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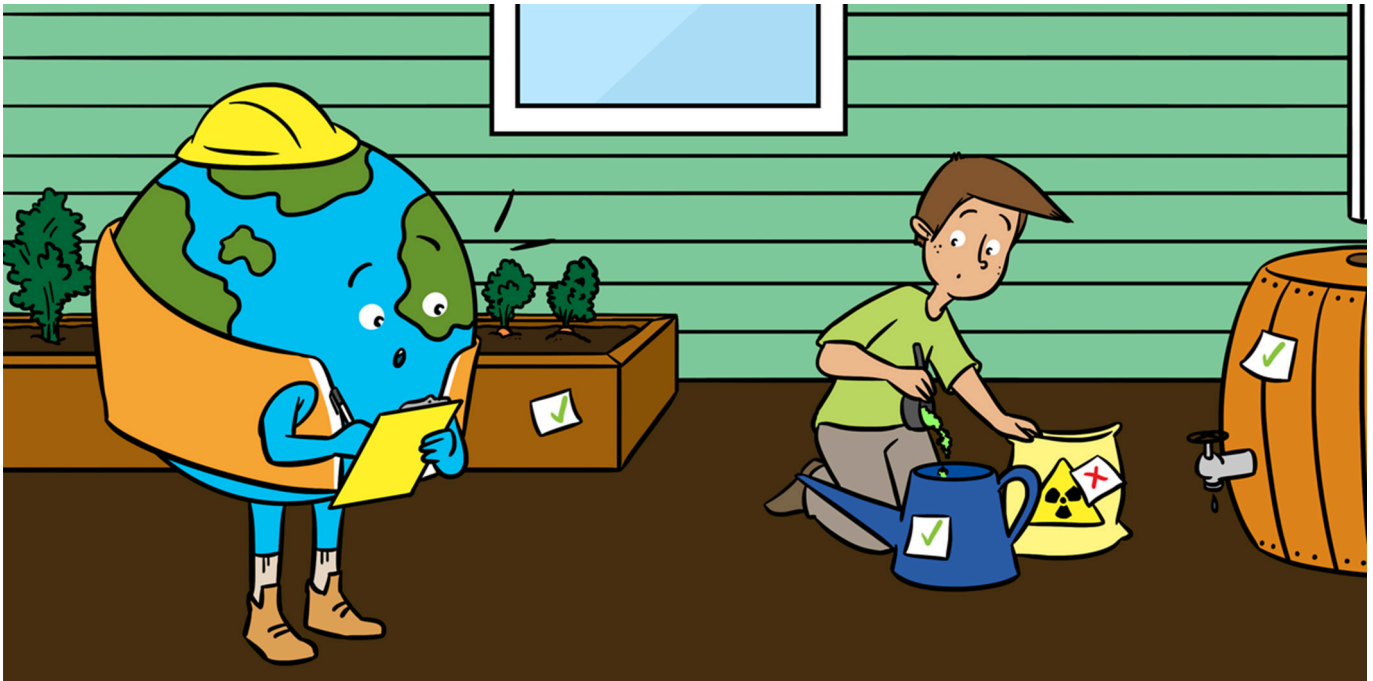
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WHAT IS SUSTAINABILITY AND HOW DO WE MEASURE IT?

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YOUNG REVIEWERS:



ALISSAR
AGE: 14



BENJAMIN
AGE: 8



IRENE
AGE: 8

SUSTAINABILITY

Being able to maintain a level over time. Here defined as the management of natural resources to ensure that human needs can be met today and in the future.

Today, we hear a lot of talk about sustainability and whether we can protect the planet while still living comfortable lives. But what does sustainability mean? Does it mean the same thing to everyone? Is it a new concept? What are its components and how do they interact? This article will try to answer these questions and explain how sustainability is measured and promoted in various contexts, such as farms and cities.

