eo Kids
earth observatory for kids

The Shape of Farming
Water for Crops

When you are flying in an airplane, you might spot neat squares, long curving lines, and green circles on the ground. What are they? Usually they are farms, which may look different based on different farming practices. The shapes have a lot to do with water: finding a steady supply, conserving it, and minimizing losses.

Farmers use a number of different methods to irrigate crops, and some of them result in pretty interesting shapes.

Where's the Water?

Crops need water to grow. Farms are typically set up where the soil receives enough water from rainfall or where there are nearby rivers, lakes, or other surface water. Sometimes it is pumped up from underground wells, like in the desert.

When water flows from mountains onto flatter land, it spreads out into smaller streams. This area at the base of a mountain in Kazakhstan looks like a fan – narrow at the water source and wide where water has spread out. These alluvial fans are often used for agriculture because they are fertile and often have groundwater for irrigation.

Circles of Crops

Center-pivot irrigation makes large circles on the landscape. Giant sprinklers on wheels rotate around a water source in the center. Farmers choose from a variety of nozzles that spray droplets at different sizes and different speeds, depending on the type of crops and the slope of the fields. This helps minimize how much water evaporates or runs off before plants use it.

Crops can be grown in the desert. Satellite images show farmers using pivot irrigation in Saudi Arabia.

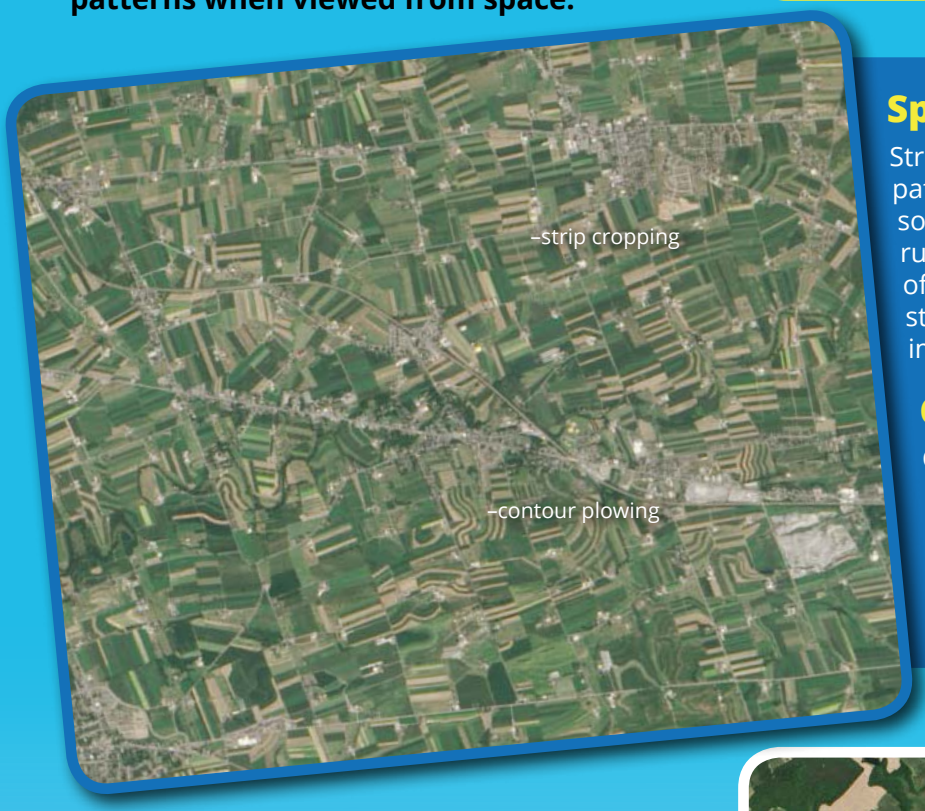
Center-pivot irrigation is useful even where water is more plentiful, like in these fields in Kansas. Some fields include multiple types of crops; you can see this in the circles with multiple shades of green.

