



# **Solinho in the Amazon**

**The importance of biodiversity to the soil**

## Introduction

In this booklet, which outlines a story set in the Amazon Rainforest, on the border between Brazil and Colombia, we seek to create material that playfully promotes scientific knowledge and gives visibility to the importance of maintaining soil biodiversity.

The Amazon, like other large tropical forests, has an important role in regulating the global climate, storing carbon and maintaining the evapotranspiration system (release of excess water captured by tree roots) which has a major impact on agriculture and the supply of water to several Brazilian regions and neighbouring countries, as well as influencing ocean currents.



However, in the last several decades, the biodiversity of the Amazon Rainforest has been altered by a series of factors, mainly human, making it urgent to develop joint actions to restore this biodiversity, which is so important for the planet.

As a result, the story presented here portrays a recurring and worrying environmental problem, burning, to show how the various functions performed by soil organisms are important in the recovery of altered natural systems and how they can serve as an example for all of us.



**Suelito:** *he is a pedon that represents a type of soil known as Podzol. This soil can be found in the Amazon basin.*

- Hello, kids, I'm Suelito, a traveling soil protector who stopped running around the world some time ago to become a storyteller. This happened on one of my trips, when I was passing through the Amazon Rainforest, right on the border between Brazil and Colombia.

I remember the weather was very hot that day, so I took the opportunity to rest in the shade of the trees and watch the routine of the people living in there. In the late afternoon, however, something changed everyone's life, including mine, when the sun was covered by dark clouds that caused a huge thunder and lightning storm. Despite the noise, not a single drop of rain fell and no one noticed small fire starting that was slowly moving towards the Rainforest.





When I saw the danger, I started to call out a warning. I also knew that the soil in this region would be very affected and I would not have the strength to help, nor could I go to a friend who could help the biome here to recover, which made me very worried. I needed to find someone who was willing to go all the way to the southeast of Brazil. Looking around, I saw a small, frightened butterfly talking to two distressed mushrooms. Without delay, I went to them and said:

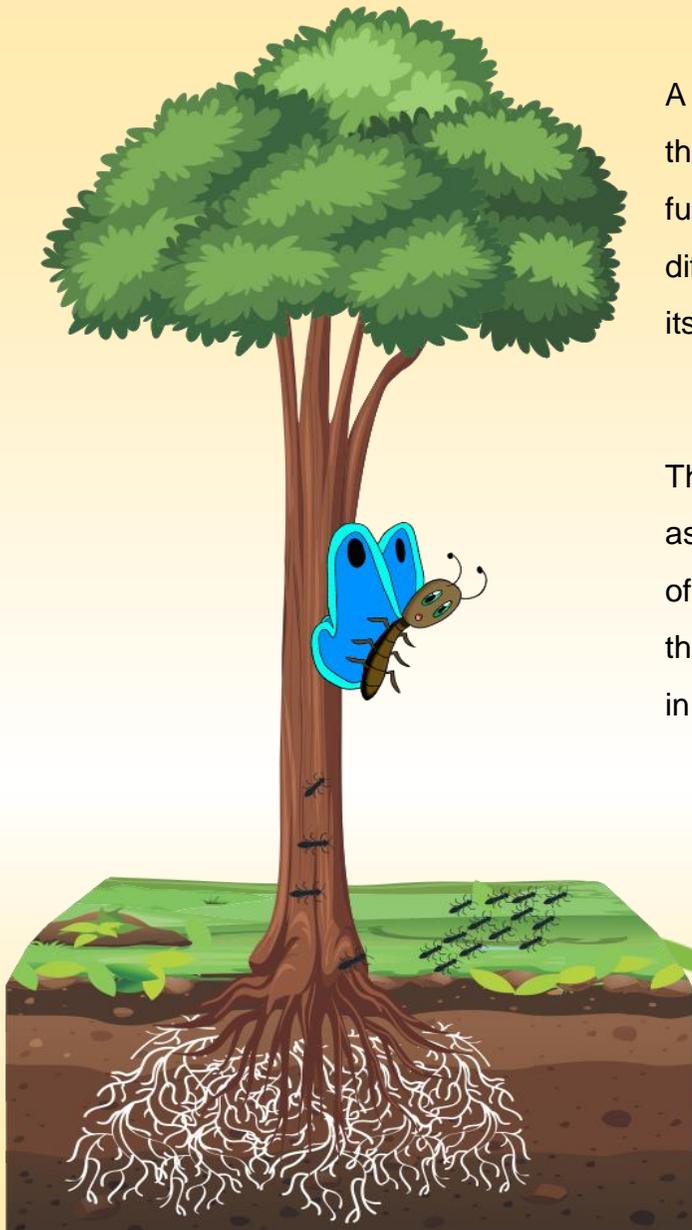
- Little Suzanna, listen to me, please. Everyone here will need a lot of help to restore the Rainforest. I know who can help us, his name is Solinho, but we need someone who is willing to go on a long journey to bring him back here.

