DOCUMENT RESUME

ED 391 636 SE 054 101

TITLE	Science across Asia Pacific. Book 1.
INSTITUTION	BP Educational Service, Poole (England).; Southeast Asian Ministers of Education Organization (Singapore). Regional Center for Education in Science and Mathematics.
REPORT NO	ISBN-967-931-031-0
PUB DATE	93
NOTE	57p.
AVAILABLE FROM	Science across Asia Pacific, SEAMEO RECSAM, Jalan Sultan Azlan Shah, 11700 Glugor, Penang, Malaysia.
PUB TYPE	Guides - Classroom Use - Teaching Guides (For Teacher) (052)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Energy; *Environmental Education; Foreign Countries; *Information Networks; Multicultural Education; Science Activities; Science and Society; Scientific Concepts; Secondary Education; Technology; *Telecommunications; Water Resources
IDENTIFIERS	Asia; Asia Pacific Region

ABSTRACT

The Science across Asia Pacific Project introduces a new approach to learning science and environmental issues through encouraging communication between school children in different Asia Pacific countries. The aims of the project included the following: introducing an Asia Pacific dimension into science education by raising awareness of different perspectives, ways of life, and national traditions of students in Asia Pacific countries; raising awareness of the ways in which science and technology interact with society, industry, and the environment; providing opportunities for students to develop communication skills in the widest sense, including in languages other than their own; and providing opportunities for schools in different countries to collaborate. This book includes three environment related topics: "Drinking Water," "What Do You Eat?," and "Using Energy at Home." The teaching units provide activities that can be meshed into the curricula of 14 to 17 year old students of science as well as other curriculum subjects. The teaching units are self-contained and include information about using the units, teacher and student notes, maps, and forms including an exchange form to allow students to exchange responses with schools in different countries. (JRH)

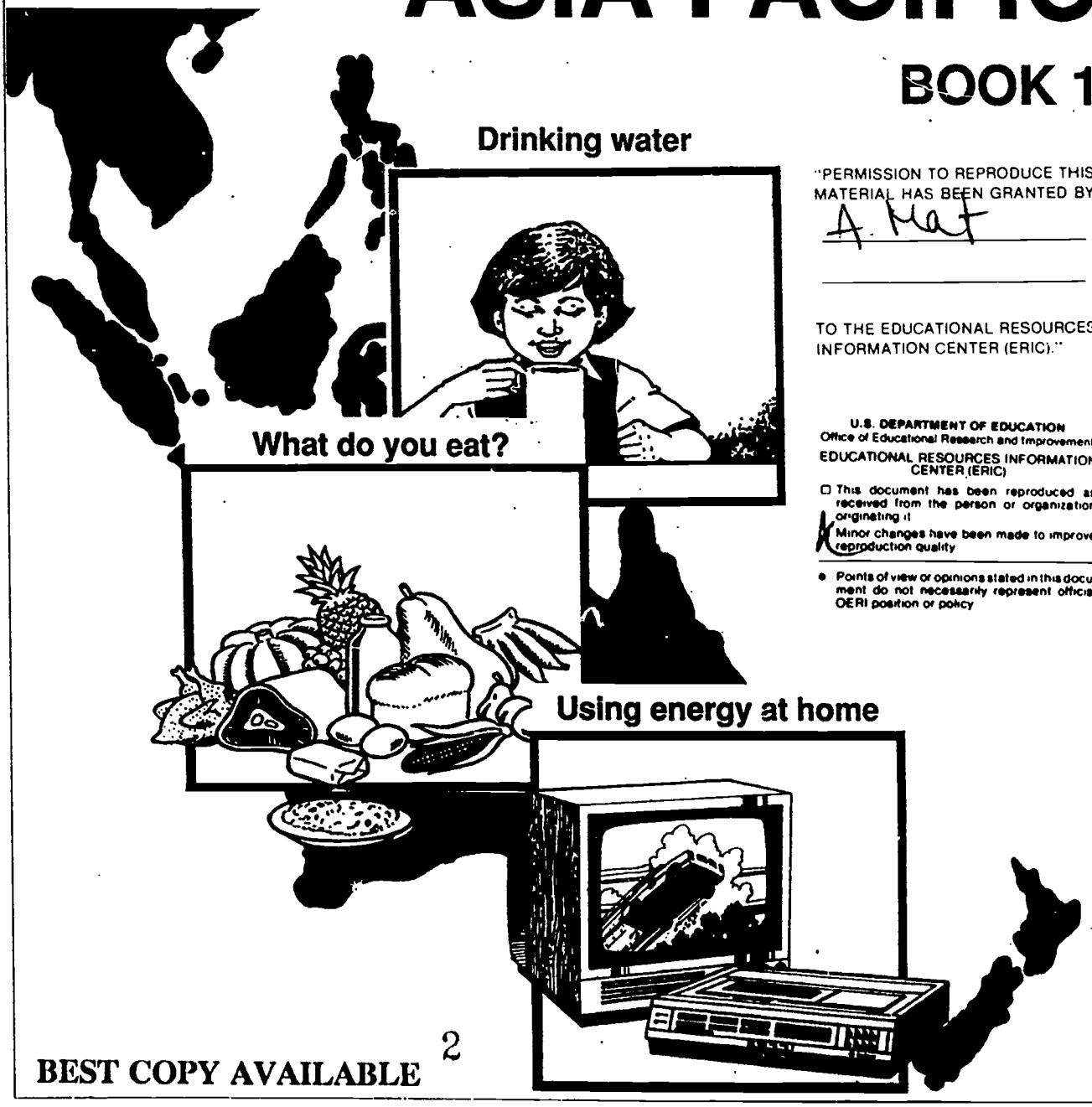
ISBN 967-931-031-0

BP

SEAMEO recsam

SCIENCE ACROSS ASIA PACIFIC

BOOK 1



SEAMEO-RECSAM is the Regional Centre for Education in Science and Mathematics located in Penang, Malaysia; established under the South East Asian Ministers of Education Organisation with the goal of improving the teaching of science and mathematics in schools throughout the member countries in SE Asia.

BP is one of the world's largest international oil and petrochemical companies operating in around 70 countries. BP actively supports education wherever it operates, and is proud to be working in partnership with SEAMEO-RECSAM in this innovative regional project in science and environmental education.

Science across Asia Pacific

About this book

The **Science across Asia Pacific Project** introduces a new approach to learning science and environmental issues through encouraging communication between school children in different Asia Pacific countries.

The Science across Asia Pacific project was initiated by RECSAM in collaboration with BP, with the advice of John Holman of the Association for Science Education (ASE). It is patterned in concept after the Science across Europe project, also a collaborative partnership between BP and the ASE, and many of the materials have been adapted from the European project. Science across Asia Pacific aims to:

- introduce an Asia Pacific dimension into science education by raising awareness of different perspectives, ways of life and national traditions of students in Asia Pacific countries
- raise awareness of the ways in which science and technology interact with society, industry and the environment
- provide opportunities for students to develop communication skills in the widest sense, including in languages other than their own
- provide opportunities for schools in different countries to collaborate.

