations for the region.

Annual average temperature for the Northeast (New England, New York State, and New Jersey) shows considerable variability on annual and longer time scales. There is also a long-term trend towards warmer temperatures: the Northeast’s average annual temperature has increased by about 1.8 °F from 1899 to 2000. Over the last 30 years, annual average temperatures have increased 1.4 °F. Even more striking is the 4.4 °F increase in winter temperatures over the last 31 years (1970-2000).

Length of Growing Season

Length of the growing season is defined as the number of days between the last frost of spring and the first frost of winter. This roughly marks the period during which plants, especially agricultural crops, grow most successfully. While freezing temperatures affect all commercial, agricultural, industrial, recreational, and ecological systems, the human system most sensitive to changes in the length of the growing season is agriculture. In addition, the length of the growing season is a defining characteristic of different ecosystems. Growing season length is an event-driven phenomenon. The growing season is solely dependent on specific cold weather events, rather than monthly or annual averages.
There are seven stations in New England that have been collecting daily temperature data since at least 1900. These stations represent the best available instrumental record of growing season for this region going back a century. The length of the growing season in the Northeast has considerable year-to-year variability (Figure 1). However, despite this variability, a long-term increase of 8 days in the length of the growing season is apparent. There is a significant spatial variability, however, with some locations experiencing considerably longer growing seasons.

Spring Bloom Dates for Lilacs, Apples, and Grapes

Phenology is the study of seasonal biological events in the animal and plant world as influenced by the environment. Plants are particularly useful to scientists as weather instruments and indicators of climate change because their phenological responses are based on a complex integration of temperature, sunshine, rainfall, and humidity that is difficult to match by simple analysis of weather records.

Changes in spring bloom date from 1965 to 2001 have been analyzed using a unique data set derived from genetically identical lilac plants (*Syringa chinensis*, clone ‘Red Rothomagensis’) monitored at 72 locations within the Northeastern U.S. In addition to the unique, geographically dispersed lilac data set, an evaluation was done of trends in bloom date of apples (‘Empire’ and similar varieties) and grape (variety ‘Concord’) collected at a few sites in New York State during approximately the same time period.

During the period 1965 to 2001, lilac bloom dates advanced about 1 day per decade in the northeastern U.S. The genetic similarity of the plants at all sites makes this a highly unique and powerful analysis. Analysis of the more geographically limited apple and grape data sets suggests a slightly more rapid advance in spring bloom, about 2 days per decade. A recent analysis of historical apple yields in the New York State region found that warmer temperatures from January 1 to bud break period was correlated with lower, not higher yields. Much more detailed information on the impact of climate change on farming is available on the website http://www.climateandfarming.org/.

Lake Ice-In and Ice-Out Dates

Observations of lake ice are tangible, readily available and technically feasible indicators of local climate conditions. Ice-out and ice-in have been recorded at 28 lakes in the Northeast US for many years. Used for local commerce and transportation, lakes have been important to people living in the region for centuries. When frozen, lakes are used for ice fishing, cross-country skiing, sled-dog racing, and snowmobiling, all of which are important for the Northeast’s tourism economy. However, the spring break-up of the lakes is also an important event, when boaters and ferry masters put their boats in the water to begin the warm season.

The date Lake Champlain, VT, was first frozen over (‘ice-in’) has also changed over the past 150 years. Today it freezes over 8 days later than it did in the second half of the 1800s. But the most remarkable part of the record is the occurrence of years in which the lake did not freeze over all winter. Over the 186 year record, the lake has not frozen over in 31 winters, and almost half of them occurred since 1970.

Figure 1. Average growing season anomaly at 7 stations in the Northeast, defined by the number of days between the last frost (minimum daily temperature below 32°F) and the first of the fall, 1900-2001. In the graph, zero represents 192 days, the average time between frosts. Years below the line experienced shorter than average seasons, while years above the line experienced longer. Overall there has been an increase in eight days in the length of the growing season at these seven stations.
Precipitation

Ecological systems depend on precipitation for hydration and human communities depend on the replenishment of underground water sources and water for growing crops. In addition, precipitation is important for tourism.

Precipitation in the Northeast has increased by an average of 3.3 inches per year (8 percent) over the past century. There was a significant increase in precipitation following the drought that affected the region in the early 1960s. That drought impacted regional agriculture, water quality and quantity, forest health, and human health. By 1965, that drought reached critical levels and resulted in widespread forest fires, crop failures, fish kills, water shortages, harmful algal blooms, and heat-related deaths. Following the 1960s drought, precipitation has increased. Of the ten years with the most precipitation over the past century, eight have occurred since 1970.

Extreme Precipitation Events

The number of precipitation events that resulted in more than two inches of rain (or water equivalent if the storm results in snowfall) during a 48-hour period is counted for each year for six stations over the past 100 years. Every station investigated reveals an increase in extreme precipitation events during the 1980s and 1990s, as compared with the early 1900s. Storrs, CT, which has data available back to 1888, averaged about three intense storms each year prior to 1970. From 1970-2000, Storrs has averaged 5.5 extreme precipitation events per year. The five other stations investigated all show an increase in extreme precipitation events in recent decades and are consistent with increases experienced in most of the country. Note this analysis does not include the locations showing a decrease of 40 or more inches per winter. Overall, the southern portions of the region have experienced a decrease in snowfall, although the decrease is not as large when compared to northern regions.

Snowfall

Total winter snowfall is an important indicator of winter weather. For those living in the Northeast, snow is an important factor of everyday winter life. Snow in New England is of vital importance to the tourism industry and also represents a key aspect of New England culture. Many regions rely heavily on income from skiers, snowboarders and snowmobiles during the winter season, while snow removal represents a significant expense for municipalities and state governments across the region.

Over the past 30 years, stations in northern New York and northern New England have experienced significant decreases in snowfall, with several locations showing a decrease of 40 or more inches per winter. Overall, the southern portions of the region have experienced a decrease in snowfall, although the decrease is not as large when compared to northern regions.

Days with Snow on Ground

Like total snowfall, total days with snow on the ground are an important indicator of winter weather. Satellite records indicate that snow cover extent in the Northern Hemisphere has decreased by about 10 percent since 1966 and is strongly related to increases in temperature. Unfortunately, few meteorological stations have been recording the presence of snow on the ground more than 30-40 years. As a result, this indicator is only available back to 1970. Snowfall in the Northeast is extremely variable, with some stations receiving only a few inches of snow and others receiving more than 100 inches every year. Thus the number of days with snow on ground will also be variable across the region. The data from stations in the Northeast are generally consistent with the hemispheric trend and reveal a decrease in the number of days with snow on ground. When averaged, the Northeast stations indicate that there were, on average, 16 fewer days with snow on ground in 2001 compared to 1970. However, there are several large areas that do not have snow depth data (such as most of Maine, Massachusetts, and Connecticut). Some stations, such as Durham, NH, and Fredonia, NY, are experiencing almost a month of fewer days, on average, with snow each year. These trends are consistent with the measured increases in temperature over this time period.

Conclusion

Weather in the Northeastern United States is arguably among the most variable in the world. This variability on time scales from hours to years is the result of several factors that relate to the physical geographical setting of the region, including our latitude, topography, and coastal orientation. Despite this variability, the indicators of the Northeast’s changing climate presented in this report provide a coherent set of evidence of a region that is warming, especially over the last thirty years. This evidence comes from a wide range of environments – the atmosphere, the biosphere, the oceans, and snow and ice. Additional research is required to better understand our changing climate, and to determine why it is changing. There are additional indicators that will be collected in the coming years that report not only on changes in the region’s climate, but also the impact those changes are having on the region’s environment, economy, and quality of life. However, the remarkably consistent signal of a warming trend across the region cannot and should not be ignored. We now have our canary in the coal mine. The decisions we make today and over the next decade regarding our emissions of heat trapping gases will determine the climate that our children and grandchildren inherit.
Climate Change: How Will It Affect Crops, Livestock, and Farming in the Northeast?

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In case you haven’t noticed, climate change is already upon us. What can really bring it home to many farmers and gardeners is to compare the familiar 1990 USDA “Plant Hardiness Zone” map with the 2006 revision recently released by the Arbor Day Foundation (www.arborday.org). It is reprinted here on page 2. The new map shows considerable “zone creep” northward as minimum winter temperatures have increased in just the past 15 years.

Here in the Northeastern U.S. we have experienced about 0.5 degrees Fahrenheit (F) increase in average annual temperature per decade since 1970. When we break it down by seasons, winters are warming the most in our area – 1.3 F per decade from 1970 to 2000. Recent climate trends for the Northeast also include fewer snow cover days, longer growing season, more summer days with temperatures above 90°F, and more flooding events due to more of our rain coming in heavy rainfall events (more than 2 inches in 48 hours).

It is true that the Earth’s climate has always been changing, even before there were humans on the planet. But seldom has it been warmer than it is today, and seldom has the pace of change been this fast. To put things into perspective, 12,000 years ago the Earth was 11˚F cooler than it is today, and much of the Northeastern U.S. was under a glacial ice sheet several feet thick. Now, the latest climate model projections for this region (see www.climatechoices.org) indicate we must brace ourselves for an additional 6 – 12°F warming within just the next 80 years or so assuming a “business as usual” scenario of fossil fuel use and greenhouse gas emissions.

It is not just the thermometer record from weather stations telling us the climate is changing. We have considerable evidence that the living world is responding. I and several collaborators examined historical records for lilacs, grapes and apples in the Northeast and documented an advance in spring bloom date of 4 to 8 days since the 1960s. In just the past few years, Cornell Integrated Pest Management (IPM) specialists have found they must change the scouting dates for certain crop insects several weeks earlier than they used to. With a trend for warmer winters there is a very real concern of increased pressure from marginally over-wintering crop pests and invasive weeds. Throughout the Northern Hemisphere other researchers have reported indicators of change such as earlier spring arrival of migrating birds, and northward and upward expansion of habitat range for birds, insects, and mammals.

Key questions regarding agriculture and climate change are:

- How will current crops and livestock respond?
- How will it affect weed, insect, and disease pests?
- Can the “carbon dioxide (CO2) fertilization effect” compensate for negative climate change effects?
- How can farmers adapt, and what will it cost them?
- What can farmers do to reduce reliance on fossil fuels and mitigate greenhouse gas emissions?

Temperature Change and Northeast Crops

For farmers in the Northeast, the first thought that often comes to mind with respect to “global warming” is longer growing seasons and opportunities to experiment with new crops and markets. The recent impacts assessment for our region (available at www.climatechoices.org) acknowledges these potential opportunities, but also provides a sobering picture of our future that includes new invasive weed and insect pests, an increase in summer heat stress for crops and livestock, and serious challenges with water management.

The fact is that the financial well-being of most farm families is currently structured around crops and particular varieties adapted to our current relatively cool climate. For example, many agricultural shrubs (e.g., blueberry, cranberry), fruit trees (e.g., apples, grapes), and winter cereal grains (e.g., winter wheat) require a prolonged winter chilling period to develop flower buds and fruits the following spring. The chilling requirement for many of our most common apple varieties, and for native grapes like Concord, is over 1000 cumulative hours (over 40 days) at temperatures below about 45°F. Blueberries require between 700 – 1200 hours. Warmer winters that do not meet these requirements, and/or more erratic winter temperatures that cause premature leaf-out or bloom (and subsequent frost damage), will have negative consequences for yield of these perennial crops, whether or not spring and summer temperatures are optimum for their growth. Fruit crop specialist Alan Lakso at Cornell’s Geneva Experiment station has already documented a trend for lower apple yields in years with warmer winters.

Climate projections for the Northeast indicate that by end of the century much of New York and southern parts of New England would no longer meet a 1000 hour or greater chilling requirement with a “business as usual” greenhouse gas emissions scenario. Maple syrup production depends on our region’s unique combination of freezing nights combined with warm days to trigger the flow of sweet sap in spring. Syrup producers are already reporting that warmer and more erratic winters are making it more difficult to determine the best time to tap, and reducing the amount of high quality syrup produced.

Climate projections for average temperature in the Northeast

The center of the maple syrup production has been migrating northward into Canada in recent years, arguably due at least in part to climate change.

Cool season-adapted vegetable crops, such as potatoes and cabbage, will likely be more challenging to grow in a warming climate, requiring farmers to experiment with new planting dates and new varieties. Although corn is generally considered a warm-adapted crop, sweet corn benefits from our current relatively cool summers that lead to a slow kernel ripening process and outstanding eating quality that is well known among consumers and wholesale buyers. If warming trends continue, it is not that we could not grow crops like sweet corn, potatoes or cabbage, but our competitive edge in the marketplace associated with superior quality may be lost unless new varieties adapted to the new climate are developed.

On the positive side, climate change could create new opportunities for farmers with enough capital to take risks on new crops. For example, the rapid expansion and success of the European wine grape (Vitis vinifera) industry in upstate New York during the past 30 years may in part be attributed to less severe winters. These European varieties do not have the long winter chill requirement of native grapes, and suffer vine and root damage when winter temperatures dip below -12°F. Thus, the success of this industry may in part be attributed to the fact that the frequency of extreme winter cold has diminished.

A longer summer growing season will tend to benefit those attempting to grow watermelon, tomatoes, peppers, peas, and other crops that are currently constrained by our cool climate. However, fruit quality of even a warm season-adapted crop such as tomato can be negatively affected by temperatures exceeding 90°F at critical growth stages. Climate projections indicate this will be a common problem during Northeast summers by the end of the century if we follow the “business as
More Drought and Flooding Projected for the Northeast

We are already observing an increase in the frequency of high-rainfall events, and if this trend continues as projected by the climate models, we will be facing more frequent field flooding. In addition to possible crop losses due to lack of oxygen for roots and disease problems associated with wet conditions, excessive rain at the wrong time increases soil erosion and compaction, and can delay spring planting or fall harvest. In response to farmer requests for information, at Cornell we began field experiments this summer to compare different vegetable crops for their ability to recover from early-, mid-, and late-season flooding events.

Somewhat surprisingly, our region is also projected to have an increase in the frequency of late-summer short-term drought. The reason for this is that warmer temperatures will increase the demand for water by crops, but rainfall is not projected to increase (if anything, it may decrease slightly in late summer). These two factors, combined with more of the rainfall arriving in short heavy-downfall events, leads to water deficits. Many crops in the Northeast, particularly grain and silage crops, are not irrigated, so what climate change brings in terms of summer rainfall will be critical. Even many farms growing high value horticultural crops do not currently have enough irrigation equipment to meet the needs all of their acreage during drought periods.