Suzanna asked who Solinho was and after listening to me carefully, she offered to complete the mission, but there was a problem:

- I can bring back your pedon friend, but I don't know the way, how do I get to him?

**Pedon:** *smallest unit or three-dimensional volume that contains all layers in depth, called horizons, of a particular type of soil.*

***Caligo suzanna*** (Deyrolle, 1872): *also known as the Owl Butterfly, it is an insect of the order Lepidoptera and is typical of Brazil and Colombia.*



A Brazil nut tree overheard our conversation and offered help because she knew that fire could affect her too. She took a deep breath, connected with mycorrhizal fungi that lived at her roots, traced the coordinates and passed them on to different families of ants that climbed her trunk. Immediately an army organized itself and showed Suzanna the way.

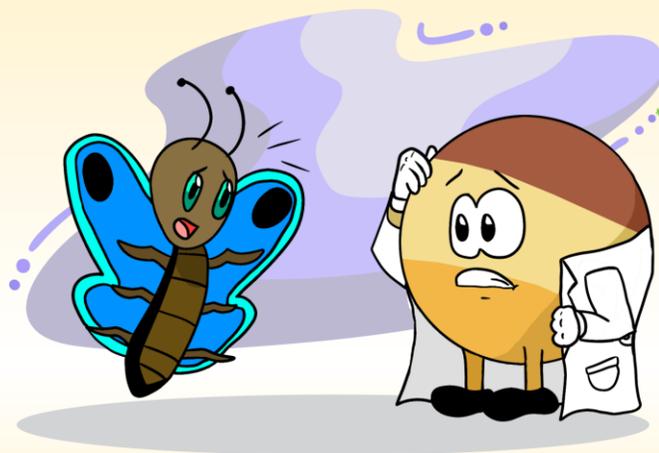
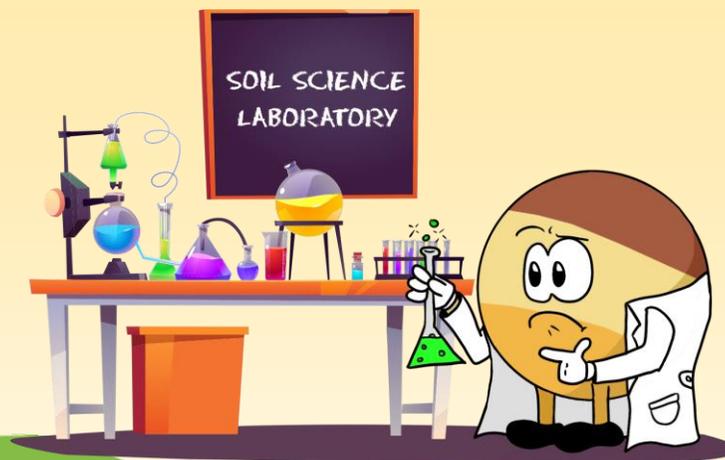
The brave butterfly flew as fast as she could to the southeast of Brazil, being helped along by the wind, which was also going in that direction.



**Fungi:** they have branches called hyphae that help them to settle in the soil. Some individuals in this group can form a very beautiful structure that we know as a mushroom.

