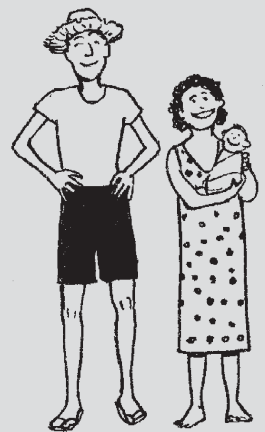
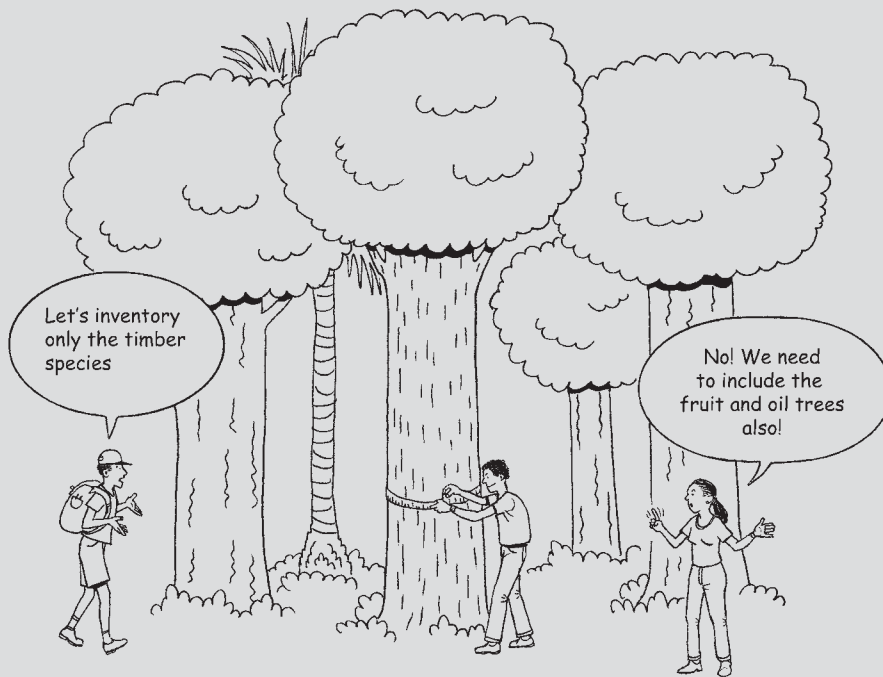


Who will use this  
book and how?



