

Johnny Appleseed in the Sahel; or, the Giving Tree

Grades: 7

Description: How can the ownership of a tree send children to school, end malnutrition, and turn back the Saharan Desert? This lesson will teach how man's interaction with the environment is influenced by the governmental policies and economic system of Niger.

Time: Two or three 45 minute class periods

Objectives:

Materials Needed:

- The modified article "In Niger, Trees and Crops Turn Back the Desert" (one page of maps and images and four pages of text)
- Graphic Organizer
- Extensions can include Google Earth satellite images of Niger and/or Google searches of related images of Niger

1st Step:

Pre-write: ask students to brainstorm possible uses of trees. After students write their ideas, have a whole class discussion.

2nd Step:

Have students take a pre-quiz with questions such as:

Where is Niger? What and where is the Sahel? What is a market economy? What is subsistence farming?

3rd Step:

Show the students the included images as a color handout or in a PowerPoint. Have the students speculate on what the boys are doing; what would Americans of the same age be doing; how does farming differ from the US and Niger; etc.

4th Step:

Introduce the graphic organizer to students and review with them what examples of Geography, Government, History, Economy, and Culture. You may want to use examples from the article to illustrate these.

Tell them they will be identifying examples of these concepts/disciplines in the article they are about to read. It will not be necessary to identify all of the relevant examples of each but instead to find ones that demonstrate how each impacts the others.

Alternatively, create reading comprehension questions for each section to guide their reading.

5th Step:

Guided Practice – Read aloud the first paragraph and have students identify the Geography and Economy information. Explain to students that some of the descriptions may apply to one or more categories. See the completed graphic organizer for possible method of classifying the information.

6th Step:

Independent Practice for remaining three sections in class and or for homework.

Assessment:

1. Complete the graphic organizer
2. Have pairs of students write a series of cause and effect statements then have other pairs answer them.
Ex. Governmental Policy of individuals owning trees causes what type of economic change?
Farmers have incentive to protect trees and profit from them
Ex. Increased farming income leads to what cultural/family changes?
There is less need for sons and daughters to move away for jobs and send remittances home
3. Students should write a letter from the point of view of a Nigerian farmer to his son explaining why he should return home as his remittances are no longer needed.
4. Have students apply their knowledge by having them role play farmers, poachers, village chiefs, etc. in new images.

Extensions:

LEP and Exceptional students: Label the paragraphs with the appropriate concept and have the student identify the evidence. The article has already been modified to make it an age appropriate reading level, content has been divided into chunks, and definitions have been incorporated definitions. Provide additional images to illustrate the topic, highlighted terms, farming practices, etc.

Students can be divided into pairs and or groups to read one section and then report their findings to the class.

Gifted Students can be provided with the original article, which can be found at

<http://www.nigerembassyusa.org/profile.html>

1. Compare the planting of trees in the Sahel with the farming practice of slash and burn, often seen in South America and West Africa.
2. Examine a second Sahel country and compare both countries efforts to reduce poverty. What is the second country doing that Niger is not? Which country would students rather live in or visit?
3. Create a booklet for younger students on how trees have increased the standard of living in Niger.
4. Write a persuasive paragraph on how additional growth will occur in Niger or how an extended drought could harm these improvements.

Additional background on Niger: <http://www.nigerembassyusa.org/profile.html>

NC Standard Course of Study:

Objectives Social Studies 2.02, 2.03, 3.01-3.03, 5.01-5.03, 6.01 and 6.02

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	Geography	History	Economy	Culture	Government
Background	<p>Sahel – southern border of Sahara</p> <p>Semi-arid – light rainfall</p> <p>Desertification – soil loses ability to grow & turns into desert</p> <p>Trees were all gone – rocky, sandy soil</p> <p>Fierce winds</p> <p>Well ran dry</p> <p>Drought- lack of rainfall</p> <p>Cleared land and firewood</p> <p>Farming and livestock practices</p> <p>Plow around trees</p>	Greener than 30 years ago	Poverty – unable to buy necessities	Population doubled Human behavior can transform the environment	Planting NOT by the government
Governmental Laws for Trees	<p>Rural – countryside</p> <p>Tree roots fix the soil in place, preserve farm land and well water, put nitrogen in the soil and add fertilizer</p> <p>Gao tree</p>	Trees belong to the government since colonial times	No incentive to protect trees Now can sell branches, pods, fruit, and bark	Farmers used to clear their fields then move to a new one	Trees belong to the government since colonial times Not enough foresters to police the country
Farming in Niger	<p>Niger – 12% of land supports 90% of population</p> <p>Irrigation can grow cabbage and lettuce fields</p> <p>600,000 acres have been reclaimed</p> <p>Barren lands helped by seeds, water, and manure</p>	Nigeria's population has doubled in last 20 years	<p>Subsistence farming – able to grow just enough for family</p> <p>90% are farmers</p> <p>Few tools, machinery</p> <p>Selling trees can bring \$300</p> <p>Migrate- move</p> <p>Remittances – money sent home</p> <p>Profit – money earned after subtracting expenses</p> <p>Poachers – illegal hunters</p>	<p>Motorized pump leads to children in school</p> <p>Support families – send remittances home</p> <p>Women raise crops</p> <p>Village committee enforces rights of farmers</p>	Village committee enforces rights of farmers
Niger and the Sahel's Future	<p>Millions of acres planted</p> <p>Droughts lead to hunger</p>	Drought in 2005	<p>Sale of firewood prevented children's deaths by malnutrition</p> <p>Reduce poverty and control future</p>	Effort of the whole community for farmer – led tree growth 3 wives and 17 children	Village Chief

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Farming in Niger					
Niger and the Sahel's Future					

In Niger, Trees and Crops Turn Back the Desert

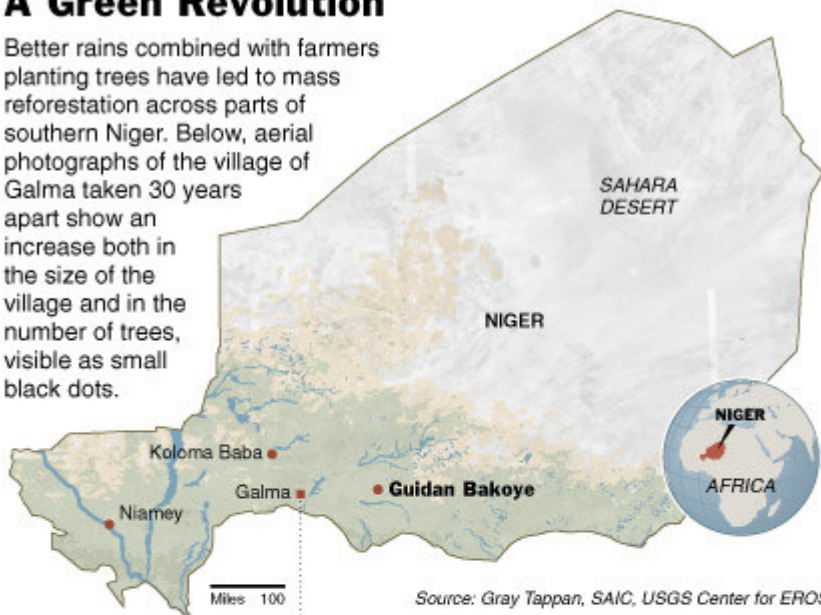


Michael Kamber for The New York Times

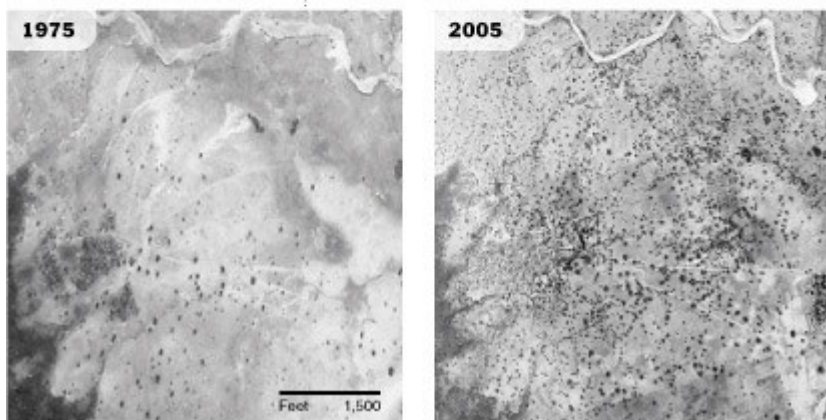
In Ague, Niger, where replanting trees helped alleviate the effects of a famine in 2005, boys operate a foot pump to draw water for irrigation.