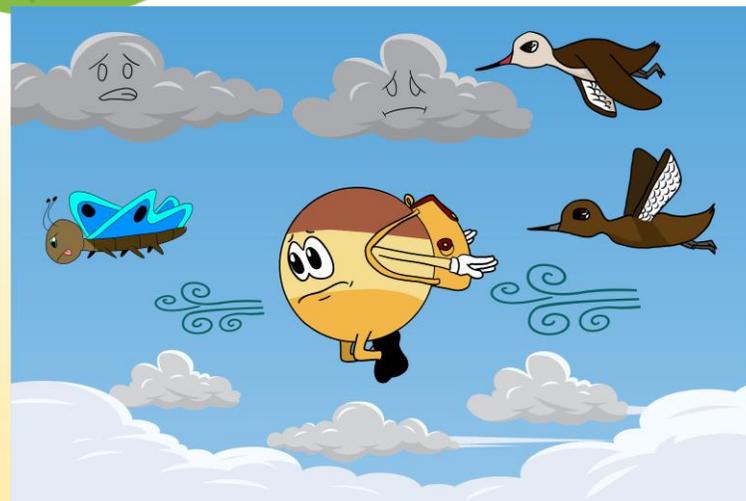
Solino, who worked in his laboratory doing important experiments to restore altered areas, was surprised by the visit and saddened by the news. He knew the problems we would face and decided:

- Suzanna, we have no time to waste, I'm going with you to the Amazon!



**Solino:** he is a pedon and represents the Lixisol, which are soils found in several regions of Brazil, with well-defined horizons.

So, with his backpack on his back, he took a ride on a wind current that went to the north of Brazil and followed our friend to answer my call. On the way, migratory birds joined the group to take seeds and help with the restoration of the Rainforest. They also met some rain-laden clouds that were touched by the story and changed their path to help too.



Meanwhile in the forest fire, after seeing what was happening to their homes my macro friends and microorganisms were unable to do their usual jobs. To try to cheer them up a little and wait for Solinho to arrive, I told them stories I had learned on my travels, especially about firebreaks. Impressed, they asked how they were made and, after my explanation, they managed to stop the spread of the fire before it reached the thick forest.

