Central American CACAO Project

The Central American Cacao Project (PCC) at CATIE (Tropical Agricultural Research and Higher Education Center) aims to increase the productivity, diversity and financial and environmental value of the cacao plantations of at least 6,000 Central American families.

Working closely with cacao farming families, the Project creates alliances with other partners in the region in order to enhance the social interactions, competitiveness and business capacity of the producers' organizations and improve the living conditions of their members.

The Project promotes efforts to increase the knowledge and skills of farming families and students at agricultural schools, technical colleges and agronomy faculties, for the sustainable production of cacao.

The Project also offers equal opportunities as well as economic, social and cultural responsibilities for men and women in all its spheres of action.

For more information contact:

Shirley Orozco Estrada
PCC Communications
CATIE, Costa Rica
Tel: (506) 2558-2466
E-mail: sorozco@catie.ac.cr

ISBN: 978-9977-57-499-8

CATIE
Solutions for environment and development
Soluciones para el ambiente y desarrollo

Agroforestry Farm Planning:

Manual for farming families

Eduardo Somarriba, Francisco Quesada

COLLECTION FIELD SCHOOLS PCC 1

Central American CACAO Project

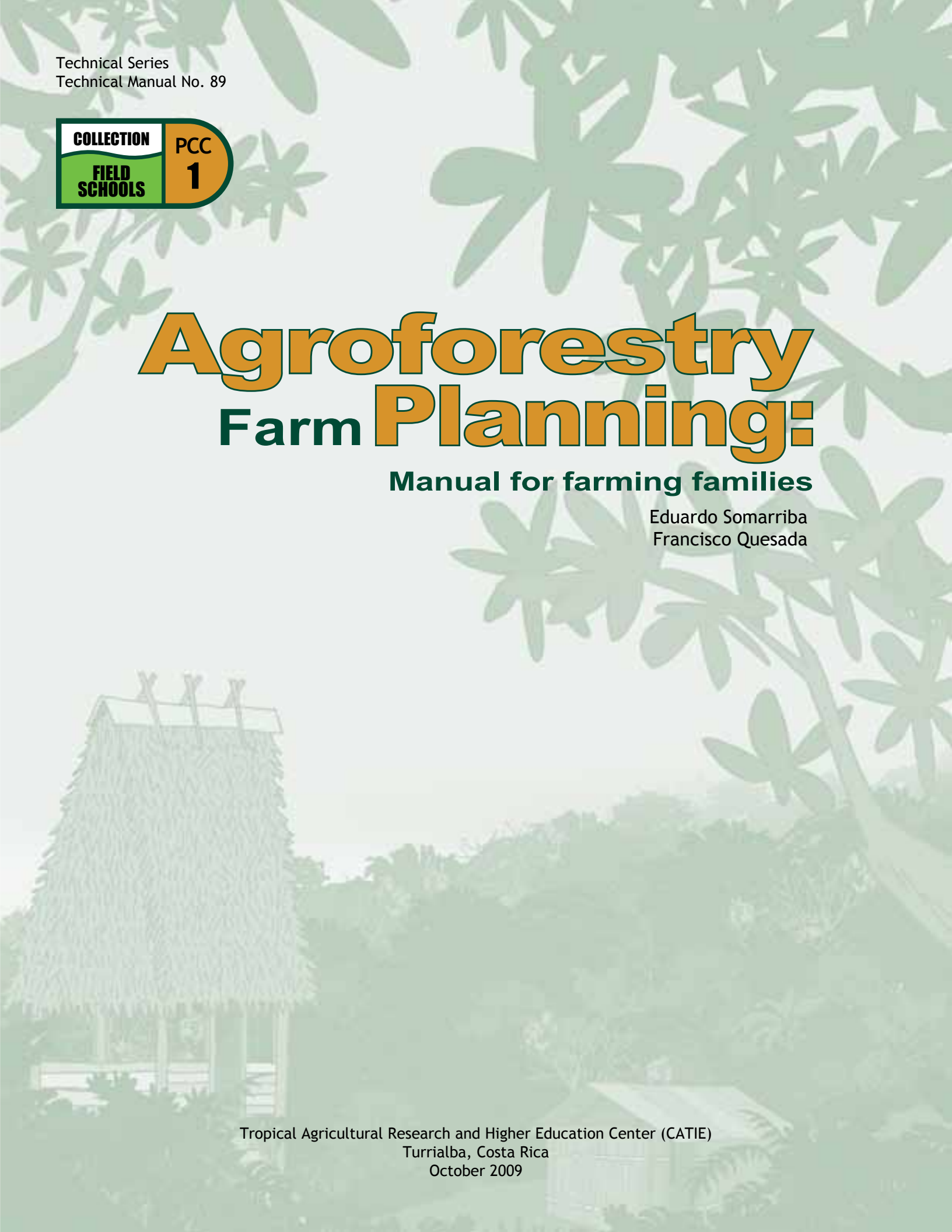
Technical Series
Technical Manual No. 89

COLLECTION FIELD SCHOOLS PCC 1

Agroforestry Farm Planning:

Manual for farming families

Eduardo Somarriba
Francisco Quesada



Tropical Agricultural Research and Higher Education Center (CATIE)
Turrialba, Costa Rica
October 2009

Tropical Agricultural Research and Higher Education Center (CATIE) is a regional center dedicated to research and postgraduate education in agriculture, management, conservation and sustainable use of natural resources. Its members are the Inter-American Institute for Cooperation on Agriculture (IICA), Belize, Bolivia, Colombia, Costa Rica, the Dominican Republic, the Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Venezuela and Spain.

631.58
S693p Somarriba, Eduardo
Agroforestry farm planning : manual for farming families / Eduardo Somarriba y Francisco Quesada. – 1st ed. – Turrialba, C.R. : CATIE, 2009.
46 p. – (Technical series. Technical manual / CATIE ; no. 89, Eng. ed.)

ISBN 978-9977-57-499-8
También como: Collection field schools : no.1

1. Agroforestería – Planificación de fincas
2. Agroforestería – Conservación de los recursos 3. Planificación de fincas – Materiales de enseñanza I. Quesada, Francisco II. CATIE III. Título IV. Serie

Credits:

Authors: Eduardo Somarriba Chavez
Francisco Quesada Chaverri

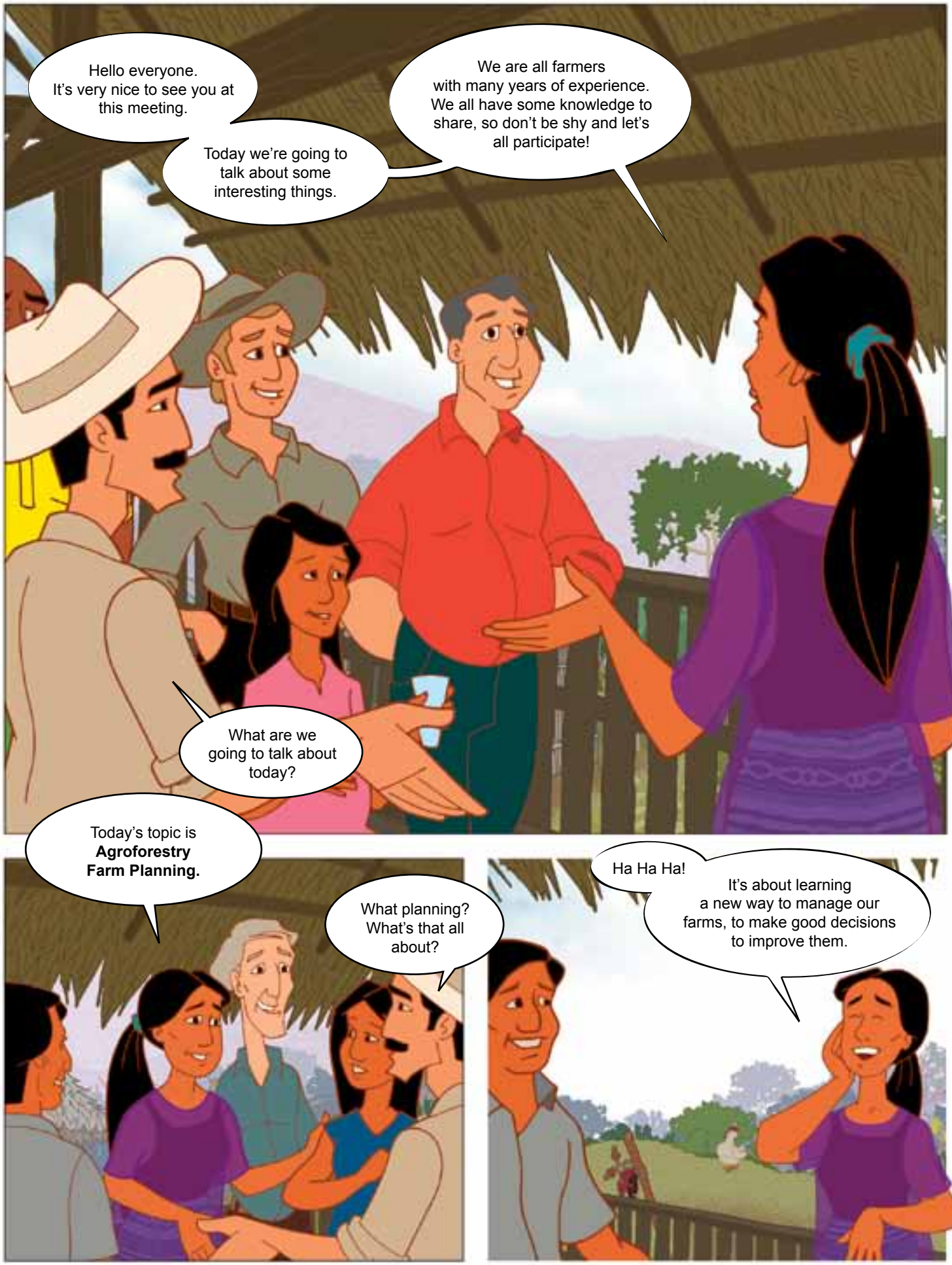
Editing: Unidad de Comunicación

Translation: Christina feeny

Illustration, design and arts: Alexander Corrales Mora

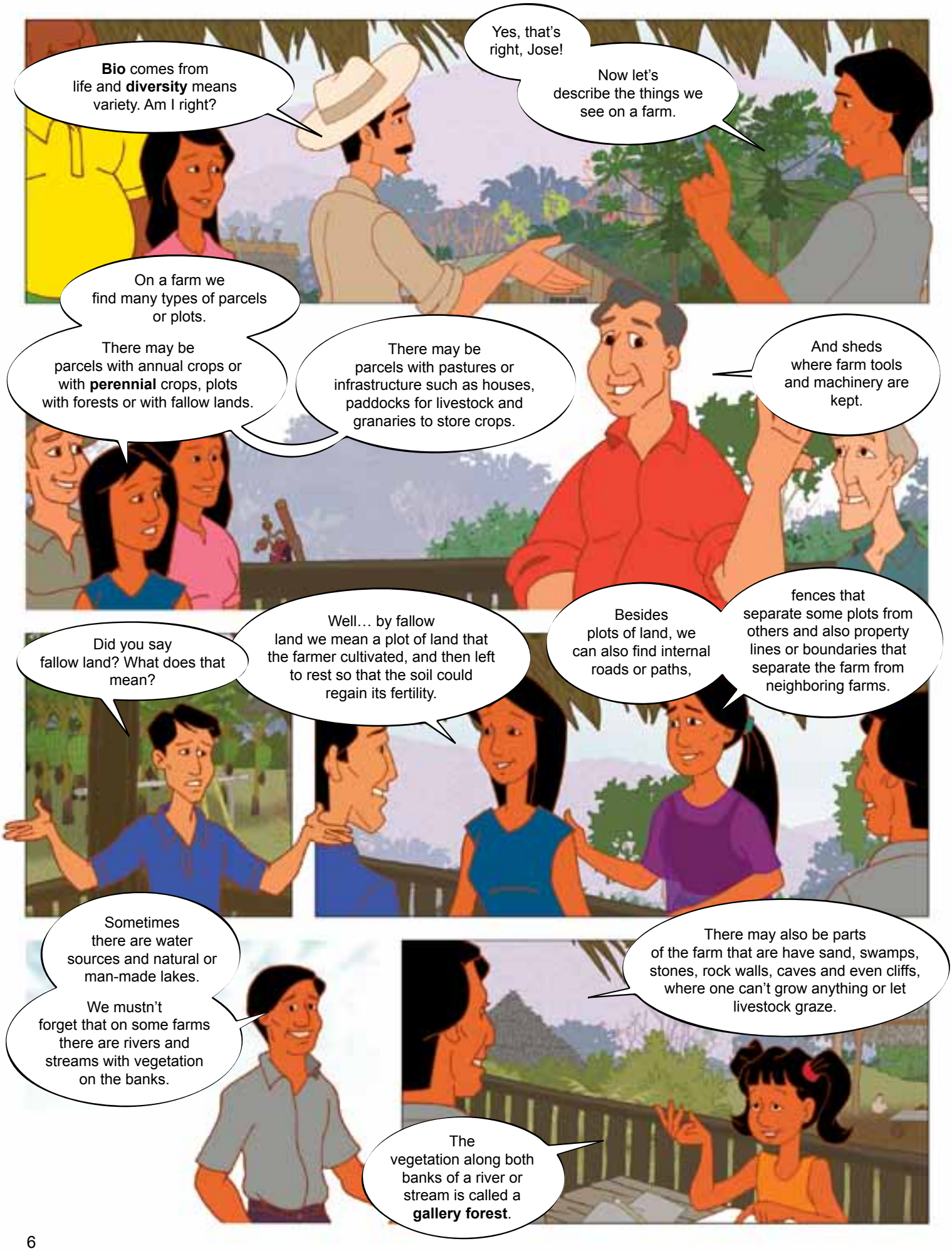
Coordination: Shirley Orozco Estrada

This manual has been prepared with the aim of providing support material for education and information purposes on agroforestry planning on farms. It was financed by the CATIE Project Competitiveness and Environment in Cacao Producing Territories of Central America (Central American Cacao Project).


Hello everyone.
It's very nice to see you at this meeting.
Today we're going to talk about some interesting things.
We are all farmers with many years of experience. We all have some knowledge to share, so don't be shy and let's all participate!
What are we going to talk about today?
Today's topic is **Agroforestry Farm Planning.**
What planning? What's that all about?
Ha Ha Ha!
It's about learning a new way to manage our farms, to make good decisions to improve them.


In agroforestry farm planning we pay a lot of attention to the use and management of trees, shrubs, palms,
vines and giant grasses like the bamboo we have on the farm.
We call all these plants **woody perennials.**
Woody comes from **wood** and is any trunk, branch or vine that produces wood.
They aren't like rice or corn, which produce a harvest, then die and have to be replanted. Are they?
And **perennial** means they live for a long time.
That's right!
Today we have some visitors who aren't farmers.
I would like to introduce you to Carlos, who lives in the city.
Hello everyone. I'm not a farmer but I work with an organization that supports farmers.
As a part of my job, I have to visit farms.
Today's topic revolves around farms.
It would be a good idea if we all could agree on what we understand by a farm.
I suggest we start with the basics.
Let's see... Let's establish what we mean by a farm and explain what makes it different from other businesses or human activities.
I think a farm is a business that makes use of the land for agriculture, environmental conservation or for recreation.


That's a good definition, but it would be good to explain it with more detail.
Mmm… For instance, let's remember that agriculture isn't just crops, it's also livestock.
And livestock not only includes cattle; but also pigs, goats, birds and even fish.
Did you know that in China they plant a tree called a white mulberry and they use the leaves to raise silkworms?
That's also a type of livestock.
I'd be willing to go to China just to feast on silkworms!
If you do go, don't forget to bring me a nice silk shirt!
What's all that about environmental conservation?
Carlos is talking about preserving forests, rivers and other water sources,
the purity of the air and the fertility of the soil.
And the variety of plants and animals that live use on the farm and its surroundings-in other words, its biodiversity.
Biodiversity is the variety of plants and animals that live in a place.

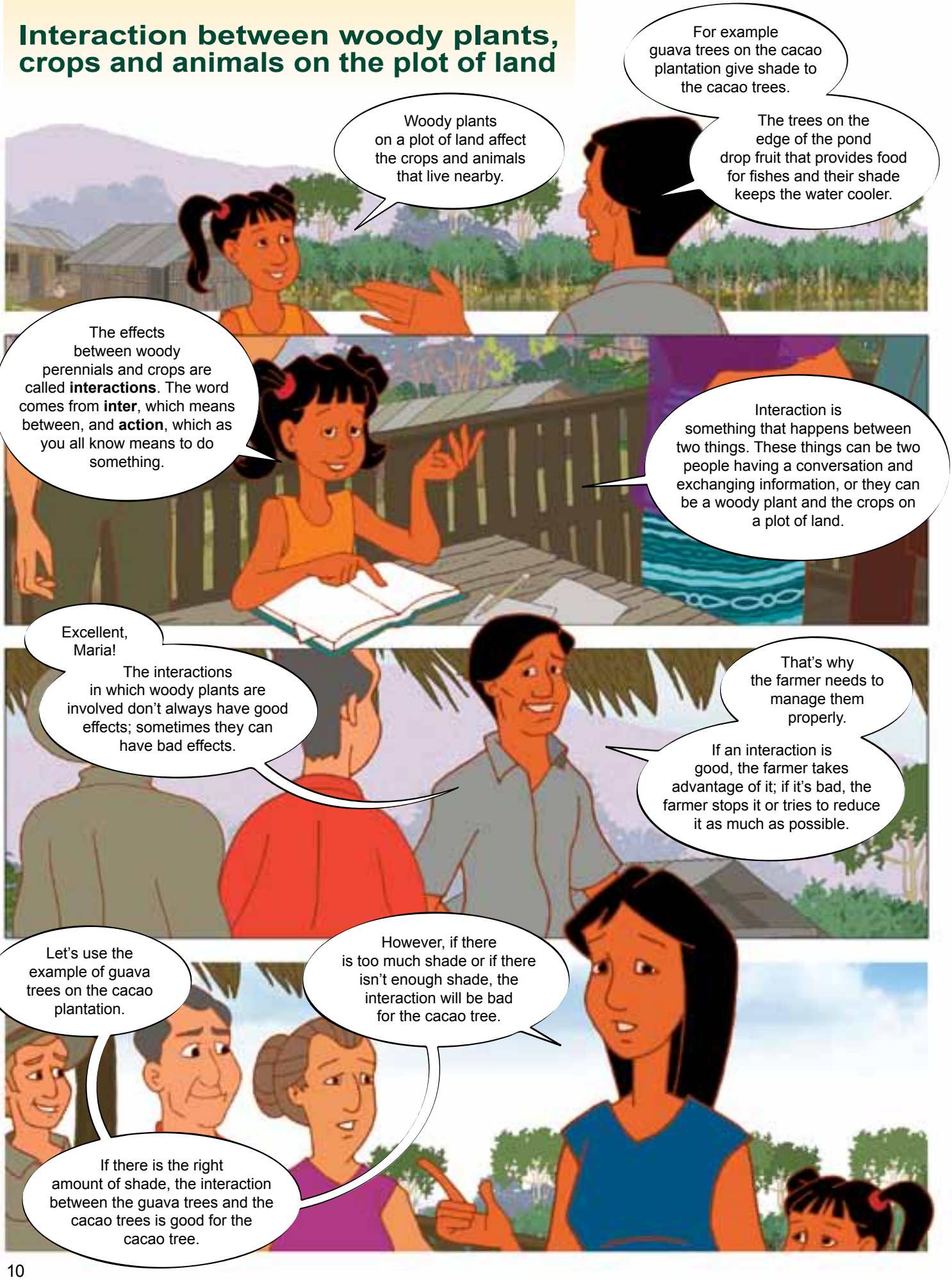

Bio comes from life and **diversity** means variety. Am I right?
Yes, that's right, Jose!
Now let's describe the things we see on a farm.
On a farm we find many types of parcels or plots.
There may be parcels with annual crops or with **perennial** crops, plots with forests or with fallow lands.
There may be parcels with pastures or infrastructure such as houses, paddocks for livestock and granaries to store crops.
And sheds where farm tools and machinery are kept.
Did you say fallow land? What does that mean?
Well… by fallow land we mean a plot of land that the farmer cultivated, and then left to rest so that the soil could regain its fertility.
Besides plots of land, we can also find internal roads or paths,
fences that separate some plots from others and also property lines or boundaries that separate the farm from neighboring farms.
Sometimes there are water sources and natural or man-made lakes.
We mustn't forget that on some farms there are rivers and streams with vegetation on the banks.
There may also be parts of the farm that are have sand, swamps, stones, rock walls, caves and even cliffs, where one can't grow anything or let livestock graze.
The vegetation along both banks of a river or stream is called a **gallery forest**.


