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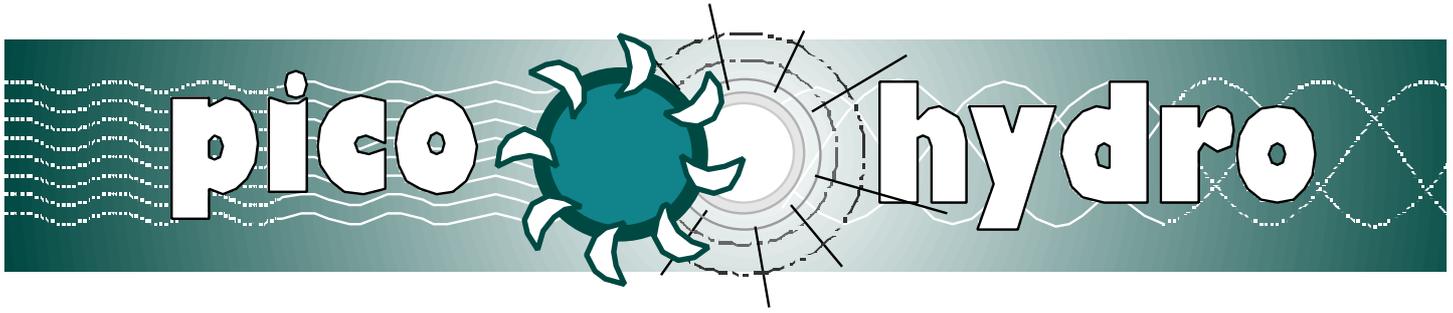


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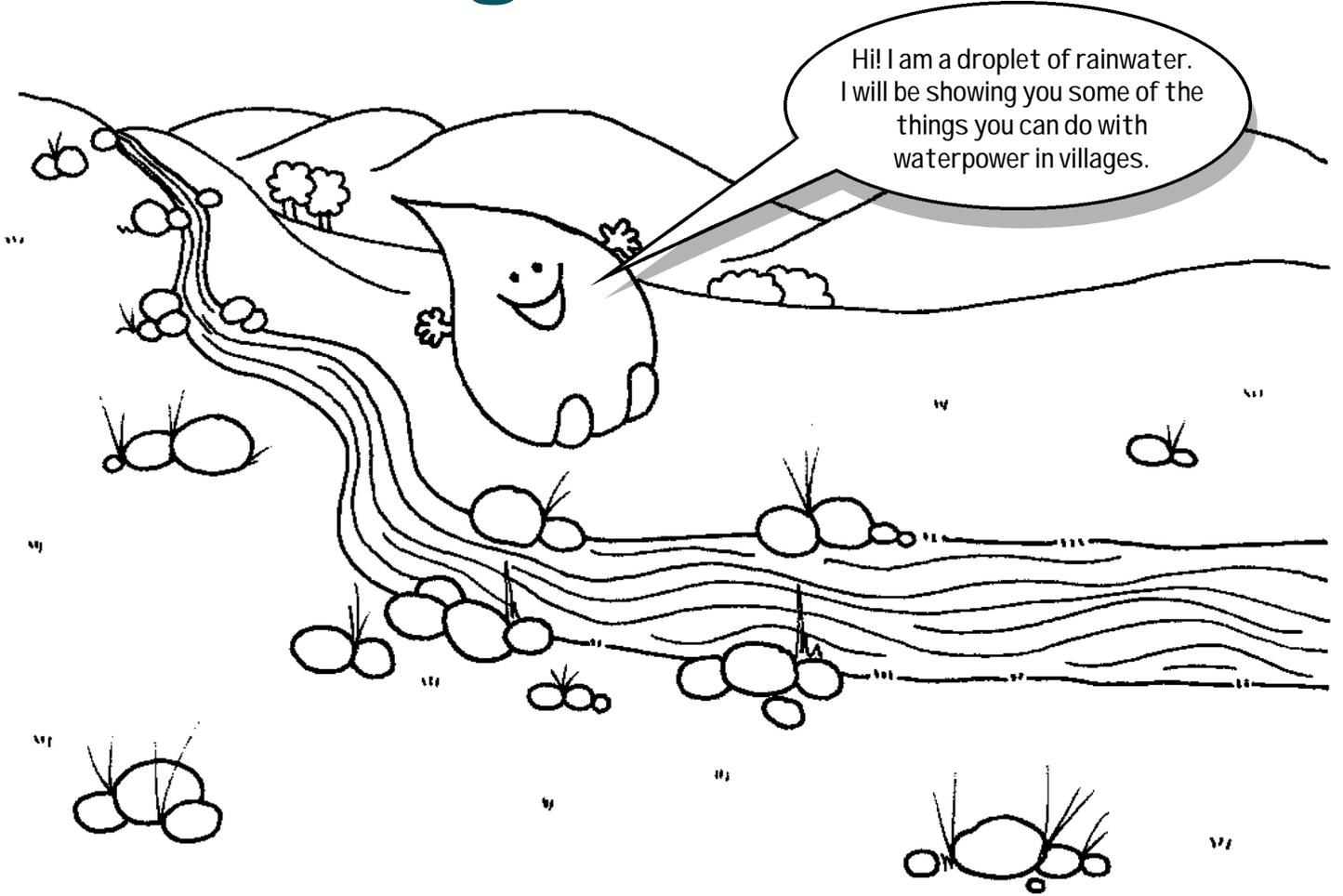
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# Water Power for a Village Business



