

Climate Action for Healthy People, Healthy Places, Healthy Planet: Food & Agriculture, Climate Change, and Health



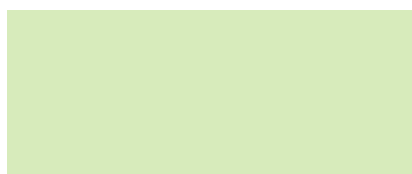
Climate change is the greatest health challenge of the 21st century. It threatens our air, food, water, shelter, and security — the basics on which human life depends. Climate change exacerbates health inequities by disproportionately impacting people living in poverty and communities of color.

At the same time, action on climate change provides one of our greatest health opportunities because many climate change solutions improve community environments and the public's health and reduce health inequities. Everybody benefits.

In this brief we explain the health and health equity benefits of reducing climate pollution from food and agriculture systems. For other **"Climate Action for Healthy People, Healthy Places, Healthy Planet"** briefs see <http://www.usclimateandhealthalliance.org>

Key Messages

- Shifting to healthy diets and local, sustainable food and agriculture systems offers significant health, climate and environmental benefits.¹
 - Local food systems increase access to healthy fruits and vegetables.²
 - Eating less red and processed meat reduces the risk of heart disease and cancer³ and reduces methane emissions from livestock production.
 - Sustainable agricultural practices conserve water, reduce pesticide and fertilizer use, protect topsoil and sequester (store) carbon.⁴
- Reducing food waste and food waste diversion can reduce food insecurity and climate pollution at the same time.⁵
- Poor nutrition — especially overconsumption of calorie-dense foods and meat — is a leading cause of illness in the U.S., associated with diabetes, obesity, and cardiovascular disease.^{6,7}
- Agriculture is a significant source of methane and nitrous oxide, extremely potent climate-warming gases. It is responsible for 9% of U.S. greenhouse gas emissions (GHGE) and about a third of global GHGE.⁸
- Industrial agricultural practices are also associated with antibiotic resistance, water contamination, pesticide illness, and topsoil loss.^{9,10,11}
- Climate change will reduce worldwide food production through adverse impacts on crop yields and fisheries.¹² This will increase food insecurity, and increase the risk of chronic illness and under-nutrition.



Food and agriculture systems affect our health in many ways

Poor diet and nutrition are some of the leading causes of illness and death, contributing significantly to the risk of chronic diseases such as diabetes, cardiovascular disease and cancer.¹³

- Between 2007–2010, over 60% of U.S. children and adults did not meet fruit intake recommendations, and almost 90% did not meet vegetable intake recommendations.^{14 15}
- U.S. consumption of meat, calorie-dense high-fat, high salt foods, and sugar has increased remarkably over the past several decades, driven by big government subsidies for corn and soy crops that have led to cheap meat and processed foods.^{16 17}
- Concentrated animal feeding operations (CAFOs) account for 70% of all antibiotics used in the U.S, providing opportunity for development of antibiotic resistant organisms that can result in antibiotic resistant infections.^{18 19 20}
- Overuse of nitrogen fertilizers results in groundwater contamination with nitrates, which are associated with “blue baby” syndrome.^{21 22}
- Pesticides may cause acute pesticide illness in farmworkers and are associated with cancer, reproductive defects, and impaired mental functioning.²³



? DID YOU KNOW?

Growing soy crops for cattle feed is adding to the destruction of rainforests in Brazil, where deforestation leads to a loss of stored carbon, destroys watersheds, changes weather and adds to climate change.

Food and agriculture systems affect climate change and the environment in many ways

What we eat and the way our food is grown, stored, processed, packaged and transported have important impacts on climate change and on the environment.