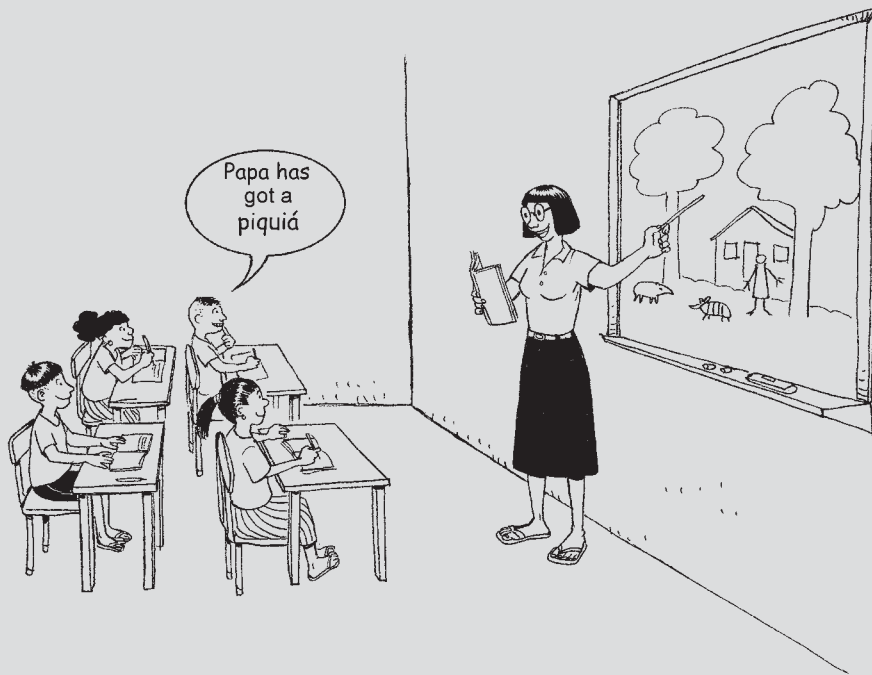
## FORESTERS AND EXTENSIONISTS



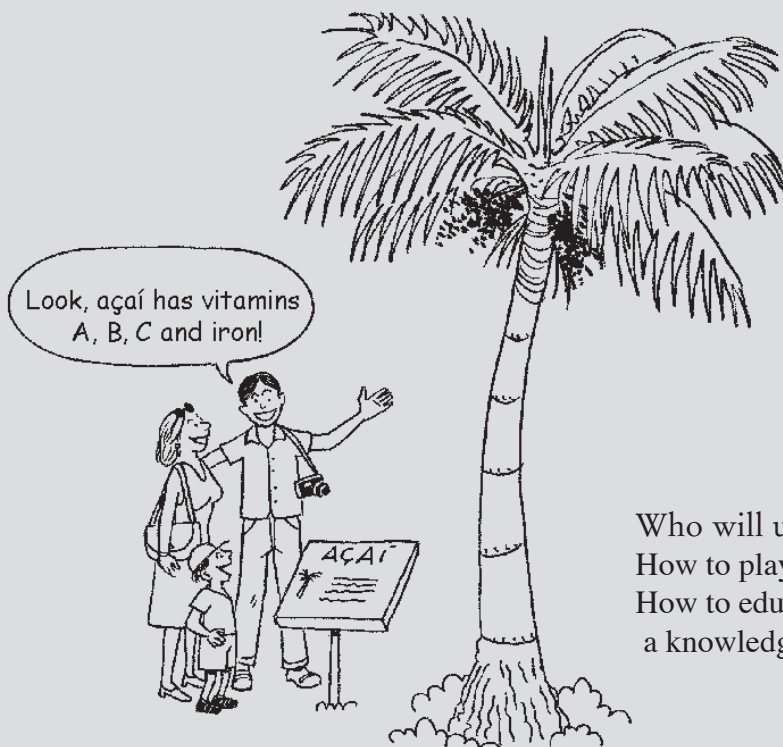
## LOCAL PEOPLE



## EDUCATORS



## CITY FOLK



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## Who will use this book and how?

The Portuguese version of this book has been made available in English for two main purposes. One is to demonstrate how it is possible to make science relevant and accessible, and to show how scientific publications can be prepared with and targeted to a broad public, including marginalized populations. Twenty five percent of the world's youth and adults in developing countries are functionally illiterate<sup>1</sup> as well as a quarter of 16-65 year olds in the world's richest countries.<sup>2</sup> In rural communities this figure can reach close to 40%, particularly among the elderly, the poor and women. The descriptions below and the chapters that follow were laid out to allow rural and urban audiences lacking formal education to extract information from pictures and numbers while more detailed information is given for others.



Why is it important to communicate to people lacking formal education? First, persons schooled in the forest as opposed to a classroom may be particularly knowledgeable about forest resources; their insights and experience are extremely valuable. Second, local and national decision making processes require understanding of complex information. Without information, urban and rural people can be at a gross disadvantage in negotiations with the private sector and participation in governance processes. Furthermore, all elements of civil society need to understand the value of forests and the connections between nutrition, family health care, culture, the arts and the environment.

Another purpose of the book is to share information regarding Amazonian species, which urban

and rural families depend upon for their livelihoods, with a worldwide audience. Some of the trees are well known and used throughout the world, like the rubber tree and Brazil nut. Other species, much like the people the book is meant to serve, are invisible to policy makers. These include species such as uxi, ipê-roxo, jatobá and andiroba. It is important that the full range of species serving both global and local needs is recognized and appreciated.

## Enhancing comprehension while maintaining rigour

### Illustrations, language, font and layout

Abundant visual representations are used to make concepts comprehensible to a broad audience. The Portuguese edition uses large font with ample space around the text and illustrations. The language of the Brazilian text is farmer-friendly, written in conversational Portuguese. Given the expanded audience for the English version, the colloquial nature of the language is diminished and the font reduced in size. To assist comprehension for non-readers, quantities in the text are generally conveyed as numbers instead of words.

### Integrating scientific and traditional knowledge

Perhaps most importantly, the voices of local people are found throughout the book, over 100 farmers, community members and rural women collaborated by helping to generate or share information. Armed with diverse knowledge and experiences from various people in the region, our hope is that local communities can make more informed decisions in the face of the opportunities and challenges the future will bring.



### How to use this book

Each chapter of the trees and palm sections represents one species and is divided into six topics: ecology, economic value, uses, nutrition, wildlife and management; each of these is described below. The common names of species vary from place to place. We place the scientific name for each species below its common name so that people from different regions can recognize it. For example, Uxi is the common name for the tree with the scientific name of *Endopleura uchi* Cuatrec. The scientific name is composed of the genus (first name) and the species (second name). The final name refers to the person who published the first scientific description of that species. The illustrations of the species can help to identify the plants as well.

## ECOLOGY

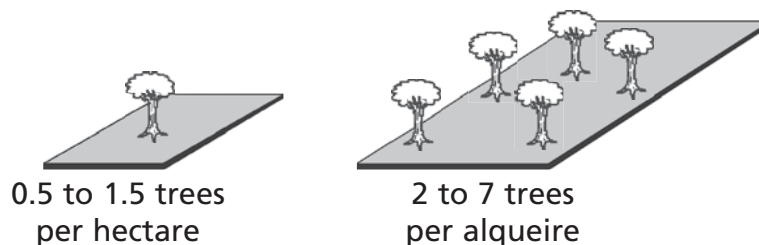
### This topic is divided into three parts:

**Flower and fruit seasons:** The flower and fruit seasons are depicted using a calendar diagram that illustrates the time of year when flowering and fruiting occurs. The letters below the illustration represent the months of the year. However, the seasons often vary from region to region within the Amazon. The text cites regional differences, while the illustration highlights only one of the areas described in the text.



**Density:** Density refers to the number of a particular species of tree found in a certain sized area of forest. It is a measure of the size of the population in a unit area. The density will depend on the measurements used for the inventory. Often only individuals above a certain diameter are counted. Likewise, since tree distribution is not uniform, the total area inventoried may affect the resulting average density. Communities and foresters often use different measures to denote spatial areas of forest. Foresters often use a hectare (equivalent to 100 x 100 m, or 10 000 m<sup>2</sup>, about 2.5 acres) while forest communities in Amazonia often use alqueire (equivalent to 4.8 hectares).