Some of parcels of land, such as the cacao plantation and the dairy, are used for production, while others are used for environmental conservation.
For instance, for example, fallow lands allow the soil to recover its fertility.
Let's look at another aspect of the farm: the human aspect.
People live on a farm, such as the farmer and his family. Such as the farmer and his family.
On big farms some of the workers may also live there.
On every farm there are people who make decisions. Often it's the farmer and his family.
In other cases the owners hire an administrator or a manager to run the farm.
The person in charge of a farm or business is called a **manager**.
Of course - because on a farm, just like any other business, decisions must be made in order to achieve the goals.
That's right, Jose. For example, the manager might say:
our goal for this year is to produce at least 10,000 kilos of cacao on this farm.
Going back to our main topic,
today we're going to learn a method of planning our farms. You do know what planning means…right?
To make plans, get organized and think about what we are going to do ahead of time!


Very good, Jose!
A farm works well if the farmer and his family plan how to manage it instead of improvising everything.
On my farm, for example, one of my plans it to improve half of my cacao trees with good grafts.
My plan is to plant more fruit trees along the inner fences.
My plan is to take advantage of Carmen's fruit trees to make a good nest and have fresh fruit for breakfast every morning.
¡Ji ji ji!
People who plan their activities do better in life.
That's what I keep telling my children!
My mother always used to say that it's better to plan than to improvise.
But we want to teach you a method of planning farm
based on something known as **agroforestry**.
I would like you to notice that the word **agroforestry** is two words joined together:
Agro, which refers to agriculture, and **forestry**, which refers to trees or to the forest.
So agroforestry means something like **agriculture with trees or forests with agriculture**.
Yes, Gerardo, you're on the right track.
Agroforestry is the management of woody perennial plants and trees on the different plots of lands on the farm.


Woody perennials can be found throughout the farm. We find them on the plots containing perennial and annual crops,
on pasturelands, along the edge of the farm, along internal roads and in gallery forests, frontyards and home gardens,
on fallow lands and in the forest.
Because they are found everywhere, woody perennials open up a world of opportunities.
Of course!
Woody plants provide us with a great variety of goods and services.
Let's clarify the difference between **goods** and **services**.
Goods are things you can touch, like fruit and other food,
or forage for livestock, wood and other building materials, poles for fences, firewood, medicinal substances,
materials for making handicrafts to sell, of for one's home.
I still think we could name more goods provided by woody plants.
You can make syrup out of the sap of some types of trees and you can also get industrial substances,
and such as natural rubber, which can be used for tires, boots and other things.
Services, on the other hand, are intangible benefits that the farmer can obtain from trees but that aren't material objects.
For instance, shade for some crops that need it and for houses, and to make the landscape look nicer,
to improve the soil, for protection against the wind, shelter for birds and other animals.
And they can even be part of our cultural rituals.

Interaction between woody plants, crops and animals on the plot of land




Thank you, Carmen, I'm going to give you another example.
On my farm there's a row of trees next to the plot of land where I have crops.
This row of trees is called a windbreak – it stops the wind and keeps it from damaging the crops.
On my farm there are some guava trees next to the pastures. These trees produce fruit that can feed the cows - a favorable interaction between the guava tree and the cattle
The cattle disperse the guava seeds with their manure, encouraging the guava trees to reproduce in the pastures.
I also disperse seeds and fertilize the soil.
As long as you don't put fertilizer on my head, everything will be fine.
¡Ji ji ji!
Fertilizer on my head
¡Hi hi hi!
What a good joke!
My cousin Tobias had to close off a parcel of land where he'd planted pine trees because the cows would tread on the young pine saplings.
And sometimes the cows would come and scratch themselves on the young pine trees and would break the branches or knock the trees over.
My cousin dealt with this bad interaction by closing off the plot of land with the pine trees so the cattle couldn't come in until the trees were bigger.
Here in my notes I saw that interactions vary according to which plot of land the woody plants are on.
That's true; the most important interactions on a cacao plantation aren't the same as those that occur in the living fences on pasturelands or the windbreaks in a plantain grove.


In fact, on the cacao plantation the most important interaction is between the cacao trees and the other trees that provide shade for them,
in living fences on pasturelands the most important interaction is to control the movement of livestock and to provide forage,
while in the plantain grove the most important interaction is to stop the wind.
That's right!
Pay a lot of attention to the next thing I'm going to say.
The main purpose of agroforestry is to help farmers effectively manage the interaction between woody plants and the crops and animals on different plots of land on the farm.
Would anyone like to repeat that?
The main purpose of agroforestry is to cover the farmer and the animals he raises with trees and the interaction between the plots and the management.
What did you think of that?
You failed!
¡Hu uuu aaah!
Well, let's continue. We've already discussed the meaning of these three words: planning, agroforestry and farm.
If we put these three words together, we get the topic of today's meeting, agroforestry farm planning.
See how easy that is?


Don't think that there aren't any other ways of planning farms.
We have chosen agroforestry because many of us don't take full advantage of the woody perennials we have on the farm.
And that means that we lose a great opportunity to improve the farm's production, to increase it's value and to contribute to the conservation of the environment.
Listen everyone, I think this "Afro forestry" thing is great.
No one's talking about African forests!
They're talking about agroforestry.
This parrot can't get anything right!
Could you explain a bit more about the three main advantages of agroforestry?
Increase production, increase the value of the farm and conserve the environment.
Gladly, Miriam.
We've already looked at an example of how one can increase production on cacao plantations by properly managing the shade.
Let me give you another example.
If you plant forage trees in the living fences to feed the cattle, you would increase milk production.


That's right Cecilia. Now let me explain about a farm's value.
Look at that other farm, over there. It belongs to Rafael and Teresa. That farm has very few trees and is almost completely planted with shade-less bananas.
You could plant trees that produce wood in some parts of the banana plantation without reducing the production of bananas.
Of course! On the outer boundaries of the farm and on the inner paths one could plant salmwood, timber such as oak and mahogany trees.
Each tree is worth a lot of money.
Imagine how much that farm would be worth when those trees grow.
Good heavens! I can see that Jose is becoming quite an expert on this topic. But leave the topic of conservation to me.
Sometimes we see how the rain washes away the soil. We see currents of muddy water but we do nothing.
If we manage our farm based on the principles of agroforestry, then we prevent soil erosion.
That's what conservation is all about!.
We must also conserve animal life.
We complain because we hardly see any monkeys, parrots, agoutis or peccaries any more, but we don't do anything to conserve biodiversity.
For example, that gallery forest on either side of the river – why do you think it's so important for conservation on farms?


Look, in the gallery forest you find animals that live in water, like crabs, fish and freshwater shrimp, along with,
animals that live on land and in the trees, like agoutis, armadillos, sloths, monkeys, iguanas and snakes.
You also find birds and rodents passing through in search of food.
Gallery forests also serve as biological corridors, connecting the cultivated parcels with the forest parcels on the farm and with the protected areas.
Nowadays, with so many roads and deforestation, there's not much space left for the animals to move from one place to another for feeding or mating.
Speaking of mating, are you planning to go to the dance this evening? The Toucans will be there!
What? I was not invited¡
The man is talking about the band called The Toucans; don't you understand?
Let's continue. Where were we? Ah, yes.
And is agroforestry planning just for small farms like ours?
No, agroforestry planning is applicable to small, medium and large farms.

Agroforestry farm plannig

First stage: **Farm assessment**

Biophysical assessment

I'll begin by explaining the **biophysical** assessment.

It is called this because it includes a **biological** description, which has to do with human beings, animals and plants,

and the physical, which refers to the characteristics of the land and the climate.

A biophysical assessment involves describing the parcels on the farm, how they are used, which crops are grown, how much each parcel measures and any special features of the land or the climate there.

For example, if the land slopes, if the soil is good or poor, if it floods when it rains a lot, if it is a windy site or if its soil has a lot of clay.

To give you an example, a biophysical assessment of my farm might begin like this:

My farm measures a total of 15 hectares and includes a fairly flat banana plantation measuring half a hectare, 3 hectares of cacao with shade trees of various species,

and so on. We continue to describe all the rest of the parcels. Do you understand?

But in addition to the parcels on farms, we also have what we farmers call rows and agroforestry experts call **line plantings**.

Examples of line plantings are the property borders, internal roads and divisions, gallery forests, windbreaks and everything that would be represented on a map with lines.

For example, the row of orange trees at the edge of that internal road is a **line planting**.

A row of trees in a windbreak is also a **line planting**.


To carry out a good biophysical assessment, you must begin by making a drawing of the farm-in other words, a hand-drawn map.
Draw this map with your family, taking care to include all the parcels and all the lines on the farm.
As an example, we'll do an assessment of the farm that we're going to visit today,
which belongs to Gerardo and Miriam.
I asked you to draw a map of the farm. Did you do it?
Of course, Alberto! Here it is.
SKETCH OF THE FARM
OWNER: GERARDO SEGURA
AGE: 47 YEARS OLD
HECTARES: 8
NORTH
EAST
WEST
SOUTH
PORFIRIO
HOUSE
HOME GARDEN
ROAD
TENCIO
PLANTAIN WITHOUT SHADE COVERAGE
BANANA WITH SHADE COVERAGE
GALLERY FOREST
RIVER
BRIDGE
GALLERY FOREST
CACAO WITH SHADE COVERAGE
FOREST RESERVE
FLORIBERTO
Thank you. Come closer and take a look at the map.
This farm covers an area of 8 hectares and contains the following parcels:
Two hectares of cacao with shade.
One hectare of organic banana with shade.
One and a half hectares of plantain without shade at the edge of the river.
One hectare of forest reserve in this steep area that is very difficult to cultivate.
One hectare of forest on the riverbanks and a quarter of a hectare of kitchen garden.
What is there in this part, Gerardo?


It's a small plot of cassava. It measures about half a hectare. Write **cassava** there; we forgot to write it down.
Cassava, very good. Those are the parcels. Now let's see the lines.
This farm is more or less 400 meters long by 200 meters wide. The property lines, alone, which separate it from neighboring farms, measure 1.200 meters.
HOUSE
HOME GARDEN
ROAD
BANANA WITH SHADE COVERAGE
GALLERY FOREST
RIVER
CACAO
CASSAVA
we already have 2,300 meters. We still need to add 200 meters of gallery forest on each riverbank; that gives us a total of 2,700 meters in linear plantations.
To this, we must add abourt 300 meters of the main road and 200 meters secondary roads, with plantations on both sides, plus 100 meters of windbreak next to the banana plantation
Gerardo can tell us what plants grow in the lines.
Yes. On the property lines we have Madrecacao, madero negro and some **guavas trees** from natural regeneration.
Along the main internal pathway or road, there are oranges, Madrecacao and some other trees.
We have conserved a strip of gallery forest 15 meterswide on each side of the river.
There are native trees such as casha, virola, pilon, gavilan and about 30 other species, many of whose names I don't know.
Oh, and the windbreak is planted with teak trees.

