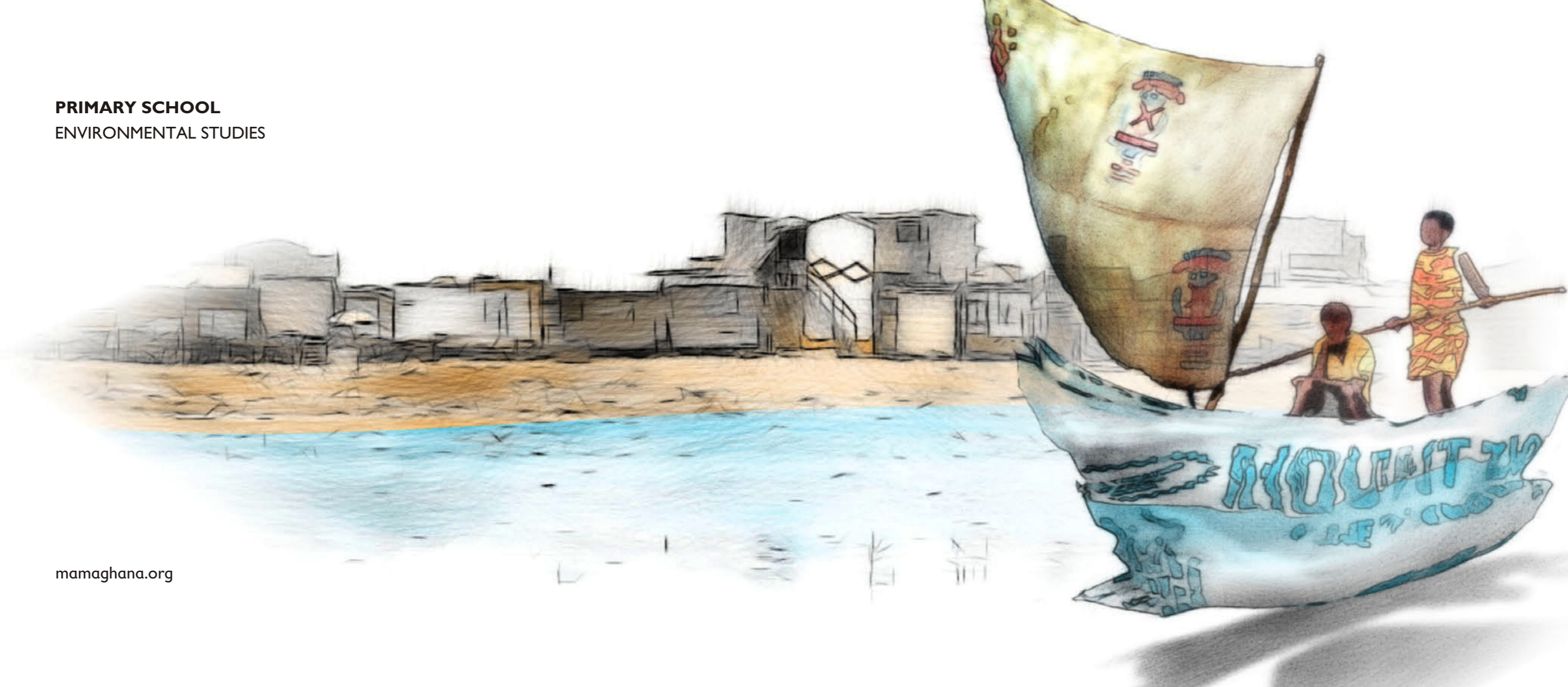


PRIMARY SCHOOL
ENVIRONMENTAL STUDIES

Kofi and Adwoa

A Water
Sachet's
Journey of
Discovery.

mamaghana.org



DESIGN / ILLUSTRATIONS

Stefan Trebbin

SAVING RESOURCES

The inlay pages contain of 90% renewable bamboo fibres and 10% used rags. *No trees were felt.* The cover page is made of recycled cardboard. Renewable flax fibres bind the booklet together. All colours are made of environmental inks.

Finally, this booklet is completely compostable.

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School is finally over.

Kofi and Adwoa are two pupils at the primary school.

They like playing football and they like to compete with each other.

Last time Kofi and his friends won the football game.

Now Adwoa asks for a challenge.

Two teams are easily formed:
Boys against Girls!

Chapter 1 Playing Football



ACTIVITIES

- 1 Organise a football match with your class after school.

ORIGINS OF FOOTBALL

Chinese people probably invented an early form of football in 2000 BC.



FIRST CLUB

FC Sheffield was the first official football club in the world. It was founded in 1857.



AFRICA CUP OF NATIONS

Ghana was the host country in 2008. Ghana has won the Cup three times.



And the winner is ...

... Adwoa and her girls team!

But it was a close run and all played with total commitment.

Kofi has to cope with the defeat.

Adwoa suggests a dare for tomorrow.

Kofi accepts.

After the match they are thirsty and go their own way.

Chapter 2 Why are you thirsty?