There are many urgent questions facing humans today. How can we make sure we will still have enough food, energy for heating, and materials to build houses in a few years' time? Can the Earth replace as many resources as humans are currently using? Can we recycle and reuse resources we have already used? If there are more and more people on Earth, will not our wastes pollute the environment? And how can we make sure everyone can earn a fair living without damaging the Earth? These questions all involve the concepts of **sustainability** and **sustainable development**. We hear the term sustainability a lot these days, but what does it actually mean? How is sustainability measured and how is it put into action?

SUSTAINABLE DEVELOPMENT

Development that allows humans living today to have acceptable living conditions, while also allowing those who will come after us to enjoy good conditions as well.

WHAT IS SUSTAINABILITY?

Sustainability has to do with making things last. When we talk about being sustainable, we mean we are trying to balance the needs of people with the impacts humans are having on the environment. We must make improvements in the way we are living so that we do not damage the Earth—that way, the people who come after us can also live good lives on a healthy planet.

The first person to ask whether the growing number of people on Earth would make it difficult to feed everyone despite technological progress was a man named Malthus, back in the 18th century! Other people also reflected on this matter and several of them came together and wrote the [Bruntland Report](#) in 1987 where the first mention was made and the first definition given of sustainable development. A major conference in Rio de Janeiro Brazil in 1992 built on this report. The countries at the conference agreed on 27 general principles to guide the development of their countries while protecting the environment. They drew up an action plan called Agenda 21, to put these principles into practice. Agenda 21 contains targets for the year 2000 and beyond like combating poverty and providing all persons with the opportunity to earn a sustainable livelihood.

Sustainable development is defined as development that allows humans living today to have acceptable living conditions, while also allowing those who will come after us to enjoy good conditions as well, by minimizing the damage that humans do to the Earth as our population grows. But this is not the only definition of sustainability—there are many definitions, depending on the topic being discussed. For instance, there are definitions of sustainable forests, sustainable cities, sustainable industries, and sustainable agriculture [1]. The United Nations Food and Agriculture Organization's definition of sustainability is: the management and conservation of natural resources (soil, water, air, etc.) through our technological and political choices, to ensure that human needs can be met today and in the future. This means protecting the environment while allowing today's societies to remain economically healthy and approved by the people [2]. All these definitions tell us that sustainability is based on three key aspects: the environment, people's daily lives, and the economy ([Figure 1A](#)).

The definition of sustainability also depends on the scale at which it is viewed: we can look at the sustainability of a single farm, a city, a large region, or the whole planet ([Figure 1B](#)). Different phenomena are involved at each level. For example, the use of chemicals that pollute water and soil could affect the sustainability of a region, but climate change affects the entire planet.

When we talk about sustainable living, we mean living a lifestyle that aims to be sustainable, by limiting our use of resources. It can

Figure 1

(A) Sustainability has three main components: the environment, people's daily lives, the economy. (B) The definition of sustainability differs depending on the scale we view it at—from the level of a single farm, for example, to the level of the entire planet.