The environment related topics **Drinking water, What do you eat?** and **Using energy at home** were selected as teaching units for development by the teams which participated in the Science Technology Society development workshop held by SEAMEO-RECSAM in Penang in December 1991. The three units were successfully tried out in 45 schools during 1992 in the eight participating countries of Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand, Australia and New Zealand.

The teaching units provide activities that can be meshed into the curricula of 14 to 17 year old students of science as well as other curriculum subjects, including languages. The teaching units are self-contained and include:

- information about using Science across Asia Pacific units
- teachers and student notes
- maps
- forms, including an exchange form to allow students to exchange responses with schools in other countries.

The main activities involve the exchange of information between schools across Asia Pacific, and this act of communicating responses to the same scientific concepts among children of different cultures is at the core of the project.

The Science across Asia Pacific project will provide a list of schools taking part. To join the network please fill in and post the Registration Form which is included at the back of this book.

Collaborators

This project was initiated in 1991 by the Director of the Regional Centre for Education in Science and Mathematics (RECSAM), Tn Hj Khairuddin, in collaboration with BP through Toby Littlewood, BP Asia Pacific, and in consultation with John Holman the Project Director of Science across Europe. RECSAM's new Director, Dr. Ashari bin Che Mat, strengthened RECSAM's commitment to the project from the 1992 trials through to implementation and institutionalisation in 1993.

Special thanks are also due to all the members of RECSAM who helped this project, and to the education ministries and individuals from participating countries including Australia, Brunei Darussalam, Canada, Indonesia, Malaysia, New Zealand, Philippines, Singapore, Thailand and Vietnam, who provided the teachers and officials the opportunity to develop, adapt, trial and revise these teaching units. Thanks are also due to the British Council in Malaysia and CIDA for additional support.

The development team (1991)

Drinking water

Alan Marshall	Australia
Haji Adi Othman Hj. Bahrin	Brunei Darussalam
Mohd. Zaini bin Ab. Kudus	Malaysia
Estrella S. dela Rosa	Philippines
Lim Poh Seng	Singapore
Laddawan Kanhasuwan	Thailand

Using energy at home

Dk. Mahani Pg. Mumin	Brunei Darussalam
Hadiat	Indonesia
Abdul Halim Ismail	Malaysia
Steve Benson	New Zealand
Gloria B. Dasmarinas	Philippines
Seth Sulaiman	SEAMEO RECSAM
Visoot Pathomrojanarid	Thailand

What do you eat?

Toby Littlewood	BP Asia Pacific
Reg Wild	Canada
Djoko Susetyo	Indonesia
Yow Sow Lay	Malaysia
Avelina T. Llagas	Philippines
Lee Shok Mee	SEAMEO RECSAM
Boonvatana Srinapong	Thailand
John Holman	United Kingdom

Editors

Perla S. Roxas	SEAMEO RECSAM
Alan Marshall	Australia

Contact address

Science across Asia Pacific
SEAMEO RECSAM
Jalan Sultan Azlan Shah
11700 Glugor
Penang, Malaysia

How to use the units in this book

- Make copies for the class of the
  * student pages
  * map(s)

  If preferred, the maps can be copied as overhead projection transparencies, or enlarged for display.

- Make a few copies of the Exchange Form

- On registering with the project, you will receive a list of participating schools. Select a few schools from different countries that have chosen the same period for the work for your class to contact. Three schools is a reasonable number.

- You can make contact with other schools by mail, fax or electronic mail. It is a good idea to contact these schools beforehand and essential if you are making your own arrangements. (You may use the 'First Contact Form' provided in this unit). Let them know how they may contact you by post, fax or electronic mail. Fax has been a very successful means of communication, allowing for quick responses. If your school does not have a fax machine, it may be possible to receive faxes via a local business or a parent.

- Before beginning students should be familiar with the concepts listed in the teachers' notes.

- When students have done the work in the un , fill in the information they wish to send on a photocopy of the Exchange Form. (To keep the exercise short, the Exchange Forms ask you for collated information – i.e. information collected from the whole class). Deciding what to put down is sometimes difficult, but all you need to convey is a summary of the information and an impression of the opinions of your students, however some schools like to provide more detailed information.

- It may be useful to include a sketch map showing the location of your school in your country.

- Make several photocopies of your completed Exchange Form. Send a copy to each of the schools you have chosen. Keep some spare copies in case other schools contact you.

- Please acknowledge receipt of any Exchange Forms sent to you by fax.

Science across Asia Pacific

key issues for society

Drinking water

Drinking water

Water is vital to life. This unit reviews water the 'wonder solvent,' how it collects impurities and what may be dissolved in it. It asks students to collect information about the quality of their drinking water and to find out if their community has concerns about it. Students may then exchange their information with other schools across Asia Pacific countries. The unit concludes by asking students to compare their findings with the information they received in return.

There are many possibilities for extending this study and for linking it with subjects such as geography and foreign languages.

This unit is in five parts:

Part 1 Water the wonder solvent

A short introduction to the unit.

Part 2 What is in your drinking water?

Information about the quality of water used by students in your class.

Part 3 What do other countries think?

Exchanging information about water quality with students in other countries.

Part 4 Drinking water across Asia Pacific countries.

Comparing the responses from different countries and discussing the results.

Part 5 Information section

This part includes a section with data and information about impurities found in drinking water.

The aims of the unit are:

- to show that it is difficult to get pure water, and why
- to show that the purity of water depends on local conditions
- to encourage critical awareness of water quality

Prior knowledge and skills:

The unit is intended for use by students aged 14 to 17 years. It is assumed they will have the following prior knowledge and skills.

- **Concepts and knowledge**

  the difference between physical and chemical change
  ions
  micro-organisms
  chemical formulae
  concentration of solutions
  solubility

- **Skills**

  reading and interpreting data from tables and maps
  estimating quantities
  measuring pH

Instructions for teachers

Requirements

Before beginning the lesson:

- make a class set of copies of the student pages.
- make a few copies of the Exchange Form for sending your information to other schools in Asia Pacific countries. (It may also be helpful to make a copy for overhead projection).

When you have received the Exchange Forms from other schools:

- copy Exchange Forms received for your students
- read and discuss the Exchange Forms received and compare with the class's own Exchange Form
- copy the map(s) for student use or make transparency for overhead projection use.

Summary of the unit

Part 1 Water the wonder solvent

This is a short introduction to the unit.

Part 2 What is in your drinking water?

It is best if students work on this part individually.

Part 3 What do other countries think?

When students have completed part 2, the whole class will need to agree a set of answers for the Exchange Form in part 3. The Exchange Form provides a quick and simple way of exchanging information between classes in different countries. You are more likely to get an answer from another school if you send your own results at the same time as asking for information.

Part 4 Drinking water across Asia Pacific

This part may be used as a follow-up when you have received Exchange Forms from other countries.

