

Population growth is a threat multiplier – it makes other problems worse and more difficult to combat. As more people join the planet, they affect the world around them and the world affects them too. More people also means some of the world’s most pressing issues become harder to solve and at the same time, impact more communities worldwide.

The following topics all have connections to both **population growth and ocean health**. Each is accompanied by bullet points of information on a variety of issues within the topic and **links to continue your research**.

## AGRICULTURE AND FOOD

Human history begins with agriculture: having a consistent food supply let people build settlements and form the bases of society all over the world. As our human population has grown, people have discovered new ways to grow more food and feed more people.

Today, agriculture is at risk. The variety and abundance of food is greater than any other time in history, but changes to land and weather patterns threaten to make farming more difficult and less productive. At the same time, agricultural production needs to [increase by 60% by 2050](#) to create enough food to feed the global population. Agriculture is becoming more difficult just as we need more food than ever before.

Agriculture affects far more than just our food supply. Farm waste pollutes the environment and expanding farmland replaces delicate ecosystems. Overworked land shifts into deserts and precious freshwater is wasted by inefficient irrigation. But sustainable agriculture also lifts people from poverty, empowers women, and encourages healthy diets.

Since human civilization is unlikely to return to hunter-gathering any time soon, agriculture will continue to be the backbone of society. A sustainable agricultural future will rethink our food production to create a world where nobody has to worry about where they’re getting their next meal.

### Changing Diets

People living in the 21<sup>st</sup> century have unprecedented access to different kinds of food and cuisines. As the types of available food have changed worldwide, people’s diets

have changed as well. Very few people today eat the same way a similar person would have 100 years ago.

- People all over the world are eating more calories from more diverse sources than in the past. [Read more](#)
- The greater availability of high density, high calorie foods has caused obesity rates to skyrocket worldwide. These foods are often highly processed. [Read more](#)
- Though diets are shifting to provide more calories, those diets do not necessarily include all of the nutrients that a person needs: it is becoming more common for people to be obese and malnourished. [Read more](#)
- Vegetarianism and veganism are on the rise worldwide. Though plant-based diets have been most common in wealthy nations, most new vegetarians these days are in low or middle income countries. [Read more](#)
- Overall meat consumption has hit record highs, partially due to rising affluence – when people have more money, they can afford to eat more meat. [Read more](#)

## High Water Use and Irrigation

Just as people require water to drink, the food we eat requires water to grow. Most farms worldwide don't naturally get enough water, and so most farmers use irrigation, or water that is diverted into fields to help crops grow. Though irrigation is the backbone of our global food supply, it also alters the landscape and uses a high amount of water, not all of which is used as efficiently as it could be.

- More than 70% of freshwater used worldwide goes to irrigation. Without irrigation, there wouldn't be enough food for the world's population. [Read more](#)
- Most irrigation techniques around the world waste a lot of water. Over 50% of U.S. crops are watered by outdated, inefficient forms of irrigation. [Read more](#)
- Global agriculture is expected to require 40% more water use by 2050; however, decreasing global water supplies and increasing population growth means that more water will also be needed in non-agricultural areas. [Read more](#)
- Over one-third of the world's aquifers are stressed from having too much water withdrawn. Aquifers that have lost too much water may not be able to collect water again and can make surrounding land unstable. [Read more](#)
- Many farmers don't switch to efficient irrigation methods because they are expensive to install, though efficient irrigation will save on water costs in the future. [Read more](#)

## Chemical Runoff

Scientific advances have made it possible to feed billions more people than any other time in history. The tools we use to increase our food production, like fertilizers and pesticides, may create a larger volume of food but have devastating effects on the surrounding environment.

- Human development of land gets in the way of the natural processes that filter chemicals and make water safe. In agriculture, extra water from rain or inefficient irrigation collects dangerous substances before flowing directly into rivers and streams. [Read more](#)
- Poor farming practices destabilize soil and create more erosion when an area rains or floods. This introduces sediment, fertilizers, and pesticides into waterways, all of which harm ecosystems. [Read more](#)
- Chemical runoff that enters surface water is eventually spread into groundwater. Nitrate from agriculture is now the most common pollutant in groundwater. [Read more](#)
- More than half of the world's agricultural land is at risk of spreading pollution from pesticides alone. [Read more](#)
- Pollution from livestock is now the most common form of agricultural runoff. This includes animal waste as well as the hormones and antibiotics that livestock is commonly treated with. [Read more](#)

## Soil Health

There would be no agriculture without soil. Soil provides the nutrients and minerals that help plants grow and turn into healthy food, but soil also requires active management to keep it healthy. Human and environmental problems can easily make soil unusable without sustainable soil health practices.