By Adam Harvey and Nigel Smith



## INTRODUCTION



Over the centuries rural communities world-wide have used power from streams to process food. Nowadays compact metal water turbines tend to be used instead of traditional wooden water wheels. They are used as a power source for a wide range of applications, including grain milling and electricity generation, workshop tools, refrigeration, hospitals, clinics and battery charging.

This short booklet is intended for use by village people living in hilly areas, to provide introductory information on the possible uses of water power. It contains information on a range of applications for water power, illustrated case studies and an introduction to estimating the power potential of a stream.

Our hope is that this collection of real examples will encourage more people to develop their local hydro power potential and that these schemes will be both economically productive and socially beneficial.

We wish to add more examples of productive uses of small-scale water power to this booklet. Please send these to the Micro Hydro Group using the address at the back. If you would like to reproduce this booklet in another language and can send a translation of the text, we will try to help.

**Adam Harvey and Nigel Smith, 2000**

## ACKNOWLEDGMENTS

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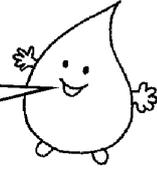
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## RELATED PUBLICATION

'Pico Hydro for Village Power: A practical design and installation manual for schemes up to 5kW in hilly or mountainous areas' by Phillip Maher. This book provides greater detail on financial planning, technical design and installation and can now be down-loaded from the internet from:  
[www.eee.ntu.ac.uk/research/microhydro](http://www.eee.ntu.ac.uk/research/microhydro)

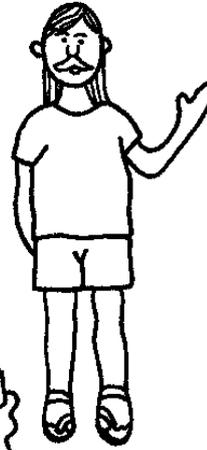
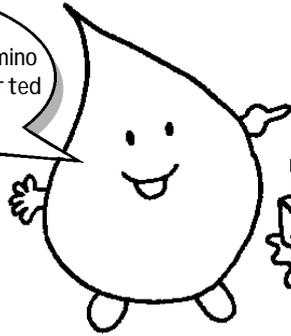
# CONTENTS

Hi! I am a droplet of rainwater and I will be introducing you to some of the things that you can do with waterpower.

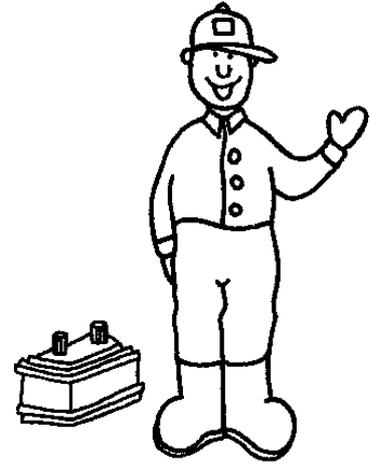


## SECTION 1

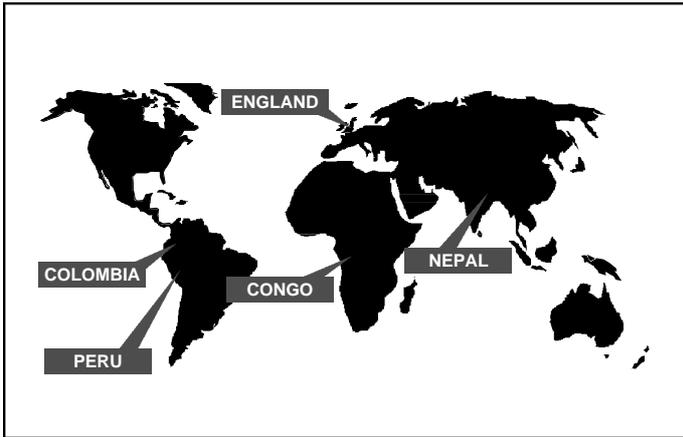
Firstly I will be talking to my friends Eusebio and Maximino who will tell you how they started their businesses using waterpower.