Part 5 Information section

Additional information on water supply, impurities and purification that may be used with other parts of the unit.

The following maps are provided

Map 1 *The countries of the region (The names need to be added by the students)*

Map 2 *Rainfall in Asia Pacific region*

Further activities

Here are some suggestions.

1 Where does your water come from?
Find where the water was collected from before it was stored and purified. Draw a map showing catchment areas, reservoirs, storage areas, purifying plants where these are applicable.

2 Looking at hardness
Measure the hardness of different types of water, including mineral waters.

3 Design and build a water purifier

4 How do water purifiers work?
Examine water purifiers of the filter type to see how they work.

5 Looking at mineral water
Collect different brands of mineral water and look at the analyses to find the concentrations of dissolved substances. Compare these with World Health Organization (WHO) guidelines.

6 Site visits
Visit your local water department and/or purifying plant.

Notes on the questions

Part 2

2 Where water is not metered it may be difficult to answer this question. This information may also be available from consumer organisations or other sources.

3 Include home water supplies used to make any drink or liquid food, but not canned or bottled drinks such as lemonade or beer.

4 Include all water (purified or mineral) in any form of packaging. Do not include canned or bottled drinks such as lemonade or beer or boiled water kept in bottles in some homes.

5 Home water purifiers include large ion-exchange softeners as well as simple filter equipment.

6 Students will need to be instructed in the method to be used to measure pH.

7 The answer to this question will, of course, be subjective and it will be interesting to find out if people's worries are based on facts.

9-11 The local water department may be able to give answers to these questions and provide an analysis of the water. Some students may obtain their water from other sources and may not be able to obtain an analysis. Information concerning various impurities is given in tables 1 and 2 in the information section.

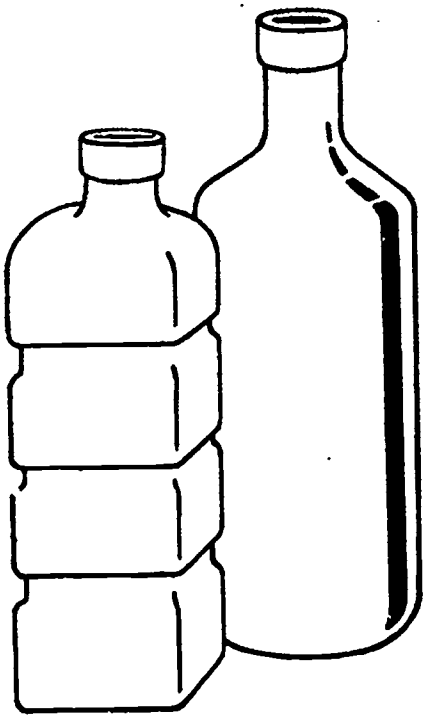
9 & 10 The WHO's standards for selected substances are given in Table 2 in the Information section (Part 5).

14 The answers to this question will again be subjective. Students should be able to judge the awareness of family and community by asking a few simple questions about impurities and micro-organisms in the water supply.

Part 4

1 Rainfall is one of many factors affecting water supply. Loss of water through evaporation and the transpiration of plants is another factor. Large cities, the standard of living (for example, the use of water for toilets, baths and washing machines), the use of water for irrigation and gardens, all place high demands on water supply. Water shortages in areas of high rainfall may sometimes be due to lack of investment in storage reservoirs and pipe lines or to environmental objections to the building of new ones.

2 The drinking of bottled water is a growing trend in Asia Pacific countries.



Science across Asia Pacific

Drinking water Exchange form

Date

To
(teacher's name)

School

Address

Tel No. Fax No.

From
(teacher's name)

School

Address

Tel No. Fax No.

Please indicate preferred method of communication by circling the appropriate word.

Fax Air mail E-mail

Please provide E-mail address if available

We would like to know your opinions about drinking water and its quality. Please give answers to the following questions. We are asking the same questions of students in other Asia Pacific countries. We have included our own answers below.

1 *Where does your water come from?*
a *Tap water* **b** *Well water* **c** *River water* **d** *Rainwater tank*
e *Others (state source)* [ ]

2 *Do you sometimes have a shortage of water? Is the water supply rationed?*

_____

3 *How many litres or cubic metres of water per person does your home use in a week?* [ ] L

4 *How many litres of water do you drink in an average day (including any drinks or liquid food you make from your own home water supply)?* [ ] L

5 *How many litres of bottled water (purified or mineral) do you drink in an average day?* [ ] L

6 *What percentage of your class have a water purifier in their home?* [ ] %

7 *What is the average pH of your local water supply?* [ ] pH

8 *What is the concentration in your local water of each of the following? Give your answer in mg/L.*
a *Lead ion,* Pb^{2+} [ ] µg/L
b *Nitrate ion,* NO_3^- [ ] µg/L
c *Pesticides* [ ] µg/L

9 *What is the total number of coliform bacteria per 100 mL in your local water supply?* [ ] /100 mL

10 **a** *Are there any substances in your local water supply that are above the WHO's standards?*

_____

b *Does your country use different guide levels?*

_____

11 *What impurities and/or micro-organisms in the water are people in your community particularly worried about?*

_____

12 *Which statement, **a**, **b**, **c** or **d**, best describes what people in your community know about the quality of their drinking water?*
a *They do not question the quality of their drinking water.*
b *They are aware that drinking water contains impurities or micro-organisms, but have no idea of what they are.*
c *They are aware that drinking water contains impurities or micro-organisms, and can name at least one of them.*
d *They are aware that drinking water contains dissolved substances or micro-organisms, and can name several of them and their possible effects on health.* [ ]

Drinking water

Part 1

Water the wonder-solvent

Living water, clean water, used water, dirty water ...

How can this liquid be so varied? It is because of its amazing ability to dissolve and carry many different substances.

Water is an excellent solvent – but this property can be both an advantage and a disadvantage.

The advantages

The solvent properties of water (H_2O) are vital to human beings. Our body is 70% water, and this water needs to carry dissolved substances around our body. So the water we drink not only provides water, but also carries the food, dissolved gases, ions of salts such as sodium (Na^+), potassium (K^+) and (Ca^{2+})and everything else we need around our bodies.

The disadvantages

Human beings are not the only organisms that benefit from the solvent properties of water. Micro-organisms also need water. You can find micro-organisms of all sizes living in water, supported by the dissolved substances in it. Unfortunately, some of these micro-organisms can be dangerous to health.Water can dissolve harmful substances as well as health-giving ones. When the concentration of harmful substances becomes too high, water may be a health hazard.

Once impurities are dissolved in the water, it is difficult to remove them. Fortunately, it is not necessary to remove dissolved impurities – unless they are harmful to health.In this unit you will collect information on water quality from students in your own class, then compare it with information you collect from students from other countries.

Figure 1 *The many uses of water*

Part 2

What is in your drinking water?

In this part of the unit, we are collecting information from students about the water they drink. In part 3, you will exchange some of this information with students in other countries.