- Agriculture was responsible for 9% of total U.S. GHGE in 2013, 52% of methane emissions, and 84% of nitrous oxide release.²⁴ Methane and nitrous oxide are both potent short-lived climate pollutants with global warming potentials far higher than that of CO₂.^{17 25}
- When fertilizer use, refrigeration, transportation, and land use changes, such as deforestation and soil depletion, are taken into account, our food and agriculture systems account for about a third of all U.S. GHGE.²⁶
- Livestock — especially cattle — accounts for nearly half of GHGE from agriculture, emitting 37% of methane, 65% of nitrous oxide, and 64% of ammonia.²⁷
- Total meat consumption reached 271 pounds per person (in 2010), but has slightly decreased in recent years.²⁸ Red meat and dairy production typically cause far greater greenhouse gas emissions than fruit and vegetable production.²⁹
- Growing soy crops for cattle feed is adding to the destruction of rainforests in Brazil, where deforestation leads to a loss of stored carbon, destroys watersheds, changes weather and adds to climate change.
- Livestock production also contributes to the depletion of water resources, topsoil loss, and ecosystem damage.^{27 30}



FAST FACT:

An astounding 40% of food — worth about \$165 billion — goes to waste each year. 23% of methane emissions in the U.S. is due to food waste decay in landfills.



- The application of nitrogen fertilizer accounts for nearly 80% of domestic nitrous oxide emissions.³¹
- Conventional agricultural practices are extremely water intensive. Agriculture uses about 70% of the world's freshwater supply.³² In California, 80% of water is currently used for agriculture, though water management practices can significantly improve water efficiency.^{32 33}
- Food production and processing are energy intensive, accounting for 17% of U.S. fossil fuel use.³⁴ Within the food industry, food production accounts for 83% of carbon emissions, while transportation of food accounts for 11%.³⁵
- An astounding 40% of food — worth about \$165 billion — goes to waste each year.³⁶ 23% of methane emissions in the U.S. is due to food waste decay in landfills.

Climate Change Threatens Global Food Security

Climate change poses a huge threat to global food security, through numerous pathways.

- Drought, extreme temperatures, and precipitation can reduce crop yields.
 - Climate change is expected to lower grain yields and raise crop prices across the developing world, leading to a 20% increase in child malnutrition.
- Prolonged heat stress can affect livestock, making them more vulnerable to disease, reduced fertility, and decreased milk production.
- More frequent and severe droughts are forecast for areas where summer temperatures are increasing and precipitation is decreasing. As water supplies are reduced, it may be more difficult to meet water demands for crops used for human consumption and for feeding livestock.
- Woman and girls' nutrition tends to suffer more during periods of climate-related food scarcity than that of their male counterparts because they are often last in household food hierarchies.
- In a recent Harvard study, researchers found that wheat grains grown at elevated CO₂ levels had 9.3% lower zinc and 5.3% lower iron than those grown at ambient CO₂ levels. These elements are important micronutrients delivered by food.
- Many weeds, pests and fungi thrive under warmer temperatures, wetter climates, and increased CO₂ levels. The ranges of weeds and pests are likely to expand northward, presenting new challenges for farmers, and may drive an increased use of pesticides.

These complex interactions can result in rising food prices, increasing food insecurity — itself associated with increased risks of chronic diseases such as diabetes and hypertension — and political instability.^{37 38 39 40}

We can reduce food-related climate pollution and improve health

If we improve the way we produce and distribute food, eat less meat, and reduce food waste, we can reduce food-related climate and environmental pollution and improve our health.

- The use of available best sustainable agricultural practices could reduce agricultural GHGE by 5-14%, while increasing soil productivity and reducing soil erosion and water contamination^{41 42 43 44} These include better crop management, reduced fertilizer use, soil and degraded land restoration, improved manure management, and increased water efficiency. Healthy soils can also increase the amount of carbon that is stored and kept out of the atmosphere.
- Eating less meat and more fruits and vegetables would decrease greenhouse gas emissions and yield substantial health benefits such as maintaining a healthy body weight, support nutrient adequacy, and reduce the risk of chronic diseases.^{45 46 47 48}
 - One kilogram of beef is roughly equal to 160 highway miles in an average mid-size car. Eating a plant-based diet versus a meat-based diet is comparable to driving a Toyota Camry versus an SUV.^{49 50}
- Reductions in the use of pesticides and antibiotics would reduce pesticide-related illness and water contamination, improve worker safety, and decrease antibiotic resistance.⁵¹
- Building sustainable local food systems can:
 - reduce the use of fossil fuels in food transport, processing, packaging, and storage.
 - increase access to healthy fruits and vegetables.
 - build social capital, neighborhood support systems, and improve mental health.⁵²



? DID YOU KNOW?

One kilogram of beef is roughly equal to 160 highway miles in an average mid-size car. Eating a plant-based diet versus a meat-based diet is comparable to driving a Toyota Camry versus an SUV.