EUSEBIO

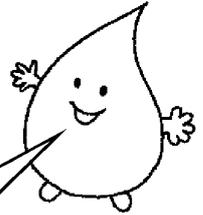


MAXIMINO



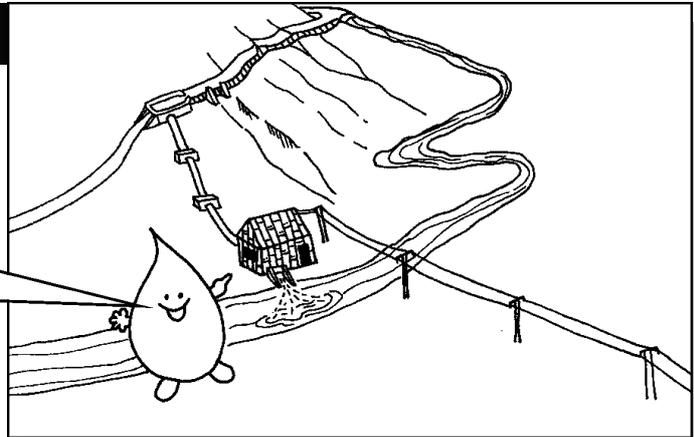
## SECTION 2

Secondly, you will see a few examples from different countries where people have bought a small water turbine and are using it to run a business or help the local community.



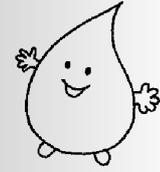
## SECTION 3 & 4

In section 3 I will show you what a waterpower system can look like and section 4 tells you what you need to do to see if your stream is strong enough.



SECTION 1

# ICE IN THE COLOMBIAN JUNGLE - EUSEBIO'S WATER POWERED BUSINESS



1

Hello! I just rained in the Chocó jungle in Colombia and I'm on my way to chat to my friend Eusebio.

2

Good morning Eusebio! Today I rained in this jungle and I came through the turbine pipe to ask you, how did you realise that you could use a turbine to make ice? I imagine someone must have taught you that....

My dear droplet, you are right. Before, all I did was catch fish. One day a friend told me that a water turbine could be used to make ice, just like the ice-making machines I'd seen in Solano Bay.

3

What convinced you to start an ice-making "business"?

I realised that making ice was a good business when, during a good fishing season, we ran out of the ice which we had bought from the boats that come from Solano Bay. WE HAD NO MORE ICE!!!!

4

I realised that if I made ice here I would have all I need and could sell it to many others. I would also have an income when I am too old to fish.

5

So how has your life changed now you have an ice-making business?

I don't go out fishing so often, and lots of people visit me to buy ice. However, do you know something? I don't charge much for the ice, especially when someone is not well or has little money.

6

I have another question. Where did you get the money to install the ice-making machine?

A friend who installs turbines helped me. He said "I'll bring you the turbine and help you assemble it. You find the money to buy the equipment and if the business goes well, you will be able to earn back the money you spend". That's how it was.

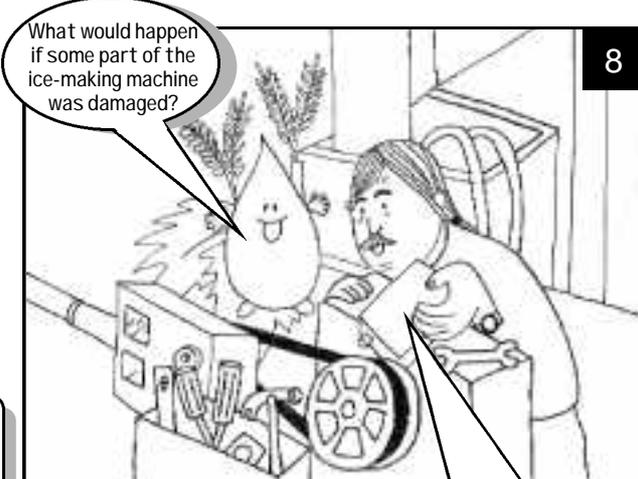


How much did all the equipment cost?