Water in your home

1 *Where does your water come from?*
   - a *Tap water*
   - b *Well water*
   - c *River water*
   - d *Rainwater tank*
   - e *Others (state source)*

2 *How many litres or cubic metres of water does your home use in a week?* (You can find this from the readings of your water meter or estimate an answer to this question.)

3 *Estimate how many litres of water you drink in an average day (including any drink or liquid food you make from your own home water supply)*

4 *Estimate how many litres of bottled water (purified or mineral) you drink in an average day.*

5 *Do you have a water purifier in your home? If so:*
   - a *What kind is it?*
   - b *What does it remove from the water?*
   - c *Why do you use it?*

6 *What is the pH of your drinking water?*

7 *What impurities and micro-organisms in water are people in your home particularly worried about?*

8 *Does your community suffer from water shortages? Why? Is the water supply rationed?*

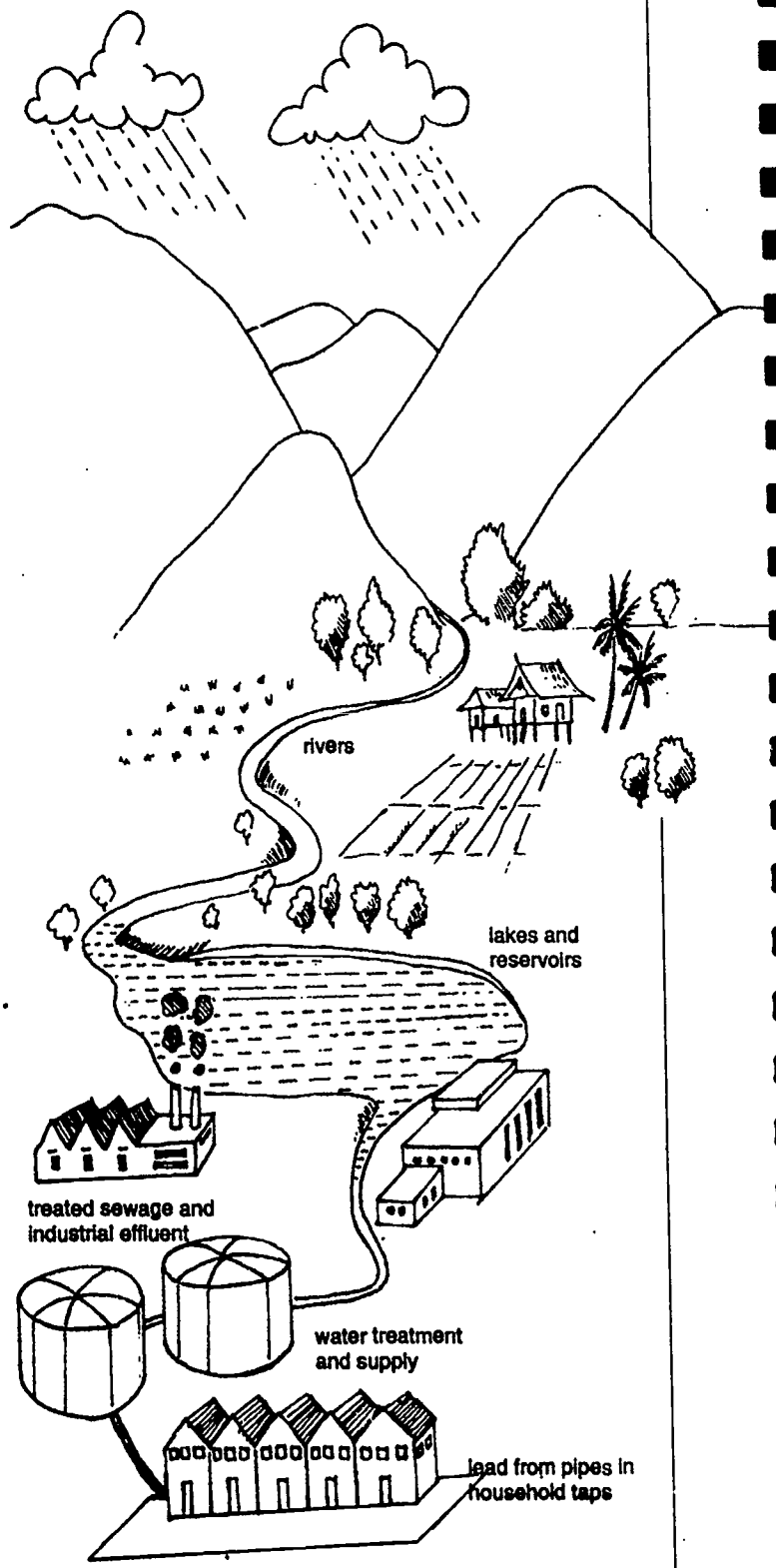
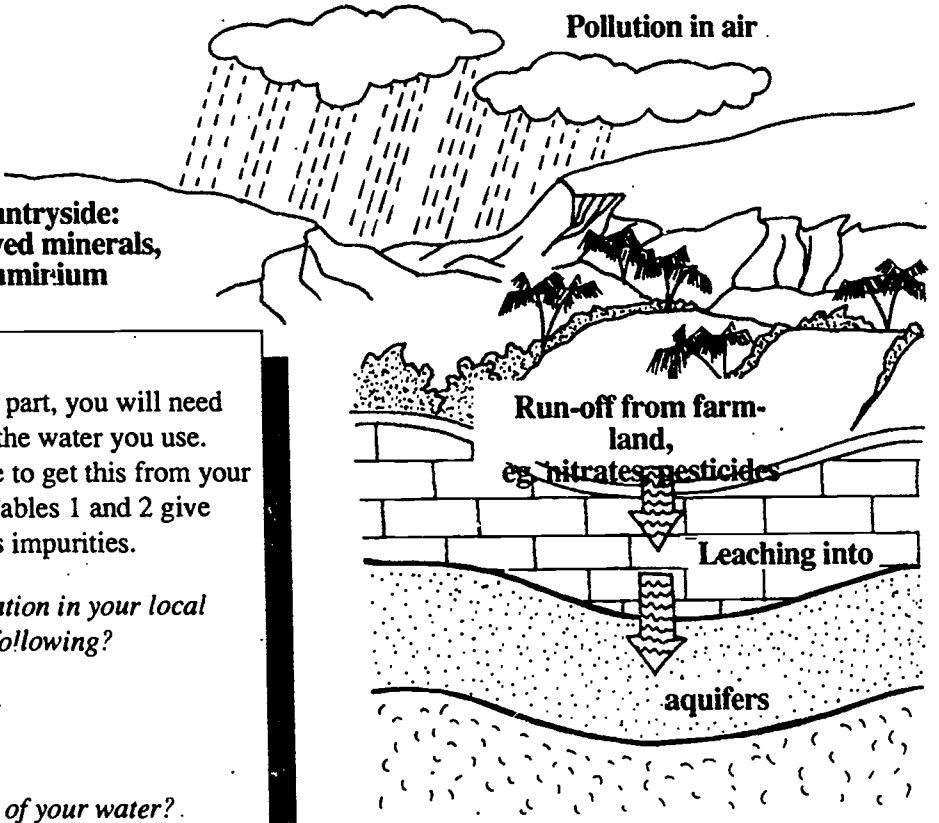


Figure 2 *The ways in which water collects impurities - and where they can be controlled or removed. You can see that water quality depends on local conditions: the type of rocks, and the kind of human activities in the locality.*



What is in the water?