ACTIVITIES

- 1 Write down all the things you drink in one day.
- 2 Count the amounts of water and compare them in your class.



DID YOU KNOW ...

- ... that water is the pre-condition of life?
- ... that your body consists of 70% water?



SWEATING

It's important to cool your body. While sweating, your body loses water, which you have to balance by drinking.



DAILY AMOUNT

Water is the best way to quench your thirst. It's healthy to drink about 3 litres per day.



Let's take some Ice Pure Water.

Kofi and Adwoa see a Pure Water seller and they decide to buy two sachets.

Adwoa wants to comfort Kofi for his defeat.

She buys the water for him.

Both open the sachet with their teeth.

They enjoy the ice-cold refreshment on their way home.



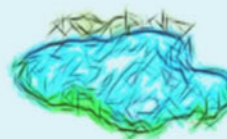
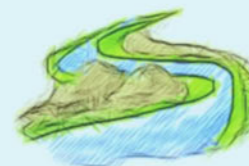
Chapter 3 Sources of water

QUESTIONS

- 1 Can you drink any water?
- 2 What else can you do with the help of water?

ACTIVITIES

- 1 Calculate how many Pure Waters a football team needs when they are thirsty.



Throwing away the sachet.

After some minutes they finish drinking their sachets.

While they talk, Adwoa throws her empty sachet in the gutter.

Kofi asks her:

'Why did you do that?'

Adwoa replies:

'Because the rain will flush it away!'

But Kofi has a bad feeling about it.

He doesn't agree with her and keeps his sachet in his hand.



Chapter 4 The quantity of waste

DID YOU KNOW ...

- ... that every person in Accra produces nearly 1kg waste a day?
- ... that the total daily waste of Accra is the amount of 90 fully loaded trucks?



ACTIVITIES

- 1 Find places where lots of waste accumulates.
- 2 Talk about your role of being responsible for pollution.

Disposal in a tricycle.

Just one junction later
Kofi discovers a tricycle.

He throws his sachet into the bin.

There is already a lot of
other waste inside.

Now Adwoa has to say
goodbye to Kofi.

She lives here, and Kofi's home is
only a few streets away.

Tomorrow morning they will
meet again at school.



Chapter 5 Disposal Opportunities

ACTIVITIES

- 1 Find out how the waste is collected at your school.
- 2 Talk about your disposal opportunities at home.



DID YOU KNOW ...

- ... that tricycles are used in areas with dirt roads?
- ... that street names are necessary to retrieve waste bins?



Let's get back to the gutter.

Only a few days later, something happens with the clean gutter.

Many people like Adwoa have disposed of their waste into the gutter.

Now there is plenty of refuse in it.

Even a slop of dirty water has formed.

Adwoa's Pure Water sachet has crumbled and it is blocking the grate with other refuse.

It's interesting for rats who inspect the gutter.

Chapter 6 Inspecting the gutter

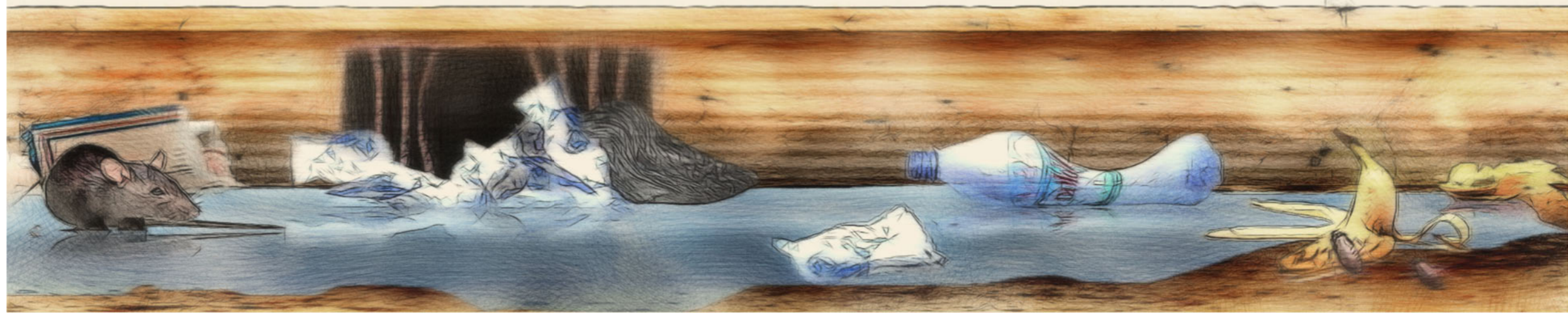
ACTIVITIES

- 1 Talk about the picture.
- 2 Explain the purpose and function of a gutter.
- 3 Find things that don't belong in a gutter.