Pipe	US\$ 350
Turbine	US\$ 250
Compressor	US\$ 600
etc.	
<b>TOTAL</b>	<b>US\$ 1,200</b>

7

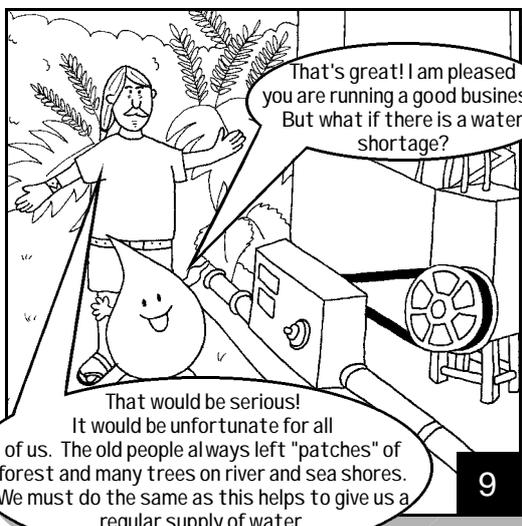
I spent US\$ 350 on pipe to carry the water. The turbine with its axle, jets and valves cost me another \$250. Finally, I spent another \$600 on the compressor, the copper pipes, the second-hand freezer, cement, planks, wires, etc. The total was US\$1,200.



What would happen if some part of the ice-making machine was damaged?

8

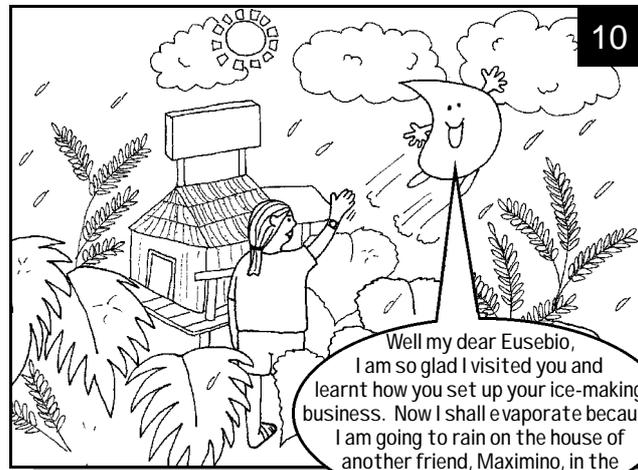
My goodness! So far nothing has gone wrong, because my friend who helped with the installation showed me how to do the maintenance work. I take maintenance very seriously, to avoid any problems. I have some money saved up, just in case I need to buy a replacement part.



That's great! I am pleased you are running a good business. But what if there is a water shortage?

That would be serious! It would be unfortunate for all of us. The old people always left "patches" of forest and many trees on river and sea shores. We must do the same as this helps to give us a regular supply of water.

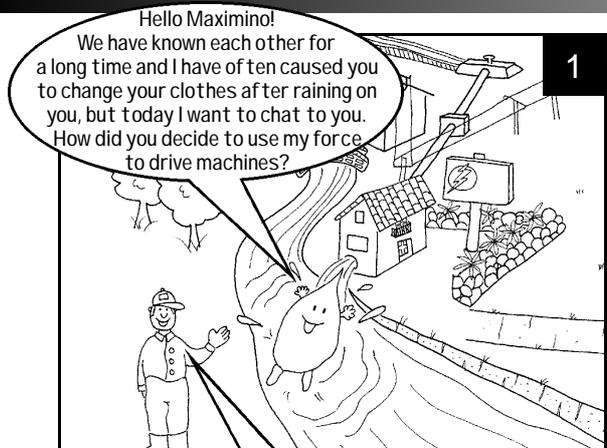
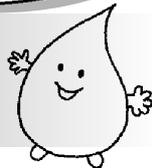
9



Well my dear Eusebio, I am so glad I visited you and learnt how you set up your ice-making business. Now I shall evaporate because I am going to rain on the house of another friend, Maximino, in the Peruvian Highlands.