To find the answer to this part, you will need to obtain the analysis for the water you use. You will probably be able to get this from your local water department. Tables 1 and 2 give information about various impurities.

9 *What is the concentration in your local water of each of the following?*
- a *Lead ion, Pb^{2+}*
- b *Nitrate ion, NO_3^-*
- c *Pesticides*

10 *What is the hardness of your water? (Choose one below)*
- a *Low*
- b *Medium*
- c *High*

11 *How many coliform bacteria per 100 mL are in your water supply?*

12 *Are any substances in higher concentration than the WHO's standards for drinking water? (See table 2)*

13 *Does your country have its own guide levels? (If so how do they differ from the WHO's standards?)*

What do people know about the quality of their water?

14 *Which statement,* **a**, **b**, **c** *or* **d**, *best describes what people in your community know about the quality of their drinking water?*
- **a** *They do not question the quality of their drinking water.*
- **b** *They are aware that drinking water contains impurities and/or micro-organisms, but have no idea of what they are.*
- **c** *They are aware that drinking water contains impurities and/or micro-organisms, and can name at least one of them.*
- **d** *They are aware that drinking water contains dissolved substances and/ or micro-organisms, and can name several of them and their possible effects on health.*

Part 3

What do other countries think?

In this part of the unit, you will exchange information with students in different Asia Pacific countries.

Your teacher has an Exchange Form that contains questions similar to those you answered in part 2. As a class, decide what information to provide on it.

Send the form to students in other schools across Asia Pacific. Your school has a list of classes in other countries that are studying the same unit of work. Your class will receive Exchange Forms from other schools in return.

Part 4

Drinking water across Asia Pacific

When you have received replies, answer these questions.

1 *Did any classes say they had a shortage of water? Why do you think they have a shortage? Where do they get their water from? The rainfall map on page 22 may help you.*

2 *Which countries drink a lot of bottled water? Suggest why some countries drink more bottled water than others.*

3 *Are people in other countries worried about different impurities or micro-organisms in the drinking water? Or are their concerns similar?*

4 *Did any of the schools tell you they had a noticeable impurity or micro-organism? Is this impurity above the WHO's standards?*

5 *Are people in other countries:*
a *well-informed,*
b *not concerned,*
about the quality of the water supply?

Part 5

Information Section

Table 1 *Information on some important impurities found in drinking water.*

Impurity	How it may get in the water	Bad effects
Lead ion, Pb^{2+}	From lead pipes, sometimes from industrial waste	Affect brain and nervous system, causes anaemia.
Copper ion, Cu^{2+}	From copper pipes, sometimes from industrial waste	Causes nausea
Aluminium ion, Al^{3+}	From water treatment, from aluminium cooking pots	May cause Alzheimer's disease (loss of memory in elderly people)
Mercury, Hg, compounds	Waste disposal	Affects nervous system
Nitrate ion, NO_3^-	From fertilizers	Causes 'blue baby syndrome' (a rare blood disease in young babies), may cause cancer
Phosphate ion, PO_4^{3-}	From fertilizers, detergents	Causes algae to grow in waterways
Pesticides	From agricultural pest control	May cause cancer
Coliform bacteria (bacteria of type found in human gut)	From sewage	May upset the stomach

Table 2 *Levels for drinking water impurities*

Impurity	World Health Organisation Guidelines (WHO) 1984 in mg/L
Aluminium ion, Al^{3+}	200
Cadmium ion, Cd^{2+}	5
Chloride ion, Cl^-	250000
Copper ion, Cu^{2+}	1000
Fluoride ion, F^-	1500
Iron ion, Fe^{3+}	300
Lead ion, Pb^{2+}	50
Mercury, Hg	1
Nitrate ion, NO_3^-	10000
Phosphorus, P (normally as phosphate ion PO_4^{3-})	
Sodium ion, Na^+	200000
Zinc ion, Zn^{2+}	5000
Pesticides:	
- DDT	1
- Aldrin + dieldrin	0.3
- 2,4 D	100
Coliform bacteria	0 per 100 mL

How is water purified?

It is not possible - or necessary - to remove all the impurities from drinking water. At the waterworks, they reduce the concentration of impurities to make the water safe to drink. The normal purification process is shown in Figure 3.

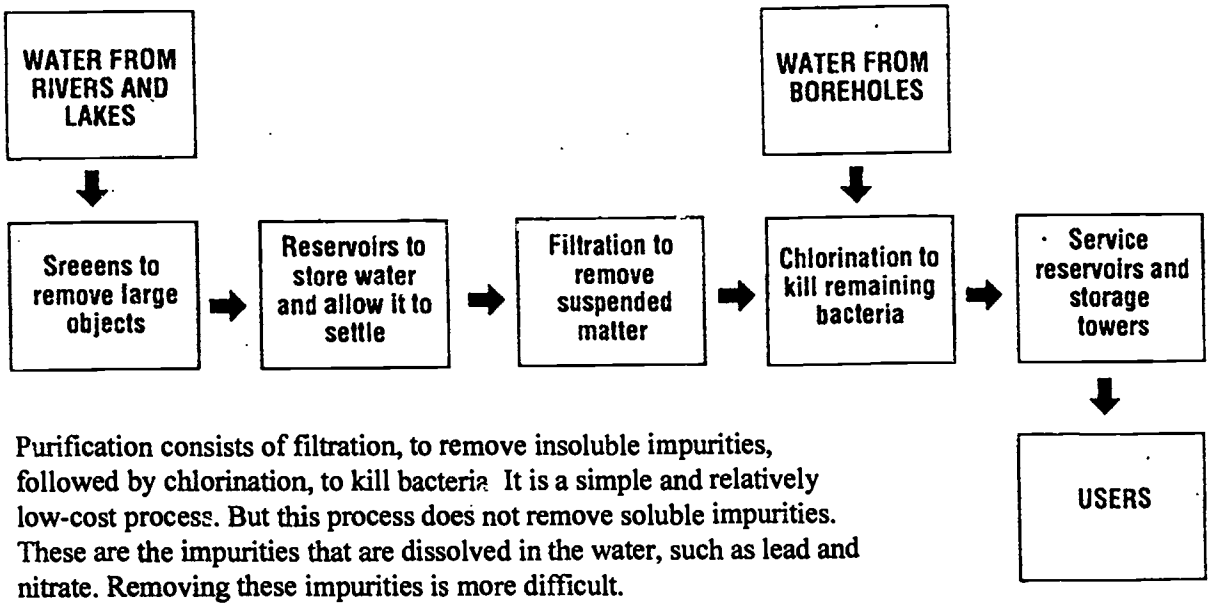


Figure 3 *The main stages in the purification of water.*

Purification consists of filtration, to remove insoluble impurities, followed by chlorination, to kill bacteria. It is a simple and relatively low-cost process. But this process does not remove soluble impurities. These are the impurities that are dissolved in the water, such as lead and nitrate. Removing these impurities is more difficult.