Slowing Runoff

Getting enough water to your crops is important, but it's also important to keep that water on the farm. When water runs away too quickly, plants do not have enough time to absorb it. Worse, the fast flow can take soil with it.

One way that water is wasted is called runoff – the water literally runs off the land into nearby creeks, rivers, or lakes. Runoff picks up soil and sediment, but also fertilizers that end up in the water and can cause problems for the fish and wildlife. Farmers can prevent some runoff through practices that make some interesting patterns when viewed from space.

In dry areas, farmers need to pump in water to irrigate crops. In California's Imperial Valley, farmers use water from the Colorado River. Any water that isn't used by the plants ends up in the Salton Sea. The sediment in that runoff makes it a saltwater lake.



Sprouting Strips

Strip cropping alternates rows of crops in a pattern. Crops with more runoff (like corn or soybeans) are planted between crops with less runoff (like hay). When strip cropping, farmers often create terraces that slow erosion and trap storm water. Strip cropping can be seen in this image from Southeastern Pennsylvania.

Curving Crops

Contour plowing is a tilling and planting pattern where farmers follow natural hills, valleys, and curves of the land rather than making straight rows. This helps minimize runoff by trapping water in terraces.

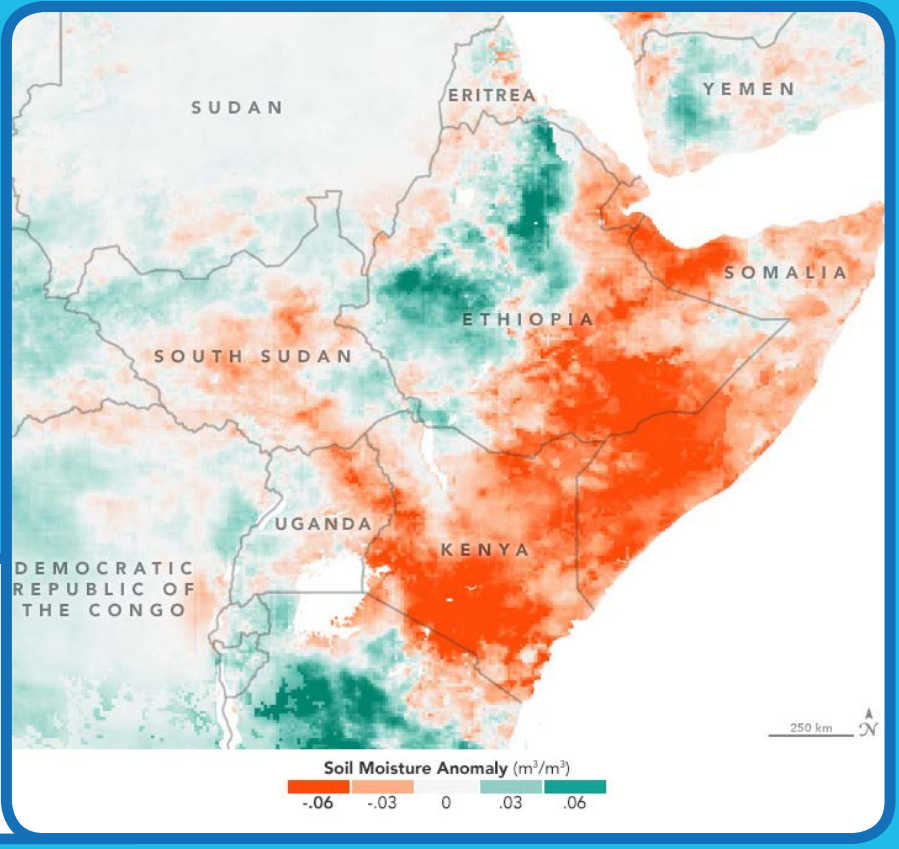
Grassed Waterways

Another way to curb runoff is to make lines of plants and trees between the farm and the water. These lines help filter and soak up runoff water before it reaches nearby streams and rivers. These plants can also stabilize stream banks and provide shade to keep water temperatures cool, which is better for many fish.