10

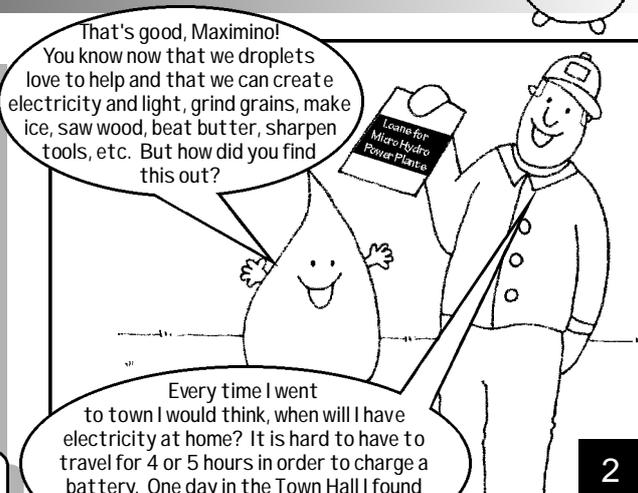
## MAXIMINO'S ELECTRICITY SUPPLY BUSINESS IN THE PERUVIAN MOUNTAINS



Hello Maximino! We have known each other for a long time and I have of ten caused you to change your clothes after raining on you, but today I want to chat to you. How did you decide to use my force to drive machines?

1

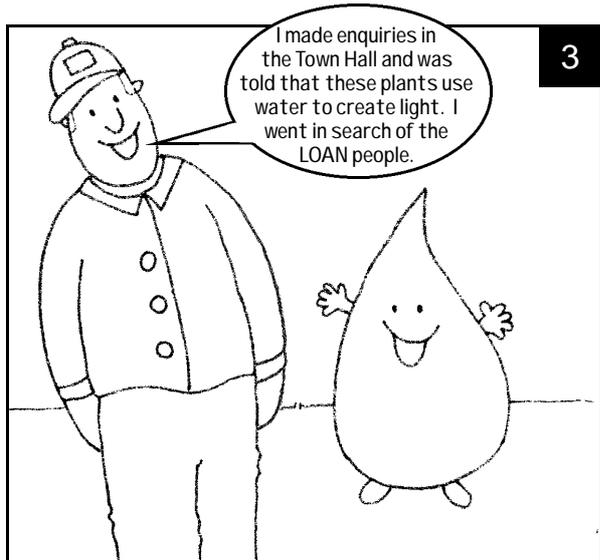
My dear little droplet! To tell the truth, I didn't know how much you could do. I thought you were good for making plants grow, and relieving our thirst; but I didn't know that you had the power to drive machines and make electricity!



That's good, Maximino! You know now that we droplets love to help and that we can create electricity and light, grind grains, make ice, saw wood, beat butter, sharpen tools, etc. But how did you find this out?

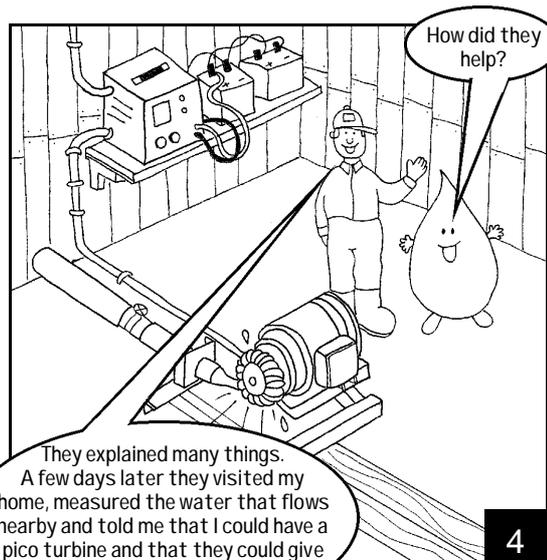
2

Every time I went to town I would think, when will I have electricity at home? It is hard to have to travel for 4 or 5 hours in order to charge a battery. One day in the Town Hall I found this leaflet about village lighting with waterpower.



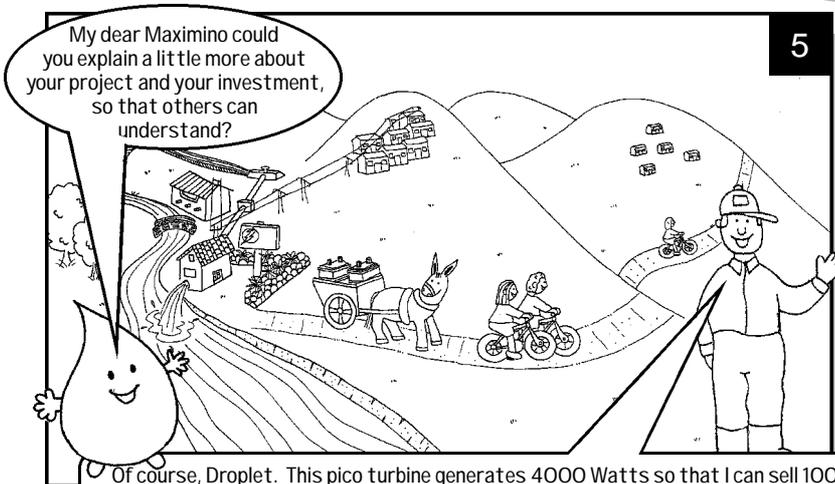
I made enquiries in the Town Hall and was told that these plants use water to create light. I went in search of the LOAN people.