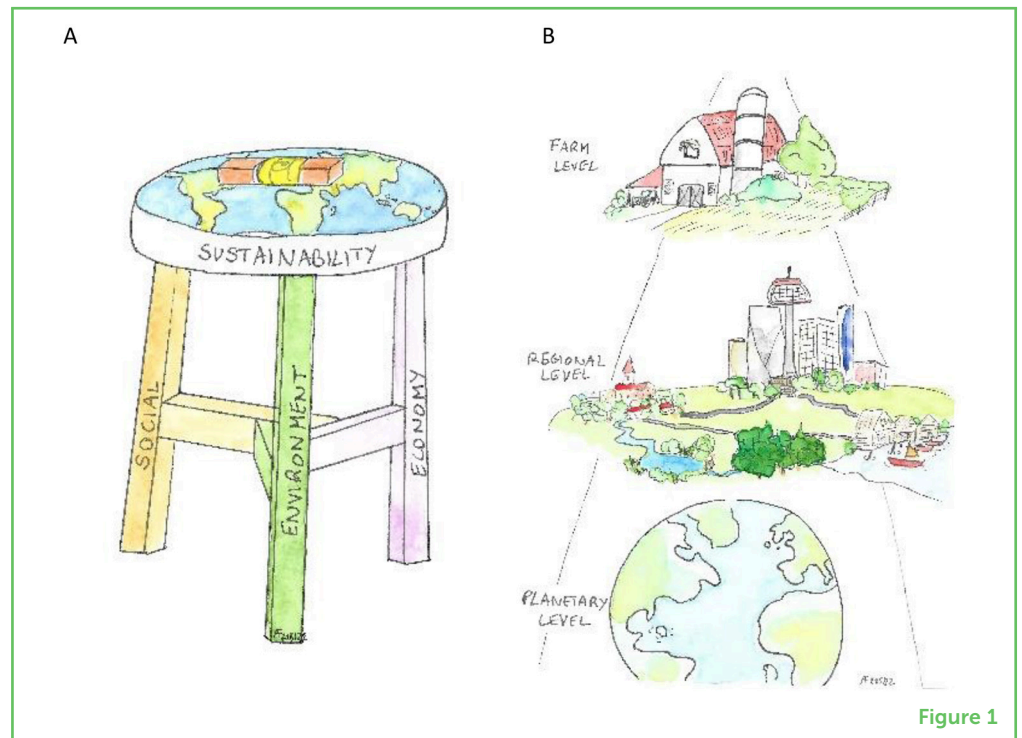


Figure 1

imply recycling our wastes, using only rainwater to water our gardens, deciding to buy fewer things, or eating only what is produced by farms close to where we live, not on the other side of the world. This [United Nations webpage](#) can help you learn more about sustainable development and discover fun ways to live more sustainably.

EVALUATING SUSTAINABILITY

Evaluating something complex often involves trying to understand it by simplifying it. If we want to evaluate the sustainability of something, we must first define what we will evaluate (a city? an industry? a farm?), why we are evaluating it (to compare two farms? to choose the best crops to grow on a farm?), who will evaluate it (experts? groups of citizens?), and how we will evaluate it (Figure 2). The evaluation of sustainability will be different if, for example, it is done by a group of farmers comparing the sustainability of their farms to figure out how to improve their practices, or if it is done by a group of experts evaluating the sustainability of a city, to help the mayor define city policies.

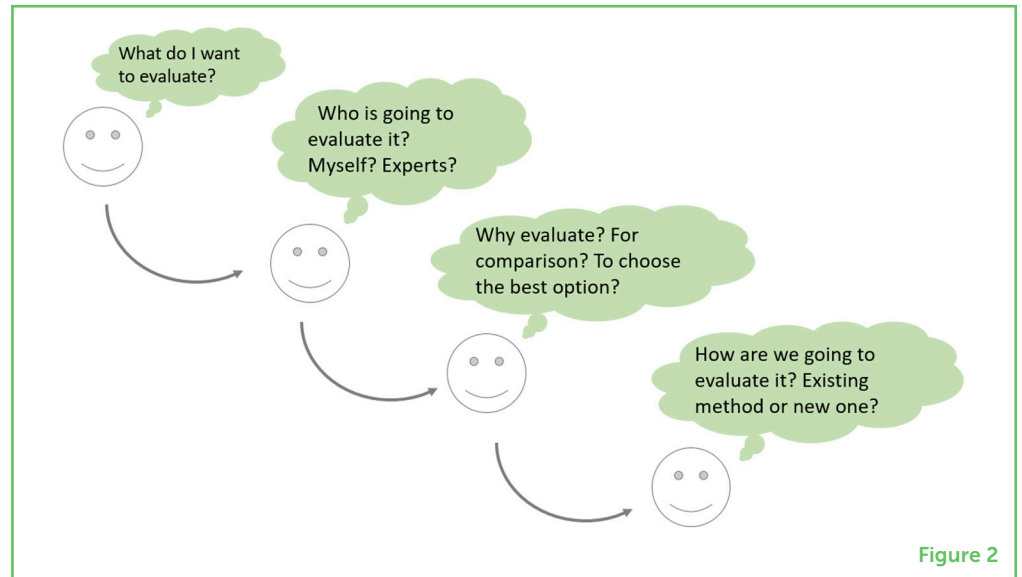
Once we have our definition of sustainability, we must then choose **criteria** that allow us to say whether the system we are evaluating is sustainable. Let us take the example of a farm. To figure out if a farm is sustainable, we must look at all three important aspects of sustainability: environmental, social, and economic. We can ask a whole range of questions, such as: Does the farm create jobs? Does it produce high-quality food? Does it protect nature or threaten it? Can the farm produce a lot of food and provide a decent salary for the farmer, without damaging the environment? Whichever questions

CRITERIA

The standards by which something may be judged. For example, whether the price paid to farmers for their crops is fair or not.