Weeds, Insects and Pathogens

Crop plants in agroecosystems do not grow in isolation. Weeds, and beneficial and harmful insects, microbes, and other organisms in the environment will also be responding to changes in climate. As warmer climate zones drift northward the potential habitat range for many species will also drift northward. The spread of plant pathogens will benefit in those years when wetter conditions prevail, and be constrained in drought years. Historically, cold winter temperatures in the Northeast have protected our forests, gardens, and farms from large populations of weeds and insect pests that are a severe problem in more southern areas. One example is kudzu, an invasive weed that is notorious in the Southeastern U.S., but is constrained in its northward expansion by winters that dip below -4 F. In our recent impacts assessment (www.climatechoices.org), we show that under a “business as usual” emissions scenario, the potential range of kudzu will march...
In the hot summer of 2005, many New York dairy farmers reported 8-20 percent reductions in milk production and increased costs for cooling. More summers with frequent heat stress are projected for the Northeast, which will eventually require investments to improve cooling capacity of dairy barns.

Corn earworm and the flea beetle are examples of marginally over-wintering insect pests that will become more common problems in the Northeast as winters continue to warm. Recently, Cornell Integrated Pest Management (IPM) specialists have found they must begin monitoring for corn earworm much earlier in the spring (with pheromone traps), assuming a “business as usual” emissions scenario. Organic farmers will be challenged to keep track of these new weed and pest pressures as they arise, and be creative in seeking new non-chemical means of control. It is not well understood how natural or managed biological control of pests will be affected by climate change— in some cases antagonistic organisms may out-compete pests while in others the pest may be favored.

Conventional farmers will attempt to adapt with increased application of herbicides and pesticides, but of course this has potential economic, food safety, and environmental costs. Also, chemical means may not be as effective for weed control in a future high-CO2 world. Lewis Ziska at the USDA in Beltsville, MD has found that many weeds are much more difficult to control with herbicides at atmospheric CO2 levels we anticipate will occur in the coming decades (see “Weeds” fact sheet at: www.climateandfarming.org).

The CO2 Fertilization Effect on Crops and Weeds

Carbon dioxide, in addition to being a greenhouse gas, is also the gas that plants take up in the process of photosynthesis to produce sugars and grow. Therefore, the exponential rate of increase in atmospheric CO2 could have a direct beneficial effect on Earth’s plant life. The magnitude of the “CO2 fertilization effect” varies tremendously among plant species and from variety to variety. Plants with the so-called “C-3” photosynthetic pathway, which includes most Northeast crop species (with the notable exception of corn) and many weed species, can show productivity increases of 10 to 20 percent or more when grown at twice current CO2 levels (expected to occur within this century) and at optimum environmental conditions. In general, plants that are able to easily expand their growth capacity, such as plants with an indeterminate growth habit, respond most positively to a CO2 doubling.

Unfortunately, many of our most invasive and noxious weeds show two to three times the growth stimulation from higher CO2 than the crop plants they compete with (see “Weeds” fact sheet at www.climateandfarming.org). Also, some studies have observed increased damage from leaf-feeding insects on plants grown at higher CO2 levels. In some cases this latter phenomenon has been attributed to higher leaf sugar content of high-CO2 leaves, and in other cases it appears that lower protein content of high-CO2 leaves causes insects to eat more tissue to meet their protein quotient.
It is important to note that CO$_2$ benefits on plants can become negligible at low or high temperatures, on shallow soils restricting root growth, or when water, nutrients or other factors limit growth. In general, high CO$_2$ cannot compensate for negative effects from other environmental stresses. For example, multi-year field and greenhouse studies conducted at Ithaca, NY showed significant yield increases for both potatoes and beans at twice current CO$_2$ levels when daytime maximum temperatures did not exceed 80˚ F, but when maximum temperatures were allowed to reach 95˚ F during tuber or pod formation, there was no yield benefit from higher CO$_2$ (see “Crops Overview” fact sheet at www.climateandfarming.org for more information and references).

Dairy and Livestock

Climate change could positively or negatively affect the availability and price of crops used for animal feed, thus indirectly affecting the livestock and dairy industries. Climate change will have more direct effects on these industries by affecting the intensity and frequency of summer heat stress. Heat stress in dairy cattle can have a long-term effect (weeks to months) on both milk production and birthing rates. Dairy cows like it cool, with the temperature optimum for maximum milk production at temperatures between 40 and 75˚ F (see “Livestock” fact sheet at www.climateandfarming.org for more information). High humidity makes it worse. During the unusually warm summer of 2005, Cornell animal scientist Larry Chase, estimated that many New York dairy herds suffered milk production declines of 5 to 15 pounds per cow per day (8 to 20 percent decrease of normal production).

In our recent analysis of climate change impacts on the Northeast we used a well-tested dairy “thermal heat index” model, and projected 10 to 20 percent declines in milk production for much of Pennsylvania, New Jersey, and the southern half of New York, Massachusetts, and Connecticut by the end of the century with the “business as usual” greenhouse emissions scenario (www.climatechoices.org).

Can Farmers Adapt to Climate Change?

It is generally assumed that farmers will adapt to climate change, with production areas for specific crops shifting as needed. Hopefully, farmers in the Northeast will be able to take advantage of new opportunities and minimize negative effects associated with climate change. It is important to recognize, however, that adaptation in the midst of climate uncertainty will not be cost- or risk-free. Below is a brief description of some farmer adaptation strategies:

- **Change planting, harvest dates** [cost: 0 to low]: An effective, low-cost option. The major risk is that this will put farmers into a different market window with lower prices.
- **Change varieties grown** [cost: 0 to moderate]: Usually a no or low cost option, although in some cases seed for new varieties is more expensive, or new varieties require investments in new planting equipment, or require adjustment in a wide range of cultural practices. In some cases, there may not be a suitable new variety.

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**Farmers as Part of the Solution - Mitigation**

Climate change may be an incentive for farmers to take advantage of some “win-win” opportunities, that benefit both the farmer and the environment. Many of these involve less work, not more work, for the farmer. Below are some ways toward becoming part of the solution:

- **Improve energy conservation**: This involves obvious steps such as reducing unnecessary tractor driving, using fuel-efficient vehicles, keeping engines well-tuned, replacing lights and appliances with more energy-efficient versions, improving building insulation, etc.

- **Renewable energy sources**: Some farmers in the Northeast are already leading the way toward becoming “carbon neutral” by growing and producing their own fuel, such as corn pellets for heating greenhouses, soybeans for biodiesel production to fuel farm vehicles. Exploring the use of solar energy and wind turbines to subsidize farm energy needs are other examples. Some farmers are entering the energy market place for profit by producing biofuels or other renewable energy for off-farm sales.

- **Increase soil carbon sequestration**: When crop residues decompose much of the carbon in them becomes part of the soil organic matter pool. Reduced tillage, maximizing year-round vegetation cover and other techniques to increase soil organic matter is something farmers should be doing anyway to improve soil health and yields. This also serves to sequester carbon in the soil that otherwise would be in the atmosphere as CO₂ gas.

- **Use less synthetic nitrogen fertilizers**: Organic and conventional farmers need to be as efficient as possible in use of fertilizer. On top of the nitrous oxide emissions during soil degradation, synthetic nitrogen fertilizers are also very energy intensive to manufacture (the process often involves temperatures exceeding 700 F), so the use of these greatly adds to greenhouse gas emissions.

- **Recycle and reduce use of disposable products**: The recycling effort in the U.S. is already a great success story. Now we need to re-double those efforts, considering not only the issue of waste management, but also the reduction in greenhouse gas emissions associated with recycling and minimizing our use of disposable products. It takes more fossil fuel energy to build a product from scratch than to start with recycled materials. Every time we throw something away, it means more energy spent creating its replacement, and also energy spent in transporting waste to a waste facility.

**Concluding Remarks**

A longer growing season may allow farmers to experiment with new crops, but farmers in the Northeast will face increasing uncertainty and risk as they attempt to adapt to the effects of climate change. Along with some potential new opportunities, unabated greenhouse gas emissions will almost certainly increase weed, insect, and disease pressure for most farmers, and some of the weeds and pests will be new nuisances. For organic farmers, careful tracking of weed and pest populations, and creative biological and crop rotation approaches to stay one step ahead of new weed and pest complexes, will be even more essential than they are today. The first line of defense for conventional farmers will be to increase herbicide and pesticide applications, but these may be less effective, or labels for new chemical control options lag behind the needs. Increased use of chemical controls will also have environmental as well as economic costs.

New building design and construction and installation of thermostated controlled air conditioning systems. Some of the increased costs for cooling in summer could be compensated for by reduced heating requirements in winter.

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owners are surprised to learn that one of the biggest “culprits” when it comes to greenhouse gas emissions is sloppy use of nitrogen fertilizers. Nitrous oxide (N₂O), a potent greenhouse gas (300 times more "warming potential" than CO₂), is released in soils as nitrogen fertilizers are degraded by soil microbes. This is true for organic nitrogen sources such as manure as well as synthetic nitrogen fertilizers, so both organic and conventional farmers need to be as efficient as possible in use of fertilizer. On top of the nitrous oxide emissions during soil degradation, synthetic nitrogen fertilizers are also very energy intensive to manufacture (the process often involves temperatures exceeding 700 F), so the use of these greatly adds to greenhouse gas emissions.

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It is likely that climate change will almost certainly increase weed, insect, and disease pressure for most farmers, and some of the weeds and pests will be new nuisances. For organic farmers, careful tracking of weed and pest populations, and creative biological and crop rotation approaches to stay one step ahead of new weed and pest complexes, will be even more essential than they are today. The first line of defense for conventional farmers will be to increase herbicide and pesticide applications, but these may be less effective, or labels for new chemical control options lag behind the needs. Increased use of chemical controls will also have environmental as well as economic costs.

New building design and construction and installation of thermostated controlled air conditioning systems. Some of the increased costs for cooling in summer could be compensated for by reduced heating requirements in winter.
Earth's climate system

The Earth’s climate system is composed of a number of interacting components. The main driver is the sun whose energy is by far the main source of heat for Earth. The sun does not heat the Earth’s atmosphere directly but rather its energy passes through the atmosphere and heats the surface of Earth. The surface then heats the atmosphere from below. If the Earth did not lose heat to space, it would continue to heat up as energy is supplied from the sun. To maintain a fairly constant temperature the Earth must lose as much heat to space as it gains. Clouds, along with naturally occurring carbon dioxide in the atmosphere, prevent some of this heat from escaping and thus warm the Earth. Without these components in the atmosphere the temperature of the globe would be about 60°F colder than it is today. Besides blocking the loss of heat from Earth to outer space, clouds can also reflecting sunlight back to space. This reflected energy is unavailable to heat the Earth.

All of the components of the climate system interact. For example, during ice ages, the growth of ice sheets is triggered by a reduction in the amount of energy reaching the Earth from the sun. As the ice sheets grow, forest and soil covered surfaces, which normally absorb (and therefore are warmed by) solar energy, are replaced by ice. Ice reflects most of the sun’s energy making it unavailable to warm the surface. Therefore the growth of the ice sheets contributes to further cooling of the planet. This is known as a positive feedback, since the cooling due to the reduction in solar energy is enhanced by the ice sheet. The same positive feedback results from global warming, as the extent of the ice sheets diminishes, more soil and potentially forest is exposed. These surfaces absorb more heat than the ice covered areas and hence the warming is enhanced.

Natural forces that affect the climate system

Ice ages are just one example of how the Earth’s climate varies through time. Other variations can be caused by:

- Natural fluctuations in the sun’s intensity. The amount of energy emitted by the sun is not constant. Changes in its intensity are typically small (a few tenths of a percent), but can influence temperatures on Earth if they occur over an extended period of time.
- Volcanic eruptions. Violent volcanic eruptions like Mt. Pinatubo in 1991 inject sulfur dioxide into the upper atmosphere. This compound is highly reflective to sunlight. Thus its presence in the upper atmosphere prevents a portion of the sun’s energy from reaching the Earth. Once in the upper atmosphere, these compounds can exist for several years following the eruption.
- Shorter-term cycles like El Nino. The oceans and atmosphere work together to influence climate. Natural oscillations in ocean currents, the location of the warmest or coldest ocean temperatures, etc. can influence atmospheric circulation patterns. El Nino is an example. In this case the pool of warm water that usually resides in the western tropical Pacific Ocean migrates east. This changes the atmospheric circulation pattern in the tropics which influences global weather patterns.

Human factors affecting the climate system

Increase in greenhouse gases. Carbon dioxide and water vapor are both natural components of the Earth’s atmosphere. These gases, along with methane, nitrous oxide and ozone are termed greenhouse gases (GHGs) because of their ability to absorb some of the energy that the Earth emits to space and reradiate it back to the surface.

Prior to industrialization, the Earth’s atmosphere contained about 280 parts per million of carbon dioxide (280 CO₂ molecules for every 1,000,000 molecules in the atmosphere). This carbon dioxide was maintained in the atmosphere via volcanic and biological activity.

What causes these increases?

- Fossil fuel burning releases about 6 billion tons of carbon each year into the atmosphere.
- Increasing energy efficiency and use of renewable energy sources, and reducing tillage to increase soil carbon sequestration.
- The oceans and atmosphere work together to influence climate. Natural oscillations in ocean currents, the location of the warmest or coldest ocean temperatures, etc. can influence atmospheric circulation patterns. El Nino is an example. In this case the pool of warm water that usually resides in the western tropical Pacific Ocean migrates east. This changes the atmospheric circulation pattern in the tropics which influences global weather patterns.
- Human factors affecting the climate system

Increase in greenhouse gases. Carbon dioxide and water vapor are both natural components of the Earth’s atmosphere. These gases, along with methane, nitrous oxide and ozone are termed greenhouse gases (GHGs) because of their ability to absorb some of the energy that the Earth emits to space and reradiate it back to the surface.

Prior to industrialization, the Earth’s atmosphere contained about 280 parts per million of carbon dioxide (280 CO₂ molecules for every 1,000,000 molecules in the atmosphere). This carbon dioxide was maintained in the atmosphere via volcanic and biological activity.

What causes these increases?

- Fossil fuel burning releases about 6 billion tons of carbon each year into the atmosphere.
The Earth’s Climate System

- Methane from agriculture, livestock, landfills and industry has increased by 133%.
- Nitrous oxide from agriculture and industry has increased by 15%.
- Changes in land use and land cover release 1 billion tons of carbon annually plus other gases.