What can we do?

Health professionals have a critical role in building healthy, equitable, sustainable, and climate resilient communities. We can help to achieve substantial climate and health benefits by supporting healthy diets and sustainable food and agriculture systems.

- Support efforts to build more localized, climate resilient food systems, through establishment of community gardens, urban farms, farmer's markets, peri-urban agriculture (agriculture in and near cities), and food hubs.
 - Reduce legal and zoning barriers to the growing and selling of food in urban areas.⁵³
 - Encourage large institutions, such as hospitals, to sponsor farmers' markets and community gardens.
- Increase access to affordable healthy foods.
 - Expand the use of SNAP EBT and financial incentives at farmer's market coupons or mobile fruit and vegetable vendors.⁵⁴
 - Support institutional food procurement policies that preferentially source local and regionally grown foods.⁵⁵



FAST FACT:

We can reduce climate pollution and improve health at the same time by supporting improvements in our diets and in our food and agriculture systems.

- Promote programs that link low-income families to healthy foods, such as nutrition prescription programs.⁵⁶
- Encourage less meat consumption through consumer education and campaigns such as “Meatless Mondays.”⁵⁷
- Reduce food waste.
 - Promote local gleaning and edible food waste diversion programs that increase donations of healthy and usable food from hospitals, restaurants, and groceries to food banks and pantries, and increase composting of food scraps.⁵⁸
 - Educate consumers on reducing food waste by shopping wisely, knowing when food goes bad, and using leftovers.⁵⁹
 - The US Food Recovery Act, currently proposed by Rep. Chelli Pingree, recommends standardizing date labeling practices, which may help reduce the approximately \$29 billion of wasted consumer spending each year by 5-10%.⁶⁰
- Advocate for sustainable farming and land use practices to create climate resilient food systems:
 - Support initiatives that promote farming practices that use environmentally-friendly and energy-efficient growing, processing, and distribution practices, such as drip irrigation strategies for water conservation,^{61 62} and conservation tillage practices that reduce soil degradation.^{63 64}
 - Support the preservation of agricultural lands and natural habitats through tax credits, such as the Natural Heritage Preservation Tax Credit.⁶⁵

Summary

We can reduce climate pollution and improve health at the same time by supporting improvements in our diets and in our food and agriculture systems. The biggest gains in health will come from reducing meat consumption and increasing consumption of sustainably grown fruits and vegetables. We know what we need to do to create a healthier, more equitable, and more climate-friendly and climate resilient food and agriculture system. We need your help to get there.



For More Information

- Equitable Development Toolkit: Local Food Procurement:
http://www.policylink.org/sites/default/files/edtk_local-food-procurement.pdf
- Sustainable Food Systems:
<https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/29/12/34/toward-a-healthy-sustainable-food-system>
- Climate impacts on food systems:
<https://www3.epa.gov/climatechange/impacts/agriculture.html>



Photo page 1: Oregon Department of Agriculture; 3: hadkhanong/Shutterstock.com; page 4: littleny /Shutterstock.com;



DID YOU KNOW?

Local food systems increase access to healthy fruits and vegetables.