A Green Revolution

Better rains combined with farmers planting trees have led to mass reforestation across parts of southern Niger. Below, aerial photographs of the village of Galma taken 30 years apart show an increase both in the size of the village and in the number of trees, visible as small black dots.



Source: Gray Tappan, SAIC, USGS Center for EROS



The New York Times; aerial photographs by Institut Géographique National du Niger (1975) and Gray Tappan

Adapted from February 11, 2007 By [LYDIA POLGREEN](#)

In Niger, Trees and Crops Turn Back the Desert

Background

GUIDAN BAKOYE, [Niger](#) — This town located in the Sahel lies in a dust-choked region, usually thought of as a wasteland turning into desert. Now, millions of trees are growing, thanks to poor farmers whose simple methods cost little or nothing at all. The **Sahel** is found on the southern border the Sahara Desert across the continent of Africa. Its **semiarid climate** (light annual rainfall that can only support grasses and shrubs) is home to some of the poorest people on earth.

Better land preservation and improved rainfall have helped create at least 7.4 million acres of trees in Niger. This has been done largely without an expensive program of planting trees by the government or by foreign aid groups. The trees are stopping the **desertification** of land (the process by which soil loses its ability to grow crops and turns into desert). The trees are also increasing Niger's quality of life.

Examining satellite images and on-the-ground counting of trees, have found that Niger has recently added millions of new trees. It is now far greener than it was 30 years ago. Better times are developing in a place better known for its hunger and **poverty** (unable to buy necessities).

These better times have come as the population of Niger has doubled. Usually, however, population growth leads to the loss of trees. Trees are cut because people need to clear land for farming and burn firewood for cooking. The trees and other vegetation are actually most often found in some of the most **densely** (thickly) populated regions of the country.

About 20 years ago, farmers like Ibrahim Danjimo realized something terrible was happening to their fields. "We look around, all the trees were far from the village," said Mr. Danjimo, a farmer in his 40s who has been working the rocky, sandy soil of this tiny village since he was a child. "Suddenly, the trees were all gone."

Fierce winds were carrying off the topsoil of their once-productive or fertile land. Sand dunes threatened to swallow huts. Wells ran dry; a disaster was beginning.

Three problems damaged farming in the **Sahel**. First, severe **drought** (lack of rainfall) in the 1970s and '80s harmed farming in Niger. Second, an increasing population needed more land cleared and more firewood. Third, destructive farming and livestock practices meant that the land was completely left bare. The desert seemed determined to swallow everything. So Mr. Danjimo and other farmers in Guidan Bakoye took a small but radical step. No longer would they cut down the young trees from their fields before planting. Instead, they would carefully plow around them when sowing their crops of millet, sorghum, peanuts and beans.

Today, the success in growing new trees suggests that the harm to the Sahel may not have been permanent. The land seemingly suffered only a temporary loss of **fertility** (ability to sustain plant growth). The evidence, scientists say, demonstrates how relatively small changes in human behavior can transform the regional environment. In Niger's case, farmers began protecting trees just as rainfall levels began to rise again after the droughts in the 1970s and '80s.

Governmental Laws for Trees

Another change was the way trees were regarded by law. From colonial times, all trees in Niger had been regarded as the property of the government. This gave farmers little incentive to protect them. Trees were chopped for firewood or construction without regard to the environmental costs. Government foresters were supposed to make sure the trees were properly managed. There simply were not enough foresters to police a country nearly twice the size of Texas.

But over time, farmers began to regard the trees in their fields as their property. In recent years the government has allowed individuals to own trees. Farmers make money from the trees by selling branches, pods, fruit and bark. Because those sales are more rewarding over time than simply chopping down the tree for firewood, the farmers preserve them.

Mahamane Larwanou, a forestry expert at the University of Niamey in Niger's capital, said the growth of more trees had positively changed **rural** (countryside) life in Niger.

"The benefits are so many it is really astonishing," Dr. Larwanou said. "The farmers can sell the branches for money. They can feed the pods as food to their animals. They can sell or eat the leaves. They can sell and eat the fruits. Trees are so valuable to farmers, so they protect them."

They also have environmental benefits. Their roots fix the soil in place. This prevents the soil from being carried off with the fierce winds of the Sahel and preserves farm land. The roots also help hold water in the ground, rather than letting it run off across rocky, barren fields.