How can soluble impurities be removed?

If the concentration of the impurity is not too high, diluting the impurity is the easiest way to deal with the problem. The water company blends the water. It mixes the water with high levels of nitrate with water from places with a lower level of the impurity.

Soluble impurities can also be removed by chemical methods. Two important examples are:

Nitrates The nitrate ion, NO_3^-, can be removed by ion-exchange. The water is passed through a special resin which exchanges NO_3^- ions for harmless chloride, Cl^-, ions.

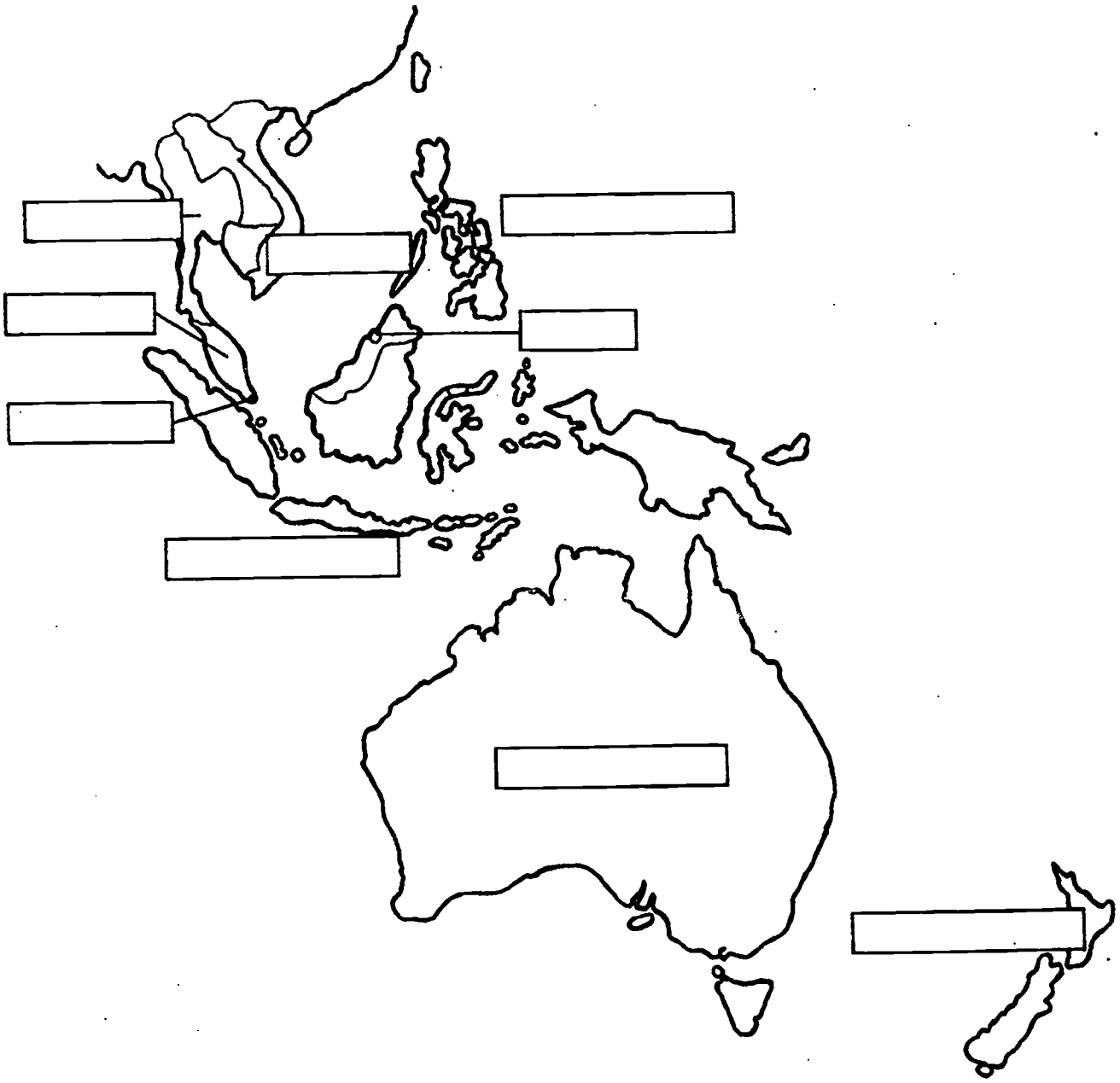
Pesticides Pesticides are organic compounds. They can be oxidised to turn them into harmless compounds using ozone, O_3, as the oxidizing agent. Pesticides can also be absorbed from the water, using activated charcoal.

What is a coliform count?