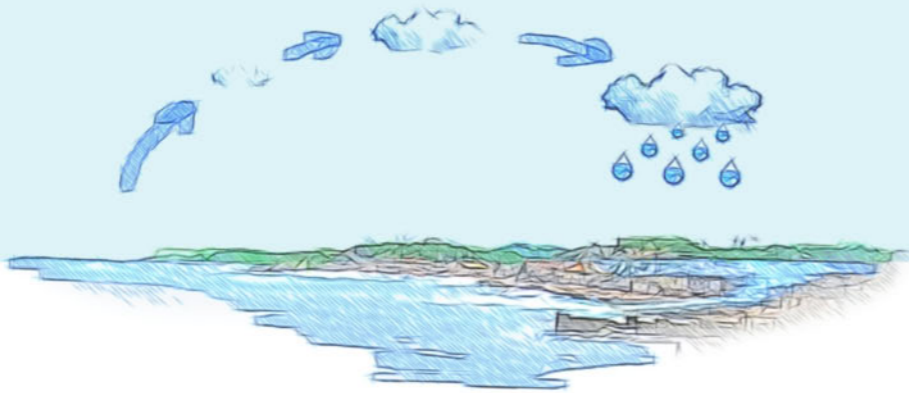
EXPERIMENT

To discover how mosquitoes develop, you can try the following experiment. Ask your teacher!

- 1 Find a jar with a cap.
- 2 Fill the jar halfway up with water.
- 3 Collect some mosquito larvae. You can find them on the water surface of rain barrels, puddles and other stagnant bodies of water.
- 4 Put the larvae in the jar and close the cap.
- 5 Observe the jar every day and see how the larvae develop into mosquitoes.



Inspecting the gutter Water



Surface Water

It comes from the rain and belongs in the gutter. The gutter drains streets and prevents them from flooding.

Water Cycle

Rain is part of the water cycle. Talk about the picture in your class.

Inspecting the gutter Types of waste



Plastic

Plastic waste can't be decomposed. However it's a valuable resource. It blocks gutters.

» FLOODING



Paper

Paper and cardboard can be recycled to create new books. They block gutters, too.

» FLOODING



Organic waste

Organic waste can be completely composted and become fertile soil. It's food for vermin.

» ODOURS
» VERMIN

Inspecting the gutter Carriers of disease



Mosquitos

Waste creates small puddles of water which are an ideal breeding ground for mosquitoes.

- » MALARIA
- » YELLOW FEVER

Rats and Mice

Organic waste like banana peels or rest of fish are a food resource for rats.

- » TYPHUS
- » CHOLERA
- » PLAGUE

Cockroaches

Vermin and cockroaches love any kind of disposed organic food. They carry many diseases.

- » TUBERCULOSIS
- » HEPATITIS B
- » CHOLERA

Inspecting the gutter Invisible dangers



Bacteria

Bacteria are microscopic and appear everywhere. Some of them cause serious diseases.

- » CHOLERA
- » TYPHUS



Chemicals

They are often dissolved in water. Chemicals can emerge from old batteries or detergents.

- » CANCER
- » POISONING



Parasites

Parasites are small creatures that live on humans and multiply inside your body.

- » WORMS

A water-slide journey.

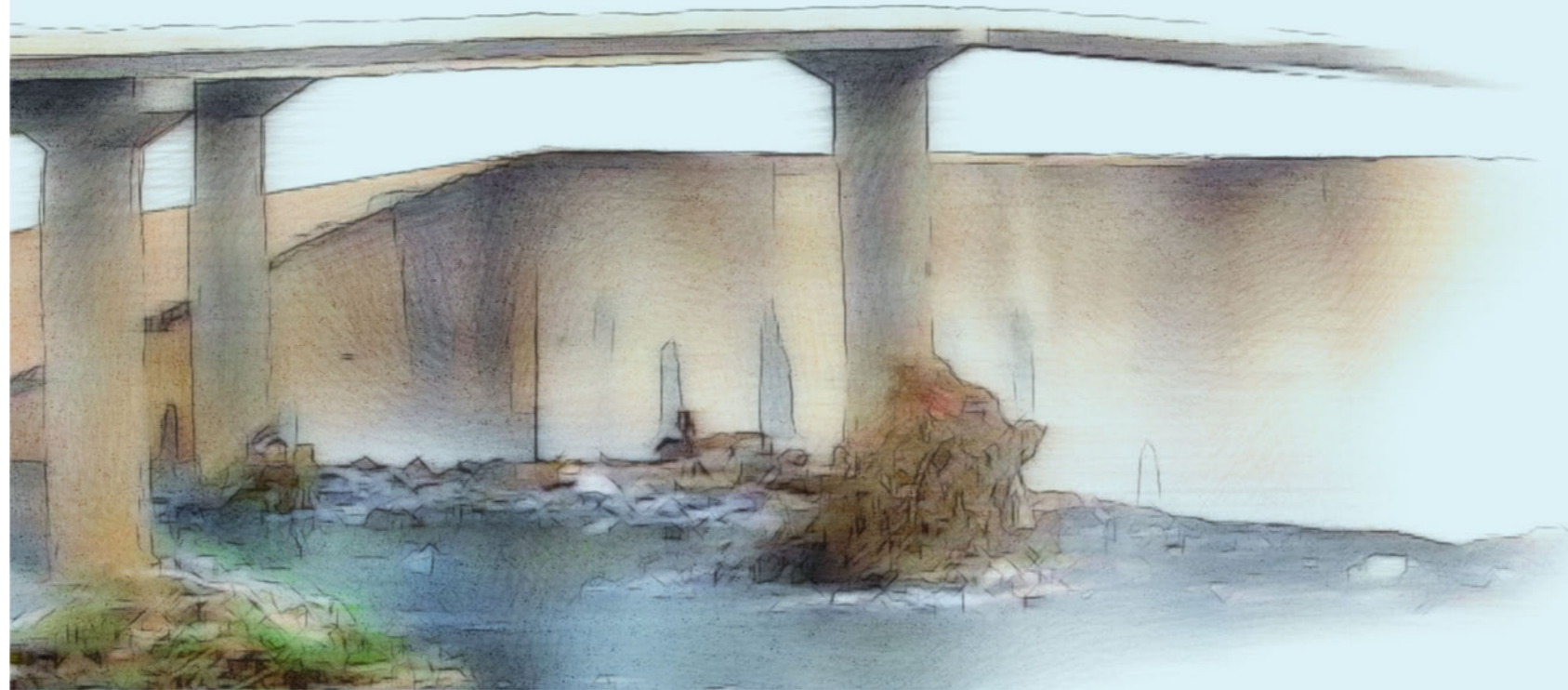
After a short but heavy rainfall, Adwoa's pure water breaks free and slips through the grate.

