Green farming utilizes different technology and practices in order to decrease detrimental impact on the environment.

Farmers have been pressured to increase production to meet the demand of a growing population. This may require employing more efficient measures to ensure maximum output. Unfortunately, efficiency doesn't always mesh with sustainability, so commercial operations have had to make some modifications to find a balance between serving the public and protecting the planet.

Green farming utilizes different technology and practices in order to decrease detrimental impact on the environment. According to the farming resource NuFarming, agricultural operations have a significant impact on climate change. Simply adopting some new practices can lessen that impact.

**Solar power**

Growing plants are not the only thing on a farm that can benefit from the sun. Farmers can convert a portion or all of their power needs to solar. According to the U.S. Department of Energy, there are benefits when solar companies and farmers work together. Solar developers reduce installation costs and upfront risk by placing solar modules on previously tilled agricultural land. Vegetation under modules also can contribute to lower soil temperatures and increased solar performance. Agricultural land managers can reduce energy costs and diversify their revenue streams with solar. Plus, they can market products to sustainability-minded customers.

**Crop rotation**

This farming technique has been used for thousands of years and involves growing different crops in different seasons over a period of time. Farmers reduce the chances for pests and diseases becoming problems in the soil because frequent crop changes prevent invaders from gaining a foothold. Farmers use fewer fertilizers and pesticides as a result.

**Hydroponic and aquaponic strategies**

Farmers can improve productivity while also reducing environmental impact with these two growing methods. NuEnergy states that hydroponic systems grow plants in mineral solutions or in materials like perlite or gravel. Aquaponics involves raising aquatic animals in addition to growing crops. The waste from the fish and other marine life is used to offer nutrients to the plants by growing them in this nutrient-rich water. Both methods remove the need for soil.

**Drip irrigation**

Drip irrigation methods deliver water to the roots of plants through a series of pipes or tubes. Because water is not being sprayed into the air through sprinklers and other methods, less is lost to evaporation, and less water overall may be needed to provide for crops.

**Plasticulture**

Plastic seems like it may not have a purpose on the farm, but recycled plastic, which is used in plastic mulch, can help produce plentiful crops with less water. Plastic mulches raise soil temperatures and insulate against evaporation so plants can grow faster and mature sooner. Invasive weeds also may be less likely to take root in plastic mulch or when crops are grown on black plastic.

**Natural pesticides**

Farmers can introduce plants that pests tend not to like to reduce reliance on chemical pesticides. For example, interspersing crops with natural bug repellants, such as basil, lavender and lemongrass, may keep insects at bay. Alliums, chrysanthemums, marigolds, and other flowers planted nearby also may deter bugs.

Green farming is something more agricultural operations may want to adopt.
For example, a recent NASA study predicted that, by 2050, the population will exceed nine billion people across the globe is wasted, amounting to 1.3 billion tons of food per year. The average global household wastes 74 kg of food each year, according to the United Nations Environment Programme’s 2021 Food Waste Index. Food waste is an issue that needs a solution as the world looks for ways to feed an expanding population in the decades to come.

In order to improve output, farmers have to make some changes. These can include investment in tools and technologies that enable farmers to apply nutrients more precisely and at lower cost, advises the Environmental Defense Fund. Seeds that need less water and fewer nutrients, as well as new fertilizers that are less likely to be lost to air and water, are some additional ideas. Farmers also may want to employ green practices, such as hydroponics and drip irrigation, if they haven’t already, to improve efficiency and cut costs. The public also may need to petition their lawmakers to make it easier for farm workers arriving on working visas to man the fields.

Food demand continues to rise, and it has become challenging for agricultural operations to keep up. Food waste is an issue that needs a solution as the world looks for ways to feed an expanding population.

Farmers and growers face a significant threat in the years to come as industrial agriculture operations continue to expand. According to the National Resources Defense Council, industrial agriculture is the large-scale, intensive production of crops and animals. Such operations make it more difficult for small farmers and growers to turn a profit, and they often involve the use of chemical fertilizers and pesticides. The use of such high greenhouse gas emissions may cause corn output to decline as early as 2030, but wheat output would increase. Farmers may need to roll with the punches and shift operations to cope with the environmental changes.

- Decreased commercial farming interest: Fewer people are working in farming. Land prices for expansion, new government mandates and regulations, and the impact of immigration and trade policies have made farming less attractive than it once was. Fewer commercial operations result in a diminished food commodity output.