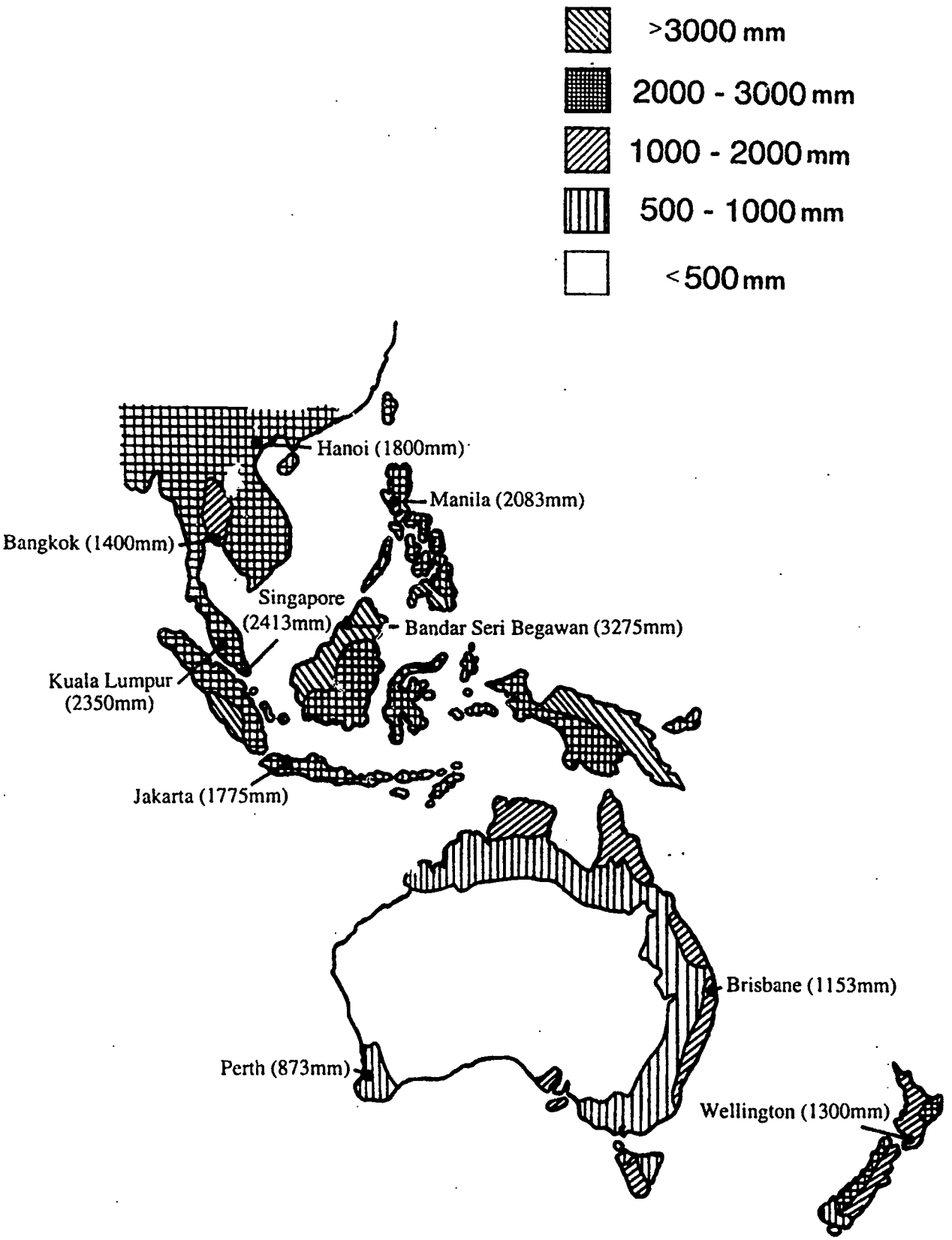
A coliform count is an indicator of soil, human and animal waste, and other organic contamination. The bacteria used in the count are themselves not disease causing. Coliform counts are expressed as a count of bacteria, *Escherichia coli* (E. coli) per 100 mL of water. Level considered safe by the WHO's standards for drinking is 0 per 100 mL.

Map 1 *Countries of Asia Pacific region*

(The names need to be added by the students)



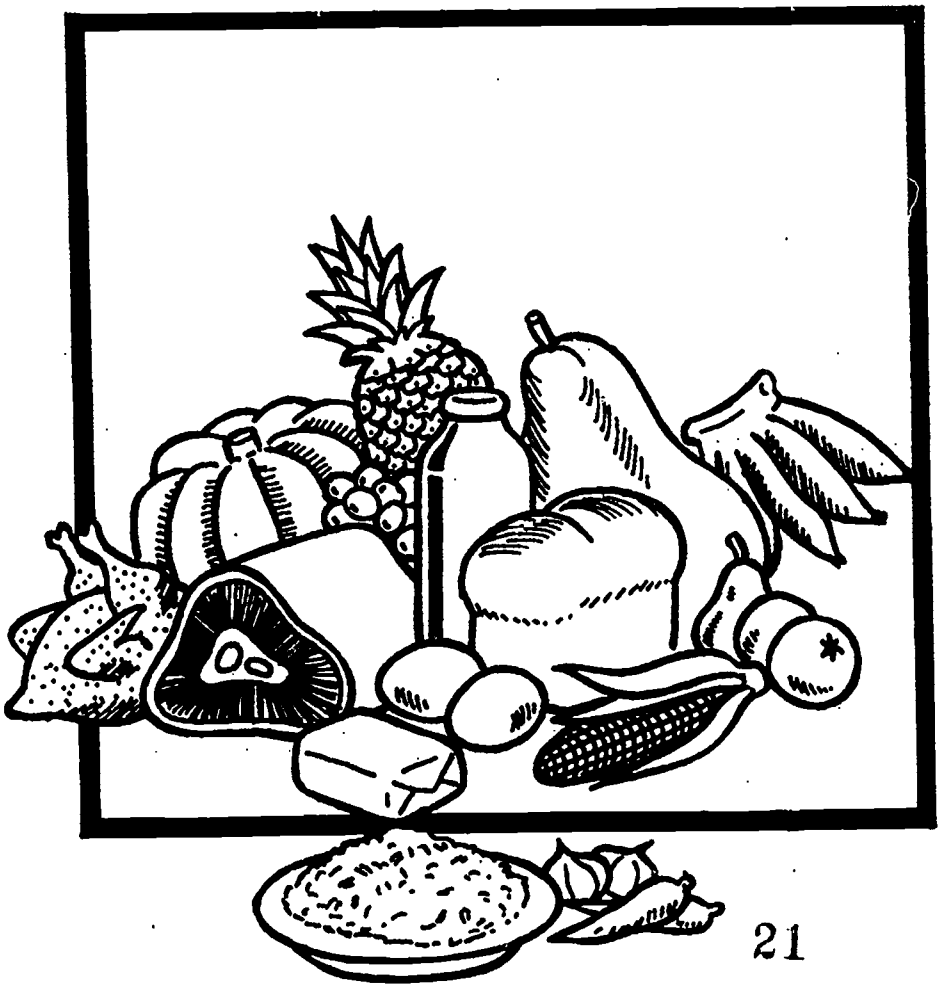
Map 2 *Annual precipitation map for Asia Pacific region*



Science across Asia Pacific

key issues for society

What do you eat ?



What do you eat ?

This unit focuses on the nutritional aspects of food and looks at links between diet and health. Students start by considering how they fit eating into their school day and what they ate in the 24 hours preceding the lesson. The class collates the data and its opinions on diet and health, and then exchanges this information with schools in other countries.

Students are then able to make comparisons and consider their own diet.

Work in this unit is suitable for lessons in chemistry, biology and home economics.

This unit is in five parts:

Part 1 Why food?
A review of the nutritional and social aspects of food.

Part 2 Food analysis
A student questionnaire for comparing food intake.

Part 3 Diet, health and lifestyle
Discussion of the results of the questionnaire.

Part 4 What do they eat across Asia Pacific?
Collation of class information and exchange of information with other schools.

Part 5 Eating habits - a comparison
Group discussion of the information collected.

Part 6 Information section
There is also information on health and nutrition.

The aims of the unit are:

- to review the nutritional and social aspects of food;
- to enable students to reflect upon their own diets by comparing them with those of students in other countries;
- to raise students' awareness of the lifestyles and traditions of people in other countries in the Asia Pacific region and their concerns about diet and health.

Prior knowledge and skills

The unit is intended for students between 14 and 17 years old. It is assumed they will have the following prior knowledge and skills.

- **Concepts and knowledge**
  They should understand how proteins, fats, carbohydrates, vitamins, minerals, fibre and water contribute to a balanced diet and their importance for growth and good health.
- **Skills**
  With the help of food tables and food labels they should be able to identify the nutrients in common foods and recognize those rich in dietary fibre.