It travels from one gutter to another, and its dimensions become bigger and bigger.

The amount of other waste increases immeasurably.

Now the sachet arrives at a big channel and it's time to rest.

Chapter 7 Drainage in Accra



ACTIVITIES

- 1 Trace the route of a gutter. Follow the way the water tends to flow.

HOW DOES A DRAIN WORK?

Imagine a Baobab tree.

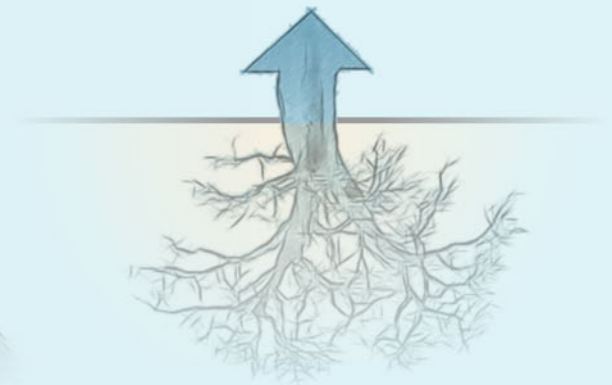
The roots represent the small gutters in every street.

They collect the surface water.

All of them merge into bigger gutters until they end in a huge stream.

At the Baobab itself, the water goes into the trunk.

The stream of Accra then goes into the sea.



Some days later at the Stream.

The Pure Water slowly arrives
at the stream on the
Agbogbloshie market side.

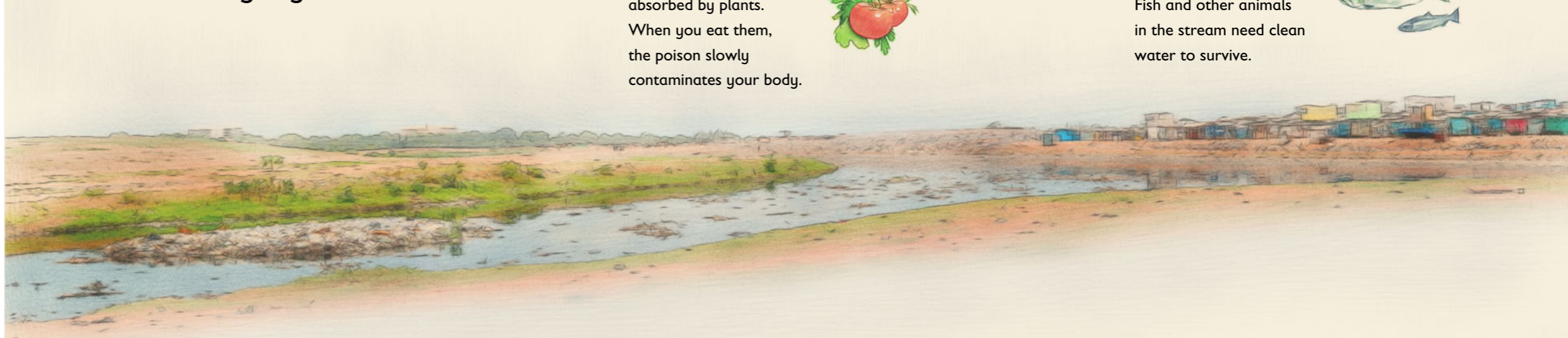
Here you can find isles of waste
floating on the water's surface.