Land use changes include deforestation and urbanization. Deforestation influences the climate in two ways. 1) Trees are sinks for atmospheric carbon dioxide. They remove CO$_2$ from the air and store it as vegetative matter. Fewer trees mean less CO$_2$ is pulled from the atmosphere. If the trees are subsequently burned, the CO$_2$ is added back to the atmosphere. 2) Removal of the trees changes the character of the land surface; this changes the amount of solar energy that is absorbed by the surface, evaporation, etc. Urbanization is similar to deforestation. Urban areas tend to absorb and hold more heat than vegetated surfaces. Thus cities are typically warmer than rural environments.

Recent Climate Change

When the concentration of greenhouse gases is increased (and everything else in the climate system, like the amount of clouds, is held constant) less of the Earth’s energy escapes to space. As a result the temperature of the Earth must rise.

Predictions

- **CO$_2$ Levels.** In order to project future climate conditions, scientists must predict what the world will look like politically, economically and environmentally in 100 years. Given the uncertainty in such predictions, scientists have developed a range of scenarios of future greenhouse gas emissions. These range from a fossil-fuel intensive society that undergoes rapid economic growth and experiences a modest increase in population. In this case atmospheric CO$_2$ levels increase to 500 parts per million by 2100. A business-as-usual scenario...continuing the present trend in greenhouse gas emissions ... leads to a similar increase in CO$_2$ levels by 2100.

- More environmentally-friendly scenarios, with reductions in fossil fuel usage, also lead to increases in atmospheric CO$_2$ concentration. This results from the lifetime of CO$_2$ in the atmosphere (about 100 years). Thus today’s CO$_2$ emissions are not removed from the atmosphere until 2106. Even the most environmentally friendly emission scenarios lead to an increase in atmospheric CO$_2$ concentration over the next 100 years, to about double pre-industrial levels.

**Temperature.** Many climate models exist. They all rely on the same physics, but differ in the ways in which variables like clouds are parameterized. The “art” of climate modeling is how processes that can not be well represented by the physics of the models are accounted for. All models experience the same increase in greenhouse gas concentration. They all show a warming by 2100. The only difference is the magnitude of the warming. Here model warming estimates range from 1.5 to 5.0°C by 2100.

**Significance.** At first glance a degree or two or even five degrees of “global warming” does not seem like a big deal. However when averaged over the globe, this change is quite substantial. From the height of an ice age to the intervening interglacial period (like today) the globe’s temperature changes by about six degrees. The more modest climate model projections are that by 2100, increase global temperature will be about a third of that associated with the ice age cycle. Keep in mind that for ice ages, this six-degree change occurs over 100,000 years. We expect to see a 1.2 degree change over 100 years!

**Precipitation.** Precipitation changes will vary geographically by 2100. Some locations (primarily...
in subtropics) will show decreases in precipitation. Large areas of the middle latitudes and tropics will see increases in precipitation.

**Summary**

Over the last century the concentration of greenhouse gases in the Earth’s atmosphere has increased markedly. CO₂ levels in the atmosphere have not been this high for hundreds of thousands of years. In isolation this change must result in a warming of the Earth’s temperature. Over this same time period climate observations indicate that the global temperature has increased by about 1°F. Although changes in average precipitation have been small (on the order of 1-2%), rain gauge records show that the character of precipitation events has changed. Heavy rainfall events have become more frequent over the last half century.

It is unlikely that the emission of carbon dioxide into the Earth’s atmosphere will slow in the near future. In fact, most projections indicate increased carbon dioxide emissions into the middle to late part of the 21st century. This continued increase will likely lead to additional increases in temperature, with most models projecting rises of between 1.5 and 5°C. Although the exact magnitude of changes in precipitation are uncertain, there is reason to believe that precipitation events will become more variable, leading to increases in both the frequency of floods and droughts.

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Researchers at Cornell University study effects of climate change’s increased temperature and CO₂ on soil ecology, nutrient cycling, nitrogen fixation and use, photosynthesis, plant-water relations, and ecosystem stress to model future regional and global food production.
Challenges

Design for Change
From ice-core samples that trace earth’s climate millions of years to recent computer models of current patterns, evidence reveals that climate change is occurring more rapidly today than in thousands of years. Research indicates that the climate has been unusually stable for the past 10,000 and even more so for the past 100 years. Today’s climate change challenge is clear: Design and develop a cultural landscape (built and biological) that will be stable within a wide range of conditions. What specific challenges should we design for? These include: longer droughts, hotter summers, colder winters, higher winds, increased pest success, heavier precipitation, earlier and later frosts, and other irregularities (which have always tested humanity’s ability to thrive and survive on this planet).

Specific Climate Challenges
High performance landscapes and buildings are designed to meet the following characteristics of Earth’s changing climate. Many of these challenges are already occurring in the New England: • Precipitation via disasters (e.g. high volumes of rain, snow, hail) • Increasing likelihood of soil erosion by flooding • Increasing heating and cooling needs • Increasing severity and probability of high wind events • Increasing overall success of pests • Decreasing influence of pollinators • Increasing likelihood of drought conditions • Increasing likelihood of annual crop failure due to spring flooding • Increasing water demand • Increasing extremes of aridity and humidity • Decreasing water table heights • Increasing sea levels • Increasing probability of early flowering and fruit-set, and consequent crop failure from frost damage • Increasing failure of perennial crops due to reduced snowpack on the ground surface


FAIRY TALE MOONS 2008 CALENDAR
Beautifully illustrated in 4-color. Retail: $14.95 Wholesale welcome.

Fairy Tale Moons 2008 is a beautifully illustrated interactive calendar which designed to bring the cycle of the seasons and the wisdom of fairy tales imaginatively alive for the young child. Each monthly illustration presents a picture which is at once in a fairy tale story and in the cycle of the seasons. Resources for obtaining each complete fairy tale and simple star gazing are included. Wholesale welcome.

Optimized microclimates can result in the following:
• Lower active energy needs for buildings: less fuel, less cost, less pollution. Example: Passive solar house within a passive solar landscape.
• Longer growing seasons relative to the surrounding environment. Example: Climate-designed garden spaces that stay frost free for weeks longer in the spring and fall than adjacent areas.
• Higher yields from plants and animals – better climate helps revive the loss of crop diversity caused by monoculture in the 20th century while adding to the abundance of foods we have to choose from.

Microclimate Development
A microclimate is any discrete area within a larger area of differing climate. They usually occur close to the surface of a material commonly earth, a building façade or vegetation. They occur in a nested manner at all scales and over various periods of time. Microclimates exist unintentionally “nature,” but good design creates microclimates intentionally. Microclimates occur over space and time. They are dynamic phenomena emerging and disappearing within a site – not a static feature of a site. They are a process, not a thing. Since cold is a limiting factor (along with light) in producing food and sustainably inhabiting the New England landscape, designing warm microclimates is the priority. Cooling strategies, however, will likely become increasingly important, especially in southern New England, if conditions continue to warm.
The excavated landform and school building create a variety of microclimates. Warmest spaces face the sun and are protected from the north and west winds by buildings, landforms or vegetation. These represent high potential outdoor activity areas across the school year. Much of the site has good solar exposure, but lacks wind protection.

**LEGEND**
- **Warmest** - faces sun and protected from wind
- **Intermediate** - faces sun but not protected from wind
- **Coolest** - does not face sun and not protected from wind

**Microclimate Development Strategies**

**Proper Site Selection**

The first step in crafting beneficial microclimates is proper site selection. Some landscape features cannot be changed at all or only to a small extent. These usually include: relative location to surrounding landscape (elevation, topography, etc.), aspect, slope, groundwater table, bedrock exposure, etc. Only when selecting a site can these primary features be considered and selected for and against. It is helpful to map the various climates on a site to understand where optimal locations are for all developments. See Figure 1 for an example of microclimate site analysis that aids in this process.

The second step in localizing your climate is site design. Once a site has been chosen a handful of strategies, planned for and implemented carefully, can optimize the existing climate of the site to more fully meet the needs of the site’s inhabitants. Please refer to figure 1 and 2 for clarifications of the concepts written below.

**Intensive Gardens**

The intensive gardens at Teal Farm will be an example of mixed annual and perennial high-yield organic food production. The system will produce year-round with the help of cold-hardy plantings, wind-buffering evergreens, and mulches that capture vertical space. Borders are defined by perennial shrubs and dwarf trees of small fruits and nitrogen-fixing herbs. Fertility is also added to the annual beds through small scale compost heaps within the garden, mulching of pathway cover grasses and from neighboring pasture production zones. This garden will feed more people per square area than any other part of the farm. See Figures 1 and 2 for a plan set for species lists and additional information.
Design of warm microclimates checklist:

1. Face-southerly
   a. South = warmest
   b. Consider orographic (elevational) weather effects
2. Slope/Vertical Space Harvesting: See Figure 2 for an example of a vertical space-harvesting garden layout
   a. The further poleward the steeper the slope should be to capture the most solar energy
3. Bowl – solar arc/sun trap
   a. Utilize energy-harvesting forms
4. Minimize radiative losses – provide cover
   a. Nighttime losses of heat are the most difficult to avoid
5. Wind-shelter:
   a. Buffer and deflect, create eddies, preserve and enhance hedgerows
   b. Still air = key for human comfort in cold climate
6. High-mass
   a. Stone and water are the primary heat-retaining materials
7. High absorption (low albedo)
   a. Utilize color effectively
8. Time your microclimate
   a. Design for a particular time of day and year, usually whenever limiting factors are most present

Examples of microclimate-creating features of a place are: hills, fields, trees, cliffs/stone, gullies, ridges, groundwater, ponds, lakes, roads, walls, lawns, roofs, courtyards. Employing such features in the development of climate-protected spaces is more effective than attempting to create new microclimates from scratch.

**Soil Carbon Sequestration and Nitrogen Management for Greenhouse Gas Mitigation**

by John M. Duxbury, Professor of Soil Science, Cornell University, Ithaca, NY john17@cornell.edu

**Carbon Sequestration Principles**

Soils have a finite capacity to sequester organic carbon (OC) that is determined by soil texture and aggregation. SOC levels increase with silt + clay content and the maximum level is achieved when soils are most highly aggregated, i.e. when they are not tilled. Tillage breaks aggregates and exposes SOC to biological decomposition. Loss of SOC is proportional to the intensity of tillage. SOC levels increase with silt + clay content and the difference between the current value and the maximum represents the carbon sequestration potential when no-tillage (NT) is adopted.

The gain of SOC following adoption of NT is slow and it will take many years (20-30 in NE USA) for most soils to reach their maximum SOC level. Soils in the USA gain an average of about 350 lb C/acre/year under NT, depending on texture and residue input levels. The gain of SOC is greatest shortly after adoption of NT and declines with time until the maximum level is reached. Without adopting NT, residue inputs have a smaller, but measurable effect on SOC content. A typical gain in SOC of 0.25 % is usually seen with organic production practices using green manuring.

There are two key requirements for long-term successful no-tillage: surface soil cover to protect the soil surface from dispersion and sealing from rain, and controlled traffic patterns to keep soil compaction to defined wheel tracks. Surface cover usually requires mulching with crop residues but continuous plant cover, including winter cover crops may also be an option. Controlled traffic is easier where bed and furrow systems are uses.

Over time, no-tillage typically leads to a much improved soil structure and tilth (except in sandy soils where structure is not an issue), large increases in earthworm and other arthropod populations, and a better-developed root zone. Over time, no-tillage leads to increased SOC levels and improved soil structure and tilth (except in sandy soils where structure is not an issue), large increases in earthworm and other arthropod populations, and a more porous soil. In long-term experiments, visible increases in soil surface elevation can be seen in no-tillage plots compared to conventional tillage plots.

<table>
<thead>
<tr>
<th>Greenhouse Gas Source (+) or Sink (-)</th>
<th>Conv. Till</th>
<th>No-Till</th>
</tr>
</thead>
<tbody>
<tr>
<td>lb Ceq ac⁻¹y⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil C sequestration</td>
<td>0</td>
<td>-30¹</td>
</tr>
<tr>
<td>Carbon dioxide emissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Ag. Inputs</td>
<td>+139¹</td>
<td>+180¹</td>
</tr>
<tr>
<td>- Machinery</td>
<td>+64¹</td>
<td>+21¹</td>
</tr>
<tr>
<td>Net C Flux</td>
<td>+203</td>
<td>-100</td>
</tr>
<tr>
<td>Relative C Flux</td>
<td>0</td>
<td>-303</td>
</tr>
<tr>
<td>Relative N₂O Emission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional N input (38 lb ac⁻¹)</td>
<td>0</td>
<td>+10²</td>
</tr>
<tr>
<td>- Manufacture</td>
<td>0</td>
<td>+57³</td>
</tr>
<tr>
<td>- Use</td>
<td>0</td>
<td>+196⁴</td>
</tr>
<tr>
<td>Switch to No-Till</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative CH₄ Emission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- additional N</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Total Additional GHG Flux</td>
<td>0</td>
<td>+271</td>
</tr>
<tr>
<td>Revised Relative GHG Flux</td>
<td>0</td>
<td>-32</td>
</tr>
</tbody>
</table>

¹ From West and Mariand, 2002; negative values indicate C sink
² Based on 22% of fertilizer as NH₄NO₃, and N₂O release from Kramer et al, 1999
³ Using IPCC formula of 1.25% fertilizer N released as N₂O from 90% of applied N
⁴ Average value from Smith et al, 2002
Carbon Sequestration and Greenhouse Gas Budget for Maize

The carbon balances for a switch from conventional till (CT) to no-tillage (NT) agriculture for grain production in the USA has been evaluated by West and Marland (2002). For maize, the net C benefit is 301 lb C ac⁻¹ yr⁻¹. However, a change to NT also alters fluxes of N₂O and CH₄, two other important greenhouse gases, which also need to be included in the calculation. Adding these changes to the C budget alters the picture substantially. An additional fertilizer N input of 38 lb N ac⁻¹ is used on NT corn, which adds 67 lb of carbon equivalents (Cequiv) ac⁻¹ of greenhouse gases to the atmosphere. A switch to NT agriculture is estimated to add an additional 196 lb C equiv ac⁻¹ in emissions of N₂O from soil (Smith et al., 2002). The combined offsets reduce the C benefit of changing to NT corn to 32 lb Cequiv ac⁻¹ yr⁻¹. A similar calculation reduces the C benefit for NT soybeans from 330 to 138 lb Cequiv ac⁻¹ yr⁻¹. It should be noted that the value assigned to N₂O emissions associated with the change to NT is uncertain and additional research is needed to better define this number. A fuller discussion of this topic is given in Duxbury, 2005.