Some inventories include all trees equal to or above 10 cm in diameter (approximately 30 cm circumference) taken at breast height (DBH). Loggers generally take an inventory of all trees above 60 cm DBH (180 cm circumference), which are considered large enough for harvesting. The density and distribution of trees (grouped or spread out) in the forest are related to numerous factors, including: the ecology of the species, the type of soil and climate, and the use and management history of the species. The data presented in this book indicate only the average density according to a few forest inventories. When the density varies significantly for a species in terra firme versus wetland areas, an illustration is given for each.



**Production:** The production of a tree is the average number of fruits grown per tree and the variations in that number. Production varies greatly from tree to tree and from year to year. For example, a piquiá tree can produce 1 000 fruits one year and none the next. Through scientific studies that involve collecting samples from various trees over a period of years, it is possible to arrive at a good estimate of fruit tree production. For a few species, this information is readily available in books; however, for many species important to rural livelihoods, no studies exist. An illustration of a pile of fruits shows the best information available on average production for a particular fruit tree. The average production of a palm tree is represented by a basket of palm fruits.



## ECONOMIC VALUE

Local, national and international economic data is provided in this section. Because even species that are widely traded may have few market studies, the economic values included come from site specific research that may be several years old. Market prices depend upon many factors, such as place of purchase, seller, time of year and the time of day that sales are made. Likewise, the exchange rates and even currencies vary over time. Brazilian reais are converted to US dollars using the 2009 exchange rate or the rate from the time period when the economic data was collected.<sup>3</sup> The dollar amount is often rounded off to the whole dollar.

Rural landowners can estimate the economic value of the fruit produced in their forest by multiplying the density of fruit trees in a specific area by the average annual fruit production and then by the value per fruit. However, people living in remote areas encounter many difficulties in bringing their products to market. Obstacles include: distance to market, lack of transportation, high product variability, perishability of fruit and lack of marketing skills. In addition to market value, it is also important to remember that fruit trees have a substantial, but often “invisible”, subsistence value and that they can produce for many years. Fruiting and flowering trees also have the advantage of attracting game and supporting wildlife. Thus, the many values of a fruit tree can exceed the comparative earnings from market sales of its timber.

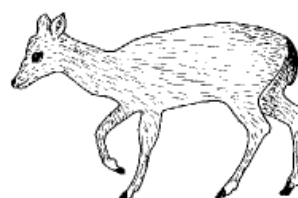
## USES, NUTRITION AND RECIPES

This section includes a list of the traditional uses of the species, often incorporating various parts of the tree, such as fruit, leaves, bark, seeds, flowers, resin and wood. The nutritional value of each fruit is explained and sometimes recipes are shared. The weight of the fruits represented in the text is the weight of the fresh fruit. Note that some of the uses (especially the medicinal uses) are limited to a few regions, and many are not yet proven scientifically.



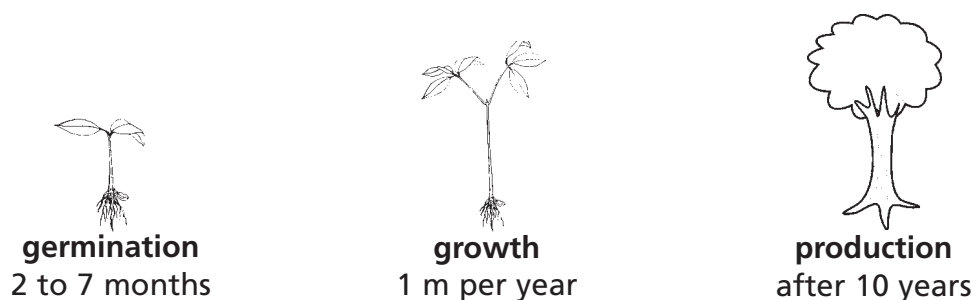
## WILDLIFE

Without wildlife, the forest would not exist. Fruit trees are an essential source of nutrition for wildlife as well as people, and game is an excellent source of protein for rural families. Animals act as pollinators and seed dispersers, carrying out a crucial function for the ecology of the forest. In this section, we point out a few of the wildlife species that interact with the plant. The emphasis is on traditional game animals, but other interesting interactions are also highlighted.





## MANAGEMENT



For centuries the forest has been managed by indigenous peoples, often to increase the number of useful trees. Agronomists also perform germination, growth and production experiments so that trees grow more rapidly and produce larger fruits. In this section, the illustration shows the average time for germination and production to take place and the average growth of the young tree. Variations in the averages and management techniques are further explained in the text.

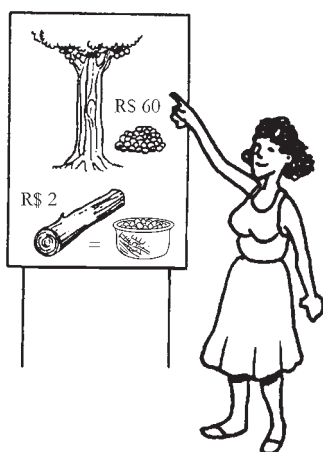
## REFERENCES

Local people, who have the most extensive experience with Amazonian fruit trees, rarely publish their knowledge. This book seeks to weave together the insights and knowledge of farmers, artisans, scientists, policy-makers and homemakers. To ensure rigour, 90 specialists and highly knowledgeable researchers for individual species have collaborated as authors and contributors. In addition, over 200 seminal scientific publications, gray literature, theses and dissertations focusing on Amazonia were reviewed and cited so that interested readers can consult the original references

Endnote numbers are used to cite literature that is referenced in the chapters. The authors and dates of the publications are listed at the end of each chapter, and the complete citation can be found in the bibliography.