Citations

- ¹ U.S. Global Change Research Program. 2015. Climate Change Global Food Security and the U.S. Food System. Available at: http://www.usda.gov/oce/climate_change/FoodSecurity2015Assessment/FullAssessment.pdf
- ² U.S. Department of Agriculture. 2010. Local Food Systems: Concepts, Impacts, and Issues. Available at: http://www.ers.usda.gov/media/122868/err97_1_.pdf
- ³ Harvard Medical School. 2012. Cutting Red Meat for a Longer Life. Available at: <http://www.health.harvard.edu/staying-healthy/cutting-red-meat-for-a-longer-life>
- ⁴ U.C. Davis Agricultural Sustainability Institute. Unknown. What is sustainable agriculture? Available at: <http://asi.ucdavis.edu/programs/sarep/about/what-is-sustainable-agriculture>
- ⁵ U.S. Environmental Protection Agency. Unknown. Reducing Wasted Food at Home. Available at: <https://www.epa.gov/recycle/reducing-wasted-food-home>
- ⁶ U.S. Centers for Disease Control and Prevention. 2015. Conditions that Increase Risk for Heart Disease. Available at: <http://www.cdc.gov/heartdisease/conditions.htm>
- ⁷ U.S. Centers for Disease Control. 2015. Chronic Disease Overview: Chronic Diseases: The Leading Cause of Death and Disability in the United States. Available at: <http://www.cdc.gov/chronicdisease/overview/>
- ⁸ U.S. Environmental Protection Agency. Unknown. Sources of Greenhouse Gas Emissions. Available at: <https://www3.epa.gov/climatechange/ghgemissions/sources/agriculture.html>
- ⁹ U.S. Centers for Disease Control and Prevention. 2013. Antibiotic Resistance Threats in the United States, 2013. Available at: <http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf#page=6>
- ¹⁰ Das, R. 2001. Pesticide-related Illness among Migrant Farm Workers in the United States. Available at: <https://www.cdph.ca.gov/programs/ohsep/Documents/migrantfarmworkers.pdf>
- ¹¹ Union of Concerned Scientists. Unknown. Industrial Agriculture. Available at: <http://www.ucsusa.org/our-work/food-agriculture/our-failing-food-system/industrial-agriculture#.VxdddWMgyqE>
- ¹² U.S. Environmental Protection Agency. Unknown. Agriculture and Food Supply. Available at: <https://www3.epa.gov/climatechange/impacts/agriculture.html>
- ¹³ U.S. Centers for Disease Control. 2015. Chronic Disease Overview: Chronic Diseases: The Leading Cause of Death and Disability in the United States. Available at: <http://www.cdc.gov/chronicdisease/overview/>
- ¹⁴ U.S. Centers for Disease Control. 2014. Children eating more fruit, but fruit and vegetable intake still too low. Available at: <http://www.cdc.gov/media/releases/2014/p0805-fruits-vegetables.html>
- ¹⁵ U.S. Centers for Disease Control. 2015. Adults Meeting Fruit and Vegetable Intake Recommendations – United States, 2013. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6426a1.htm>
- ¹⁶ Wells, HF & Buzby, JC. 2005. U.S. Food Consumption Up 16 Percent Since 1970. Available at: <http://www.ers.usda.gov/amber-waves/2005-november/us-food-consumption-up-16-percent-since-1970.aspx#.VkNn8sqSJp4>
- ¹⁷ McMichael, AJ et al. 2007. Food, livestock production, energy, climate change, and health. Available at: <http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2807%2961256-2/abstract>
- ¹⁸ Walker P et al. 2005. Public health implications of meat production and consumption. Available at: http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/pdf/research/clf_reports/PHN_meat_consumption.pdf
- ¹⁹ Centers for Disease Control and Prevention. 2014. Antibiotic Use in Food-Producing Animals.: Tracking and Reducing the Public Health Impact. Available at: <http://www.cdc.gov/narms/animals.html>
- ²⁰ Gilchrist, MJ, et al. 2007. The Potential Role of Concentrated Animal Feeding Operations in Infectious Disease Epidemics and Antibiotic Resistance. Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817683/>
- ²¹ U.S. Geological Service. 2016. Nitrogen and Water. Available at: <http://water.usgs.gov/edu/nitrogen.html>
- ²² California Department of Public Health. 2000. Health Concerns Related to Nitrate and Nitrite in Private Well Water. Available at: http://www.atsdr.cdc.gov/HAC/pha/reports/pacificgaselectric_04222003ca/pdf/apph.pdf
- ²³ Cohen M. 2007. Environmental toxins and health: the health impact of pesticides. Australian Family Medicine. 36(12). Available at: <http://search.informit.com.au/documentSummary;dn=355467860496836;res=IELHEA>
- ²⁴ US Environmental Protection Agency. 2015. Ch. 5: Agriculture. In: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013. Available at: <http://epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2015-Chapter-5-Agriculture.pdf>
- ²⁵ Smith P MD, Cai Z, Gwary D, et.al. 2008. Greenhouse gas mitigation in agriculture. Available at: <http://rstb.royalsocietypublishing.org/content/363/1492/789>

Support initiatives that promote farming practices that use environmentally-friendly and energy-efficient growing, processing, and distribution practices, such as drip irrigation strategies for water conservation.