Questions about the net greenhouse gas benefit of NT agriculture together with verification difficulties are likely to prevent soil carbon sequestration from becoming a tradable commodity. Nevertheless, increasing SOC has direct benefits for soil health and agricultural sustainability. Indirect effects increasing SOC has direct benefits for soil health and agricultural sustainability. Indirect effects of improved soil health on input use and GHG emissions related to the Dutch cropping system. Agric., Ecosyst. and Environ. 72:9-16.


**Summary**

- C sequestration in soil requires a change to no-tillage
- Annual C sequestration rates average 350 lb ac⁻¹ yr⁻¹
- Soil C sequestration benefits of no-tillage are largely offset by increased emissions of N₂O and CH₄
- Nitrogen management should focus on reducing losses of N from the system as these can lead to additional generation of N₂O
- The basic principles of sound N management are well known and need to be promoted within the context of reducing greenhouse gas emissions as well as increasing profitability
- Organic N sources lead to higher N₂O emissions than inorganic fertilizer N

**References**


The principles of sound fertilizer N management are well understood. These are:

- **Time N applications to the period of maximum crop demand**
- **Incorporate N into soil to avoid volatilization of ammonia from urea fertilizer and animal manures**
- **Use mixtures of nitrate (NO₃⁻) and ammonium (NH₄⁺) N sources to provide rapidly and more slowly assimilated N forms, including mixtures of inorganic and organic N sources**
- **Consider ways to recycle N (in plant biomass) mineralized from organic sources that is not used by the main crop or if drought (or any other production problem) reduces crop yield and N recovery**

A major difficulty in N management is predicting weather; this leads to both over and under fertilization. Recent research has focused on real time N management. The pre-sidedress soil N test is available for maize production and simple models using current season weather to adjust N fertilization rate are being developed.

**Improved Nitrogen Use Efficiency**

Improving N use efficiency (defined as % recovery of applied N by a crop) and reducing N fertilizer inputs in crop production is an important goal, given the energy and greenhouse gas costs of fertilizer N manufacture and the potency of N₂O as a greenhouse gas (310 x that of CO₂). The basic management goal is to reduce N losses from the soil plant system, especially those by denitrification which is a major source of N₂O emissions from soil. Key parts of improving N efficiency are to avoid excessive N applications and to synchronize N supply with crop demand. The latter is more easily achieved when nitrogen is supplied from fertilizer than from organic N sources, where release is controlled by biological mineralization processes.

In general, release of N from organic N sources continues beyond the period of crop production and can contribute to leaching losses and off-site pollution problems, including additional generation of N₂O. Research has also shown that emissions of N₂O from cropland are higher when manure is used as the N source (Duxbury et al., 1982).

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The Organic Farming Response to Climate Change

by Paul Hepperly, Ph.D.

One of the most powerful tools in fighting global warming is sequestering atmospheric carbon. Data suggests a new worldwide urgency for the transition from chemical to organic agriculture.

Organic farming may be one of the most powerful tools in the fight against global warming. Findings from The Rodale Institute’s Farming Systems Trial® (FST), which began in 1981 as the longest running agronomic experiment designed to compare organic and conventional cropping systems, show that organic/regenerative agriculture systems reduce carbon dioxide, a major greenhouse gas. This data positions organic farming as a major player in efforts to slow climate change from increases in runaway greenhouse gases.

Besides being a significant underutilized carbon sink, organic systems use about one-third less fossil fuel energy than that used in the conventional corn/soybean cropping systems. According to studies of the FST in collaboration with David Pimentel, Ph.D. of Cornell University, this translates to less greenhouse gases emissions as farmers shift to organic production. The ability of organic agriculture to be both a significant carbon sink and to be less dependent on fossil fuel inputs has long-term implications for global agriculture and its role in air quality policies and programs. The Rodale Institute drew these conclusions in a white paper that was released in 2003.

Organic shows dramatic increases in carbon sequestration. Since 1981, data from the FST has revealed that soil under organic agriculture management can accumulate about 1,000 pounds of carbon per acre foot of soil each year (1,123 kg/ha/yr metric). This accumulation is equal to about 3,500 pounds of carbon dioxide per acre taken from the air and sequestered into soil organic matter. When multiplied over the 160 million acres of corn and soybeans grown nationally, a potential for 580 billion pounds of excess carbon dioxide per year can be sequestered when farmers transition to organic grain systems.

Figure 1: Linear regression of soil carbon rise with compost. The organic system increases 8% to 15%. Our 2006 deep profile carbon readings on soils receiving compost raises the carbon bar to 40% improvement. The conventional system shows no significant increases in either soil carbon or nitrogen in the same time period. Soil carbon and nitrogen are major determinants of soil productivity.

Since the release of this data in 2003, there are new more dramatic findings. Figure 1 shows a more complete assessment of greenhouse gas sequestration in our long-term trial. In our comparison of soil in organic and conventional systems, we found greater levels of soil carbon in organic systems to a depth of two feet, about 60 cm. Conventional no till (or no tillage where plowing is replaced by herbicides) soil carbon increases in just the first few inches and this effect is extinguished at 3 to 6 inches (5 to 10 cm) or before this level, according to published results from several authors doing long term trials. Organic no till is typically incorporated into organic agriculture production as a supplementary practice to cover cropping; rotation and organic amendment or fertilization.

We take home message is: (i) non till is great, (ii) cover crops are greater, and (iii) combined practices offer the best overall management systems but need greater verification for their interaction. The data demonstrates that organic farming methods increase stored carbon and retain other nutrients and organically improved soils better hold these nutrients in place for uptake by plants. In the process, organic methods reduce nitrate and other nutrient runoff into streams and water aquifers. These findings can be beneficial to all farmers by helping them to increase crop yields while decreasing energy, fuel and irrigation costs.

The 1995 Kyoto Protocol references the potential of soil to sequester carbon without emphasizing its capacity nor the importance of organic agriculture management for this purpose. Since then, researchers have moved forward strongly with investigations to support agriculture’s real potential to sequester carbon. The Rodale Institute’s farm manager, Jeff Moyer, has invented and developed an innovative planter and roller for use in an organic no till system. The Rodale Institute’s farm manager, Jeff Moyer, has invented and developed an innovative planter and roller for use in an organic no till system. (See at www.newfarm.org and Google “No Till Plus.”)

In 2003, The Rodale Institute’s findings show that organic grain production systems increase soil carbon 15% to 28%. Moreover, soil nitrogen in the organic systems increases 8% to 15%. Our 2006 deep profile carbon readings on soils receiving time in both organic treatments; while, no increase is
Local Organic: The Best Approach

Part of the problem in our present food system is its centralized nature. Spinach can grow fine in Pennsylvania, but it usually is shipped from California where it is grown on subsidized water shipped hundreds of miles from its source. In the transformation of this inefficient and often unhealthy system of food, we need to engage consumers in the values local organic food resources represent. Combining organic and local is the strongest tandem concept for improving the food system, people’s health, and the health of the air, water, and soil.

Normal seasonal carbon dioxide fluctuations in the atmosphere demonstrate that plant growth governs major amounts of carbon dioxide, enough to change atmospheric concentration by up to 10 ppm. By increasing plant production, we can reduce carbon dioxide concentrations in the atmosphere. Carbon dioxide levels are minimized in summer when vegetation is lush, and maximized in winter when plants die or go dormant. The fluctuation of carbon dioxide from season to season is about 7 times greater than the yearly average increase in atmospheric carbon from fossil fuel burning and deforestation (1.3 ppm). Plants serve as sinks for atmospheric carbon dioxide. Carbon stored in vegetation, soil, or the ocean, which is not readily released as carbon dioxide, is said to be sequestered. To balance the global carbon budget, we need to increase carbon sequestration and reduce carbon emissions. While carbon can cycle in and out of soil or biomass material, there are methods for building up what are called soil “humic” substances (also known as organic matter) that can remain as stable carbon compounds for thousands of years.

Before forests and grasslands were converted to field agriculture, soil organic matter generally composed 6 to 10% of the soil mass, well over the 1 to 3% levels typical of today’s agricultural field systems. The conversion of natural grasslands and forests around the globe works to elevate atmospheric carbon dioxide levels significantly. Building soil organic matter by better nurturing of our forest and agricultural lands can capture this excess atmospheric carbon dioxide, and preserve more natural landscapes.

Soil, agriculture, and forests are essential natural resources for sequestering runaway greenhouse gases, helping to derail drastic climate changes. The amount of carbon in forests (610 gigatons) is about 85% of the amount in the atmosphere.

Less energy use and consistent yields

With the Institute’s organic no till system, we have shown that diesel fuel needs can be reduced by about 75%, as trips through the field are reduced from 9 to 2. We have shown that high consistent yields are possible for corn, soybean, and pumpkins without chemical inputs.

In addition to capturing more carbon as soil organic matter, organic agricultural production methods also emit less greenhouse gases through more efficient use of fuels. Energy analysis of the FST corn and soybean production system. Dr. David Pimentel show that organic systems use only 65% of the energy input used by the conventional corn and soybean production system.

Background and impact

In 1938, G. Callendar published findings suggesting that the burning of fossil fuels, such as coal, oil and natural gases, would likely increase world temperatures. Since 1958, continuous carbon dioxide measurements on Mauna Loa in Hawaii confirm that carbon dioxide is increasing in the atmosphere at a rate of about 1.3 parts per million (ppm) per year. Atmospheric scientists believe that although several other gases contribute to the greenhouse effect in the Earth’s atmosphere, carbon dioxide is responsible for over 80% of potential warming. NASA scientist James Hansen, Ph.D. tracked temperature changes in relation to past carbon dioxide levels and he correlated the 25% increase in carbon dioxide over the last 100 years with a 0.7° C warming of the atmosphere. A number of models have predicted that at current rates of carbon dioxide emission the Earth will warm 2.5° C in the next 100 years.

According to climatic change models, agriculture could be seriously affected by global warming. It is estimated that 20% of potential food crop production is lost each year due to unfavorable weather patterns (drought, flood, severe heat and cold, strong storms, etc.). The deterioration of weather patterns in North America could have devastating effects on world supplies of basic food grains such as wheat and corn. Climate change models predict that higher temperatures will generate more extreme weather events, such as severe droughts and torrential rains. A shift of 1 to 2° C in summer temperatures at pollination season can cause a loss of pollen viability, resulting in male sterility of many plant species such as oats and tomatoes.

As global temperatures rise, the glaciers and polar ice caps will melt, leading to major island and coastal flooding. About 50% of the United States population lives within 50 miles of a coastline. As coastlines move inland, uncontrolled carbon dioxide levels will directly affect coastal dwellers. If greenhouse gases continue to increase in the next several hundred years, the rise of global temperature is estimated at 7° C, or almost 15° F, and the sea level would rise over 2 meters, or in excess of 6 feet.

Soil organic matter is the key to sequestration. Agricultural and forest carbon sequestration will reduce the dangers that carbon dioxide currently presents to our atmosphere and world climatic patterns. These benefits will complement energy conservation and emission control efforts.

In addition, the restoration of soil organic matter can increase crop yields and reduce the need for synthetic inputs, increase energy resource efficiency, and increase economic returns for farmers, and reduce toxic effects of fertilizers and pesticides on human health and the environment.

Former U.S. Secretary of Agriculture, Ann Veneman, put it this way: “The technologies and practices that reduce greenhouse gases emissions and increase carbon sequestration also address conservation objectives, such as improving water and air quality and enhancing wildlife habitat. This is good for the environment and good for agriculture.”

In 1958, Dr. David Pimentel show that organic systems use only 65% of the energy input used by the conventional corn and soybean production system.
Pimentel’s findings show that the biggest energy input, by far, in the conventional corn and soybean system is nitrogen fertilizer for corn, followed by herbicides for both corn and soybean production. In our organic approach, winter annual legumes provide the nitrogen naturally at a small fraction of the chemical cost in all its facets — economically, environmentally and to our health.

Organic systems are economically viable. Organic farming also makes economic sense. In addition to reducing input costs, economic analysis by James Hanson, Ph.D. of the University of Maryland has shown that organic systems in the

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Organic systems are economically viable. Organic farming also makes economic sense. In addition to reducing input costs, economic analysis by James Hanson, Ph.D. of the University of Maryland has shown that organic systems in the
in the soil – carbon that would otherwise be lost to the atmosphere as a component of the growing greenhouse gas menace.

In conclusion, organic farming can reduce the output of carbon dioxide by 37-50%, reduce costs for the farmer, and increase our planet’s ability to positively absorb and utilize greenhouse gases. These methods maximize benefits for the individual farmer as well as for society as a whole. It is a winning strategy with multiple benefits and low comparative risk. These proven approaches aggregate current environmental damages and promote a cleaner and safer world for future generations.

Creating incentives and taking action

While credits for no till farming are now fully established, to elevate the response to climate change we must extend those credits to organic practices, including cover cropping, compost addition, rotation and other methods. There is a continuing need to develop verified methods and real time estimation of sequestration rates. We believe that this can be achieved by utilizing a combination of process and performance-based standards as a way of confirming and confirming greenhouse gas credits.

Each and every one of us needs to look ourselves in the mirror and ask, “How can I contribute to easing the burden of our collective planetary debt?” In terms of the food system, it can start with consumers consciously eating local, using their own food wherever possible, and even reducing feedlot beef consumption. As individuals, let us start this journey to the future by dedicating ourselves to doing the small things we can do. Then, as a collective, let us work together to do the rest of the job. We can and we must.

Paul Hepperly, Ph.D., the New Farm research and training manager at the The Rodale Institute in Kutztown, Pennsylvania, is an expert in the field of carbon sequestration in organic systems. He grew up on a family farm in Illinois and holds Ph.D. and M.Sc. degrees in plant pathology and crop sciences from the University of Illinois at Champaign-Urbana.

References:

Upon the release of our original findings, a challenge immediately arose from Rattan Lal, Ph.D. in Ohio and Goro Uehara, Ph.D. in Hawaii (see Lewerenz, 2004). These scientists suggested that our estimates for carbon sequestration were too high, based on their personal research experience on conventional no till and reports in the literature showing conventional no till practice might sequester in soil a maximum of only about 200 to 500 pounds of carbon per year. Conventional no till emphasizes tillage elimination. It does not, however, generally use live cover crops between cash crops. Under the organic farming systems, however, tillage is commonly used but live cover crops are normally established as the key biological drivers of the organic system. These drivers are what account for the 2 to 4 times greater carbon sequestration than that determined in conventional no till without cover crops as practiced by the critics. In conventional no till the ground can be covered with dead decaying crop residue for 4 to 8 months, while in organic farming cover crops provide live growing plants on the ground virtually all year long. Veenstra, Ph.D. and co-workers (2006) at the University of California have reported on an experiment in the San Joaquin Valley that evaluated the levels of tillage vs. no tillage and cover cropping vs. without in cotton and tomato cropping systems. This work confirmed our 1,000 pounds of carbon per year soil sequestration level that we obtained under their very different California environment. Moreover, it also confirmed that tillage was of less importance compared to cover crop use in terms of improving soil and increasing carbon sequestration.
Climate Change and Agriculture:
Promoting Practical and Profitable Responses
A Fact Sheet on Production and Mitigation of
Greenhouse Gases in Agriculture

by Jenifer Wightman
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How much does agriculture contribute to the total greenhouse gas emissions? Globally, agriculture is responsible for 20% of the total greenhouse gas emissions. In the United States, the national average from agriculture is 8%. In the case study below, NY dairy contributes about 2% of the state's greenhouse gas emissions.