## How to play with this book

Attention: This book is designed to be lived with and ripped up – not kept neatly on a shelf! In schools, communities and associations in the city and the country, you can use this information in participatory workshops and through posters, theatre, songs, videos, maps and discussions. While readers find that the book is instructive when read, the information becomes even more powerful when shared in informal discussions and participatory workshops.



### Posters

The more we draw, the more we learn. Posters can easily be made based on illustrations from the book. Many of the diagrams in this book came from posters designed during community workshops.

### Theatre, music, video and radio

Stories from the book and from village life are being used to create plays, radio programmes and videos. These can be entertaining as well as convey critical messages. Timber negotiations are an especially pertinent theme for role playing in frontier communities.. Some members of the community can pretend to be persuasive loggers attempting to buy timber from susceptible members of the community. Invariably, some may succumb to the lure of petty cash while others hold out and protect the forest or negotiate better deals.

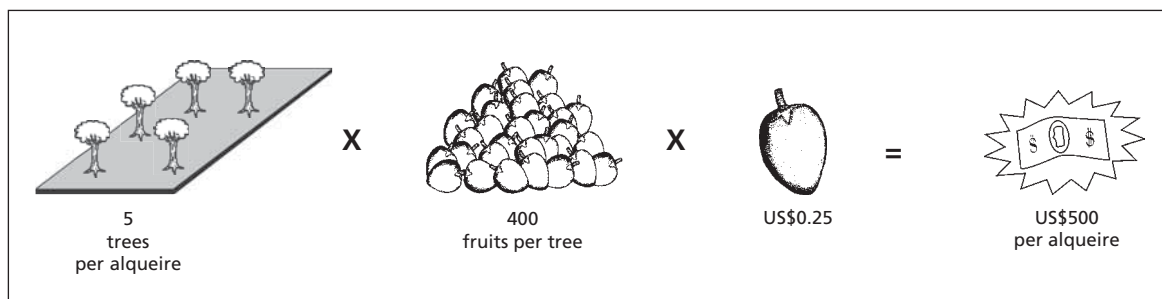


During workshops, ecological songs animate the crowd and raise awareness. Music composed by farmers and rubber tappers convey deeply felt sentiments about the human consequences of forest loss as well as the role of women in conflicts over forest resources. A documentary film, *Daughters of the Canopy*, based, in part, on the story of rural women who contributed to the book, highlights the struggle of women in logging frontiers and has stimulated intense discussions between men and women.<sup>4</sup> Through radio, nationally renowned Brazilian broadcaster, Mara Regia produced a series of programmes based on various chapters, celebrating Amazonian flora throughout Brazil.

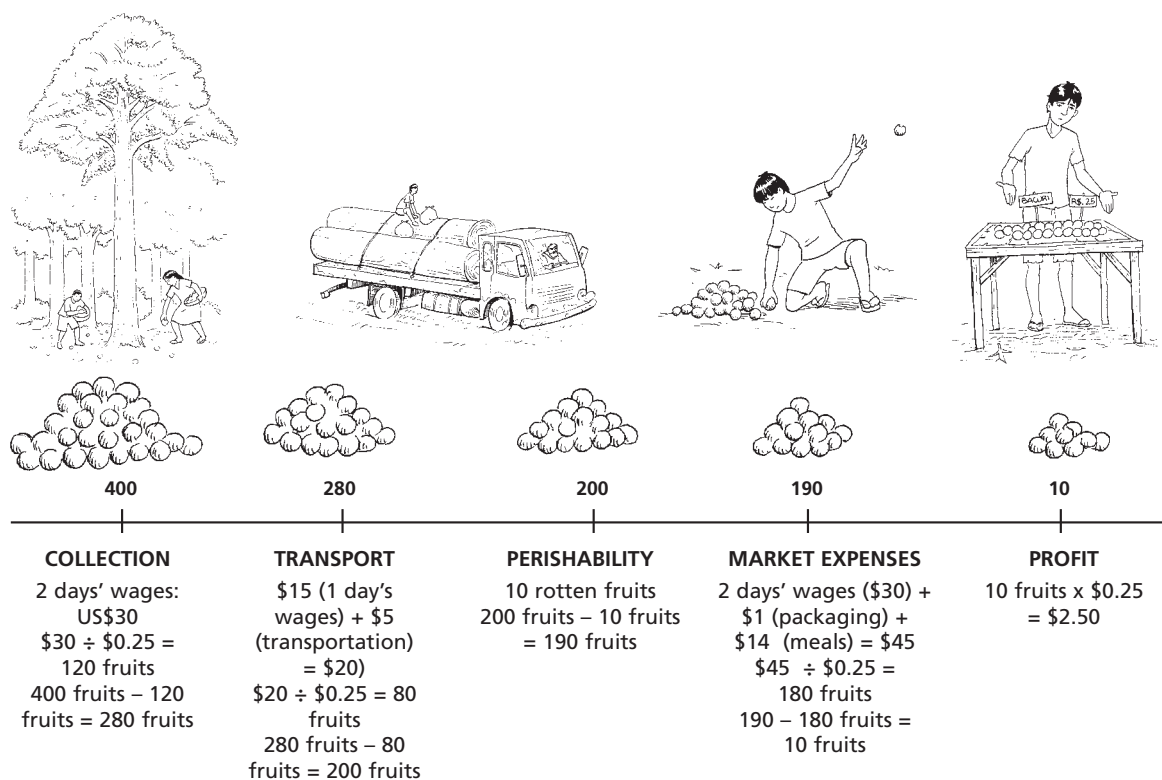
### Community decisions and cost-benefit analyses

Some communities form groups to discuss key themes of the book, weaving their life experiences into the dialogue. If representing a cross section of the community, such groups can, over time, become decision-making bodies for the management of natural resources.