- ²⁶ Gilbert, N. 2012. One-third of our greenhouse gas emissions come from agriculture. Available at: <http://www.nature.com/news/one-third-of-our-greenhouse-gas-emissions-come-from-agriculture-1.11708>.
- ²⁷ Food and Agriculture Organization. 2006. Livestock's Long Shadow: Environmental Issues and Options. Available at: <http://www.fao.org/docrep/010/a0701e/a0701e00.HTM>.
- ²⁸ Barclay, E. 2012. A Nation of Meat Eaters: See How it All Adds Up. Available at: <http://www.npr.org/sections/thesalt/2012/06/27/155527365/visualizing-a-nation-of-meat-eaters>
- ²⁹ Saxe, H et al. 2013. The global warming potential of two healthy Nordic diets compared with the average Danish diet. Available at: <http://link.springer.com/article/10.1007%2Fs10584-012-0495-4>
- ³⁰ Fiala N. 2006. Economic and Environmental Impact of Meat Consumption. Available at: http://www.imbs.uci.edu/files/docs/2006/grad_conf/06-Fiala-PaOer.pdf.
- ³¹ Johnson JM-F, Franzluebbers AJ, Weyers SL, Reicosky DC. 2007. Agricultural opportunities to mitigate greenhouse gas emissions. Available at: <http://www.sciencedirect.com/science/article/pii/S0269749107003016>.
- ³² Pacific Institute. Unknown. Issues We Work On: Water, Food, and Agriculture. Available at: <http://pacinst.org/issues/water-food-and-agriculture/>
- ³³ Guo J. 2015. Agriculture is 80 percent of water use in California. Why aren't farmers being forced to cut back? Available at: <http://www.washingtonpost.com/blogs/govbeat/wp/2015/04/03/agriculture-is-80-percent-of-water-use-in-california-why-arent-farmers-being-forced-to-cut-back/>
- ³⁴ Horrigan L et al. 2002. How Sustainable Agriculture Can Address the Environmental and Human Health Harms of Industrial Agriculture. Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240832/>.
- ³⁵ Treehugger. 2012. Is Buying Local Food the Best Way to go on a Carbon Diet? Available at: <http://www.treehugger.com/green-food/buying-local-food-best-way-go-carbon-diet.html>
- ³⁶ National Resource Defense Council. 2012. Wasted; How America is Losing Up to 40 Percent of its Food from Farm to Fork to Landfill. Available at: <http://www.nrdc.org/food/files/wasted-food-IP.pdf>
- ³⁷ Seligman, HK. 2014. Exhaustion of Food Budgets at Month's End and Hospital Admissions for Hypoglycemia. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/24395943>
- ³⁸ Porter, JR, et al. 2014. Food security and food production systems. Available at: https://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap7_FINAL.pdf.
- ³⁹ Worldwatch Institute. Unknown. Climate Change Will Worsen Hunger, Study Says. Available at: <http://www.worldwatch.org/node/6271>
- ⁴⁰ Myers, S. et al, 2014. Increasing CO2 threatens human nutrition. Available at: <http://www.nature.com/nature/journal/v510/n7503/full/nature13179.html>
- ⁴¹ Paustian, AJ et al. 2006. Agriculture's Role in Greenhouse Gas Mitigation. Available at: <http://www.c2es.org/publications/agriculture-role-greenhouse-gas-mitigation>
- ⁴² Smith, MD, et al. Greenhouse gas mitigation in agriculture. Available at: <http://rstb.royalsocietypublishing.org/content/363/1492/789>
- ⁴³ Glantz, MH et al. 2009. Coping with a Changing Climate: considerations for adaptation and mitigation in agriculture. Available at: <http://www.fao.org/docrep/012/i1315e/i1315e.pdf>
- ⁴⁴ Smith P et al. 2007. Ch. 8: Agriculture. Available at: https://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch8.html.
- ⁴⁵ Joyce, A. 2012. Reducing the environmental impact of dietary choice: perspectives from a behavioural and social change approach. Available at: <http://www.hindawi.com/journals/jeph/2012/978672/>.
- ⁴⁶ Friel S et al. 2009. Public health benefits of strategies to reduce greenhouse-gas emissions: food and agriculture. Available at: <http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2809%2961753-0/abstract>.
- ⁴⁷ Aston, LM et al. 2012. Impact of a reduced red and processed meat dietary pattern on disease risks and greenhouse gas emissions in the UK: a modelling study. Available at: <http://bmjopen.bmj.com/content/2/5/e001072.full>.
- ⁴⁸ Office of Disease Prevention and Health Promotion. 2016. Dietary Guidelines 2015-2020. Available at: <http://health.gov/dietaryguidelines/2015/guidelines/executive-summary/>
- ⁴⁹ Fiala N. 2006. Economic and Environmental Impact of Meat Consumption. Available at: http://www.imbs.uci.edu/files/docs/2006/grad_conf/06-Fiala-PaOer.pdf
- ⁵⁰ Eshel G MP. 2006. Diet, Energy and Global Warming. Available at: <http://pge.uchicago.edu/workshop/documents/martin1.pdf>
- ⁵¹ Horrigan, L et al. 2002. How Sustainable Agriculture Can Address the Environmental and Human Health Harms of Industrial Agriculture. Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240832/>
- ⁵² Hinrichs C. 2000. Embeddedness and local food systems: notes on two types of direct agricultural markets. Available at: <http://www.sciencedirect.com/science/article/pii/S0743016799000637>