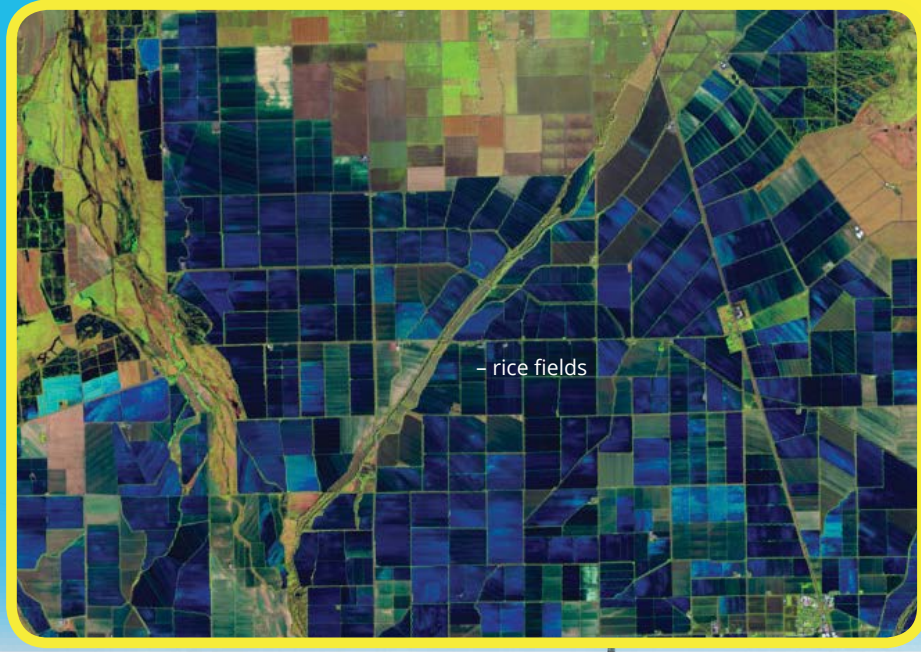
In Maryland, farmers use grasses and forests along streambeds to prevent runoff from entering the Choptank River.

Finding Food and Famine by Satellite

When it hasn't rained as much as usual, crops may struggle to survive. Scientists measure soil wetness, precipitation, and plant greenness to locate areas where crops may not produce enough food to feed the people who rely on them. They provide this information to governments and relief agencies that plan for and respond to food shortages.



Drought developed in East Africa in 2019 when seasonal rains failed to deliver much water. Data like this was used to warn government officials and humanitarian groups of the risk of **famine** so they could bring food and supplies to the area.


– rice fields

Flooding Fields for Birds

In the winter, many rice growers in California flood their fields to soften the ground and make it easier to till in the spring. These human-made ponds help migrating geese by providing a place to rest and feed on their long journey. NASA satellite data was used to identify the months when birds would benefit most from the flooded fields.

Vocabulary

drought – When there is not enough water for plants to grow.

famine – An extreme shortage of food.

Data Viz

How Does Your Garden Grow?

Growing crops or planting trees changes how our landscape appears from space. Brown, bare soil, changes to green as buds burst open and leaves spread. Try growing your own crops in an aluminum tray and take images of the changes daily – using a digital camera like a satellite.

Make a Mini Farm

1. Fill the roasting pan with soil.

Materials

- 3 different types of quick-growing seeds. For example: chia, peas, and microgreens.
- 9 x 13 inch recyclable aluminum roasting pan (at least 2 inches deep)
- potting soil
- water
- spray bottle
- camera

2. Divide the soil into three sections.

3. Plant each type of seed in their section. Water daily.

4. Take a picture of your tray straight-down every day for 4 weeks.

What's Happening?

What changes do you notice in your photographs? Did the plants all grow at the same rate? Did some seeds not grow at all? Just like you compared your images to see the changes as your plants began to grow, scientists measure how green crops appear from space and use this information to help people forecast how much of a particular crop will be produced from year to year.