What are the greenhouse gases from agriculture? Most of the global emissions come from the production and transport of feed (soybeans, corn grain) was "charged" to the dairy. Growing the crops necessary for dairy feed (soybeans, corn grain) was "charged" to the dairy. Optimizing the diet not only improves the efficiency of the cow but also reduces the methane emissions.

Nitrogen, Manure Management and Enteric Methane emissions are the major sources of GHGs. The much greater global warming potential (GWP) from methane and nitrous oxide accounts for 75% of overall farm accounting of GHG emissions as measured in CO₂ equivalents. Nitrogen is a significant source of GHG for two main reasons.

1) Producing commercial nitrogen is a very energy intensive process.
2) After nitrogen is applied to the field, either as synthetic fertilizer or as manure, a certain percentage of it is volatilized off the field as N₂O at the time of application, this is referred to as direct emissions. Indirect N₂O emissions are a fraction of the nitrogen that has leached through the ecosystem to another site. Limiting N in a cow’s diet (and therefore manure) and conserving synthetic N applied to fields reduce N₂O emissions from agriculture.

Enteric methane: The gut of the cow is full of bacteria that produce methane. About 6% of the energy source of the cow is released as methane gas from the cow. Optimizing the diet not only improves the efficiency of the cow but also reduces the methane emissions.

Manure management, methane According to data from the US EPA, 20% of NY dairy manure was stored as liquid/slurry (lagoon) in 1992. This produced 15,067 metric tons of methane (CH₄) and accounted for 47% of NY state dairy manure methane emissions. To compare, dairy spread which accounts for 70% of dairy manure handling, produced 14,056 metric tons of methane and accounted for 41% of the dairy manure methane emissions. Different manure management strategies address different environmental problems. See nitrogen section above for manure N emissions.

Unlike society at large, which contributes most of the anthropogenic greenhouse gases in the form of CO₂ from the combustion of fossil fuels, this study shows that 75% of emissions from NY Dairy is coming from CH₄ (53%) and N₂O (22%) and the remaining 25% is from energy-based CO₂.

~2% of NY’s GHGs come from agriculture; ~90% come from fossil fuel combusted for energy. Mitigate farm GHGs by displace fossil fuels with carbon neutral biofuels?

What can farmers and landowners do to mitigate their own emissions?

When it is all said and done, reducing nitrogen and energy use is the greatest way to save money and also ameliorate the climate change. Improving dairy cow diet will also improve methane and nitrous oxide emissions. Capturing and destroying methane created in manure lagoons would also reduce emissions. However, the greatest opportunity may be to farm for biofuels and displace the emissions from fossil fuel used by other sectors of society.

Summary
NY dairy contributes 6.5 Million Metric Tons of CO₂ e to the atmosphere:
• 5% comes from CH₄, 22% from N₂O and 25% from CO₂.
• NY dairy accounts for ~2% of NY State Greenhouse Gas emissions.

To mitigate emissions from farm activities:
• Reduce nitrogen use
• Avoid anaerobic conditions for manure storage unless you can capture/destroy the CH₄
• Reduce energy demand and increase energy efficiency
• Regulate dairy diet to reduce N released in the manure, and reduce enteric CH₄.

To mitigate emissions created off farm (90% of NY emissions come from burning fossil fuels):
• Crop biomass to displace fossil fuels used by society at large.
• Manage woodlots for maximum forest growth and carbon sequestration and biomass fuel
by the electro-organic bonds between some potently optimistic people. Under the big tent, staff members and volunteers worked with enthusiasm to ensure that the steady flow of attendees had what they needed to enjoy and educate themselves the weekend of August 10 through the 12th.

When Bill McKibben gave his keynote address around eight o’clock Friday night, he told all assembled in a very full Crown Center that the source of hope against some very possible gloom and doom was the strength of the bonds within our communities. To a more cynical crowd, the address might have seemed like a trite pep talk. To the Summer Conference attendees, his words rang true and the gymnasium thundered with approval every few minutes. You could almost count the space between the applause—one-one-thousand, two-one-thousand, three-one-thousand...

The sharing of information and knowledge is, of course, a primary reason the conference is held every year. So many workshops and events were occurring simultaneously that a person would be hard-pressed to decide how to spend his or her time. Presenters held sessions on everything from bio-diesel to maple sugar. Families came with the sensible strategy of splitting up and attending as many workshops as they could individually, then briefing each other at the end-of-day rendezvous. Children’s workshops that were both fun and educational seemed to make the whirlwind weekend easier on the kids.

Interestingly, although the workshops were led by presenters, the information didn’t just flow in one direction. In “Sheep Breeds for Wool (And More!),” Jill Horton Lyons and her husband Jim made a point of asking attendees about their experiences raising sheep. The class was mixed, with about half the people new to sheep raising. Soon, it became clear as we passed around samples of Dorset, Icelandic, Cormo, and other wool, that all our combined knowledge was flowing on currents of engagement. As the workshop ended, people continued their conversations on sheep and wool out into the hall. They exchanged contact information. Fibers of community were strengthened.

The NOFA Summer Conference community will undergo a slight change after this year. After the NOFA Summer Conference community were strengthened.

Hampshire College’s Farm Center Manager, Leslie Cormo, and other wool, that all our combined knowledge was flowing on currents of engagement. As the workshop ended, people continued their conversations on sheep and wool out into the hall. They exchanged contact information. Fibers of community were strengthened.

Hampshire College down the road to the University of Massachusetts, Amherst. Hampshire College’s Farm Center Manager, Leslie Cox, said “Hampshire College is having a problem that a lot of businesses would like to have--too many customers.”

Cox explained the administrative difficulties of over-enrollment. Colleges and universities typically experience a predictable loss of students due to accepted, incoming freshman who decided not to attend. Students who attended classes one year also choose not to continue at the same institution the next fall. Like airlines estimating how to book flights to ensure no empty seats, colleges have to do their best to assure that classes have as few empty desks as possible.

“Ten to twenty percent of the students that you think aren’t going to show up in the fall are actually coming,” Cox said.

Officials from UMass, Amherst were at the conference Friday morning, already finalizing plans for the transfer of the conference to their campus next year. New communities will undoubtedly be formed, new bonds forged that will reinforce the ones woven over more than a decade and a half.

Other partnerships have also given NOFA a chance to expand its presence beyond the sphere of farmers over the years. Whole Foods Market, Stonyfield Farm, Newman’s Own, Greenfields Market, and the First Pioneer Farm Credit AgEnhancement Program were all sponsors of this year’s conference. Though I kept my eyes open for a chance to interview Paul Newman, I’m not sure he was able to make it.

Dan Felton, a “Local Forager” for Whole Foods, was on hand, however, to explain his company’s connection to NOFA. He explained that Whole Foods Market is proud to be involved with the organization beyond being a food and financial sponsor.

“It’s what we’re all about,” said Felton. “Our core values include giving back to the communities we serve and promoting a sustainable lifestyle so that we can all exist.”

He said that their customers tend to want to educate themselves about food, not just shop for it.

“They want to know how what they’re buying hurts or helps the environment. They want to know how we can keep what our grandparents had,” Felton explained, noting that many consumers are becoming aware that only two generations ago the business of food was very different on both sides of the plate. About organic food, Felton described the increasing demand from shoppers.

“Oh, the demand for less ‘fake’ food is growing. When [our customers] buy a box of cereal, they want to know that it’s still a box of cereal,” he said.

As a “forager,” Felton hunts down food products grown or produced locally that Whole Foods can carry. If the farm or vendor can meet the company’s quality and packaging requirements, it doesn’t matter if the vendor can only supply enough food for one or two stores.

“Local farmers can be seasonal, one store suppliers. We definitely want to talk to them, Felton said. Just to make sure he was on the up-and-up, on my way home from that day of the conference, I stopped by the Whole Foods on Route 9 in Hadley. I wanted to make sure that I really could find local produce among fruit and veggies originating from California, Florida, and the southern hemisphere. Although not as much was available as I would have liked to see (perhaps owing to it being just the beginning of August), I did pick up some peaches grown in Deerfield. Other items like locally-produced cheeses were also on display. I’ll be watching to see what they do with their “local foraging” initiative.

Of course, this is just the sort of thing that is good news to people who sat in at the “Food Sovereignty and Food Democracy” workshop that took place on Sunday afternoon. Led by Brian Tokar, director of the Biotecnology Project at Vermont’s Institute for Social Ecology and Bob St. Peter, director of the Good Life Center in Maine, the session focused on the micro. Again, optimism seemed to flood the Adele Simmons Auditorium as the white-board list of obstacles to local control of food morphed into a discussion of point-by-point strategies for harvesting the strength of community.

Despite some obvious threats to local control of food, including the consolidation of the majority of the world food supply into just a handful of multinational corporations, rising oil prices, and the control of the genetic destiny of seeds, headway is being made on some fronts. College and university students, it turns out, are forming alliances with...
local farmers and distributors to demand that more of the meals served in the cafeterias are prepared with ingredients that originate closer to campus. Ben Grosscup, the National Animal Identification System Response Coordinator for NOFA/Mass highlighted some of the stories of towns that have passed resolutions against genetically modified foods, as well as against the NAIS program.

These victories are victories of sustainability—the theme of this year’s Summer Conference. They are precisely the type of encouraging news that Bill McKibben discussed in his address. Quoting from a wealth of sources and information on organic and local food production versus industrialized, far-flung food manufacturing, McKibben described a shift in worldview that is occurring in the public as a whole.

Citing statistics that show local farmers markets to be the fastest growing sector of the retail food industry, he joked that Wal-Mart is sure to be “looking over their shoulder.” He tempered his humor with heartfelt praise for NOFA members.

“Many people in this room,” he said, “are among my real heroes in the world. You’ve built something powerful and something precious over the last few decades.”

He continued, saying that the good news is that, “You’re winning. It’s hard for people who start out on the fringe of things to sense when they’ve moved into the mainstream and when they’ve begun, in fact, to define the future, but that’s where you all are and where we are now, in some ways, all of a sudden.”

McKibben predicts that the age of a return to local food production is at hand.

“Our short experiment with something very odd and different is coming to an end, and it’s coming to an end very quickly. Part of the reason…” he said, “is that you guys have been doing an amazing job, and part of the reason has very little to do with you. The system of industrial agriculture that we’ve built in this country, carried to its logical extension, turns out to be a bizarre disaster.”

If the charge of social energy is rewired to a new circuit in next year’s new home for the 34th Annual NOFA Summer Conference, I sense that this tightly bonded community of organic producers and consumers will have even more solutions.

Hazel Henderson, our “beamed-in” Saturday keynoter, showed in her talk and Q & A period afterward why she is a renowned futurist. Her sharp critique of how corporate and political forces try to control us, and her positive belief that the human spirit will prevail, (as well as her unsolicited words of praise for this humble rag – ed.) revealed her intelligence and thoughtful approach to the admiring audience.

…and from the Conference Co-Coordinator, Julie Rawson:

The numbers were higher than they have been since 1998 and Wendell Berry - 1406 to be exact. Internally, it was a surprise to us to invite Bill McKibben, a local hero but relatively unknown person in the larger world, and see that over the year, due to his incredible work on climate change, he became a real national hero. Bill’s fame and the explosion of organic and local were major factors in the large turnout this year.

It will be hard to say goodbye to our relationship with Hampshire. Jack and I and all of the conference committee members from all of those years have such fond memories of working with the Hampshire staff and being on “our own campus” for the weekend. I do believe, however, that this new relationship with UMass will open new opportunities for the conference to grow (we were getting too big for Hampshire). As organic goes mainstream, it is curious that we are moving to a mainstream university to house our conference. The folks at UMass have been extremely gracious with us, acquiescing to all of our off-beat requests. I know that many of you are concerned that we will be swallowed up there. We will be working quite closely with the staff to centralize all of our events, workshops, camping dorms, dining, exhibits, as
snugly as possible so we can still feel the sense of community while we are there.

Do you want to serve on the NOFA Summer Conference committee? We meet 6 times per year, and members receive free registration and housing and two meals. We have several paid jobs opening up for this season. Ads/exhibits/sponsors, to be consolidated with food donations, will pay around $3300. This is a crucial fundraising job for the conference that takes a person who likes to solicit and to talk to folks. The graphics job is open also, a 50 hour job ($550) that takes responsibility for our signage, banners and clothing sales, logo design, etc. The children’s conference coordinator job is also open with a 120 hour position that manages the kids all weekend, gathers workshop leaders and coordinates the teachers. Contact me at (978) 355-2853 or julie@nofamass.org if you are interested in applying for one of these positions. Our first meeting will be on Sunday, October 28 from noon to 5 pm at UMass in Amherst.

Many thanks to the workshop presenters, the exhibitors, advertisers, and sponsors, the hard working top notch staff and all the participants who make the NOFA Summer Conference an integral part of our lives each year. It is truly an honor to work with all of you to put on this event.
by Bill McKibben
transcribed by Marianne Radke, Julie Rawson, Becca Buell, and Jack Kittredge

Thank you, thank you all, it’s great fun to be here, but the main purpose of after dinner speech is to give oneself time to digest before the dancing begins. I won’t be insulted if you nap a little bit, during this talk. But it’s a great honor and a great pleasure for me to get to be here.

As I was driving down today I was just kind of thinking about all of the images over the years that NOFA and organic farming in this part of the world conjure up in my mind, and all the good friends and all the good times from the all local Berkeley College dining hall at Yale to good times up in Unity, Maine, to the food project outside Boston, to all our old and dear friends at Sam and Elizabeth Smith’s Caretaker farm, to long evenings in the Grange Halls in northern NY, to all the glories of Organic Vermont where I hang out at the moment.

I was thinking just about last week being camped with a bunch of kids who I’ll tell you about in a while at Nesenkeag Farm, in Litchfield, New Hampshire, talking with Eero Ruutila, the farmer there. He was talking about being a NOFA Certifier at the very beginning of all this long ago. All of those people and many people in this room are among my real heroes in the world. You’ve built something powerful and something precious over the last few decades, which leads me to the first thing that I want to say tonight.