- When soil erosion occurs slowly, it spreads beneficial nutrients. The problem with modern soil erosion is that it happens too quickly, both destroying the original soil and oversaturating the environment with too many nutrients that throw ecosystems out of balance. [Read more](#)
- Soil becomes especially vulnerable to erosion when land is left completely uncovered. This is made even worse when land is tilled but not planted, as the soil is less stable and has nothing to anchor itself to. [Read more](#)

- Dry, non-desert areas of the world are particularly vulnerable to desertification, or the transformation of arable land into desert. Overgrazing and deforestation are two causes of desertification. [Read more](#)
- Billions of people worldwide have food supplies threatened by desertification. Many of these people live in the poorest areas of the world. [Read more](#)
- Livestock overgrazes grassland when herds eat more vegetation than the environment can naturally replenish. When land is overgrazed, it is more vulnerable to soil erosion and invasive species. [Read more](#)

## Impacts of Climate Change

Climate change is already forcing farmers to deal with new and unprecedented problems. The rising global temperature does more than just warm things up: it's fundamentally changing how we cultivate our food.

- As weather becomes more extreme, farms are at risk of both unseasonable heat and excessive flooding. This disrupts growth patterns and sharply reduces how much food a farm can produce. [Read more](#)
- The areas that face the most risk to agriculture from climate change are also the areas of the world that rely most heavily on agriculture. [Read more](#)
- Climate change is reducing the quality of food as well as the quantity. Some foods are less nutritious because of changes in the local environment. [Read more](#)
- Because weather patterns have become unpredictable, it's harder for farmers to make plans about which crops to grow. [Read more](#)
- Pests like locusts will become an even bigger threat to agriculture. Warm temperatures let them be active in more parts of the year and they will have to eat more food to get the nutrition they need. [Read more](#)

## Habitat Loss and Fragmentation

As the need for food increases, people increasingly turn to farming on land that had previously been untouched. Though this helps with an area's short-term needs, agricultural land expansion has devastating effects on the local biodiversity.

- When land becomes unusable or more food needs to be produced, agriculture takes over previously undeveloped land. This displaces the species in these wild places and reduces the overall area of their habitable land. [Read more](#)

- Land is usually developed in a piecemeal way that leaves small pieces of habitats isolated from one another, or fragmented. [Read more](#)
- Agricultural output is negatively affected by habitat loss and fragmentation. Pollinators are necessary for crop production, but pollinator populations decline as they lose their habitats. [Read more](#)
- Developing new land brings people closer to wild animals, as species have reduced space to live and people now live on the edge of wildlands. This closeness to animals is a key reason for zoonotic diseases, or diseases that originate in animals. [Read more](#)
- Fragmented habitats have more “edges,” or areas where undeveloped land meets human development. The types of species that thrive in edge spaces have more land available to them than species that are more vulnerable, which changes the fundamental biodiversity of the region. [Read more](#)

## Food Insecurity

Food insecurity is defined as not having a consistent source of food. Millions of people all over the world are either food insecure or in danger of becoming food insecure, and this number is expected to grow. Agricultural productivity loss will cut off people’s access to local food sources and make traditional forms of agriculture impossible for many.

- There is more than enough food grown globally to feed all of the world’s people. However, because of poverty and failures in distribution, there are still hundreds of millions of people who are chronically food insecure. [Read more](#)
- Staple crops like rice and wheat are the basis for people’s diets all over the world. Climate change is expected to make it harder to grow these crops, leaving people without a key food source. [Read more](#)
- Most of the world’s food insecure people live in rural areas where food is grown to feed the local population rather than be sold. [Read more](#)
- The quantity of fruits and vegetables that can be grown will decrease as a result of climate change. These food groups provide important nutrients to people; a lack of fruits and vegetables can both directly cause diseases and make other diseases deadlier. [Read more](#)
- Agricultural productivity loss will disproportionately affect women, who grow most of the world’s food and have fewer options for employment beyond farming. [Read more](#)

## Greenhouse Gas Emissions

Farming today isn't like the idyllic image of a single farmer with a pitchfork and a handful of seeds. Modern agriculture is a mechanized operation even for small farmers, and the sheer amount of food needed means that agriculture collectively happens on an enormous scale. Unfortunately, these modern processes help make agriculture one of the biggest sources of the greenhouse gases (GHG) that cause climate change.

- Agriculture is responsible for around a quarter of the world's total emissions. Livestock and improper soil management are the two primary sources of agricultural emissions. [Read more](#)
- The mechanisms for processing and transporting food have grown as a source of agricultural emissions. Gases from refrigeration are an especially potent greenhouse gas, and refrigeration has increased as a share of emissions. [Read more](#)
- Atmospheric methane has hit record highs in recent years, partially driven by expanding agriculture. Methane is a byproduct of ruminant animals, such as cattle, goats, and pigs. [Read more](#)
- Fertilizers (both natural and synthetic) and rice cultivation are each responsible for at least 10% of agricultural emissions. [Read more](#)
- Half of livestock emissions come from producing food for livestock to eat. This includes emissions from the deforestation of land for the purpose of grazing or crop production. [Read more](#)