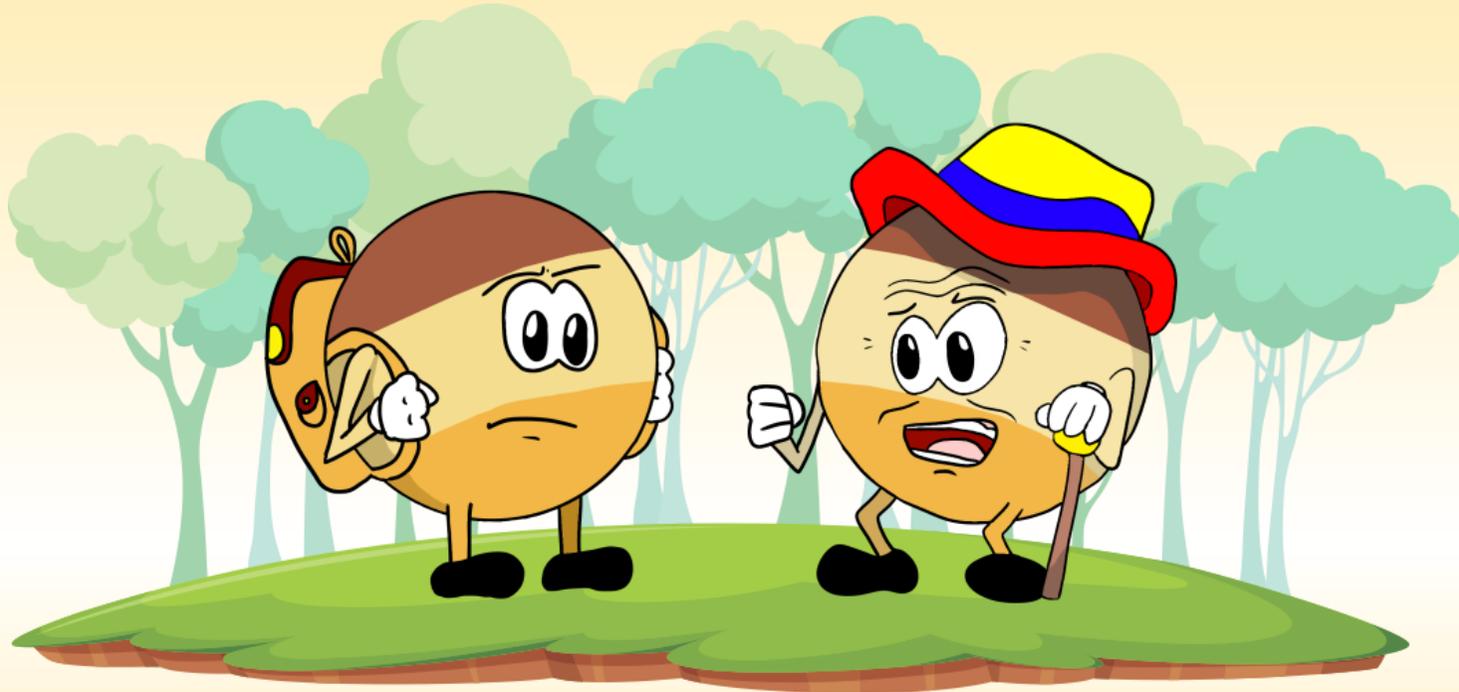


**Firebreak:** they are cuts in the ground or scraped areas, without vegetation, that are made in the forest to avoid the spread of fires.

Shortly after that, with immense relief I spotted Solinho and Suzanna arriving with their new friends who started to work immediately! The clouds put out all the fires, which led to the soil cooling down, while the birds dropped seeds where the fire was already out.

Knowing that Solinho had studied a lot in recent years, I confidently handed my job over to him:

- Solinho, from now on you will be the soil protector. Your first mission will be to help this area recover! Emotionally, my young friend looked around, accepted the great responsibility that lay ahead and took action.



He called everyone to the small firebreak, and they all quickly gathered, including the termite families who were organizing finding another place to live.

Then he took his logbook out of his backpack and started talking:

- My friends, we cannot abandon the region that was destroyed by fire, as it is very important for the balance of nature. The forest that was here needs to be restored, but to do that, we all need to work together.

His speech made many creatures protest, as they saw only a devastated home, with no future. But Solinho persisted:

- I understand that you are sad and that many will want to leave this place, but I ask you to stay and try to help, as this can work.



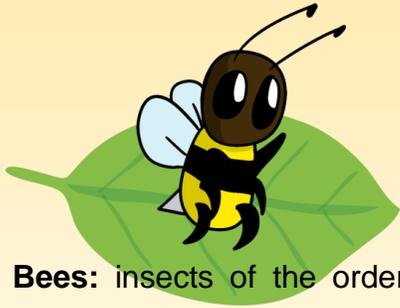
The termites, who had listened closely to what the pedon had said, replied:

- Solinho, we understand your hope that we will stay, but it is in our nature to leave when something bad happens.

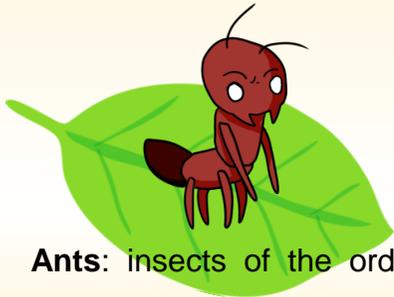
My friend did not give up:

- My dear termites and everyone else, you may not realize how important each of you are to nature. Scientists from around the world are discovering fascinating things and learning from you how it is possible to act harmoniously to keep the soil alive and to protect its biodiversity.

Everyone was listening as Solinho described the role each of those macro and microorganisms played. So, little by little, I saw those creatures go from being scared to being impressed with what they heard about themselves.