One tree in particular, the gao tree, is particularly helpful. The tree puts nitrogen into the soil which makes it more fertile. Its leaves fall off during the rainy season, which means it does not compete with crops for water, sun or nutrients during the growing period. The leaves themselves become organic fertilizer when they fall.

"This tree is perfectly adapted for farming in the Sahel," said Dr. Larwanou. "Yet it had all but disappeared from the region."

For generations local farmers had simply cleared their fields of all vegetation, including trees, before sowing neat rows of sorghum, millet, peanuts and beans. When a field became less productive, the farmer would move on to another.

Farming in Niger

Subsistence farming (able to grow just enough for your family) for 13 million people from Niger's fragile environment is something like a puzzle. Only 12 percent of its land can be farmed but 90 percent of Niger's people live off of agriculture. These farmers live in the **Sahel**.

Farmers here have few tools and no machinery, making survival hard even in so-called normal times. But when the rains and harvest fall short, hunger becomes a terrible problem. The drought in 2005 caused the nation's worst food crisis in a generation.

Making matters worse, Niger's population has doubled in the last 20 years. Each woman bears about seven children, giving the country one of the highest growth rates in the world.

The growth of trees increases the income of rural farmers and herders. Ibrahim Idy, a farmer in Dahirou, a village in the Zinder region, has 20 baobab trees in his fields. Selling the leaves and fruit brings him about \$300 a year in additional income. He has used that money to buy a motorized pump to draw water from his well to irrigate his cabbage and lettuce fields. His neighbors, who have fewer baobabs, use their children to draw water and dig and direct the mud channels that send water coursing to the beds. While their children work the fields, Mr. Idy's children attend school.

In the village of Koloma Baba, in the Tahoua region just south of the desert's edge, a group of widows have reclaimed fields once thought forever **barren** (crops will not grow here). The women dig small pits in plots of land as hard as asphalt. They place a shovelful of manure in the pits, then wait for rain. The pits help the water and manure stay in the soil and regenerate its fertility, said Dr. Larwanou. Over time, with careful tending, the land can regain its ability to produce crops. In this manner, more than 600,000 acres of land have been reclaimed.

Still, disaster is always one missed rainfall away. Most able-bodied young men **migrate** (move) to Nigeria and beyond in search of work. They support their families with **remittances** (money sent home). The women struggle to grow a modest crop from their fields.

"I produce enough to eat, but nothing more," said Hadijatou Moussa, a widow and **subsistence farmer** in Koloma Baba.

The women have managed to grow trees on their fields as well, but have not seen much **profit** (money earned after subtracting expenses) from them. People come and chop their branches without permission, and a village committee that is supposed to enforce the rights of farmers to their trees does not take action against **poachers** (one who hunts illegally on someone else's land).

Niger and the Sahel's Future

Can Niger's success with the gao tree be repeated in other Sahel countries? While Niger's tree growth on a scale of millions of acres is unique, scientists say, smaller areas of land have been planted in other countries. "It really requires the effort of the whole community," said Dr. Larwanou. "If farmers don't take action themselves and the community doesn't support it, farmer-led tree growth cannot work."

Moussa Bara is the chief of Dansaga, a village in the Ague region of Niger. The trees here have been a huge success and the village has benefited enormously from it. He said not a single child died of malnutrition in the hunger crisis that gripped Niger in 2005. The trees provided extra income from selling firewood. Still, he said, the village has too many mouths to feed.

"We are many and the land is small," he said while bouncing on his lap a little boy named Ibrahim. Ibrahim is the youngest of his 17 children by his three wives.

The Sahel, like other parts of Africa, has experienced big swings in rainfall in recent years. Severe **droughts** in eastern and southern Africa have led to serious hunger crises in the past five years. The drop in rainfall in Niger in 2005 contributed to the food crisis here that year. Long-term projections point to longer and more frequent dry periods in the Sahel, caused by rising temperatures in the Gulf of Guinea.

Still, more trees mean that Niger's people are in a better position to withstand whatever changes the climate might bring. "This is something the farmer's control, and something they do for themselves," said Dr. Larwanou. "It demonstrates that with a little effort and foresight, you can reduce poverty in the Sahel. It is not impossible or hopeless, and does not have to cost a lot of money. It can be done."