FAST FACT:

Climate change is expected to lower grain yields and raise crop prices across the developing world, leading to a 20% increase in child malnutrition.



- ⁵³ Land Use Law Center. 2012. Overcoming Barriers to Cultivating Urban Agriculture. Available at: http://law.pace.edu/sites/default/files/LULC/Conference_2013/Overcoming%20Barriers%20to%20Cultivating%20Urban%20Agriculture%20-%20Full.pdf
- ⁵⁴ Let's Move. Unknown. Chapter 4. Access to Healthy, Affordable Food. Available at: http://www.letsmove.gov/sites/letsmove.gov/files/TFCO_Access_to_Healthy_Affordable_Food.pdf
- ⁵⁵ Fine Farm to Institution New England. Unknown. Setting the Table for Success. Available at: <http://www.farmtoinstitution.org/food-service-toolkit>
- ⁵⁶ County Health Rankings. Nutrition Prescriptions. Available at: <http://www.countyhealthrankings.org/policies/nutrition-prescriptions>
- ⁵⁷ Meatless Monday. Unknown. The Global Movement. Available at: <http://www.meatlessmonday.com/>
- ⁵⁸ Stanford School of Public Policy. 2014. Increasing Restaurant Food Donations: A Strategy for Food Waste Diversion. Available at: https://conserve.restaurant.org/Downloads/PDFs/Reduce-waste-and-recycle/2014_Duke_Report_Donation.aspx
- ⁵⁹ Waste Not OC Coalition. 2015. Feed the Need. Available at: <http://www.wastenotoc.org/>
- ⁶⁰ ReFED. 2016. A Roadmap to Reduce U.S. Foodwaste by 20 Percent. Available at: http://www.refed.com/downloads/ReFED_Report_2016.pdf
- ⁶¹ California Climate and Agricultural Network. 2015. Climate Solutions in California Agriculture. Available at: <http://calclimateag.org/wp-content/uploads/2015/02/Climate-Benefits-of-Agriculture-2015.pdf>
- ⁶² California Climate and Agricultural Network. 2013. Water Stewardship Fact Sheet. Available at: <http://calclimateag.org/wp-content/uploads/2013/04/Water-Stewardship-Fact-Sheet.pdf>
- ⁶³ California Climate and Agricultural Network. 2013. Soil Building Fact Sheet. Available at: <http://calclimateag.org/wp-content/uploads/2013/04/Soil-Building-Fact-Sheet.pdf>
- ⁶⁴ California Department of Food and Agriculture. 2016. Healthy Soils Initiative. Available at: <https://www.cdfa.ca.gov/oefi/healthysoils/>
- ⁶⁵ State of California Wildlife Conservation Board. Unknown. Natural Heritage Preservation Tax Credit Program. Available at: <https://www.wcb.ca.gov/Programs/Tax-Credit>



Center for
Climate Change & Health



IN PARTNERSHIP WITH



Created with the support of Kaiser Permanente and The Kresge Foundation

COPYRIGHT INFORMATION © 2016 Public Health Institute/Center for Climate Change and Health. Copy and distribution of the material in this document for educational and noncommercial purposes is encouraged provided that the material is accompanied by an acknowledgment line. All other rights are reserved