I’m starting tonight with the very good news -- which is that you’re winning. It’s hard for people who start out on the fringe of things to define the future, and when they’ve begun. in fact, to define the possible way you can in this country -- then it is the same way that we’re used to thinking of our economy becomes more real and more other spheres and spread pretty quickly. The other side, the system of industrial agriculture, has now in some ways, all of a sudden.

And change is coming on the offensive, whether you know it or not, now we are on the upswing. Y’all are no longer like.

In Vermont we’re still losing dairy farms because commodity dairy is a pretty hard business to make a go of. But in Chittenden County, Vermont, around our biggest city, last year the total number of farms grew 19 percent. It’s not all people who are making a full time living off of it, but it’s all people serving that local market, and there’s way more demand. There was an article in the Burlington Free Press a month or two ago saying that the number of people wanting CSA shares couldn’t get them at least 5 or 6 or 7 hundred families. You know there’s lots and lots of room for that to grow.

Farmers Markets are the fastest growing part of the food economy in America. Sales are up to 15% a year. It’s growing a hell of a lot faster than Wal-Mart is growing. (Audience laughs) We haven’t quite caught up to Wal-Mart, but they’re looking over their shoulder!

One way you can tell that you’re winning is that the other side is starting to get scared. There was an Op-Ed piece in the New York Times three days ago where someone from the New Zealand Lamb Industry was trying very hard to argue that it made more sense in terms of fuel use to be shipping lamb from New Zealand, than growing it locally. They were comparing it, interestingly enough, to the kind of industrial lamb that you can grow in this country. When they did the calculation that way -- the worst possible way you can in this country -- then it might well work, but of course that’s not the comparison people are making anymore. People are starting to understand that lamb can come from their neighbors, and that all food can come from the people around us the way that it has for all of American history until fifty years ago and for all of human history until fifty years ago and for eighty percent of the people who live on this planet now.

We have hit nadir with our food system and now we are on the upswing. Y’all are no longer on the defensive, whether you know it or not, you’re on the offensive. And change is coming your way and reacting to you and following your lead. Now, this is still the beginning of that trend and so some of the evidence for it is mostly anecdotal. You can tell because every time you pick up a magazine in this country, a food magazine or a lifestyle magazine or anything, all of the articles all of a sudden are about local food. And about new ways of eating and about new ways of thinking. You can tell because, when I was talking on the phone not long ago with my friend Jack Lazer of Butterworks Farm up in northern Vermont, one of the great farmers in all of New England, he said that his only problem at the moment was that there were so many localvores now in Vermont. Word had gotten out that he made forty or fifty gallons of sunflower oil and they were sort of beating down his door, demanding that he sell them a gallon of local cooking oil.

But it’s not just anecdotal. The numbers are starting to show the same thing. If you look at the places where this movement is strong, and where it sunk its first roots, in the last agricultural census in the state of Oregon, the number of farms doubled. Its been a long time since anyplace in this country has the total number of farms going steadily up instead of steadily down.

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Our short experiment with something very odd and different is coming to an end. And it’s coming to an end because of the reason it’s coming to an end is that you guys have been doing an amazing job, and part of the reason has very little to do with you. Which is the other side, the system of industrial agriculture that we built in this country, carried its logical extent, turns out be a bizarre disaster. (Laughter). We’re only now beginning to realize that what you do seems normal, and that seemed normal to America for a while. But we’re beginning to really understand what the cost of that is.

I got to share the stage earlier this year with Michael Pollan, who’s another old friend of mine and who has been doing this work for a long time. Journalistically, he was saying, all of a sudden, he’s no longer having to explain to his editors what it is that he’s talking about. People had begun to really catch on, begun to catch on the idea that industrial agriculture has ruined rural communities, that it has caused unbelievably environmental damage, which I will get back to. And that it has left us a nation of puffy people.

Demographers say that the life expectancy in America, in the next couple of years, may actually begin to fall, for the first time in this century, because we have become so unbelievably unhealthy on the diet that we eat. One in three people born in New York City this year will develop type 2 diabetes in the course of their lives. It’s the new normal in the industrial food system that we have developed. In fact, that industrial food system provides a pretty good picture of itself in the animals that it raises. Just like the swine that it raises -- two and a half million at a time in huge corporate farms -- it’s extremely productive, but its increasingly unable even to move about.

There’s a sense in which industrial agriculture is being revealed all of a sudden to be something like the old Soviet Union -- rotten from within, entirely dependent upon subsides from the centralized element, and kind of waiting for a shove to collapse. A shove which has been coming from a lot of different directions -- probably most importantly from the fact that it can no longer rely on the absolutely cheap input of fossil fuel very much further into the future.

Now it won’t come down in a day, it’s a pretty big and pretty powerful model. If the Soviet Union had nuclear weapons, this system has lobbyists. They’ll be able to delay its fall. This year’s Farm bill was not all that exciting or interesting. It will cushion for a while longer the sort of current way of doing business. But this fall farm bill activists were actually looking at it and commenting on it, taking action on it and beginning to really think about and challenge it, and it won’t be long before even the central government of this country is beginning to catch up to this message and beginning to spur this transition.

It’s happening and its happening fast. And one of the best pieces of news is, because of this sense of movement toward local, real, food, we’re now seeing that idea start to spread to other spheres and spread pretty quickly. The idea, the possibility of localizing large parts of our economy becomes more real and more possible with each passing day. Not just in food, look at spheres such as energy. Just in the same way that we’re used to thinking of
We can’t do that, it’s not an option anymore. It’s not an option in the ways that we have gotten used to. That sense that we couldn’t depend on things to go the way we think they will last to another generation. It’s upside the head in a lot of ways for Americans. That sense that we couldn’t depend on things to go the way we think they will last to another generation in the ways that we have gotten used to. That’s why we’re rolling forward for another generation under the illusion that we’re being to desperate to get rid of.

So that vulnerability and that insecurity is one part of the reason why we are moving slowly and quickly in the ways that we have gotten used to. There’s another reason too, and its just as interesting, and in a way, more interesting and maybe more profound. The one real, maybe one biggest, lie of the kind of growth economy of consumer capitalism that we’ve built since WWII in this society, the one real lie is that it was going to make us spectacularly happy. And it turns out as we begin to look at it -- this was part of the burden of a book of mine, Deep Economy -- that that just isn’t true. For a long time, we had no way of assessing this. Academics stayed away from the business of trying to decide whether or not people were happy, even though it seemed like a kind of basic-bottom-line question, maybe the basic-bottom-line question. It also seems too soft for them. They had no way to know, in any confidence, that if you asked people: “Are you satisfied with your life?” that the answer would mean anything. It was viewed as just too wrong a question. Instead we were left with the economist’s proxy: the concept of utility, the idea that you could tell what satisfied people by what they bought. And that served as our basic proxy in this era of Neoclassical economics.

It’s the reason, more than anything else, that we fixate on the idea that we have to grow the GDP at an enormous rate each year, because surely it has something to do with the world getting better and better. In the last few years, academics have actually tried to figure out whether that’s true or not. And it actually began with the economists, including some pretty prominent ones: Daniel Kahneman from Princeton for instance, who won the Nobel four years ago in economics.

Big economists began to try and study this question in grim dismal ways. The first study that Kahneman talks about in his big book on this involved interrupting people every ten seconds while they were undergoing colonoscopies to ask them how they were feeling. “How are you feeling now?”

But over five or six years, economists, psychologists, and sociologists did an immense amount of research and began to build up an impressive body of data to show that in fact subjective sense of wellbeing was a robust phenomenon. If I asked you, Are you satisfied? The answer you give correlates with a lot of things we can measure: how people view you, certain things in your brain chemistry that are scientifically verifiable.

Once people had decided that this was a question worth asking, then they could look at what data there was lying around. And some of it is pretty powerful stuff. For instance, every year since WWII, the Gallup polling firm in this country has asked Americans flat out, “Are you satisfied with your life?” The number of Americans who say, “I am very satisfied with my life,” peaks in 1956, and goes slowly but steadily down ever since. Barely a quarter of Americans will make that claim, which is very odd because in that same fifty-year period, our average standard of living, the amount of stuff that we have, has almost tripled. We live in infinitely bigger houses, we take far more vacations, we can get any food on earth, any variety, music, entertainment, that the planet can be bought and paid for instantly, and we have appliances that no one had ever thought of fifty years ago.

If the economy worked the way that we had intuitively believed it does, those two curves should go in something like the same direction. They wouldn’t go exactly the same way, but at least the same direction. The fact that they diverge like that is very odd and very unsettling. And the question is, why are they diverging? Why would we become less satisfied with our lives? And the answer, so far as we can tell, is not more coincidence. It is that past a certain point, there are things inherent in affluence that lead to a kind of dissatisfaction. And the thing that’s mainly inherent in that affluence is a loss of connection with each other, a loss of community.

Think about what Americans spent money on since the end of WWII. More than anything else what we spent money on was building suburbs - it’s builders built bigger bigger bigger bigger. In the year 1900, the average American lived on the same acre with eight other people. By the year 2000, the density of the new subdivisions of America was two people per acre. There’s just less chance that we are going to run into each other, just mathematically in the course of the day. It shouldn’t come as a huge surprise to us that the average American has half as many close friends as we did fifty years ago. There’s just less chance that we are going to run into each other, just mathematically in the course of the day.

And it turns out that the same phenomenon can be observed if you look for it, all over the place. Past per capita income of about $10,000 a year, that is the income that a family of four, there’s no longer any correlation in any place around the world between increase in income and satisfaction with life. The results just scatter all over the place after that. The correlation that does exist when you’re very poor, and have your basic needs met by more, disappears once you’ve reached that point. Instead you begin to hunger for something else.

Now, of course the trap is, once you’ve reached that line, it’s hard to go out of it. You get more and more used to the kind of privatized life that we now lead, the sort of hyper individualistic life that Americans have built. Maybe some of you saw a story in the Times about two months ago, that I thought was one of the most moving stories I’ve seen in a long time. It set out to answer the question of what’s in those houses the size of junior high schools that people have recently built. It turns out that one of the things that’s in them -- and not just in them, but now standard in upscale subdivision housing of just the kind that is currently causing our credit markets to collapse -- is dual master bedrooms. That is to say the new trend is, the husband snorers, or the wife steals the blankets or whatever, and the way that we solve this is to add nine-hundred square
feet to the house. There’s something kind of tragic about it if you’ve spent much time in the developing world, and you know if people are lucky enough to have one bed in the house, there’s going to be four people in it and nobody is worried about who’s snoring. There’s also something kind of tragic about it and lonely about it. This idea that in the most affluent society that there ever was on the face of the earth, people are hunkered down in their little caves, peering out across the hallway at their mates. There’s something kind of horrifying about it.

And I think what it means is that here too we’ve reached a kind of nadir and we’re beginning to go the other direction. Why are people going to Farmer’s Markets in such huge numbers? Part of it is because they want delicious food, good food that’s good for them and local food and they understand the environmental benefits and all that. But that’s only part of it. A couple of years ago, a pair of sociologists followed shoppers - first around supermarkets, and then around farmer’s markets. You all have been to the supermarket, you all know that drill. When they shopped forever. They have gone to the supermarket, you all know that drill and talked among themselves, and brought food there, and taken food home. And it corresponds to Farmer’s Markets in such huge numbers? To the supermarket, you all know that drill and talked among themselves, and brought food there, and taken food home. And it corresponds to what we will see in the course of this century. It is statistically significant. Ten times: an order of magnitude more interchange and connection and involvement in community.

It’s not like it was a different way of picking up your carrots from one week to the next. It was an entirely different human experience. And not surprisingly enjoyable, because it’s the same human experience that people have been having since agriculture began. That’s how people have shopped forever. They have gone to the supermarket, you all know that drill and talked among themselves, and brought food there, and taken food home. And it corresponds with something deep inside of us. Which is why we like that.

So, in one sense, it seems to me that all of the news is good. That we are beginning to figure things out, that this kind of odd experiment in the last fifty years of this country has seen the kind of furthest reach of its penetration and now its time for the pendulum to swing slowly and patiently in the other direction. And for us to kind of resume how normal human life began. Paul Hawken, in this magnificent new book, Blessed Unrest, talks about how all around the world, in one area, in one thing after another, people are figuring this same kind of work, bringing us back from these bizarre excesses of corporate and globalizing and dehumanizing systems. And it’s very, very inspiring to read it and it makes one profoundly optimistic in all sorts of ways.

But, and you knew that there would be a but, there is one deal breaker, one game stopper, and that’s what I will be talking about for the rest of this talk. And that’s the one problem that’s so large and convincing on us so fast, that unless we figure this out, and do it very dramatically, and very quickly, there’s not going to be a way for that pendulum to swing smoothly back in the direction that it needs to go for us to resume the normal course of human affairs.

And here I am talking about climate change, about global warming. About the field where I have spent the last twenty or so years working. I won’t belabor the science with you tonight. Suffice to say that really the only thing that has changed in the twenty years since I began this work is that we understand now that both the magnitude and the pace of this problem is larger than we had guessed. And that’s because we didn’t fully understand the system twenty years ago, the physical system of the whole earth because no one had really done this experiment before. So far, human beings on this earth have increased the temperature little more than one degree Fahrenheit, about 59 degrees to about 60 degrees, global average. We would have predicted, twenty years ago, that that would be bringing us just now to the beginnings of the greenhouse era. And that the real destruction would still be another degree, and hence another few decades in the future.

It turns out the system was more finely balanced than we realized. And that there are all kinds of positive feedback effects that start happening once you tip the system a little way. And the scale of those feedback effects turn out to be truly enormous.

Just to give you an example, and there are many examples, but one that is the easiest and most obvious is what’s going on as the sea ice begins to melt in the arctic. This is not the big pack ice over Greenland or the west Antarctic which I’ll talk about in a minute. That ice, when it melts, will raise the sea level. But that pack ice, that extent of white, which you see from any satellite picture of the earth, that’s been there for a very long time, that’s melting extraordinarily fast now.

There’s a story that came out today on the wires about this years extensive melting, that scientists who last year had reported by far the largest extent of that melting , said today that this year’s melting, in the words of one, was something truly incredible and beyond anything we would have thought possible. We are now thinking that by summer 2020, there may be no ice in the arctic. That those satellite pictures will not show a white cap on top of the planet, but merely blue in the summer.