- Consumer waste: Food loss and waste (FLW) is a widespread issue, posing a challenge to food security. The World Bank estimates 30 percent of all food products poses an additional threat to small farmers and growers, as the Union of Concerned Scientists notes that the heavy application of fertilizers and pesticides accelerates soil erosion and increases pest problems. Consumers concerned by the effects of industrial agriculture on the environment and on small farmers’ and growers’ ability to earn a good living can support efforts such as regenerative farming and organic farms.

Researchers from the Institute on the Environment at the University of Minnesota concluded that, to feed the world by 2030, yields on maize, rice, wheat, and soybeans will have to rise by 45 to 60 percent. There are a few reasons why food supply may not meet up with demand.

- Climate change: Climate change is predicted to cause issues to crop yields, especially in portions of the world where the population is growing the fastest. For example, a recent NASA study published in the journal Nature predicts that high greenhouse gas emissions may cause corn output to decline as early as 2030, but wheat output would increase. Farmers may need to roll with the punches and shift operations to cope with the environmental changes.

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Substantial waste is produced in agricultural operations. Waste is a byproduct of every industry, even those that produce food. Crops and animals may feed the masses, but there are items on the farm that require disposal or recycling. Farm waste management is a practice that endeavors to remove waste in ways that are affordable, sustainable and effective.

Substantial waste is produced in agricultural operations. This can include manure, animal bedding, leaves, clippings, and even scraps from the kitchen. According to the University of Massachusetts Amherst, without proper mitigation methods, farm waste can be detrimental to the environment simply due to its volume. Farm waste may be natural, chemical-, animal-, medical-, and/or plant-based. If it is not managed, the waste can pollute water and air, and also disrupt the process of farming. That can make it beneficial to take a deep look at some of the ways to manage farm waste.

Composting
Kitchen waste or crop wastage can be turned into fertilizer and bioenergy through composting. Composting uses natural bacteria and other microorganisms to naturally break down refuse into a safer, more usable form. Compost can be spread over fields and used to feed plants without the need to supplement much with chemical fertilizers.

Food recycling
Feeding livestock animals directly with kitchen leftovers is one way to cut down on waste. Pigs do well with this, as they are omnivorous animals who tend to eat anything. The United States Environmental Protection Agency urges anyone who wants to participate in recycling food waste for animal feed to contact a local solid waste public health agency or county agricultural extension agency for more information. This way the food waste can be easily handled and safely controlled.

Manure management
Cow and horse manure can be added to traditional compost piles, but swine and other omnivores’ waste may contain bacteria not suited to the composting. According to the resource ManureToFertilizer.com, pig manure stored in a cesspool needs to be pumped into a solid liquid separator to remove extra water. Solids can be mixed with straw or sawdust to adjust the carbon-to-nitrogen ratio and spread out in rows to dry. Farmers also can look to products like MICROBE-LIFT®, which breaks down waste and reduces toxic gases to enhance manure management.

Other recycling
Waste from farms can be turned into other products. For example, corn cobs, bagasse, rice straw, and husks can be turned into silica, a nonmetallic element that is great for the skin, hair, nails, and bones. Fats from animals can be made into soaps, as can cocoa pods. Non-organic material, such as chemical waste, will need to be managed according to local regulations. Broken equipment can be taken to recycling facilities to ensure it does not end up in landfills.

Farm waste management is just another cog in the agricultural production machine.
Food security is among the more significant challenges the world will face as the population increases.

The world faces many unique challenges in the decades to come, including a rapidly expanding global population. The United Nations estimates that the global population will reach 9.71 billion in 2050. That’s an increase of more than 1.7 billion people between 2023 and 2050.

Food security is among the more significant challenges the world will face as the population increases. The United States Agency for International Development notes that food security means all individuals, regardless of their physical or economic circumstances, have access to sufficient food to meet the dietary needs for a productive, healthy life.

Food security is a more significant issue than people may recognize, even in first world, fully developed countries. For example, the United States Department of Agriculture’s Economic Research Service indicates that slightly more than 10 percent of U.S. households were food insecure at some point during 2021. In fact, estimates suggest more than 800 million people across the world go to bed hungry every night, which underscores the seriousness of the issue.

Agriculture and food security

Food security and the agricultural industry are inextricably linked. The USAID indicates that smallholder farmers who depend on agriculture to make a living and feed themselves and their families.

Supporting efforts to strengthen the agricultural industry can help to combat food security, as the USAID reports that growth within that sector has been found to be at least twice as effective at reducing poverty as growth in other sectors. Much of that can be traced to the disproportionate percentage of poor people who live in rural rather than urban areas. For example, the USAID reports that 75 percent of poor people in developing nations live in rural areas.