**Bees:** insects of the order Hymenoptera known for their important role in pollination.



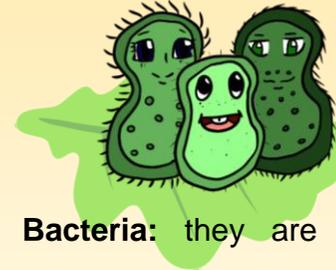
**Ants:** insects of the order Hymenoptera that can carry more than 50 times their own weight. They are among the animals that have reached the highest degree of social organization present in the most complex societies. They contribute to the fragmentation of organic material that will be decomposed by soil microorganisms.



**Winged termites:** they are social insects of the order Isoptera that contribute to the sanding of the soil. They live in colonies with well-defined functions. They usually leave the place where they are when they encounter difficulties in survival.



**Earthworms:** decomposing beings that feed on both vegetables and the remains of other animals. They dig extensive tunnels, bringing the deepest layers of soil to the surface.



**Bacteria:** they are organisms formed by a single cell and they can have functions in the nature: to promote the growth of plants, to control other harmful organisms to plants, to decompose the organic material and to help the plants to obtain nutrients.

But Solinho needed more than that, so he said:

- Look at that Samaúma that survived the fire, if we abandon it, it will perish and, with it, all the living things that depend on it.

When he finished speaking, the firebreak was silent for a few minutes, until one termite asked to speak for the rest:

- Solinho, we were going to leave, but we didn't know we were so important. This was the best place we have ever lived, so let's stay and help.





Impressed by the termites' decision, all the organisms gathered there agreed that if they worked together, they could rebuild the home that was so important to them.

Even the wind, which seemed to be gone, turned into a gentle breeze, calming the heat and showing that it was willing to contribute.

In the distance, Samaúma shook its branches, took a deep breath and buried its roots even more, finding water and transforming it into tiny droplets that dampened the air.

**Samaúma** (*Ceiba pentandra*): tropical tree of the Malvales order that can reach 90m in height and have a trunk up to 3m in diameter. It is considered one of the largest trees in the world flora. Native peoples of the Amazon consider it the “mother of trees”, as its tubular roots go deep into the soil in search of water at certain times and irrigate the entire area and the existing plant kingdom in its surroundings.



From that moment on, all the organisms worked nonstop to recover their precious forest. Solinho coordinated the work and helped the soil with the knowledge he had learned from his studies. I watched everything he did, remembering many things that I had also done to help altered soils. In order not to miss anything about the story, I wrote down everything in my notebook..

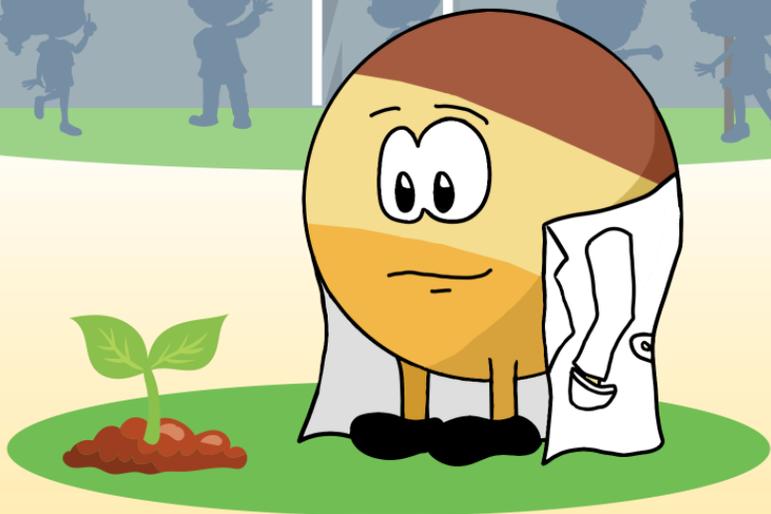
After completing his mission, Solinho told us that he needed to return to his laboratory. We said goodbye to him, very grateful for all the things he had taught us. Under his guidance, we formed a community of organisms of different species living and working together. But our meeting with Solinho did not end with that farewell.