And what does that mean? Well one thing that it certainly proves is that the planet is warming, but it also helps amplify that warming. There used to be a beautiful white mirror across the top of the earth that reflected 80% of the sun’s rays back out to space. They hit the ice bounce. You all know how bright it is on a sunny winter day. When you replace that with blue water, it absorbs eighty percent of that incoming solar radiation. And it just begins to amp up this reaction, and there are similar things going on in forests and in permafrost, and on and on and on, and in all of the big physical systems of this planet, and all taking us in the same direction.

The effects are beginning, not beginning but are showing up now. The effects are beginning very dramatically and very quickly, there’s not going to be a way that the planet can swing smoothly back in the direction that it needs to go for us to resume the normal course of human affairs.
their fingers crossed, okay, because it wasn’t ready for prime time yet. There are some in this room who were willing to be down in the basement with a wrench figuring out how to top off the batteries; but it wasn’t going to happen on the kind of scale that we needed. But now it can, now we know – I mean there was a story in the Evening Argus last week about how the wind along the side of the ridge, left-wing, is going. Last week talking about people who have figured out that with wind created across Europe - because it is always windy somewhere in Europe – they can provide enough power for the whole of the wind alone. It’s not the technology, it’s not the engineering, that’s lacking. What’s lacking is the political will. And my work now increasingly has less and less to do with writing and more and more and more to do with trying to figure out how to summon that kind of political will quickly enough to make something happen.

Let me tell you a couple of stories, just quickly. Right about this time last year I had been in Tibet and in far northern India, in the Himalayan portions of India, doing a story for National Geographic and for Harper’s, some reporting. Of course probably a lot of you have been in Tibet once upon a time, and as you know almost every time you turn a corner in the road you see in the distance some pillar of burning themselves along the road, doing the full prostration one after another on the six or eight or ten month trip to Lhasa or Mount Kailash or wherever it is that they are going. And then I was in, as I say, rural India, in a village in India, where if you are paying attention it’s impossible not to keep coming across the tracks of Gandhi and the Gandhian movements and that kind of legacy.

When I got back to Vermont, I was thinking, I think that all those images were in my head in my real despair about how little we were doing political around this problem – and remember this time last year we still had James Inhofe of Oklahoma chairing the relevant Senate Committee, a man who invited as the only witness to last years Global Warming hearings in the US Senate, the novelist Michael Crichton to explain that global warming was a hoax. In my despair about all that, I just said: ‘Well, I have to do something even if it’s sort of pointles.’ So I called up a couple of my friends, both of whom were University of Texas sorority girls, and I went to see John Alder and said: ‘Look, let’s walk up to Burlington – I was thinking about all those pilgrims – and we’ll do a sit-in on the steps of the Federal Building and we’ll get arrested. There will be some kind of story in the paper and it’ll maybe not do anything, but maybe it’ll do something. But at least we will have had the satisfaction of having taken some action, you know, kicked off something and from little acorns grow great oaks and on and on and on.’

John’s a writer like me and a good guy, and said: ‘Okay, I’ll come with you.’ We talked to a few more people and thank God one of them, doubtless one of the young people from Middlebury where I work, had the good sense to call up the police in Burlington and ask what the hell we were planning to do this. The police said nothing would happen; you can sit on the steps of the Federal Building as long as you want. As I said before, they kind of implied that we would need to burn down the Federal Building. So we calculated the carbon emissions from that – and quickly recalibrated and instead just started telling people we were going to do this walk, this kind of pilgrimage, up the west side of Vermont.

We left on a Wednesday. I guess, from Robert Frost’s old summer writing cabin in the Green Mountains because we liked that most clichéd of all high school English poems about the road not taken, you know it seemed very apropos. And for five days we walked and we camped at night in farmers’ fields, wonderful, some of the time. We got to a new farm in Ferrisburg where a fellow was growing grain and just built a clay oven and he was happily making pizza for however many of us there were there. The few first days it started with about three hundred of us who made it a kind of festival. Wonderful. Later, when we got to Burlington, there were about a thousand people marching, which for Vermont is actually a lot of people. It was the biggest political demonstration in Vermont for a very long time. It was very interesting and very instructive. It was more than enough people to get every single person who was running for office in Vermont last fall – all our federal candidates – to come meet with us. And not just people you would expect to be champions like Bernie Sanders. In fact Bernie loves organizing more than anything, activism of all kinds, and came running up to us as we were coming into Burlington, saying: ‘This is great, this is great, I’ve never seen this many people, this is so great, what is this about again?’ And he’s turned into the greatest champion on this issue in the US Senate.

But we’ve got all these girls here and then we said, look, we don’t want to just hear that you are sad about global warming. Wonderful, no more of these things we think would be good to do: ‘we’d like to see carbon emissions in this country cut 80% by 2050, and we’d like to see 40 mpg cars soon, and before you talk to the thousand of people gathered here, we’d like to give you a chance to sign on to the bottom of this big sheet of cardboard that we’re carrying around. And we slightly loaded the dice by giving the magic marker to the youngest kid who walked all five days, all fifty or sixty miles with us and he handed it to each one of them as they got up. And they all signed including the conservative Republicans who were running for office. There was a woman named Martha Rankin who was running on the GOP ticket for Congress, who actually came very close to winning. And she had said in her announcement speech two months before that she wasn’t sure that global warming was real and that more research needed to be done. It turns out, and this is something to really understand, it turns out that more research that needed to be done was how the people would walk across Vermont who believe this. Bless her heart. She signed onto that thing and then she campaigned on it all full on. In fact, her TV commercials showed her signing it; they Photoshopped out all the other candidates.

It worked the way it was supposed to work. And it was great, by the way, to have this support of the Vermont agricultural and farming community all the way along. And to have people flooding in on this day from places like the Intervale, one of the great cases in this entire nation, on 120 acres in the center of Vermont, growing something like 10% of all the fresh food that people in Vermont’s largest city eat. Not a fringe, not an experiment, not a pilot, absolutely at the center of how the world is going.

The only depressing note was to pick up the paper the next morning and read a story saying that that thousand people who gathered on the edge of Lake Champlain might have been the biggest demonstration about global warming that had yet taken place in this country. At first that seemed unlikely but I thought about it and indeed I think it was sort of true, that we built a kind of super structure of a movement around climate. We had bright economists, we had young people coming up with policy solutions. The only part that we had forgotten was the movement itself, the people who had to put the necessary pressure on.

So we decided to see if maybe we could do this same thing outside of Vermont. Is it a goofy place obviously, could we do it elsewhere, too? So on the 10th of January of this year, we (and in this case we means me and six kids who are just in the process of graduating from Middlebury, who are earning $100 a week to do this work), we set up a website called StepUp07.org. We asked people: ‘Would you organize demonstrations in your community on April 14th – which was 12 weeks away – to make this same demand: 80% cuts in carbon emissions by 2050?’

We had no money and we had no organization. We didn’t have a list of people to start with. So we just started emailing all people that we knew and asking them to tell their friends to do the same thing. We had some low expectations because of that. Our secret goal was that we would organize 100 of these demonstrations over the course of those three months and that would be 100 more than there had been before. But instead the thing just went off, not in great emails to each other, but I think in great thanks to the fact that there were people all across the country who were haunted by this thing and yet had no idea exactly what to do about it. No idea, it’s such a big problem, no idea there were more people in the crack and start jimmying. And all we did was say: ‘Well, look here’s the crack that you can start jimmying.’ People responded unbelievably. All kinds of people.

I knew that this thing would be reasonably successful seven or eight days into it. I got a picture in the mail and the email from the University of Texas in Austin from a sorority house, the Alpha Phi sorority chapter at the University of Texas in Austin. There are 180 University of Texas sorority chapters and you know exactly as you would expect. There isn’t a person in this room who could smile as widely as any of those girls. They had a big sign that said “Step Up Congress Cut Carbon 80% by 2050”. And they appended across the bottom a little note: they said “we wanted to show you it wasn’t just hippies who cared about this”. I say God bless you because that is exactly right. It is hippies, people like you and me, who think about the world a little off kilter, who start things. That’s who starts things. But it’s sorority chapter members, one of the great things that Episcopal congregations, that finish them off, that move them so far into the mainstream that they can’t be ignored or marginalized. And that’s what began to happen over those ten or eleven weeks. It was unbelievable to be getting emails everyday from churches, from just every kind of people.

By the time we finished on April 14th there were 1400 of these demonstrations taking place simultaneously. It was so much fun to watch! We gathered in Washington that night. We rented out a room in the Smithsonian and invited all the people we could find around Washington because we wanted to show them this sort of thing, the results of this thing. So people were emailing, uploading pictures all
day long of their demonstrations on our website and all these dignitaries are streaming in and the seven of us could hardly tear ourselves away from the computer screen because the pictures coming in were so beautiful, so moving.

We’d planned to think about the geography of their places to, their place to talk about hurricane places where they were that would make this sacred, and so they did. From Key West, where the only coral reefs in the continental US are, they didn’t do a normal demonstration. They got tons of people in scuba gear and went down off these coral reefs and had an underwater demonstration with a big sign “Step It Up” to make the point that those coral reefs aren’t going to be there in thirty years if that water temperature keeps warming. Already we’re seeing a leading of half of coral each year. The video on the website of them demonstrating is so gorgeous. There’s people on every side of this big gorgeous fish just swimming in and around in the middle of this thing, kind of joining in.

A little further up the coast in Jacksonville, Florida, which I’ve never been to but I suspect is somewhat different from Vermont, the sacred place they chose -- because it’s where all the community gathers in the fall for big tailgate parties and things -- was the parking lot of the Jacksonville Jaguars NFL stadium. And what did they do? They rented a crane and they winched a guy twenty foot up into the air and they said: that’s where the ocean is going to be if we don’t step it up.

In New York City there were thousands of people in blue shirts who got down in the Battery, Lower Manhattan, and linked arms made a kind of sea of people to show where the new tidal line would be. Out West people skied in formation over the dwindling glaciers in the Rockies that aren’t going to be there much longer. Glacier National Park’s not going to have any glaciers by 2030, really soon; they are melting really fast. It was amazing how people could figure out how to harness the genius of the place and make the point. It was amazing to see that in many respects this set of demonstrations actually began to do a little bit of work, to actually have some effect. When we started, 80% cuts by 2050 was seen as a very radical idea. They were saying: people who were advising us to pick something more realistic so we can claim victory in the end or whatever. Well, that would be good, but actually everything is going to melt unless we get those cuts, so we’re going to do this.

About eight weeks into this thing, before it even happened, we were starting to get calls from the different presidential campaigns, talking to John Edwards’ people back and forth. Pretty soon we got a call from them saying: ‘Look, at our next energy policy when it comes tomorrow, I think you’ll like it.’ And indeed when it came out, the first one to do a real energy policy, its centerpiece was cutting carbon 80% by 2050. Within two weeks of the end of this thing, both Hillary Clinton and Barack Obama had signed on to the Congressional Sandeep legislation in the Senate calling for the same thing, as co-sponsors. It has become part of the debate, but mostly because we really believed in this movement that you all helped to launch. This idea of globalism, part of the community as the place where one takes the stand and does what needs to be done. What we wanted to do was try to figure out how to make that community politically powerful on a larger level, too.

They don’t call it Global Warming for nothing. We need to figure out how to do this in Washington and around the world to get the change we need in time. One of the tools we now have to make that happen is the internet, that possibility of connections. It’s incredibly good to have the young people who know intuitively how to use those technologies in powerful ways. So that’s why we did it, spread out like that. That’s why we need to do it spread out like that again. Why we need you.

I think all the time about a slogan, Todd Murphy, when he started the Farmer’s Diner in Barre -- now it’s down in Quiche, Vermont -- the Diner tries to get most of its food from nearby. Not an easy task. You need bacon, which is coming in from the Midwest. But he started there was nobody in Vermont raising pork commercially. You raised pork two and half million head and swine at a time on a single farm in Utah, a farm that produces more sewage in a day than the city of Los Angeles. That’s really sort of what our system at the moment is about. But anyway, forget about the swine. He put on the top of his menu the motto “Think Globally, Act Neighbiorly”, which seems to me a good credo for the moment in which we live.

Act Neighbiorly because it makes ecological sense and Act Neighbiorly because it makes human sense. The highest cost of cheap fossil fuel wasn’t global warming, the highest cost at least for us may have been that it allowed us to be the first generation of humans that there ever were that didn’t need our neighbors for anything. If you have a credit card and telephone you don’t have a need for anybody. It turns out that is a horrible way to be a human being.

I have no absolute guarantees to offer you that it’s all going to come out okay. I mean, I wrote a book called End of Nature. But for the moment anyway, I am incredibly charged up and optimistic and frightened as hell. It is possible, in fact that we are going to do it, but it is going to be extraordinarily close. Science has given us a very short window to do what needs to be done. It’s going to take immense effort to catapult our society, our planet through that window before it shuts. We’re going to do it, it’s going to be close, we need every one of you doing all the things you’re already doing all day long but also doing this kind of political work. It’s really important to screw in the new light bulb above your kitchen table. It’s even more important to screw in the new congressman to make sure that we get the work done that needs to be done. So thank you all enormously for the work you have done. You have turned the corner in this society. You have started the work of rescuing America from the trap that it had fallen into. So thank you for that and thank you in advance for all the work you are going to do in the years to come. God bless you.
&& then reused. If a ham did not cure properly or our modern day over doing of “wash your hands!” production vats. I can’t help but wonder if this led to weeks before, in cleaning out the barrels, the old shoveled aside and into barrels could sit for many. The production line keeps moving. Waste that gets equipment mean serious injuries and even death.


368 pages $8.95, paperback review by Sandy Snyder

The Jungle is about the Jungs and how awful conditions were in the meatpacking industry, but I had never seen the book. It seems Upton Sinclair wrote a very long book, but in the end edited it down to the more essential elements about the meatpacking industry. Then in 1980 a bunch of papers were found in an old cellar near Girard, Kansas. The finder realized they might be valuable and took them to Kansas’s Pittsburgh State University where Gene De Giusepp, the special collections curator, cleaned and studied the papers. He eventually put together a more expanded edition of The Jungle which he published in 2003. The main character is Jurgis Rudkos who came to America with a group of his friends, including his future bride.

I liked the book for many reasons. The opening chapter describes a wedding not unlike the Ukrainian weddings I attended as a child. Descriptions are well written and colorful. Ona, the young woman who came to America with Jurgis and her family, had now become old enough to marry Jurgis and, of course, eventually they have a child.

It really caught my interest that when the child was born the doctor wanted the mother to stay home and nurse the child for the health of both mother and child. The mother did not, citing the need for money.