Let's continue. Before moving on to the agroforestry assessment,

let's summarize the most important points of the biophysical assessment. I'll put them in this chart.

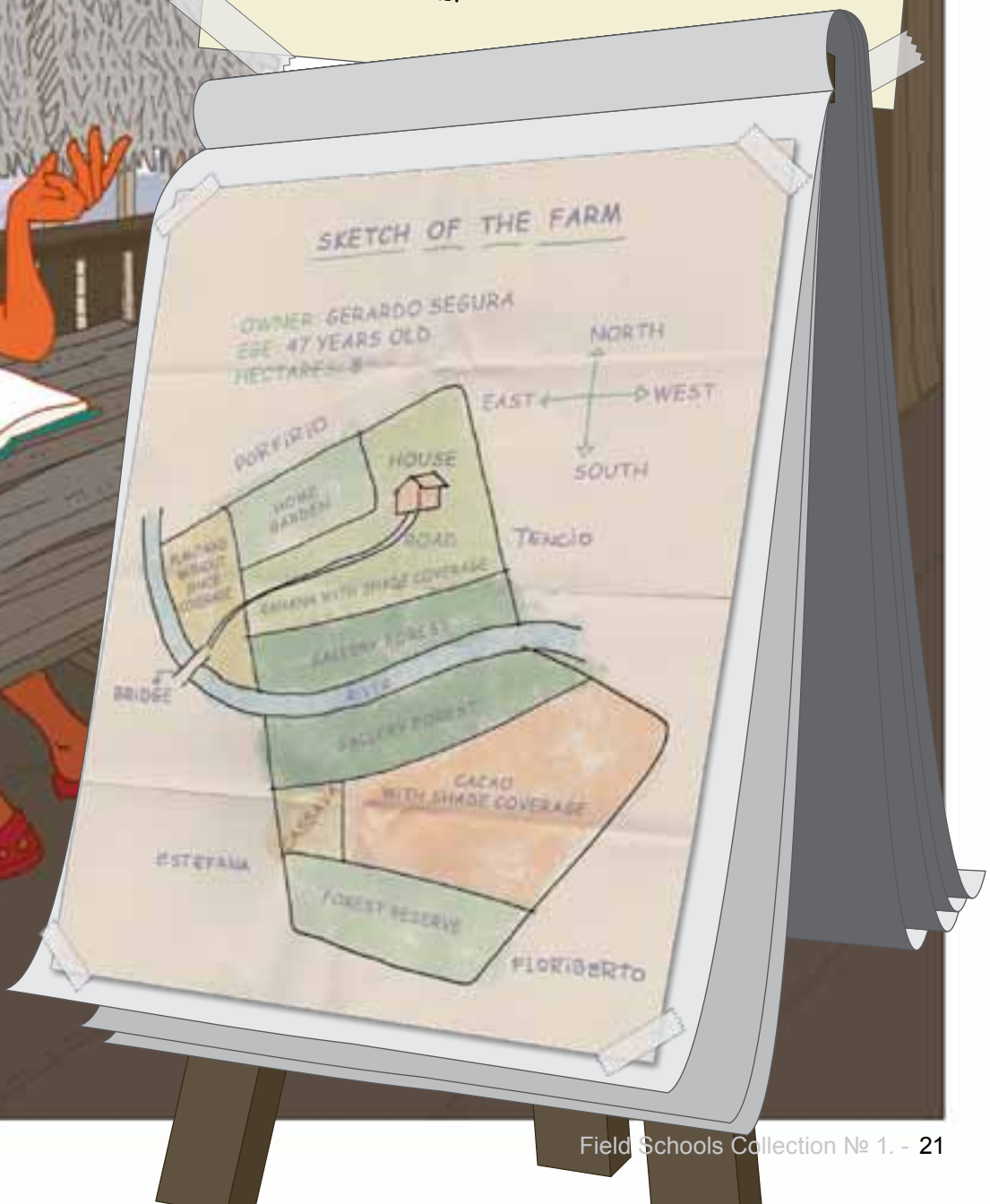
1) Let's darw a map of the farm where we clearly indicate the plots and lines.

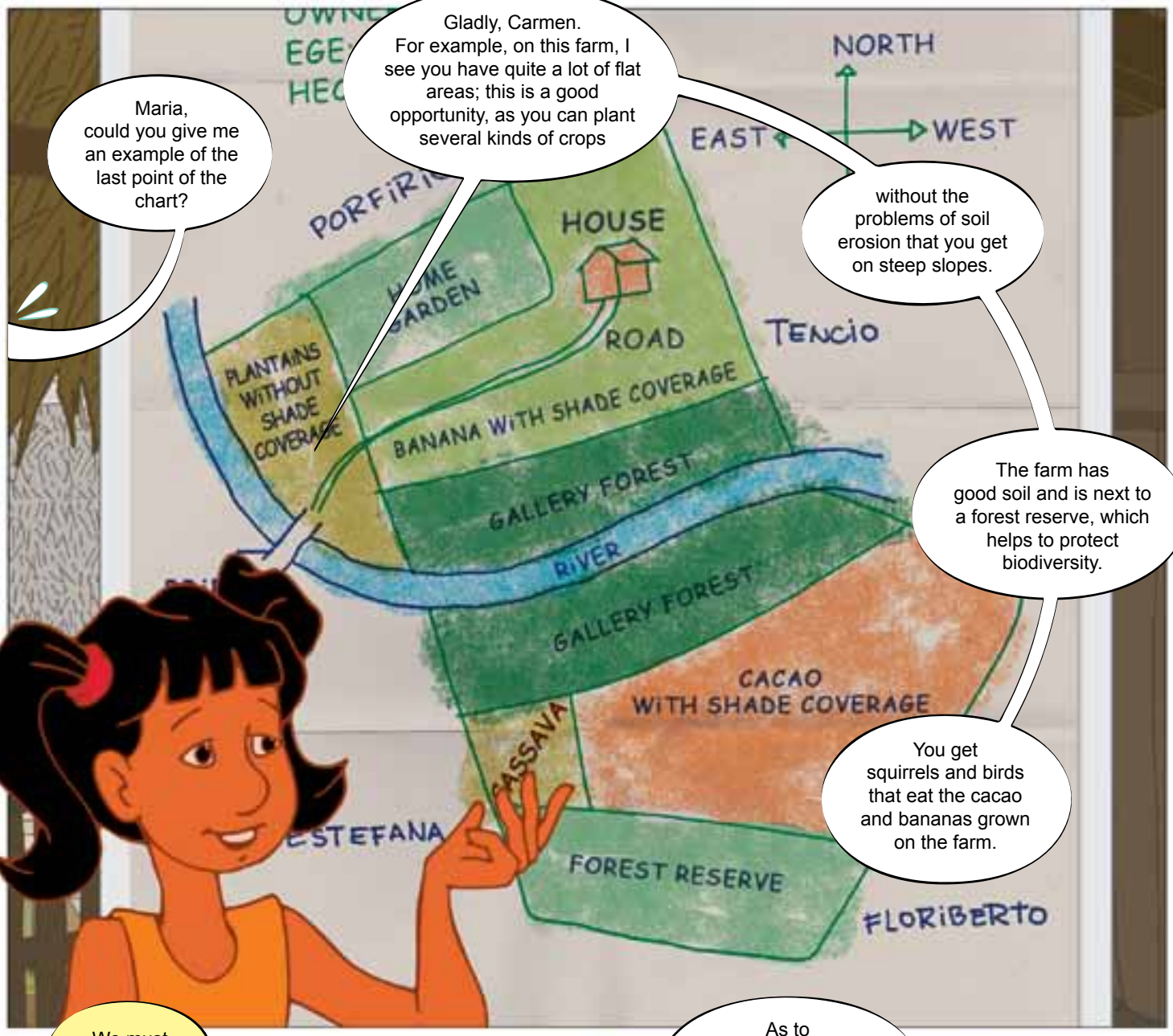
2) Let's not forget to include special sites on the map such as:

- Areas with steep slopes.
- Rivers or creeks and natural draining areas such as the ditch where the banana plantation drains.
- Low productivity areas such as swamps, cliffs, sandy or rocky areas.
- Noticeable variations in the soils.
- Strong eroded areas.
- Areas exposed to high winds.

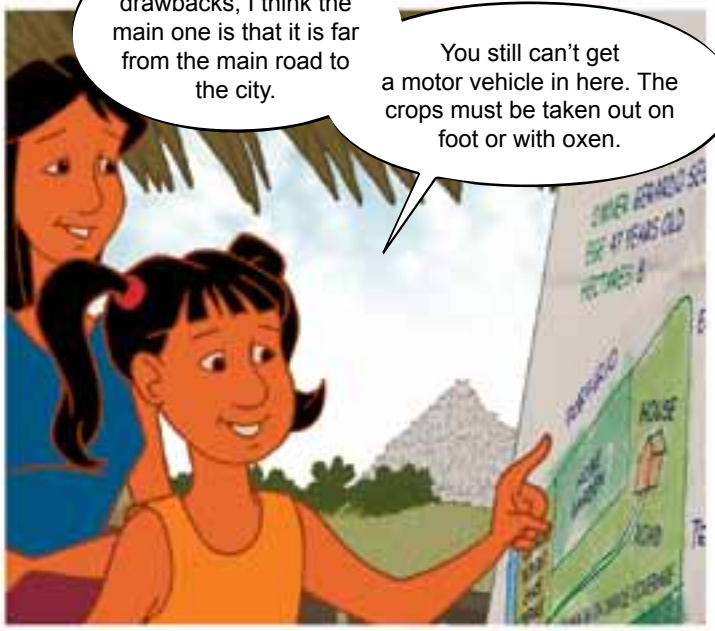
3) We also recommend:

- Reconstruction of the land-use records, especially where there are many timber trees.
- Listing the farm's main opportunities and limitations.