The water has turned pitchblack
and smells horrible.

At the riverside,
the waste piles up in layers.

In the past it was a beautiful place
with clean water and fish.

Chapter 8 Stream at Agbogbloshie



ACTIVITIES

- 1 Talk about the picture.
- 2 Do you know
where Agbogbloshie is ?
- 3 Talk about electronic waste

WATERING PLANTS

Poluted water will be
absorbed by plants.
When you eat them,
the poison slowly
contaminates your body.



FRESHWATER CREATURES

Fish and other animals
in the stream need clean
water to survive.



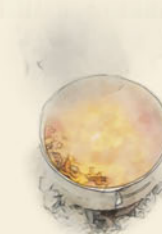
BURNING WASTE

Burning waste is highly
dangerous! It produces
toxic gases and
contaminates the soil



DID YOU KNOW ...

- ... that boiling kills
bacteria and viruses?
- ... that boiling can't
kill toxins and
heavy metals?



Cattle are thirsty, too.

Especially when the sun is burning on their backs.

The only chance to drink is to swallow polluted water.

Poisons and parasites will enter their bodies and concentrate in the muscles and organs.

When you eat the meat of these animals, you can become seriously ill.

Chapter 9 Animals



The Pure Water reaches the sea.

The waves roll the sachets into the sea.

Some of the plastic materials are stranded on the coastline.

Fishermen have to walk over large amounts of plastic waste before they can get in the sea.

Playing football on the beach or going swimming is quite impossible.

Chapter 10 Waste in the sea

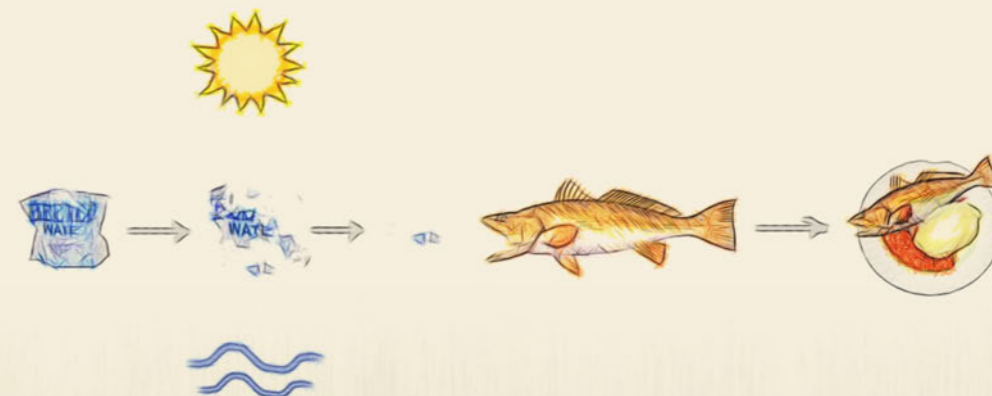
EXPERIMENT

Put different types of waste in a large glass of water and see what happens.



DISSOLVING

In the sea, plastics dissolve very slowly. Waves, salt-water and sunrays break up the plastics into small pieces, which contain toxins.



Fisherman 'Kwakpwo'

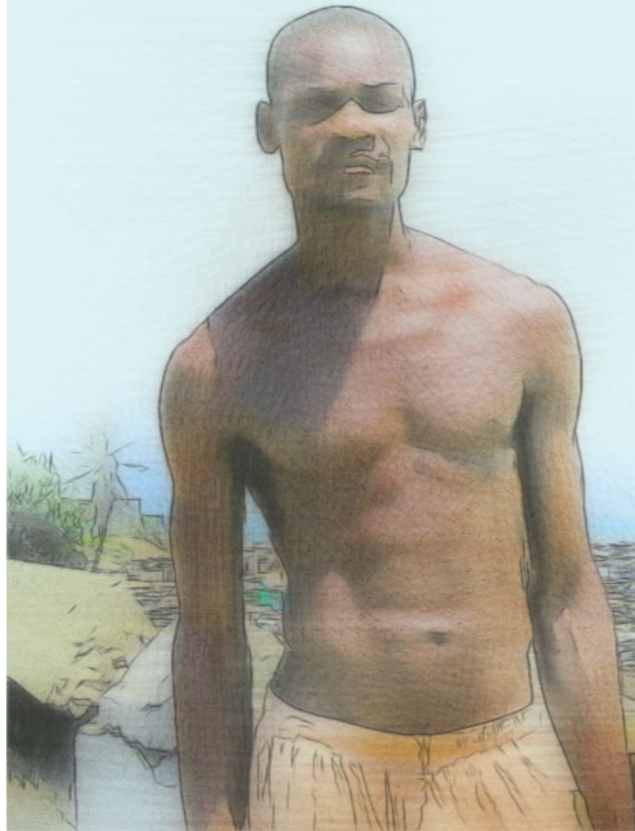
Kwakpwo is a hard-working fisherman who lives in Jamestown.