Many of the species in the book are valued for both their timber and NWFPs, such as fruit, fibres, medicine and/or game, attracting value. The NWFPs in an area may have more long-term value than the timber. To calculate the value of NWFPs, multiply the density of a species in a given area by the average production of one tree and the price of one fruit. By doing so, it is possible to calculate the value of the forest area for that species per year. Adding up the values of all of the useful species gives the total annual economic value of a given area. This information will enable you to evaluate the relative economic value of your area for NWFPs as compared to timber, agriculture or ranching.



It is important to include in the calculations the cost of labour hours, transportation, possible loss or damage to the product, as well as packaging, meals and expenses. These costs are generally high and the long distances to the market from remote forest communities can make it difficult to sell the products effectively. João's story is an example of what can happen without proper planning or marketing experience. João scouted the forest for bacuri fruit, and after 2 days he collected 400 fruit to sell in the Paragominas



open air market, in Pará, Brazil. Mud and holes in the road on the way to market held him up an additional day. However, he was fortunate because bacuri fruit have thick rinds and are tough; he only lost 10 fruits along the way. But food and other expenses used up much of his profit, leaving João with only US\$2.50 – not even enough to get a ride back home. Forest people need to be realistic about the market opportunities in their area, and weigh the benefits of taking forest goods to market against the benefits of using them as food or resources for the family. Nonetheless, opportunities often exist for making supplemental income while conducting other family chores or business in the city.

## Measuring impact: workshop preparation

Before a workshop, it can be useful to ascertain how many hectares of a community's surrounding forest are intact, and how many have already been exploited or altered. What quantities and types of fruit or other forest products does the community use and sell? Are the women or the elderly a part of the decision-making process regarding forest management and/or timber sales? How many times has timber been sold, and at what price? Has a forest reserve been created? After some time, a return visit can help to determine if resource management has changed and, more specifically, if the forest has been degraded and if and how it is being managed.

### The book hits the rubber trails

Cristina da Silva

Workers from National Council of Rubber Tappers (CNS) in Brazil have used this book to work with approximately 70 000 families living in Extractive Reserves (RESEX) in the 9 Brazilian Amazonian states. These families are responsible for the management, use, and protection of some 15 million hectares.

“The book expresses the diverse realities of the Amazon,” noted Manuel Cunha, president of CNS who was brought up in a family of Rubber Tappers in the Extractive Reserve of the Middle Juruá, in the state of Amazonas. *Frutíferas*, as the book is known locally, is being utilized by community health workers, professors, and community leaders to explain the nutritive powers of the forest through its various products. Users of the book explain that it helps community workers illustrate that the forest is a source of extraordinary food and can be a living pharmacy when necessary. A professor who teaches with the book noted that piquiá trees are no longer cut down in certain community forests due to the intervention of villagers who have had access to the book or workshops.



Community workers often infuse their own cultural experiences into the book's stories leading to lively conversations in classrooms, workshops, or meetings. The songs, popular theater, and recipes promote local culture which can help retain traditional knowledge for future generation. Galo, an extractivist from RESEX Mapuá, on Marajó Island, explained Amazonians' reaction to *Frutíferas*, “I believe in this book because it has our look, our things”.

## How to educate with this book: a knowledge network

As one collaborator indicated, “Only 50% of the work is writing the book, the other 50% will be disseminating it effectively”. Given that rural people receive scant information, the dissemination strategy of an earlier Portuguese edition was designed to ensure that the majority of copies were distributed free to rural people and organizations working in remote regions. Health, education and extension networks have been excellent disseminators. Over time, the book has been used by forestry and agrotechnical schools, rural workers’ unions, indigenous tribes, rural and urban schools and universities and homemakers. It has also been used as a tool for the literacy training of adults, who learn to read while improving their ability to negotiate for their community’s forest resources. The following examples show how the book has been used in a variety of settings.

### Training future foresters: integrated forest management

Philippe Waldhoff

In the professional Forestry Certification course of the Federal Agrotechnical School of Manaus, the book is used to help students create and analyse hypothetical field situations. The professors simulate situations in which the students must propose management options, adding value through the processing, use and marketing of certain species. Here is how it’s done:

**Choose species:** In small groups, students select a few species from the book to work with.

**Manage the property:** Each group of students is allotted an imaginary

forest of 50 hectares. This land includes 40 hectares of forest reserve, where the species of their choice can be found. The students determine the distribution of the trees within the reserve, according to the unique characteristics of each (density, habitat, flowering and fruiting season).

**Draw a map:** The group makes a map of the lot and establishes the different land uses within the property: wildlife conservation area, agricultural field, garden, stream, etc.