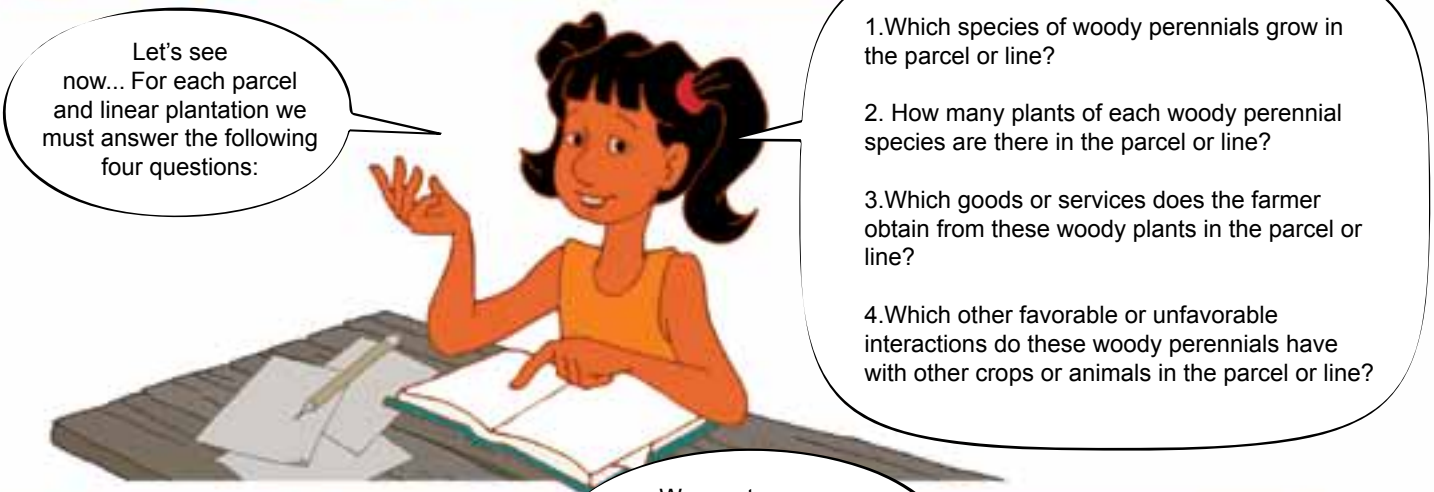


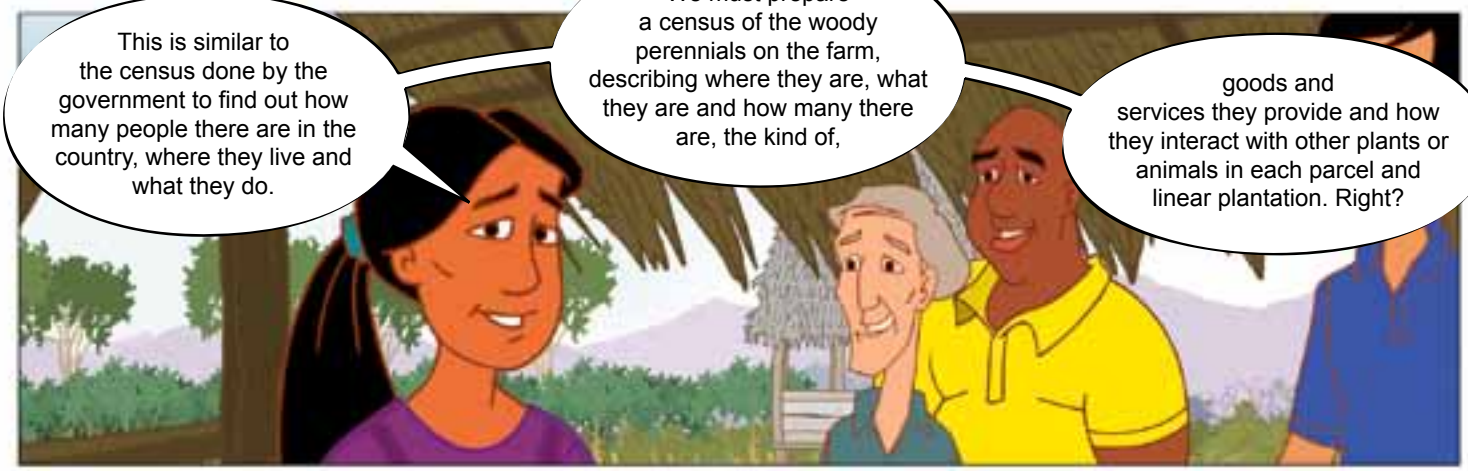

Maria, could you give me an example of the last point of the chart?
Gladly, Carmen. For example, on this farm, I see you have quite a lot of flat areas; this is a good opportunity, as you can plant several kinds of crops
without the problems of soil erosion that you get on steep slopes.
The farm has good soil and is next to a forest reserve, which helps to protect biodiversity.
You get squirrels and birds that eat the cacao and bananas grown on the farm.
NORTH
EAST
WEST
HOUSE
ROAD
TENCIO
PLANTAINS WITHOUT SHADE COVERAGE
BANANA WITH SHADE COVERAGE
GALLERY FOREST
RIVER
GALLERY FOREST
CACAO WITH SHADE COVERAGE
CASSAVA
ESTEFANA
FOREST RESERVE
FLORIBERTO


We must all feed our families.


As to drawbacks, I think the main one is that it is far from the main road to the city.
You still can't get a motor vehicle in here. The crops must be taken out on foot or with oxen.

Agroforestry assessment





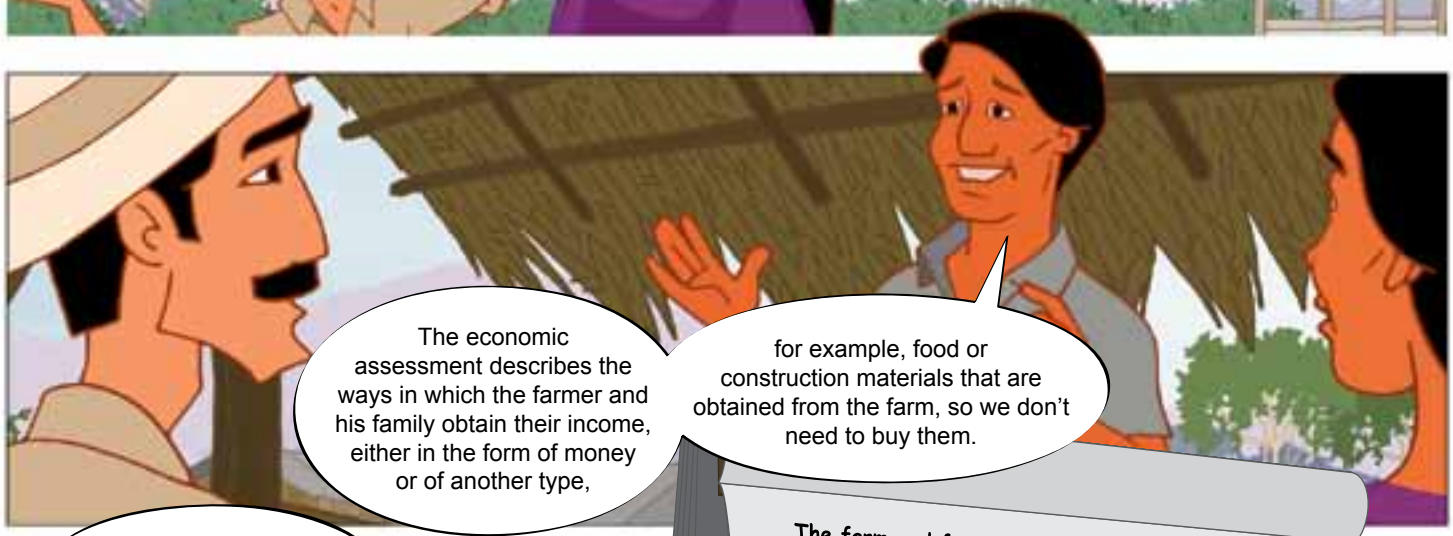

I'll start, if you'll allow, but I would ask Gerardo and Miriam to help me with the number of woody plants. Here we go.
The cacao plantation is shaded by salmwood, pejibaye and guava trees, with a few avocado trees, and breadnut.
No more, no less!
Here in these 2 hectares of cacao there are 100 salmwoods, 50 pejibayes, 30 guabas, 10 avocados, 5 cola de pava and 5 breadnuts.
In total we counted around 200 shade trees yesterday.
In addition to shade, those trees provide several goods and services.
The salmwood provides timber, while guava and avocado trees produce fruits to eat.
The pejibaye provides fruit that can be sold and is also used to feed the whole family and the domestic animals.
Pigs love pejibayes.
Breadnut trees produce a fruit that birds and other forest animals like very much.
The green leaves are also great fodder for cattle. Grande betty provides good firewood and its fruits also attract birds.
In the banana plantation there is also salmwood, though there are fewer trees than in the cacao grove.
Yes, there are 20 salmwood trees in this hectare of bananas.
You couldn't have any more because there would be too much shade and the banana plants would produce less.


The gallery forest contains several native species; as I said before, I don't know the names of many of them.
And in the forest there is manú, casha, laurel, oak and many other species of trees and plants.
I can obtain sawn wood for planks and roundwood for supporting beams.
There is also cohune for roofing and vines to make rope and baskets.
Let's see, what else? Help me a little, Miriam.
There are medicinal plants such as hombre grande, very good for your blood pressure
and for stomach ailments.
It's excellent for getting rid of hangovers the day after a party and to get you in shape to go back to work!
From the forest we also get gumbo limbo, which is good for skin ailments,
wild ginger for the kidneys, and many other plants.
Herbalists and healers use medicines collected from the forest.
Look at the swelling on my foot – it won't go away
But I'm not going back to the doctors in the city, because they told me that the only solution was to chop it off!
What do you think, Dr. Cure-all. They're wrong, aren't they?


Of course they're wrong; no need to chop off your foot! With just a couple of herbs that I'm going to prescribe, it will drop off by itself, without any pain.
¡Ahhhhh!
Let's continue with the linear plantations.
That windbreak over there, beside the plantains, prevents the wind from knocking over the plantain plants.
How many teak trees are there in the windbreak, Gerardo?
I planted the teak trees two and a half meters apart, and as the windbreak is 100 meters long, there are 40 trees.
After thinning out, about 25 trees will be left. Teak is a highly prized wood and people will pay good prices for it.
Excuse me, remember that **thinning out** means to cut down some trees to open up space and allow the remaining trees to grow stronger and grow more quickly.
Thank you, Maria. The count of woody plants in the lines is done in the way that Gerardo explained.
But for reasons of time, today we're not going to count the woody plants in all the lines or in the forests on this farm.