He says:

'In the last few years fishing has become more difficult. It's hard to catch enough fish, because I'm fishing more plastic than seafood.'

Clearing the fishing-nets of plastic waste consumes a lot of my time.'

Chapter 11 Foodresource: Sea



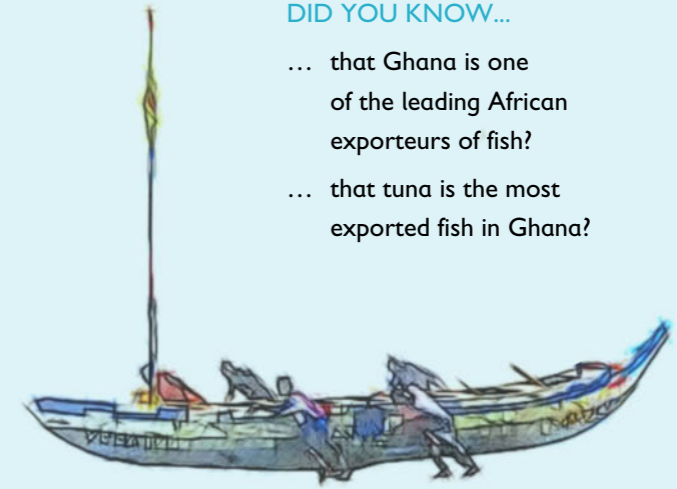
ACTIVITIES

- 1 Write down some marine creatures you know.
- 2 What kind of seafood do you like?



DID YOU KNOW...

- ... that Ghana is one of the leading African exporters of fish?
- ... that tuna is the most exported fish in Ghana?



Meeting at the beach.

The whole beach
is covered with waste.

This waste wasn't deposited by
the people who live here.

Large waves have washed
the plastic waste ashore.

This weekend Kofi and Adwoa
are playing in a fishing boat.

Kofi asks Adwoa:

**'Isn't it curious that
some of the sachets
could be yours?'**

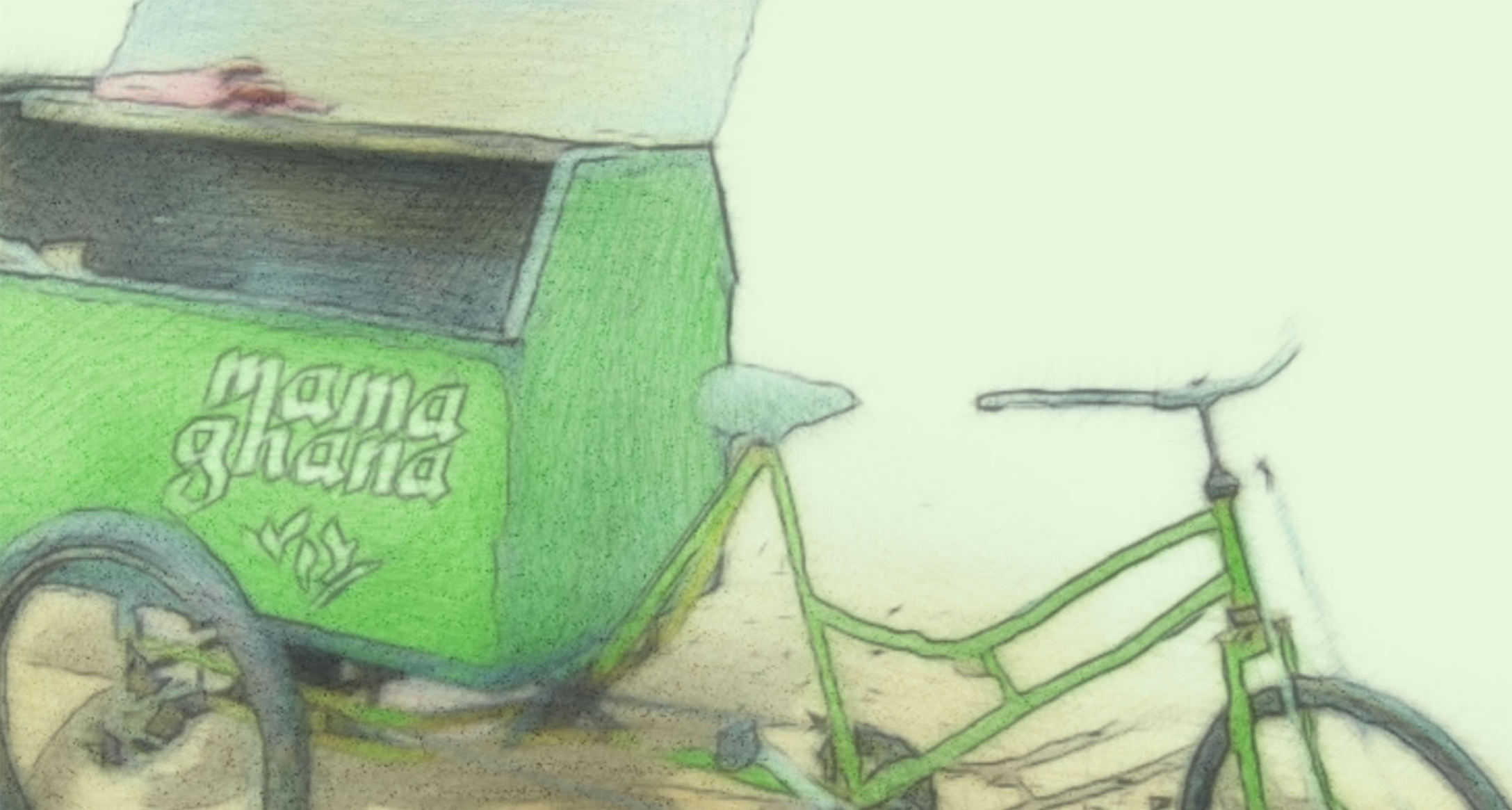
Chapter 12 The beach



WEARING SHOES

The waste on the beach contains
sharp-edged objects. Pieces of broken
glass or sharp pins can cut your feet.





**But what about
Kofi's satchet?**

Proper disposal of waste.

The tricycle transports Kofi's sachet to a central waste container.

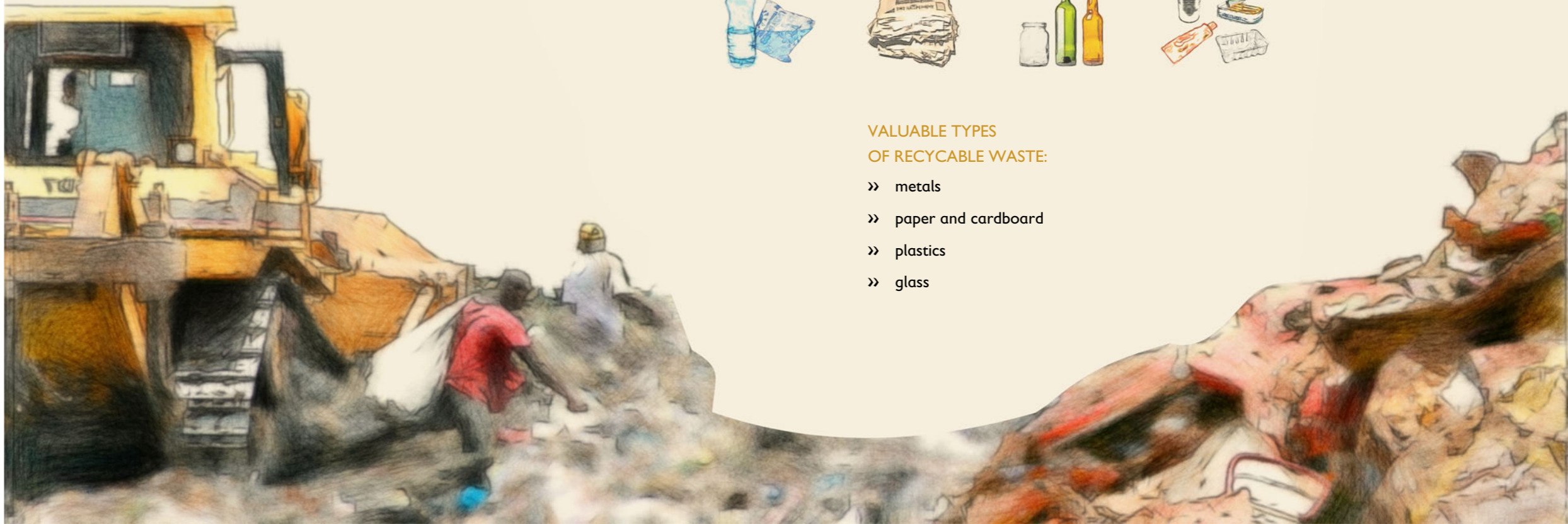
When the container is full, a truck carries the waste to a huge landfill.

This place is a staging area for waste. Interesting vehicles can be found there.

The whole place is a restricted area.

Some people are collecting valuable things.

Chapter 13 At the landfill



VALUABLE TYPES OF RECYCABLE WASTE:

- » metals
- » paper and cardboard
- » plastics
- » glass

Sorting and seperating.

This is the recycling sector
at the landfill in Oblogo.

Women sort collected
plastics by colour and type.

All of these waste materials
will later become new products.

Chapter 14 Plastic recycling

HOW TO DEAL WITH WASTE

- 1 Reduce
- 2 Reuse
- 3 Recycle

THE RECYCLING PROCESS

- 1 Collection of waste.
- 2 Seperating types and colors.
- 3 Cleaning of dirt and residues.
- 4 Crushing the material into small pieces.
- 5 Manufacturing new products.



Creating new plastic products.

A worker puts the sorted plastics into a big shredder.

This machine produces small pieces of plastic, which are called pellets.

They are very valuable and will be sold in bags to plastic manufacturers.

A lot of new things can be reproduced several times.



Kofi and Adwoa's review.