Later, whilst teaching some children who visited the laboratory to see experiments and the functioning of the soil, my friend felt a breeze that reminded him of the Amazon Rainforest. It was us, sending him a message:

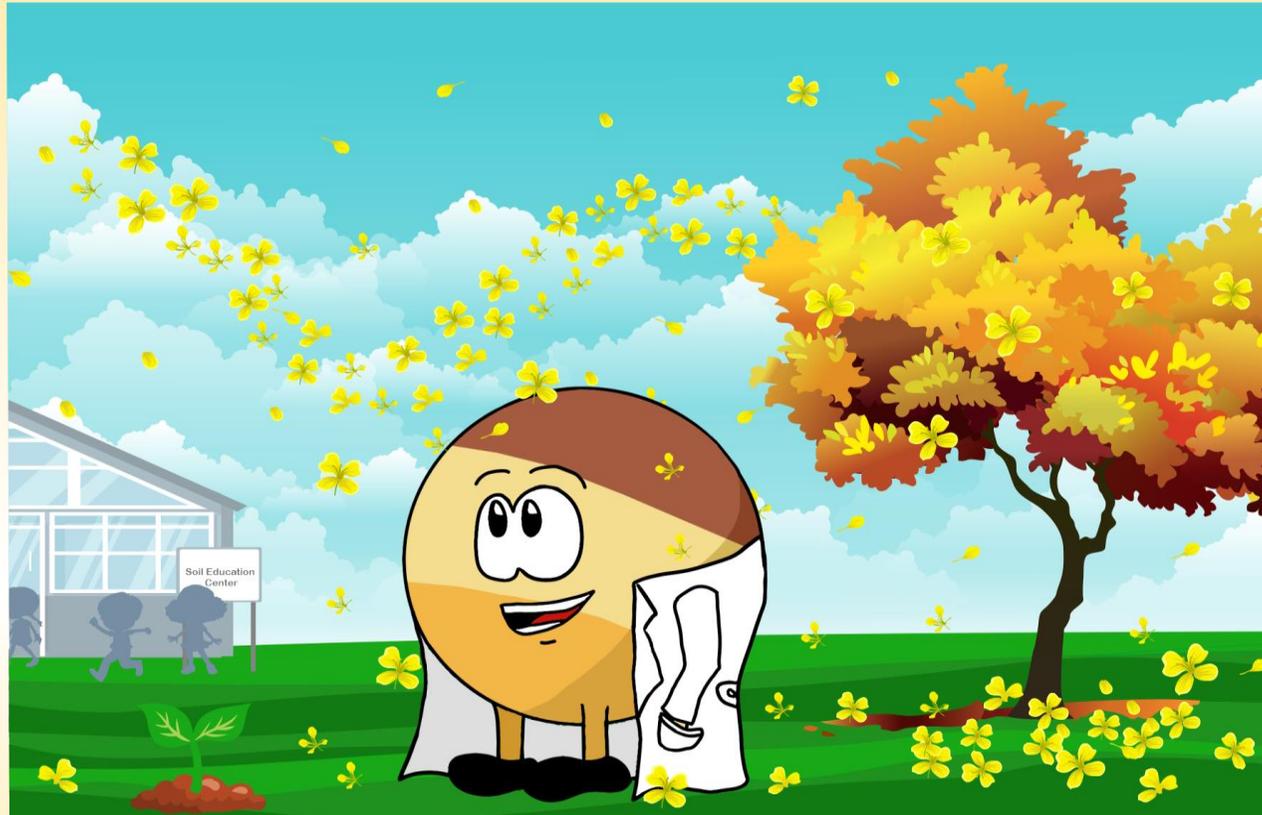


Solino, we are the organisms, animals and plants of the Amazon Rainforest. After you helped us, we connected with other biomes and we are renewed. It is due to this connection that we are here, to thank you once again for your help!



***"Keep soil alive, protect soil biodiversity"***

Moved, Solinho touched the ground in thanks, while the breeze spread pollen from different species of trees and seeds fell on the earth. It was nature, in deep connection, showing the magic that can be renewed forever if we work together..



Through this fantastic network that connects different biomes, Solinho said that the studies in the laboratory had expanded and he showed the children what he had learned from us. When we said goodbye, over the same soil connection he received an urgent request for help from New Zealand. Aware that this was a serious problem, he told us that he would have to go there immediately. But that is another story!