In the property lines we have madero negro, Madrecacao and some guava trees.
The first provides timber, the second improves the soil and the guavas are eaten by birds, pigs and other animals.
I use guavas to make marmalade.
In the internal pathways there are many fruit trees, several types of citrus trees, guavas, some soursops, Madrecacao trees, gumbo limbo and corteza amarillo trees, which look so beautiful when they bloom.
Corteza amarillo trees make the farm and the landscape look beautiful. The soursops and oranges are to eat and to sell..
The gumbo limbo provides shade and the bark is used to used to cure skin ailments. The Madrecacao fertilizes the soil and the leaves make good forage for cattle.
Then we have the woody plants in the home garden, where Miriam has planted mango, avocado, oranges, lemons, cas, star fruit, grapefruit and bay, which is a medicinal tree.
There are also bananas and several types of plantains – without counting the spices and the ornamental and medicinal plants.
The woody plants in the home garden adorn the frontyard, provide the family with food and medicines and help keep the house cool.
And something very important: without woody plants there would be nowhere to hang our hammocks.
Let’s continue. The social assessment helps you to understand the family’s objectives and its relations with its social setting.

Social and economic assessment



The farm and family's main social and economic aspects

1. Describe the family group indicating each person's age and describe the activity each of them carries out.
2. Indicate the family's and each person's objectives.
3. Indicate who the farm belongs to.
4. Indicate by whom and how decisions are made on the farm.
5. Tastes and dislikes are of the person who makes the decisions regarding wood species and crops.
6. Describe the family group's strengths and weaknesses, the degree of family ties and the knowledge and specific skills of each member.
7. Describe the farm's relationship with markets, distribution networks used, cooperatives or associations and access to credits.
8. Describe all sources of income for the farmer and his or her family, both cash and in-kind; as well as income used for expenses. Goods and services in kind that the family receives from the farm such as firewood for cooking, food for consumption, fodder for the animals, construction materials, natural medicines and others must also be included.
9. Explain how the farmer and his or her family see their future as well as the farm's future.


Let's illustrate the first point by looking at Gerardo and Miriam's farm.
Let's see, Gerardo, you begin by describing your family.
Well, I'm 47 years old, I'm married to Miriam, who is 44. We have four children.
Eliseo is 22 and is married to Flory, who is 20, and they have a little boy who is 2 years old.
Then there's Hector, who is 15, and Nubia, who is 13. They both go to school.
Eliseo and Flory live and work on the farm, but Flory isn't very involved in farming activities because she has to look after her son.
And our youngest 5 and hasn't started school yet.
Flory's brother, Juan, also lives in the house. He is 27 years old, single and works with us on the farm. And there's also my father, who has just had his 82nd birthday but still helps us a lot and gives us advice.
What about Point 2, the one about the family's objectives?
We are farmers and this is the life we love.
We're not thinking of selling our farm and going to live in the city. Instead, we'd like to make the farm work as efficiently as possible and then leave it to our children,
both to those who want to continue working it and those who prefer another type of work.
They will have to make an agreement among themselves.


Point 3:
I believe this farm belongs to you, is that right?
Correct, the farm is ours – Miriam's and mine.
I make most of the decisions, but I always consult Miriam and my son Eliseo.
Eliseo won't move a finger without asking Flory first!
Same here…even the "cockiest" ask for my opinion and consent!


Here we have a very typical example of a family farm: the farmer or his wife own the land, they work it and some family members help them out by providing labor.
Other relatives are paid and receive board and lodging.
With this information we are also covering Point 4, about decision making on the farm-who makes decisions and how.


Let's look at Point 5. Gerardo and I like trees very much.
Look how beautiful that huge javillo is - it's always full of birds.
My father doesn't like trees because he's very scared of lightning.
I love fruit trees. I planted all those citrus, avocados and soursop trees.
I would like to plant more timber trees but Gerardo is not very keen, because he says you have to wait a long time before you can harvest the wood.


I'm going to be 90 soon and I've just planted 1,000 laurel trees, because with that wood, in a few year's time, I want to build a little house and get married again.
I've already found a lovely young man who is just 75! Ha-ha.
I keep telling Gerardo that laurel and cedar grow quickly, that timber trees can serve as savings accounts for our retirement in old age, or as capital for our children.
I'm not worried about how long it takes for the timber trees to grow. In any case, I'm not thinking of leaving this farm.
My children will also live here.
Let's discuss Point 6:
The strengths and weaknesses of the family group, degree of family union and knowledge and skills of each family member.
My father is very hardworking and gets up very early every day, ready to start work.
And my mother is just as busy. She has real "green thumb" for farming. Everything she plants grows really well.
My father-in-law Gerardo, is very observant and asks lots of questions.
My husband, Eliseo, is like his father and is always reading and trying new things.
Now he's very enthused with the idea of organic agriculture.


We are a very closeknit family.
When there's a lot of work to do on the farm, my brothers and Gerardo's brothers come over to help us, and we help them, when they needed.
We work, make some money and have a good time.
Now tell us about some of the family's weaknesses.
Well, I have a small son who hasn't started school yet, and that prevents me from leaving the house to go to work.
It's the same for my daughter-in-law Flory, who has a little girl of 2 and is expecting another child.
Let's continue with Point 7 on the list.
We belong to the local farmers' cooperative.
We obtain better prices there when we buy fertilizers, machetes, spades and other tools.
Here in this community we and our neighbors all help each other a lot; we exchange labor and lend each other tools.
My cousin Tobias has a small truck and we take our produce to market together.
We lend our chainsaw. We all help each other out.


Our farm products have good access to markets.
The village is only 2 kilometers from here, but when it rains a lot there are landslides, the roads get blocked and you can't take the produce to the capital, where the prices are better.
Last year we lost part of our cassava harvest because of that.
On the other hand, one advantage of our farm is that we don't suffer from flooding.
And who gives the farmers credit?
There are loads of moneylenders around here, but I prefer the banks.
Miriam and Eliseo are trying to convince me to ask for a loan to plant timber trees on the farm.
Now let's look at Point 8, which refers to the economic assessment. This includes several things.
Let's begin with income, which may be of two types: money and goods and services provided by the farm.
On our farm the money for our daily food comes from the sale of plantain and bananas.
We sell the plantain to middlemen who visit our village every two weeks and pay for it in cash.
With that we buy our food and cover other family expenses such as clothing, transport and medicines.
Cacao produces two harvests a year: a small harvest in June and the main harvest between October and January. We prefer to sell it to the cooperative rather than to intermediaries.


Pigs are a great saving. We sell them midyear and in December.
Generally we sell two pigs each season.
¡Oh!
We also earn something from the sale of fruit, particularly oranges, soursops and pejibayes.
We've also been growing cassava for two years and it's doing well.
They're doing really well. They're getting loads of cassava out of that parcel.
The man takes sackfuls of cassava to market.
Stop this nonsense! Don't exaggerate and let people listen.
There's plenty of timber on the farm. Every two or three years we cut down a couple of large laurels to sell or to use on the farm.
I do some sewing and make aprons, tablecloths and things like that to sell. I earn a little extra money that way.
I do a bit of construction work and some small jobs outside the farm when people call me, especially in the local village.
Do you have any relatives working in the city who send you money?
Not in our case, but some families in this community receive money sent monthly by their children who live in the city or abroad.
Miriam, tell us what your farm produces.
¡Coooo!
Certainly. Our farm provides us with a lot of food: bananas, plantains, cassava, fruits, eggs.


We harvest tomatoes, sweet peppers, spices, medicinal plants and ornamentals from our home garden.
Eliseo is building his house with timber and other materials from the farm.
That's a big savings.
Now let's talk about the costs of maintaining the family and the farm.
About the farm's expenses.
Each week we have to buy some products for the house and the family, which the farm does not provide, such as salt, sugar, coffee, cooking oil, soap, matches and other things.
And there's also expenses like clothing, buses or taxis and schoolbooks and supplies for our children.
And we have to buy medicines when someone gets sick.
On the farm we use wire for the fences, tools, gasoline and oil for the chainsaw and some medicines for the sick animals. All those things must be bought.
Seed for our crops is another expense, either bought or taken from the farm.
Gerardo is thinking of improving the cacao with good grafts that will have to be bought in a nursery.
A lot of jobs on the farm and at home we do ourselves, with help from the family, but at certain times of the year we need to hire day laborers.
Some we pay with money, others with products from the farm or with labor.
Anything else?


And we must add the cost of taking our products to the village.
We hired Pedro' oxen for transportation.
You don't have debts, but if you did, you'd need to include the monthly payments to the bank in your expenses.
That's right, Maria. Good. Now we just need to cover Point 9.
What about the future of the family and the farm?
Talking about the future isn't easy, because we don't always know what our children will want to do.
But we do have some idea.
We were considering buying half the farm belonging to our neighbor Tencio, because someone is interested in buying the other half.
This would enable us to add another 6 hectares to our farm and we could plant sugarcane or corn, which now fetch very good prices.
I think our farm has a bright future. We've taken good care of it, we've planted trees and we've looked after the soil by leaving the land in fallow to rest,
keeping the soil covered, digging drainage ditches and planting windbreaks.
And Eliseo?
Very good. We have completed the 9 points of the social and economic assessment. Now, let's all have some lunch!
He will inherit the farm in about 20 years or so! Hector, Nubia and Marcos don't want to become farmers. They want to be professionals and work in the city.