Figure 2

Questions we must ask ourselves when we want to evaluate sustainability.

**Figure 2**

INDICATOR

A tool used to measure a criterion to tell whether that criterion is being achieved. For example, the number of insect species found in a farm or in a garden.

we choose as the criteria for our evaluation, we will need to answer them. Since these criteria are complex, we can simplify them using **indicators**. For example, say we want to focus on the criterion of whether the farm protects nature. Studies have shown that certain chemicals used to protect crops can kill bees, so we could look at whether the farm uses these chemicals. If the farm uses a lot of chemicals it will damage nature, which is not sustainable; but if the farm does not use chemicals, it will preserve nature and the farm will be more sustainable. In this case, the number and quantity of chemicals used can be an indicator of nature protection.

Sometimes, methods to evaluate sustainability may already exist. There are plenty of ways to assess the sustainability of farms, for example [3]. So, often there is no need to create all the criteria and indicators ourselves! However, sometimes methods to evaluate sustainability must be designed for a very specific situation, and in those cases we can create a tailor-made evaluation method by choosing our criteria and indicators. We can also decide to give more importance to some criteria than to others. For example, in a region that often suffers from drought, the amount of water a farm uses for its crops could be a very important criterion for its sustainability. Methods to evaluate sustainability can be designed by a group of experts, with the help of other people such as farmers, consumers, or nature conservation organizations.

WHAT ARE CITIES DOING TO BE MORE SUSTAINABLE?

These days, many cities want to become more sustainable to help protect our planet. In 2015, at the Milan World Expo in Italy, 100 major cities signed a pact to commit to a more sustainable food policy, and they shared their methods so they could learn from each other and improve.

URBAN AGRICULTURE

Growing crops or raising animals within or near the city. It can also include food processing, distribution or waste recycling. It can also produce flowers or pedagogical activities.

Figure 3

Urban agriculture improves the sustainability of cities and the living conditions of city dwellers.

Toronto, Canada is one city that has been interested in sustainability for a long time. Toronto first established a Food Council to connect people from food, farming and community sector and make them work together to ensure access to good, affordable and sustainable food for all in 1991. In 1993, the city developed gardens where residents could produce food, on their own or together. In 2002, Toronto even set up a farm that belongs to the city. Toronto states that having shared ground-level and rooftop gardens is important for a healthy, beautiful, active city; and the city even publishes a guide to help residents garden. Indeed, **urban agriculture** improves the sustainability of cities because even more than producing food, it brings biodiversity to the city, helps diminish the heat in summer but also helps cities to look nicer and provides city residents with an enjoyable outdoor activity (Figure 3).