The family and Jurgis were decent, hard working people who tried their best to make intelligent choices, save money, and buy a home. Milk was described as thin, watery, bluish milk, but because it was milk from weak animals spoiling…(NOT because milk “spoils” if it is truly weak.)

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NOFA Organic Land Care Program announces a new Program Manager

The NOFA Organic Land Care Program has announced the addition of Ashley Kremser to its staff as Program Manager. The seven-year-old NOFA Program is a collaboration of the Connecticut and Massachusetts chapters of the Northeast Organic Farming Association. It is the nation’s leading organic educational and accreditation program for land care professionals.

Originally from San Juan, PR, Ashley moved to Bronxville, NY in 1997 to attend Sarah Lawrence College, graduating with a B.A. in Social Sciences. Ashley has been involved with a variety of non-profit organizations and worked for a number of years with the Connecticut Association of Community Organizations for Reform Now (CT ACORN) where she was a community organizer motivating individuals to take action around issues ranging from health care to predatory lending. Within a year of starting with CT ACORN she was promoted to head organizer, in charge of Bridgeport organizing from Brookfield to New Haven. Ashley is fluent in Spanish, currently resides in New Haven, CT and volunteers for CitySeed at their farmer’s market in Wooster Square. Ashley will also be responsible for the organic land care accreditation course in Connecticut and for bringing the NOFA courses and program to other states.

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NOFA’s new Program Manager will serve as the central communication point for the Organic Land Care Program, respond to inquirers, and run the day-to-day operations of the program. Ashley will also be responsible for the organic land care accreditation course in Connecticut and for bringing the NOFA courses and program to other states.

But the book was heavier still on the overwhelming pleasures of eating locally. Meals that featured wild mushrooms, local cheeses, fresh blueberry pies and the like were described in tempting detail. How the ingredients were gathered, and food prepared were described equally beautifully, reminding us that lovingly-prepared food tastes alive. And each chapter opens with a tantalizing recipe-of-the-month.

Ashley Kremser
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organic management. For more information please visit www.organiclandcare.net. The NOFA Organic Land Care Program has announced the addition of Ashley Kremser to its staff as Program Manager. The seven-year-old NOFA Program is a collaboration of the Connecticut and Massachusetts chapters of the Northeast Organic Farming Association. It is the nation’s leading organic educational and accreditation program for land care professionals. Originally from San Juan, PR, Ashley moved to Bronxville, NY in 1997 to attend Sarah Lawrence College, graduating with a B.A. in Social Sciences. Ashley has been involved with a variety of non-profit organizations and worked for a number of years with the Connecticut Association of Community Organizations for Reform Now (CT ACORN) where she was a community organizer motivating individuals to take action around issues ranging from health care to predatory lending. Within a year of starting with CT ACORN she was promoted to head organizer, in charge of Bridgeport organizing from Brookfield to New Haven. Ashley is fluent in Spanish, currently resides in New Haven, CT and volunteers for CitySeed at their farmer’s market in Wooster Square.

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A Word to the Wise (or “Read & Weep!”)

Waterpen Farm News, June 20, 2007

Dear Local shareholders, We have sad news from the farm. We have diagnosed damage from herbicides on about half of our farm fields. It came from our hay, which we get from a local farmer who we have gotten hay from for 5 years. The likely herbicide is called Grazon, which was sprayed on his hayfields to kill broadleaf plants in the field.

Unfortunately, we weren’t aware of the possibility of herbicides being sprayed in hayfields. We have been mulching with hay for 7 years, and the farm we bought before had hay mulch for over 25 years, with only positive effects. The man we bought the hay from was also unaware of the long-term effects to us of having this chemical sprayed on his fields. It stayed preserved in the round hay bales that we had stored for the winter, and then we mulched about half of our farm’s acreage - our first 2 tomato plantings, first cherry tomatoes, 2 squash plantings, 4 cucumber plantings, and all our peppers and eggplant.

The herbicide contains picloram, which is a persistent plant growth regulator. We are still waiting for the lab results, but our Virginia extension agent, Mr. Dow, the chemical manufacturer, says there is no evidence of picloram in the chemical sample. However, he also said that we should not be spraying picloram in hayfields - it is not labeled for that purpose. We have already removed all the hay that was used for this year’s mulch.

The likely vector seemed to be the hay. When Eric and I were harvesting squash, he pointed out some of our tomatoes that were also curled on the sides. Eric had also taken photos that our extension agent sent to us, and the samples to send into the state lab for analysis. Eric seem the plants have to get big enough to know immediately if the fields were contaminated, because the plants would twist up and die. Aside from these crops, we have our third tomato planting in the field, un-mulched and therefore uncontaminated, and more tomatoes and melons and cucumbers yet to plant. Winter squash and fall greens and broccoli are yet unplanted, too. We also have three rows of winter squash and some winter greens and broccoli yet to plant for the later season. We also can assure you that no contaminated vegetables are or have been in the shares.

We have abandoned the plants that produced the squash we had in the first shares, but they didn’t show any signs of damage. As far as we can tell, this was mostly indica. We have only 5 to go. We’ll be resuming cleanup on Thursday afternoon - all are welcome!

For a while on Tuesday we thought that it might only be on 15 bales. Some mulched fields didn’t seem affected, and some rows of zucchini, all of the bell peppers and almost all of our squash looked fine. I called our extension agent again, to find out if there were any potential affects on human health in eating or selling produce from contaminated plants. He didn’t think there would be, but called VDACS (the Virginia Department of Agriculture and Consumer Services), and got back to us on Thursday.

At that point, we learned that Picloram isn’t rated for human consumption and therefore it is illegal to sell food contaminated with it. We still don’t know if the chemical is actually transferred to the fruits, but at that point we decided not to sell anything from potentially contaminated plants. Then, on Wednesday, we received a call from a farmer up near rain in even thunderstorms. On Thursday we got almost another inch of rain, mixed with hail. We noticed damage on more and more crops - cherry tomatoes, melons, and half of our bell peppers, where we had seen damage before. The rain had washed more residues from the mulch into the soil.

We decided before the rain that we needed to remove mulch from affected fields. At that point, we realized that all of the fields we had mulched were affected. On Friday morning, we sent out a call for help to our local community and friends - we had an enormous, very yucky job to do, removing the contaminated mulch and free farms in the area available for you to purchase on the farm during the 8-week break in the CSA season. We will also have a few vegetables that we produce, as well as eggs available. We will need shareholders who know when we have produce from other farms available for sale on the farm.

We also worked about 120 hours. As I write this on Tuesday, we have cleared 12 1/2 fields, and have only 5 to go. We’ll be resuming cleanup on Thursday afternoon - all are welcome!

There are many unanswered questions that we have at this point about the long-term prospects for our farm and fields. Once the contaminated hay is out of the fields, we’ll work to remediate the soil and hopefully use the hay again as a mulch for plants to grow next spring. On a long-term scale, we’re confident that we’ll still be farming well into the future. For this season, we are abandoning all the potentially contaminated crops. That’s about half of our farm - and about half of our expected sales for the year - but we have no way of reconstructing what the yields would have been. We’ll hope it looks like most or all of them had the herbicide residues.

Young plants that look fine now probably just haven’t started showing symptoms yet, as it seems the plants have to get big enough to reach the affected soil. We are beginning the process of working with our hay supplier and his insurance company to try to get some compensation for our losses, which we might still be compensated for, the scope of which are unknown at this time. Our supplier has been forthcoming in sending us more hay, which is a huge help, and feels terrible about it. He knew we were using the hay for mulch, but he didn’t know the label for Grazon specifically says not to use hay from treated fields to mulch vegetables.

Coming from the standpoint of being blissfully ignorant of the herbicide we used for hay all at, we’re getting an education on a class of agricultural substances we never dreamed we’d have to know very much about. The more we learn about this class of chemicals, the more I see it seems to have invented it and to apply it to the earth at all.

Picloram (formerly named Tordon) has been used for over 25 years, with only positive effects. The more we learn about this class of chemicals, the more I see it seems to have invented it and to apply it to the earth at all.

We have hopes of getting more pepper plants to re-plant greens and broccoli are yet unplanted, too. We also have plans to plant more squash, peppers, and eggplant for the second shares. We also were pleased to have about 1/4 inch of rain on Friday, June 1.

We had a very dry month of May, and we were happy that the field weir river using our drip irrigation system, which also worked about 120 hours. As I write this on Tuesday, we have cleared 12 1/2 fields, and have only 5 to go. We’ll be resuming cleanup on Thursday afternoon - all are welcome!

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As shareholders you have two options - you can stay with the CSA and we’ll refund you 40% for the 8 weeks of lost produce (that would be $95 for a half share, or $165 for a full share). We can also opt out for the rest of the season, and we’ll send you an 80% refund for the remainder of the CSA season ($188 for a half share, $332 for a full share). Please make this decision knowing that whatever you decide, we won’t take it personally. Please let us know your decision via e-mail or phone by June 27th.

We know that our farm is an important source of local, pesticide-free vegetables, and wish our community had more options for purchasing this kind of produce. Because of this, we will make every effort to honor the purchases from other pesticide-free farms in the area available for you to purchase on the farm during the 8-week break in the CSA season. We will also have a few vegetables that we produce, as well as eggs available. We will need shareholders who know when we have produce from other farms available for sale on the farm.

We hope to see you this summer! Any contributions, expertise, or ideas you have are welcome to us. We are very thankful for your support and help as we work through this difficult situation. We know Eric and I are doing our best to keep our farm healthy and productive and we know more. ~Rachel and Eric, Waterpen Farm
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The Natural Farmer Fall, 2007
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**NOFA Membership**

You may join NOFA by becoming a member of one of the seven state chapters. Contact the person listed below for your state. Dues, which help pay for the important work of the organization, vary from chapter to chapter. Unless noted, membership includes a subscription to The Natural Farmer.

**Connecticut:** Individual $35, Family $50, Business/Institution $100, Supporting $150, Student/Senior $25, Working $20

Contact: CT NOFA, Box 164, Stevenson, CT 06491, (203) 888-5146, or email ctnofa@ctnofa.org or join on the web at www.ctnofa.org

**Massachusetts:** Low-Income $20, Individual $30, Family/Farm/Organization $40, Supporting $100

Contact: Kathleen Geary, 411 Sheldon Road, Barre, MA 01005, (978) 355-2853, or email: info@nofamass.org

**New Hampshire:** Individual: $30, Student: $23, Family: $40, Sponsor: $100, Basic $20, Contact: Elizabeth Obelemus, 22 Keyser Road, Meredith, NH 03253, (603) 279-6146, nofanh@iname.com

**New Jersey:** Individual: $35, Family/Organizational $50, Business/Organization $100, Low Income $15

Contact: P O Box 886, Pennington, NJ 08534-0886, (609) 737-6848 or join at www.nofanj.org

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Erich V. Bremer, c/o NJ Dept. of Agriculture, PO Box 330, Trenton, NJ 08625, (609) 984-2225 erich.bremer@ag.state.nj.us

**Calendar**

**Sat. Sep 8 and Sun, Sep 9:** 19th Annual Sheep and Wool Festival, Essex Junction VT, for more info: 802-446-3325, www.vermontsheep.org, or katsmth@vermontnet

**Sun. Sep 9, 2007:** Taste! Organic Connecticut - Topmost Herb Farm, Coventry, CT, for more info: (301) 888-3146 or email ctnofs@ctnofa.org

**Sat. Sep 15 and Sun, Sep 16:** North Quabbin Garlic and Arts Festival, Orange, MA, for more info: 978-344-9023

**Sat. Sep 29 and Sun, Sep 30, 2007:** Northeast Animal Power Days, Tunbridge Vermont, for more info: 802-234-5254 or lmccrory@overther.net

**Sun. Sep 30:** Pioneer Valley Relocalization Workshop, Northampton Center for the Arts, keynote by Bill McKibbon, for more info: Eli Eckereman at 617-821-1453 or elibbeck@comcast.net


**Oct. 27:** Dewey Caron addresses Franklin County Beekeepers, Deerfield, MA, for more info: warmcolors@verizon.net

**Sat. Nov 3, 2007:** Step It Up 2 Actions throughout the country, for more info: www.StepItUp2007.org

**Sat. Nov 3, 2007:** Organic Heritage Celebration and Annual Meeting - Jones Auditorium at the CT Agricultural Experiment Station in New Haven, CT, for more info: (203) 888-5146 or email ctnofs@ctnofa.org

**Sat. Nov 10, 2007:** Organic Beekeeping Fall Workshop, New Paltz, NY, for more info: Carol Rosenberg, 845-352-5020 x20, info@pfeiffercenter.org, or pfeiffercenter.org

**Sat. Nov 10 and Sun, Nov 11:** Soil Nutrition From a Plant’s Eye Point of View with Mark Fulford, Dorchester, NH, for more info: (603) 786-2366 or info@dacres.org, or www.dacres.org

**NOFA-VT 2007 Summer Workshop Series, for more info: www.nofavt.org, or 802-434-4122, or info@nofavt.org.

**Sat. Sep 8, Basics to Organic Gardening Workshop, Cohasset Common, VT

**Tues. Sep 11, Methane Digesters, Time & Location TBA

**Wed. Sep 12, Hands On Gleaning Introduction, Volcott, VT

**Mon. Sep 24, Training for Tractors & their Various i Implidents, Huntington Center, VT

**Tues Sep 25, Tractor Maintenance and Repair Jobs, Huntington Center, VT

**Thur. Oct 4, Value Added Product, Starksboro, VT

**Sat Oct 20, Biodynamic Tree Pasting, East Montpelier, VT

**New York:**

- Student/Secondary/Limited Income $15
- Individual $30, Family/Farm/Nonprofit Organization $40, Business/Partnership $100, Add $10 to above membership rates to include subscription to The Natural Farmer.

Contact: Mayra Richter, NOFA-NY, P O Box 880, Cobleskill, NY 12043, (607) 652-6632, Fax: (607) 652-2290, email: office@nofany.org www.nofany.org

**Rhode Island:**

- Student/Secondary: $20, Individual: $25, Family: $35, Business $50

Contact: Membership, NOFA RI, 51 Edwards Lane, Charlestown, RI 02813 (401) 364-7557, fritzvogt@verizon.net

**Vermont:**

- Individual $30, Farm/Family $40, Business $50, Sponsor $100, Sustainer $250, Basic $15,525

Contact: NOFA-VT, PO Box 697, Richmond, VT 05477, (802) 434-4122, info@nofavt.org

*does not include a subscription to The Natural Farmer
Scientists predict by 2050 wheat production will virtually disappear from the USA, except Alaska. This issue contains news, features, and articles about organic growing in the Northeast, plus a special supplement on Climate Change and Organic Farming.