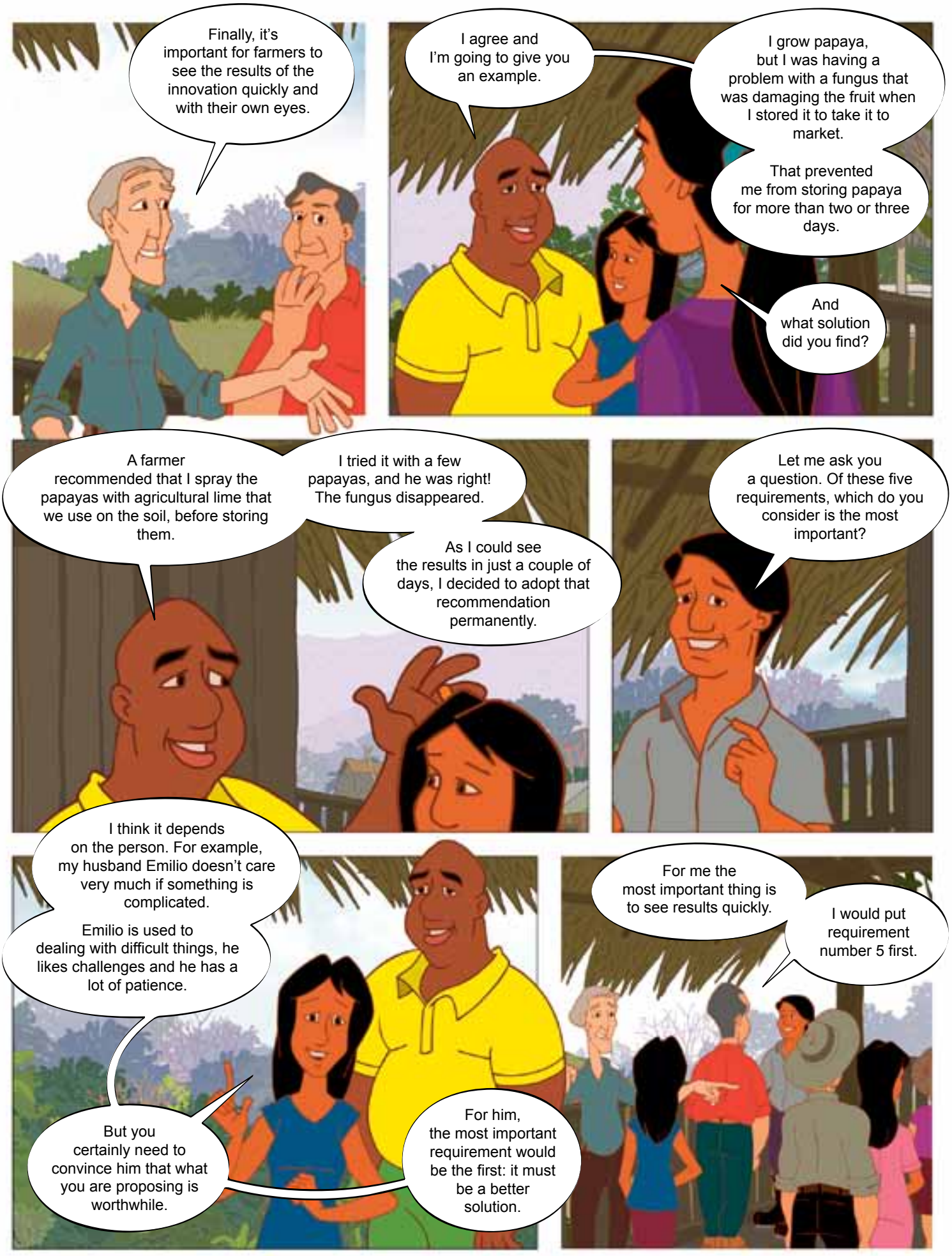
Second stage:
The search for solutions

After lunch…


These actions are mainly aimed at the woody component on the farm.
For example, thinning out the shade trees in the banana plantation when there is too much shade, eliminating certain trees from the cacao plantation because they are hosts for pests that attack cacao,
Planting forage trees in the hedges to increase milk production.
Planting a row of trees to review soil erosion,
using chicken manure to make natural compost and to fertilize the fruit trees in the kitchen garden.
The solutions will depend on the farm and on the state it's in. That's why we carry out an assessment first.
You'll see that when you start to think, several solutions will occur to you.
I love this! Then we'll choose the best.
Mmm…well some of the solutions we think of will have drawbacks, but it will be easy to eliminate these.
The first thing to do is to make a list with all the possible solutions that come to mind.
But there are always several good solutions. It's a matter of choosing one or, at most, two solutions. The best ones!
To decide which solutions are best for the farm, you need to spend some time thinking,
do some calculations and measurements, find out how much it costs to hire workers, the price of materials and study the market.
It's also important to see if the proposed solution fits in with the farmer's plans and those of his family, taking into account their tastes and preferences.


And if you find two good solutions, why not put both into practice?
Sometimes you can and sometimes you can't, either because you don't have enough money or labor or time.
Sometimes the problem is that people cannot agree on something, even when the solutions are good.
You're quite right. That large farm over there, where the road ends, would be excellent for planting timber
But Julian and Aurora can't agree on anything; if one says white, the other says black.
To apply a solution means to make some changes on our farm, or sometimes even try out things that are new.
The experts say that most people resist change and innovation.
An innovation is something new. True?
As true as the world is round!
Requirements for successful innovations:
1. They are superior, in other words, better than current situation.
2. They are compatible with our farm and family.
3. They are simple.
4. We can implement them with our resources and knowledge.
5. Results are available quickly.
Right!
Did you know that good innovations, the ones that people accept, fulfill five requirements?
Carlos. Explain these five points.


Certainly, Maria.
The first is very easy: if someone suggests something new to me and I see that it's no better than what I already have, then why should I change?
But if the innovation promises to increase the production of a particular crop or saves me money and labor, then perhaps I'll be interested in trying it..
Being compatible means that it is appropriate to the farm, to its size, its crops and meets the objectives, preferences and capacities of the farmer and his family.
For instance, if someone suggests planting all the parcels of a dairy farm with timber trees, where will the cows graze?
Sometimes the proposals are not compatible with the farmer's preferences. You're not going to plant fruit trees if you don't like fruit trees.
Something very important: innovations should not be complicated; they should be simple, because people don't like complicated things.
For example, if someone suggests planting a crop that has a very good market but the seeds are difficult to obtain or the crop itself is complicated to grow because it requires a lot of care, then what do you think will happen?
That the farmer won't follow the recommendation because it's too complicated and will look for a simpler crop, even if it has a smaller market.
An innovation can be very good, but it's no use to us if it's too expensive to put it into practice.
For example, there's no point in telling me to build a conveyor belt to transport the cut banana bunches to this warehouse.
That's a solution for large plantations owned by the banana companies, not for a 15-hectare farm like mine.
I wish they would build aerial conveyor belts all over the farm, so I could hang from them and travel around effortlessly.


Finally, it's important for farmers to see the results of the innovation quickly and with their own eyes.
I agree and I'm going to give you an example.
I grow papaya, but I was having a problem with a fungus that was damaging the fruit when I stored it to take it to market.
That prevented me from storing papaya for more than two or three days.
And what solution did you find?
A farmer recommended that I spray the papayas with agricultural lime that we use on the soil, before storing them.
I tried it with a few papayas, and he was right! The fungus disappeared.
As I could see the results in just a couple of days, I decided to adopt that recommendation permanently.
Let me ask you a question. Of these five requirements, which do you consider is the most important?
I think it depends on the person. For example, my husband Emilio doesn't care very much if something is complicated.
Emilio is used to dealing with difficult things, he likes challenges and he has a lot of patience.
But you certainly need to convince him that what you are proposing is worthwhile.
For him, the most important requirement would be the first: it must be a better solution.
For me the most important thing is to see results quickly.
I would put requirement number 5 first.

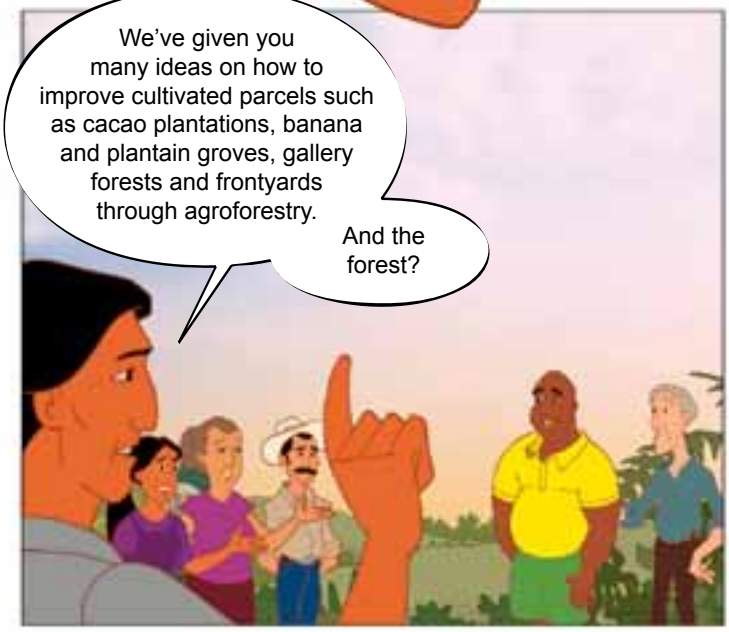

To choose the best solution, you need to take those five points and discuss them with your family.
Every farmer should ask himself which of those five requirements are most important to him and, according to that, gradually eliminate options
until he's left with one or two very good solutions, with which he feels comfortable.
Very good, but after all these comments, it would be good to see an example.
Let's apply what we've discussed to Gerardo and Miriam's farm, since we already did the assessment.
All we can do now is to propose solutions. Afterward, Gerardo and Miriam will decide whether they want to put any of these solutions into practice.
Let's begin! I see that the property lines and internal divisions on Gerardo and Miriam's farm are not clearly demarcated.
Leaving the area in the front of the house free, I would suggest planting timber trees along the property lines and the internal divisions.
That's a good idea. Which ones would you suggest, Alberto?
I wouldn't put fruit trees in the property lines because they would be too far away from the house and there are plenty of folks round here who would help themselves to the fruit. I would plant timber species and trees that attract birds.
But they should be five-star hotel trees like guarumo or capulin.
In the internal roads and divisions, I would plant trees that improve the fertility of the soil and produce many flowers to adorn the farm and make it look really pretty.
I would also add some fruit trees so that the children have different fruits to eat.

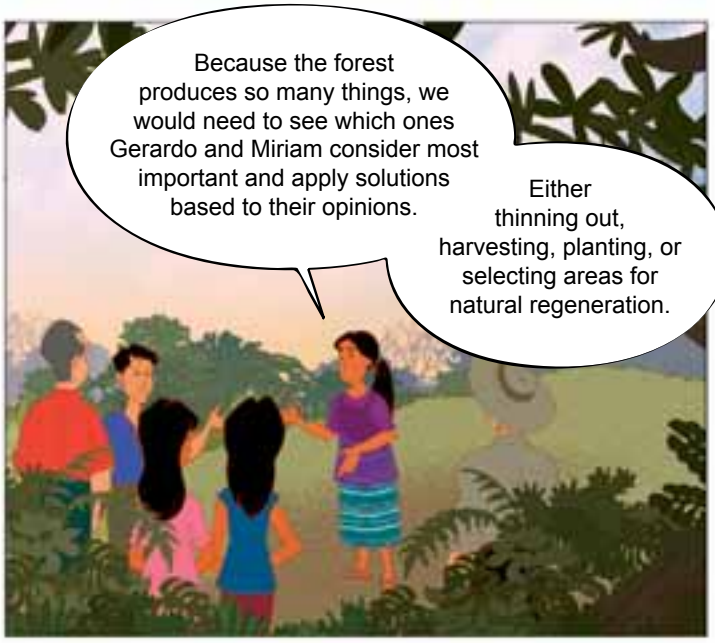

I would propose improving the shade in the banana plantation, which looks very uneven.
The shade trees in some of the very shady areas need to be thinned out and pruned.
There are also some places with very little shade where you could plant trees.
True, in that patch over there we could plant two laurels.
In the parcel with cacao, which is way over there, I suggest planting mahogany, because this tree improves the soil and its fruits attract a great variety of birds.
The fruit is edible for humans and the trunk produces a resin that is used to make cosmetics in Brazil.
At some point we'll have to find a market for the resin that we produce here.
If you're going to sell the resin, I agree. But don't touch the fruit!
Any suggestions for the plot with plantain?
The plantain has been planted right up to the water's edge and that's affecting the riverbanks.
With each flood the riverbed gets wider. You could plant bamboo or bribri trees to help keep the riverbanks in their place.