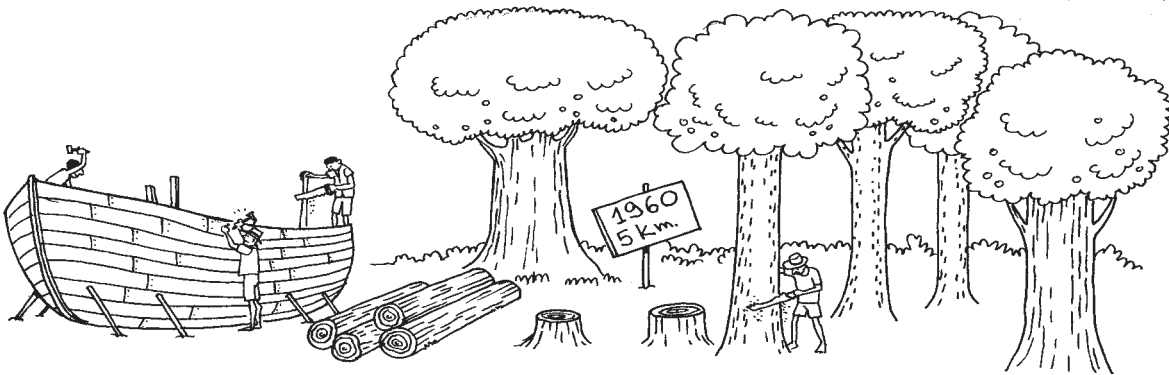
**Design a management plan:** The students design a management plan for the lot. The plan contains (1) *introduction*, in which the group emphasizes the importance and unique value of each forest product; (2) *description of the species*, their characteristics, as well as examples of other species of the same family; (3) *calculation of the productivity of the lot in relation to each species*, using the production per individual, density and area; (4) *forms of marketing and income*; and (5) *presentation of the plan*. To conclude, students and professors review each other’s work and offer comments and suggestions as to the management plan.



## Building rural capacity: learning from mistakes and achievements

This book contains accounts of people who lost their forest and regretted their decisions, and stories of people who maintained reserves to sustain their families with fruit, fibres, game and medicinal plants. Sharing of both negative and positive experiences has catalysed communities to inform others about the various options for forest use. Extensionists and scientists are now using these and other examples as well in workshops and trainings. Consider these two scenarios:

One community with roughly 3 000 hectares of forest sold timber to logging companies 13 times over a 20-year period. A neighbouring landowner maintained a reserve for the future. The community came to lament its decision because it no longer had fruit or game to eat. In 1993, average consumption was 392 fruits per family in the community. By 1999, this number had fallen to 156 fruits. Up river, Senhor Mangueira's family guarded a large forest reserve and ate thousands of fruits per year. He and his family note that they remain healthiest during the season of uxi. Their consumption during the four-month fruiting season shows why: in 1993, they ate 3 779 fruits, and in 2001 consumption continued high at 2 500.

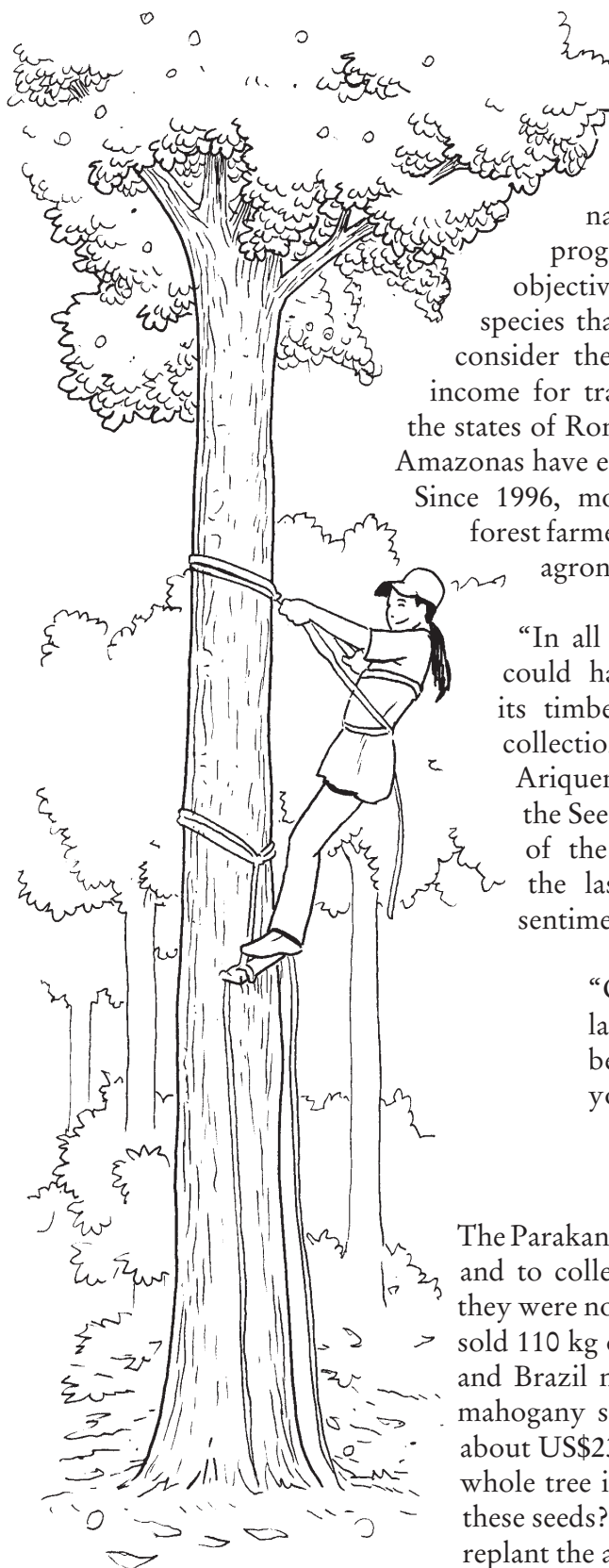


This book has also been utilized by the boat builders' professional qualification course in Igarapé Miri, in Pará. It inspired the students to build a timeline for species used in naval construction. The group made a map and established a scale of ten-year intervals beginning in 1960. They specified the species used in each decade and where they occurred. This exercise enabled the builders to visualize the process of species loss more clearly, revealing that a few of the most prized woods no longer exist in the area and can now only be found in another municipality 120 km away.