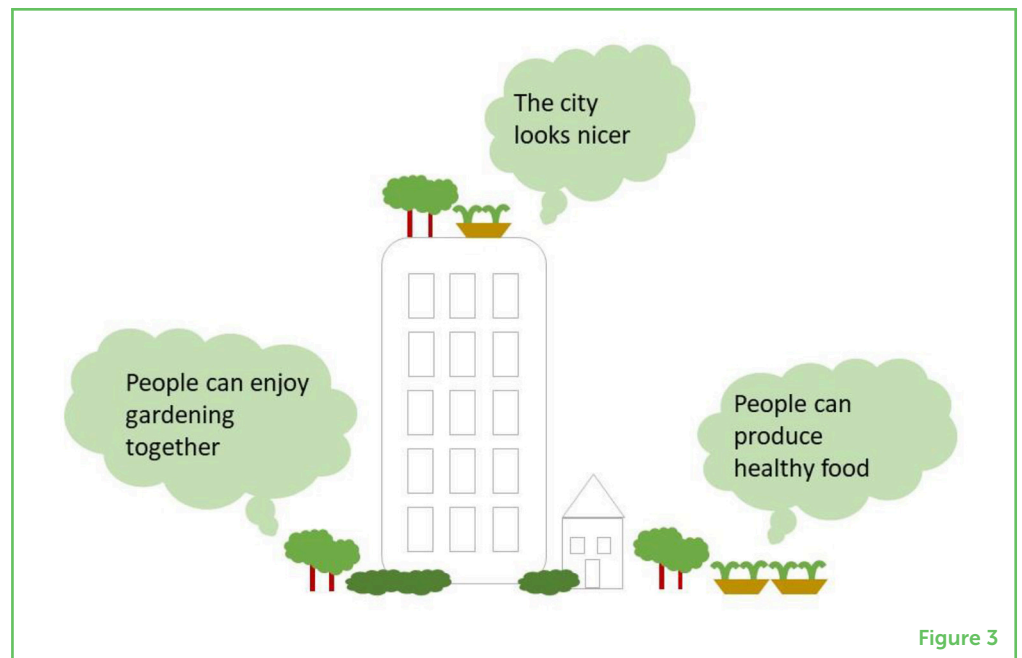


Figure 3

In 2009, Toronto wanted to measure the impact of urban agriculture on its residents. The city launched a study to identify indicators to measure the benefits of urban agriculture on health, the economy, the environment, and people's social connections. The study defined 30 indicators like the number of urban agricultural projects growing native plants or the number of people trained in gardening as tools to measure the benefits of urban agriculture. Toronto used the results of the study to set public policies, to make the city even more sustainable [4]. In 2013, Toronto adopted an agricultural program to increase the number of projects all over the city and, in 2015, the city published a new guide to growing and selling fruits and vegetables in the city to answer common questions on rules, health and safety so that everyone can grow and sell healthy food.

CONCLUSION

Evaluating sustainability can tell us whether we are producing and consuming Earth's resources in ways that will allow us to live healthy lives—now and in the future—while being fair to all humans and protecting the planet. There are many tools already available to check if we are achieving our sustainability goals, whether we are looking at the scale of our own home or the whole planet. Now it is up to us to measure and promote sustainability!

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YOUNG REVIEWERS



ALISSAR, AGE: 14

I spend summertime's swimming, riding around town, and playing in the park. My childhood was idyllic and I have many fond memories of those carefree days. I was involved in a lot of extracurricular activities, including the school band and the drama club. I am a member of some green sorority and involved in a lot of campus activities. I hope to land some small roles in independent films and commercials and do also some modeling work and being appeared in some TV shows and movies.



BENJAMIN, AGE: 8

Hi, my name is Ben, and I am 8 years old. I love Science and Math and want to be an astrophysicist someday!



IRENE, AGE: 8

Irene is my name. I adore animals and all things cute and lovely. When I grow up, I want to be a veterinarian and a teacher. I enjoy writing about anything! Dork Diaries is my favorite book, and I own the entire Dork series. When we were not fighting, I adore my younger sister. I participate in a variety of sports, including rhythmic gymnastics, tennis, swimming, and ice skating. Among them, rhythmic gymnastics is my favorite. I enjoy playing chess, but I do not get to do so often because no one in my family knows how... so sad.

AUTHORS



AGNÈS FARGUE-LELIÈVRE

I am both a teacher and a researcher in agronomy. I share my time between teaching engineering students and doing research on the working of urban farms and their impact on the city. In a previous life, I worked on crop production in rapeseed and maize and on the adoption of innovations by farmers. I am also regularly contacted by farmers and collectivities to help them develop urban agriculture.
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PAOLA CLERINO

I am a researcher in agronomy, working on ways to assess the sustainability of urban agriculture. I study how we can define sustainable urban agriculture. I also develop tools to assess if urban farms are sustainable, with people who create and manage these farms. They can be urban farmers or people working in cities' development such as city hall employees or architects for instance.
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