3



They explained many things. A few days later they visited my home, measured the water that flows nearby and told me that I could have a pico turbine and that they could give me a loan, and these are the results.

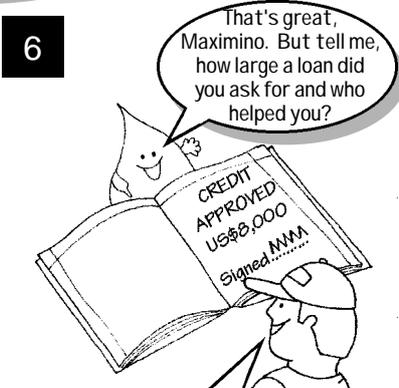
4



My dear Maximino could you explain a little more about your project and your investment, so that others can understand?

5

Of course, Droplet. This pico turbine generates 4000 Watts so that I can sell 100 Watts to every one of my 25 nearby neighbours and charge the batteries of those who live further away. The batteries are used for lighting and I'm paid for each charge. Soon I will start a video business so that my friends can see films.

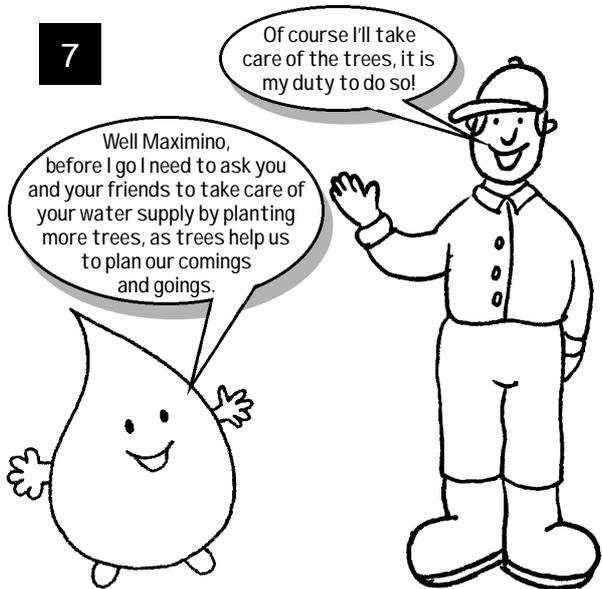


That's great, Maximino. But tell me, how large a loan did you ask for and who helped you?

6

I asked for US\$8,000 which covered everything. The organisation providing the loan also gave technical assistance, so now I am happy.

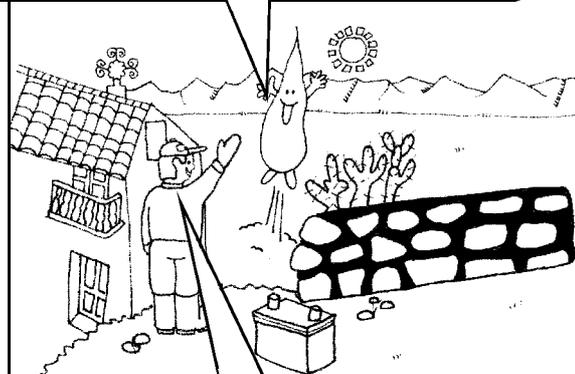
7



Of course I'll take care of the trees, it is my duty to do so!

Well Maximino, before I go I need to ask you and your friends to take care of your water supply by planting more trees, as trees help us to plan our comings and goings.

All right Maximino! It was a pleasure to make your turbine spin around and to see you using our power to help your friends. Good-bye for now, Maximino! This deliciously warm sunshine makes me feel like climbing up to the clouds, but if all goes well we should see each other soon.



8

See you soon, Droplet! Of course I will follow your recommendations and I shall tell my friends how you helped me and how to take care of our water supplies.