## Climbing high to collect and sell seeds

Noemi Vianna Martins Leão  
Selma Toyoko Ohashi



The seed laboratory at Embrapa (the Brazilian National Agricultural Institute), together with various partners in Amazonia, offers courses on the collection and storage of seeds from native tree species to be used in reforestation programmes. The course has two principal objectives: (1) to conserve forests with native species that produce high quality seeds and (2) to consider the seeds as an NFP that can generate income for traditional communities. Communities in the states of Rondônia, Roraima, Acre, Amapá, Pará and Amazonas have enthusiastically participated in the course. Since 1996, more than a thousand people, including forest farmers, foresters, horticulturists, students and agronomists have taken the 40-hour course.

“In all my life I never thought that the forest could have so much value without extracting its timber,” noted one participant in the seed collection course offered by Embrapa in the Ariquemes Reserve in Rondônia, supported by the Seed Network of Amazonia, of the Ministry of the Environment. The shirt he wore on the last day of the course summarized his sentiments:

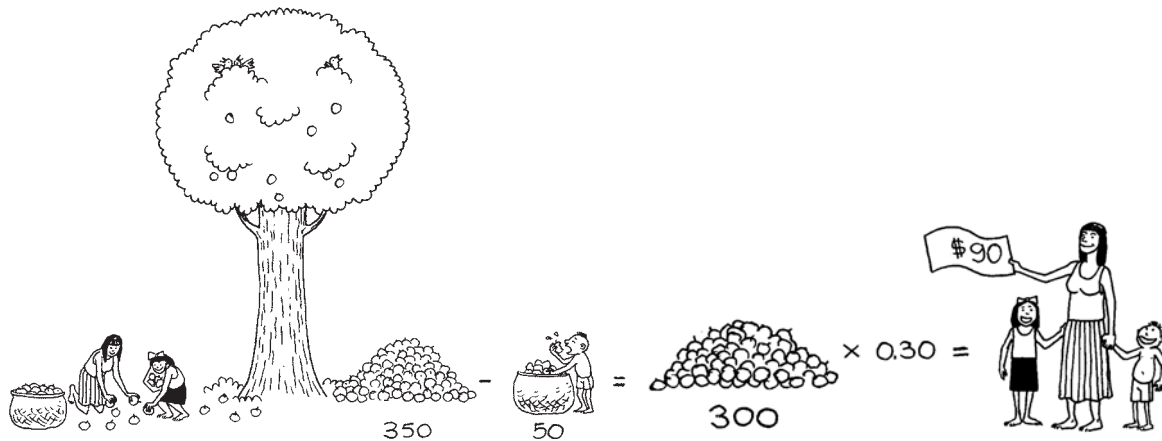
“Only after the last tree has fallen, the last fish has died and the last river has been poisoned, will you perceive that you cannot eat money.”

- Cree Indian Proverb

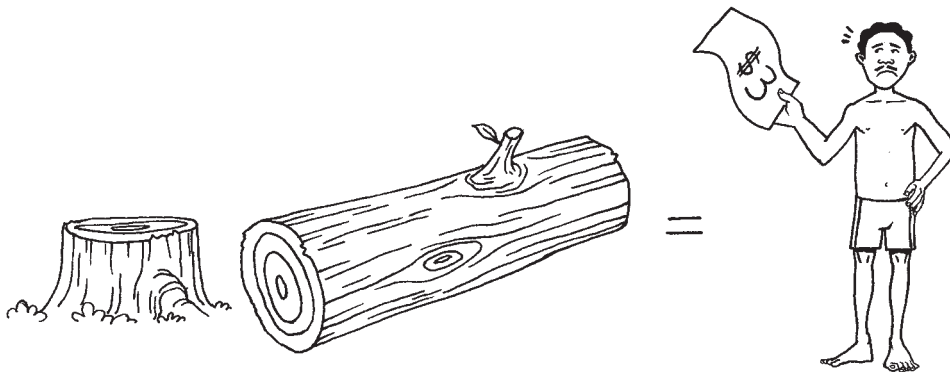
The Parakanã Indians learned to climb trees with ropes and to collect valuable seeds for sale. Even though they were not able to store the seeds successfully, they sold 110 kg of mahogany, tatajuba, andiroba, copaíba and Brazil nut seeds. In 2003, for each kilogram of mahogany seeds, around 1 600 seeds, they received about US\$23 – more than they would be paid for the whole tree if they sold it to loggers. Who purchases these seeds? There is a law in Brazil that loggers must replant the areas they cut, and so there is a significant demand for forest seeds.

## Reviving Amazonian culture in schools

When Amazonian children learn to read in school do you think they prefer, “See Spot run” or “Mummy picked a piquiá”? Because the majority of scholastic materials are produced in the south and southeast of Brazil, schools in Amazonia lack culturally appropriate material. Rural and urban schools in Amazonia are now using this book to teach biology, math, history, nutrition, environmental education and music while celebrating Amazonian forest culture. In addition, the Adult Literacy Program (Pronea) run by the federal government has incorporated the book into their innovative curriculum which teaches thousands of rural families throughout the Amazon basin to read.