But the poverty rate is higher in rural areas than urban areas in the United States as well. Data from the 2019 American Community Survey indicates the poverty rate in rural areas was 15.4 percent in 2019 compared to 11.9 percent in urban areas. Though recent data regarding rural poverty rates in Canada is unavailable, a 2013 discussion paper on the topic from the Government of Canada noted that the country’s rural residents earned less and had lower levels of education than residents in urban areas, suggesting that poverty is likely more prevalent in the Canadian countryside than in the country’s cities.

What can be done

Though food security poses a significant global challenge, lack of access to healthy foods is preventable. Individuals in rural and urban communities can voice their support for efforts to strengthen the agricultural sector. A thriving agricultural sector can ensure fewer people go to bed hungry each night and bolster the economies of rural communities that are disproportionately affected by poverty.

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The agricultural workforce is shrinking, and has been for some time. The American Farm Bureau Federation estimates there are roughly 2.4 million farm jobs that need to be filled annually, but there has been a drastic decline in workers each year.

There are a number of reasons for the shortages. The AFBF says more than 73 percent of farm workers are immigrants from South America and Mexico. While the United States’ H2-A visa program, which allows employers who meet specific requirements to bring foreign laborers in for temporary work, has increased the number of accepted applications for immigrants to 250,000, this number is still just a drop in the bucket in terms of labor needs.

Another factor is a career in agriculture isn’t always easy or lucrative. According to the U.S Department of Agriculture, for every dollar spent on food, a farmer receives only 7.6 cents. Farmers were predicted to lose 9.7 percent of total net income in 2021.

Declining interest in the field has also affected the number of farm workers. As more farm operators reach retirement age, fewer young farmers are replacing them due to volatile pricing, high real estate and land costs, steep initial machinery investment costs, and other factors. The physical demand of the industry also takes its toll. So what does this mean for the agricultural industry?

Many with knowledge of the industry indicate sweeping changes are warranted. Ellen Poeschi, the project director for the National Association of Agricultural Educators Teach Ag campaign, has said that a lack of agricultural education is contributing to the problem. Increasing availability of ag education courses across the country could build interest in the industry. Connecting students to internships or mentors may help, too.

Another option is to rally for greater economic opportunities in agriculture. The ag industry in general needs to find ways to make the economic benefits more competitive to other industries, and improve the working conditions and job flexibility. Agricultural industries currently average only 60 percent of what other industries offer in salaries. Farm wages have been rising due to the H-2A program, which requires farm worker pay to be higher than the state/federal minimum wage. More change is needed, but this may have to come at the federal level or be sparked by efforts on the part of agricultural advocacy groups.

Additional strategies farm operators can employ to combat shortages are: scaling back farm operations; integrating ag technology to reduce labor burdens; pivoting to crops that require fewer laborers; leasing portions of land to have extra money; employing temporary guest workers; and moving operations abroad.

Worker shortages continue to be problematic for the agricultural industry. A greater focus on remedying the issue is needed on a grand scale.

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Sodic soil is a condition people may experience at home or in commercial farming operations. Plants often are only as strong as the soil in which they grow. While certain greenery may thrive no matter where it’s planted, soil conditions are often key to successful growing.

Sodic soil is one condition people may experience at home or in commercial farming operations. Sodic soils, sometimes called saline-alkali soils or dispersive soils, are defined as having high levels of exchangeable sodium and low levels of total salts, according to the Colorado State University Extension. These conditions compromise growing conditions because sodic soils tend to be poorly drained and crust over. Water intake also can be poor in sodic soils, and pH is usually high — coming in above 9.0.

The Department of Primary Industries and Regional Development of the Government of Western Australia advises a simple sodic soil test to check for sodicity. One can collect dry soil aggregates (crumbs of soil) from different depths. Those crumbs should be placed into a clear jar of distilled water, taking care not to mix or agitate the soil. The water around the edges of sodic soil will become cloudy and appear milky. For highly dispersive soil, the dispersion will be evident after about 10 to 30 minutes. Moderately sodic soil may take 2 hours.

Individuals can take steps to improve sodic soil. Gypsum is the most commonly used amendment for sodic soil, according to Science Direct. It also can reduce the harmful effects of high-sodium irrigation waters. Gypsum is a mineral that is composed of hydrated calcium sulfate. Gypsum has an effect on reducing the rate of soil erosion. It is more effective when gypsum is spread on the soil surface rather than mixed in.

Limestone, which also contains calcium, is another additive that can amend sodic soils. Gardeners may want to add calcium to the soil because it replaces the sodium and then the sodium can be leached out.

Additional mitigation methods for sodic soils include changing plant species or varieties to more tolerant ones that will grow more readily.

Commercial farmers or home gardeners may encounter sodic soil. Though sodic soil is not ideal, it can be remedied in various ways.