Bribri is a very leafy tree with powerful roots that hold the soil very well
But it produces a lot of shade, so you can't grow plantain very near these trees.
This gallery forest has the same problem as most of the farms in this area.
We farmers have planted right up to the river's edge, cutting down all the native trees and destroying their biodiversity.
That forest has to be restored either by promoting natural regeneration or by planting native species.
we must restore a strip of at least 15 meters on either side of the river.
Very good point. In both cases, either by planting or managing natural regeneration
You must remember that in our country it's forbidden by law to cut down trees on riverbanks.
Those trees cannot be used for timber.
So in the gallery forests we need to plant trees that will provide food for animals,
protect the riverbed, embellish the farm or provide products that we can extract without cutting down the trees. For example, resins, sap, vines, medicines, or fruits.
For example, we could plant basket tie-tie in the trees, which could be used for making baskets and rope.

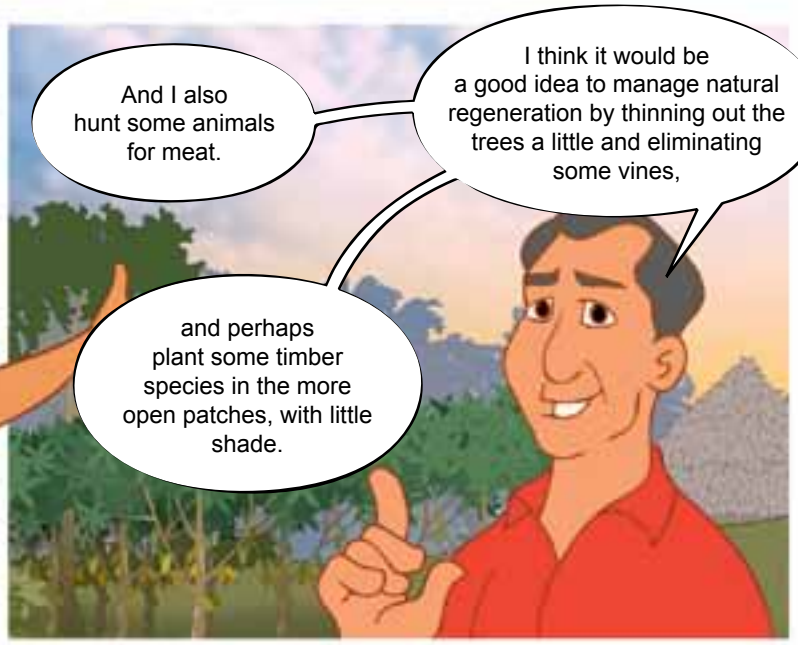

Let's discuss the frontyard, usually the family's favorite place on the farm because it's cool and gives a pleasant climate to the house.
There we have avocados, citrus trees and other fruits, medicinal plants and herbs and spices for food.


Miriam, your frontyard is lovely, but if this were my house, I would add a couple of small trees to block out the view of the people passing along the road.


We've given you many ideas on how to improve cultivated parcels such as cacao plantations, banana and plantain groves, gallery forests and frontyards through agroforestry.
And the forest?


Because the forest produces so many things, we would need to see which ones Gerardo and Miriam consider most important and apply solutions based to their opinions.
Either thinning out, harvesting, planting, or selecting areas for natural regeneration.


We collect cohune leaves from the forest for roofing, and laurel and cedar for timber.
We cut several species to extract roundwood for supporting beams and wood to make planks for construction.


And I also hunt some animals for meat.
I think it would be a good idea to manage natural regeneration by thinning out the trees a little and eliminating some vines,
and perhaps plant some timber species in the more open patches, with little shade.


I have a suggestion.
Place well-peeled ripe plantains in the trees in different parts of the farm to sweeten the air with good smells.
I'm sure that it's not to sweeten the air! You lazy rascal!
Good, with all these suggestions and with some of your own ideas, you can now prepare an agroforestry plan to improve the farm.
It is important to calculate the cost of implementing this plan, the benefits it will produce and how long it will take to see the results.
Good, now we all know what an agroforestry farm planning is.
The next step is for all of us to apply this on our farms. Thank you all for coming.

GLOSSARY

Agroforestry The effective management of woody perennials on the farm and their interactions with other crops.

Assessment Evaluation or opinion issued by an expert on the status of something. For example, a doctor examines a patient and afterwards issues a diagnosis or assessment, to determine the patient's status. To prescribe medicines, the doctor must first diagnose the ailment.

Aversion Something that we do not like.

Biodiversity The variety of living species animals and plants present in a given location.

Census A count to determine how many inhabitants a country has, where they live and what they do. In the case of a woody plants census, the aim is to find out which spices of plants grow on a farm, how many of each species and which goods and services the provide to the farmer.

Compatible Well-matched or appropriate. A solution is compatible with the farm if it fulfills the farm's objectives and reflects the preferences of the farmer and his family.

Diagnosis Criterion or opinion of a specialist about the state of something. For example, the doctor examines a patient and then makes a diagnosis that indicates the state of the patient. In order to prescribe medications, the doctor needs a diagnosis first.

Enterprise Activity carried out by individuals or groups of people to obtain an economic benefit or some other type of benefit.

Farm Enterprise based on the use of land for agriculture, environmental conservation or recreational purposes.

Fertility A necessary condition in the soil to ensure that crops grow well and produce good harvests. A fertile soil contains sufficient nutrients to feed the plants.

Goods Material things obtained by the farmer, such as firewood, timber, fruits, leaves, logs, pollen, honey.

Innovation New thing, something new.

Interactions Effects that are exchanged between two things, for example between woody plants and the crops in a parcel.

Lines These are property lines, internal divisions, internal roads, rivers or streams, rows of trees and everything that can be represented on a map using a line. Areas used for growing crops and for other purposes are called parcels.

Minimize Make something as small as possible. Minimize an interaction means to reduce it as much as possible.

Objectives The goals that a farmer and his family wish to achieve on their farm.

Perennial Lasting many years or indefinitely. Perennial crops are different from annual crops. Perennial crops (coffee or cocoa) live several years and are harvested every year. Annual crops (corn, potato, rice or beans) produce once a year and then die-sowing is needed to get a new crop.

Planning To make plans. On a farm, for example, activities are planned according to a calendar of activities that the producer makes for the year for each plot and row.

Plot Part of a farm dedicated to a specific purpose-for example, a particular crop or for livestock, forest, fallow land or something else.

Property line Line that marks the boundary between two farms.

Services Nonmaterial advantages such as shade, soil fertilization, be a part of rites and ceremonies and other cultural events, beautify the landscape, purify the air or conserve biodiversity.

Thermometer Instrument for measuring the temperature of people, air, a machine, etc.

Thin out To remove trees in a plantation in order to make open space for the remaining ones to grow strong and grow quickly.

Woody Trunk, branch or vine that burns when set alight.

Woody perennial Tree, shrub, palm or giant grass that has a woody structure.

Plant names

Araza	*(Eugenia stipitata)*
Arce	*(Acer saccharum)*
Avocado	*(Persea americana)*
Almendro of montaña	*(Dipteryx panamensis)*
Banana	*(Musa AAA.)*
Bamboo	*(Bambusa vulgaris)*
Basket tie-tie	*(Heteropsis oblongifolia)*
Bay	*(Pimenta racemosa)*
Bean	*(Phaseolus vulgaris)*
Breadnut	*(Brosimum spp.)*
Bribri	*(Pithecolobium longifolium)*
Cacao	*(Theobroma cacao)*
Caña agria	*(Costus spicatus)*
Capulin	*(Muntingia calabura)*
Cas	*(Psidium friedrichsthalianum)*
Cascha	*(Chloroleucum eurycyclum)*
Cassava	*(Manihot esculenta)*
Cedar	*(Cedrela odorata)*
Coffee	*(Coffea arabica)*
Cohune	*(Geonoma congesta)*
Cucumber	*(Cucumis sativa)*
Gavilán	*(Pentaclethra macroloba)*
Grande betty	*(Cupania sp.)*
Grapefruit	*(Citrus paradisi)*
Guaba	*(Inga spp.)*
Guarumo	*(Cecropia obtusifolia)*
Guava	*(Psidium guajava)*
Gumbo limbo	*(Bursera simarouba)*
Javillo	*(Hura crepitans)*
Lemon	*(Citrus limon)*
Madero negro	*(Gliricidia sepium)*
Madrecacao	*(Erythrina berteroana)*
Mahogany	*(Swietenia macrophylla)*
Maize	*(Zea mays)*
Mango	*(Mangifera indica)*
Manú	*(Minquartia guianeensis)*
Morera	*(Morus alba)*
Orange	*(Citrus sinensis)*
Papaya	*(Carica papaya)*
Pejibaye	*(Bactris gasipaes)*
Pilon	*(Hyeronima alchorneoides)*
Pine	*(Pinus spp.)*
Plantain	*(Musa AAB)*
Rice	*(Oryza sativa)*
Roble	*(Tabebuia rosea)*
Rubber	*(Hevea brasiliensis)*
Salmwood	*(Cordia alliodora)*
Soursop	*(Annona muricata)*
Starfruit	*(Averrhoa carambola)*
Sugarcane	*(Saccharum officinarum)*
Sweet pepper	*(Capsicum annun)*
Teak	*(Tectona grandis)*
Tomato	*(Lycopersicum esculenta)*
Virola	*(Virola spp.)*
Yellow Cortez	*(Tabebuia neochrysantha)*

Animal names

Agouti	*(Agouti paca)*
Armadillo	*(Dasypus novemcinctus)*
Green parrot	*(Amazona farinosa)*
Iguana	*(Iguana iguana)*
Owl	*(Otus cooperi)*
Peccary	*(Tayassu pecari)*
Raccoon	*(Porcyon lotor)*
Sloth	*(Choloepus hoffmanii)*
Squirrel	*(Sciurus spp.)*
Tick	*(Borrelia burgdorferi)*
Toucan	*(Ramphastus sulfuratus)*
White-faced monkey	*(Cebus capucinus)*