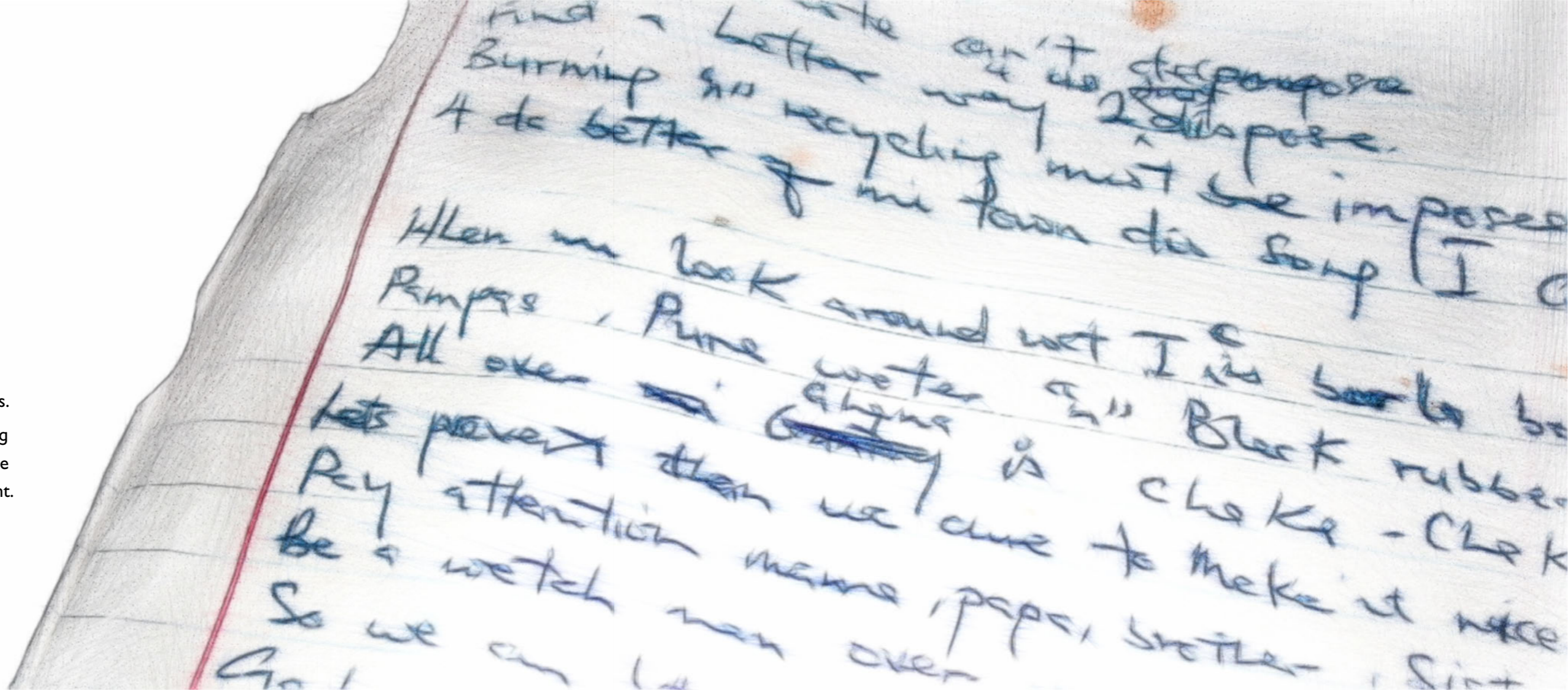
Adwoa is stunned by the dramatic effects of how the environment becomes polluted.

She wants to change something.

For this reason, she meets up with Kofi and her other friends.

Together they compose a song to convince other people of the need for a cleaner environment.

They want to change their attitudes.



Let's sing their song!

CHORUS

Plastic waste can't be decomposed
Find a better way for us to dispose
Burning recycling must be imposed
For the betterment of the town this
song we've composed.



GA VERSE

atswa wo adafi bei kone eho
keji ole le no etswaa
ole,nye fiea klalo
keha fale fale feemo
ke fon ne wo fieo waa
eke helai pii baa
öle keji keji nye le
ni muji muji yaba
ni eba hawo tontoro
ni eba eba hi shi
ni eba ha wo atredee
ni mobo eya naa wo
ni wo ya naa tsamo
onuu jeme fee, mantse lilone
chuckidigidey
yoomo etso aye.

ENGLISH VERSE

When i look around all i see is borla borla
Pampas pure water and black rubber rubber
Allover my country is chaka chaka
Make a ghetto youth everytime barsa barsa
Let's prevent than we cure to make it nicer nicer
Listen mama papa brother sister sister
Be a watchman over your neighbor neighbour
And let's live on earth healthy
Gateway to africa mama ghana
Cleaniness next to godliness mama ghana
Why then choke the gutters oh my sister
Keep well da plastic oh mama ghana
We can export to china for income
Experiment this and tell us da income