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BASICS OF REGENERATIVE AGRICULTURE

Regenerative agriculture could have a profound impact on the world over the next half century.

Climate change poses a threat to various industries, not the least of which is the agricultural sector. Agricultural industry insiders recognize that the changing climate has been forcing farmers and agricultural organizations to adapt and adjust for decades, and that need to be flexible won’t change in the years to come.

One of the changes many farmers may consider in coming years, if they haven’t already, is a pivot to regenerative agriculture practices. Regenerative agriculture could have a profound impact on the world over the next half century, so now may be a great time to gain an understanding of the practice.

What is regenerative agriculture?

Regenerative agriculture is a production system that focuses on reducing water usage and other inputs as part of a larger attempt to prevent land degradation and deforestation. According to the organization Green America®, regenerative agriculture is designed to harness the power of photosynthesis in plants to sequester carbon in the soil. The ability to do that can improve soil health, crop yields, water resilience, and nutrient density.

Why should people be interested in regenerative agriculture?

GreenAmerica® notes that regenerative agriculture draws down atmospheric carbon dioxide. That’s a significant benefit, as Climate.gov, which is a product of various departments within the National Ocean and Atmospheric Administration, reports that adding more carbon dioxide to the environment is causing global temperatures to rise. In fact, observations from the NOAA Global Monitoring Lab in 2021 revealed that carbon dioxide alone was responsible for about two-thirds of the total heating influence of all human-produced greenhouse gases. GreenAmerica® reports that, at scale, regenerative agriculture could help to reverse the climate crisis by drawing down atmospheric carbon dioxide.

Another reason to consider regenerative agriculture is its connection to topsoil. GreenAmerica® reports that the world is on the cusp of running out of topsoil, which is vital to growing food. Regenerative agriculture rebuilds topsoil, which can lead to greater food security across the globe.

What are some regenerative agriculture practices?

Regenerative agriculture practices include the usage of cover crops, a reduction in tillage, crop rotation, and spreading compost. GreenAmerica® notes that regenerative agriculture practitioners also avoid the use of synthetic fertilizers, pesticides, herbicides, and factory farming.

As the climate crisis continues to challenge the agricultural sector, regenerative agriculture could help farmers and the larger industry successfully confront those issues.
Challenges Climate Change Poses to Agriculture

The National Oceanic and Atmospheric Administration notes that the impacts of climate change on various sectors of society are interrelated, a connection that mirrors the ripple effects of the COVID-19 pandemic.

Climate change poses an array of challenges. The National Oceanic and Atmospheric Administration notes that the impacts of climate change on various sectors of society are interrelated, a connection that mirrors the ripple effects of the COVID-19 pandemic. The human health crisis that arose during the pandemic affected all aspects of life, as illnesses limited worker productivity, thus affecting the global supply chain, including the availability of food.

Scientists warn that a similar scenario could play out as a result of climate change. The agricultural sector could face considerable challenges in the years to come. The Fourth National Climate Assessment is a government-mandated report that must be delivered to the United States Congress once every four years. Among the many aims of the report are to provide an analysis of the effects of global changes on the natural environment and agriculture. The report also must project major trends for the next 25 to 100 years. The most recent report, delivered in 2018, noted that changing precipitation patterns could intensify in the coming years, leading to more intense periods of heavy rain and longer dry periods.

Those shifting patterns and other changes could lead to an increase in conditions and weather events that pose unique challenges to the agricultural sector.

- **Flooding:** The Union of Concerned Scientists notes that many agricultural regions of the United States have already experienced increased flooding. The effects of flooding on the agricultural sector are often devastating and include accelerated soil erosion, water pollution and damage to infrastructure that challenges farmers’ ability to get food from their farms to stores and, ultimately, consumers’ dinner tables.

- **Drought:** The National Integrated Drought Information System reports that the primary direct economic impact of drought in the agricultural sector is crop failure and pasture losses. The Government of Canada notes that areas of western Canada are already experiencing frequent and severe droughts, and scientists expect other areas of the country to be affected by drought more often in the years to come. The same goes for the United States, which the UCS notes has already dealt with severe drought in California, the Great Plains and the midwest. Depleted water supplies are a byproduct of drought, and such depletion can take a toll on crops and livestock.

- **Economics:** The effects of climate change on crops and livestock may force farmers to change the nature of their farms. The UCS notes that farmers may be forced to choose crop varieties and animal breeds that are suited to the new conditions sparked by climate change. Going in a new direction could force farmers to make potentially costly investments in machinery and other changes as they make the transition.

Climate change will pose unique challenges to the agricultural sector that could force farmers to make some difficult decisions in the years ahead.