Professors can create math problems based on data in the book. A sample problem could look like this: “A piquiá tree produced an average of 350 fruit per year. After he let his children eat 50 fruit, Maroca sold the remaining fruit at a farmer’s market for 30 cents a piece. How much did he make from his tree this year? A friend of his from another community thought he would earn more if he sold his tree for \$3.00. Which of them earned more?”

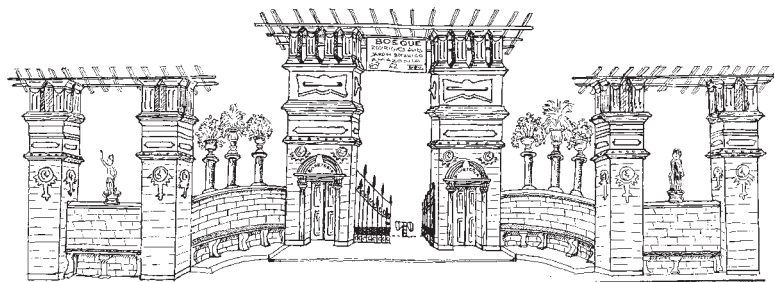
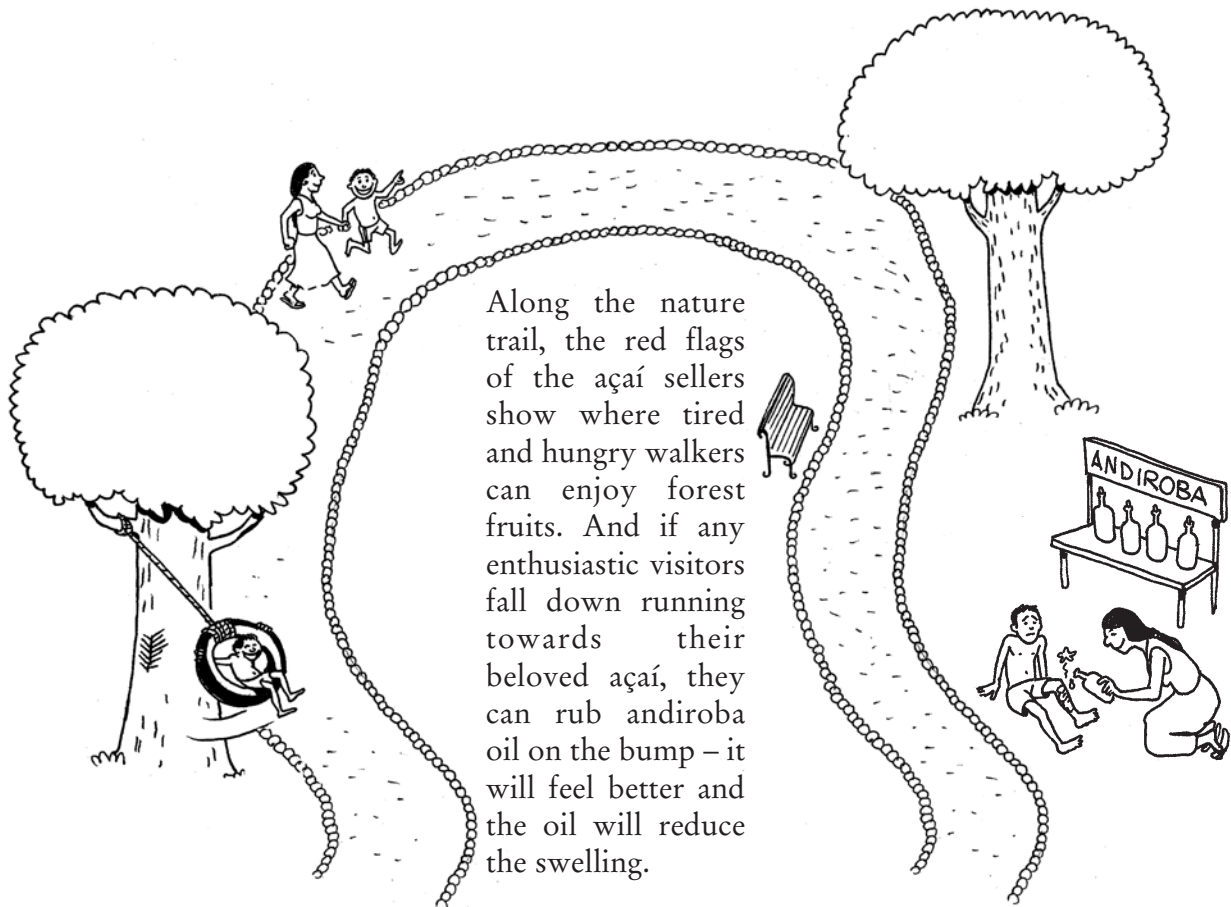




## Raising awareness in cities

Murilo Serra

Many of the beautiful parks, theatres, municipal buildings and stately homes in Belém were constructed with money earned from the sale of latex tapped from rubber trees. Visitors to the historic Rodrigues Alves Park (the Bosque) in Belém learn about the history and uses of native plants along the nature trail. Here they have created guided trails and illustrated plaques based on this book to awaken the people of Belém to the beauty and riches of the forest.



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<sup>1</sup> Richmond, M., Robinson, C. & Sachs-Israel, M. 2008

<sup>2</sup> Credaro, A. 2004

<sup>3</sup> [www.data360.org/dsg.aspx?Data\\_Set\\_Group\\_Id=59](http://www.data360.org/dsg.aspx?Data_Set_Group_Id=59), June 11, 2008

<sup>4</sup> MacDonald, T. 2004