Instructions for teachers

Requirements

Before beginning the lesson:

- Provide the student pages for each student.
- Provide separate copies of the questionnaire for students to write on.
- Make a few copies of the Exchange Form to send your information to other schools.
- Collect or ask students to collect food labels from foods and drinks, especially those that can be bought all over Asia Pacific, for investigation and exchange - for example milk, bread, flour, margarine, cooking oil, biscuits, jam and chocolate drink.

When you have received Exchange Forms from other schools:

- Copy the Exchange Forms you received from other schools and the class' own Exchange Form for comparison and analysis.
- Copy the map of Asia Pacific (Map 1) if needed. Students can fill in the names of the countries to help them become familiar with the countries in the region.

Summary of the unit

Note: **You will need to advise students to keep a note of the food they eat during the 24 hours before the lesson.**

Part 1 Why food?

This part introduces the topic and reviews the nutrients/food components in food. Students can read it in class or for home work.

Part 2 Food analysis questionnaire

Students can use this questionnaire to record the food they ate during the last 24 hours. Each student will need to complete his/her own.

Before the lesson, you will need to advise students to keep notes of the food they ate during the last 24 hours before this lesson. In the column headed 'Name of Food', they should list each separate food item eaten for each meal. In the columns headed 'Food components', they should tick one or two major food components in the food.

Part 3 Diet, health and lifestyle

This is a discussion activity which extends the results of the questionnaire in Part 2. The discussion can be organized in small groups of students, or it could be for the whole class together.

The questions discussed in this part would aid completion of the Information Exchange Form in Part 4.

Part 4 What do they eat across Asia Pacific?

In this part, the teacher will complete the Information Exchange Form to send to schools in other countries, who will send their own information in return.

The teacher should collect the information from the class as a whole, in order to fill in the form. **You will also need to send a typical Food Analysis Questionnaire.** There are several ways you could do this, such as the two suggestions below:

(a) Select one of the Students Questionnaires which is typical of the whole class.

(b) Look at all the Questionnaires and use them to produce a typical, 'average' example. This will take a longer time than (a).

Part 5 Eating habits - a comparison

After receiving the Exchange Form from other schools, the questions in this part can be used to compare the responses of different countries.

Part 6 Information section

Additional information on diet and disease, malnutrition, average weight, heart diseaseand nutritional value of foods.

The following map is provided

Map 1 *The countries of the region (The names need to be added by the students)*

Further activities

Here are some suggestions.

1 **Determine the nutritional value of popular foods.**
Your students could carry out food tests on samples of food they bring to school. Standard food tests can be found in textbooks.

2 **Visit a food processing factory.**

3 **Vitamin supplements**
Determine which foods have vitamin supplements. Are they necessary ?

4 **Preserving foods**
Compare different ways of preserving foods, including traditional methods of drying and salting, with modern methods such as canning.

Notes to help you complete the Information Exchange Form

Information about our school

The information about ethnic groups (Chinese, Malay, etc.) and religious groups (Muslim, Christian, etc.) may be useful because diet is likely to be influenced by ethnic and religious factors. You do not have to complete this part of the information if you do not want to.

Remember to enclose a sheet showing the typical food consumption of a member of your class. You can make a blank copy of Table 1 and fill in the relevant information.

Information about our eating habits

1 State the person (mother, school cook, student etc.) who normally chooses and prepares the food at different meals.

2 Self explanatory.

3 Give the number of times an average student eats in the two types of fast food outlet.

4 There are many interesting traditional beliefs about the effects of foods, such as 'eating fish makes you intelligent'. It is interesting to discuss with the class whether or not these beliefs are scientific.

5 'Nutritional content' means the proportions of protein, fat, carbohydrate etc. in the food. This information is not always shown on food labels, but it is very useful in planning diet.

6 The health problems identified will depend on the region and the class. They might include:
- dental caries due to eating excessive sugar.
- beri beri as a result of malnutrition.
- heart problems due to eating excessive fat.

7 It will be necessary to collect suggestions from the class. These might include:
- 'eat less sugar'
- 'eat less fat'
- 'eat more protein'
- 'eat less salt'

Science across Asia Pacific

What do you eat? Exchange form

Date

To (teacher's name)

School

Address

Tel No. Fax No.

From (teacher's name)

School

Address

Tel No. Fax No.

Please indicate preferred method of communication by circling the appropriate word.

Fax Air mail E-mail

Please supply E-mail address if available

Information about our school.

Please tick one box.

Rural/Village [ ] City/Town/Urban [ ]

Nationality of students in the class ._____

* If it influences what people eat, please state the number of students in

a different ethnic groups.

b different religious groups.

We are enclosing a sheet showing the typical food consumption of a member of our class in 24 hours/we are sending several sheets to represent the differences between ethnic or religions groups.*

* You need not have to complete this part of the information if you do not want to.

Information about our eating habits

1 The person who normally chooses and prepares the food at each meal is shown below.

Meals	Person Who Chooses	Person Who Prepares
Breakfast		
Lunch		
Dinner		
(Any other)		

2 When we asked whether people in our class enjoy their lunch, the majority said:

Yes [ ] No [ ]

The two most common reasons for **enjoying/not enjoying*** lunch are:

a _____

b _____

(* Delete where not appropriate)

3 The following table shows how often in one week our typical students eat in fast food outlets as shown by the ticks (✓).

Meal	Hawker/Street Vendor Food			Western-Style Fast Food		
	Never	Once	More than once	Never	Once	More than once
Breakfast						
Lunch						
Dinner						

4 Two traditional beliefs from our country about the dangers or benefits of certain kinds of food are:-

a _____

_____

b _____

_____

5 The processed food (packaged/canned/bottled) that we buy has the following information on the package as shown by the ticks (✓).

	On All	On Most	On Some	On none
Ingredients				
Additives				
Expiry date				
Nutritional content				

6 The three most common health problems caused by diet in our country are :

a _____

b _____

c _____

7 Our suggestions for a healthier diet for our class are:

_____

_____

8 The average height of our **class** is = _____ cm

The average weight of our **class** is = _____ kg

9 We have attached the following food labels from our country:

_____

10 Other information about our diet (OPTIONAL):

_____

_____

What do you eat?

Part 1
Why food?

Everybody has to eat and drink. But for most people food is not just a matter of survival. Sharing food brings people together. Food may be the centre of a social event like a family gathering. Whether you live in a village or a city, one way or another, food is an important part of your life.

Food contains five groups of nutrients - proteins, fats, carbohydrates (starch and sugar), vitamins and minerals. Water and fibre are not nutrients but are also essential for health. You need nutrients, water and fibre in the right amounts to grow and stay healthy. The best way to balance your diet is to eat a wide variety of foods containing all these nutrients. The body uses them to provide itself with energy, for growth and repair and to help regulate body processes such as digestion and temperature control.

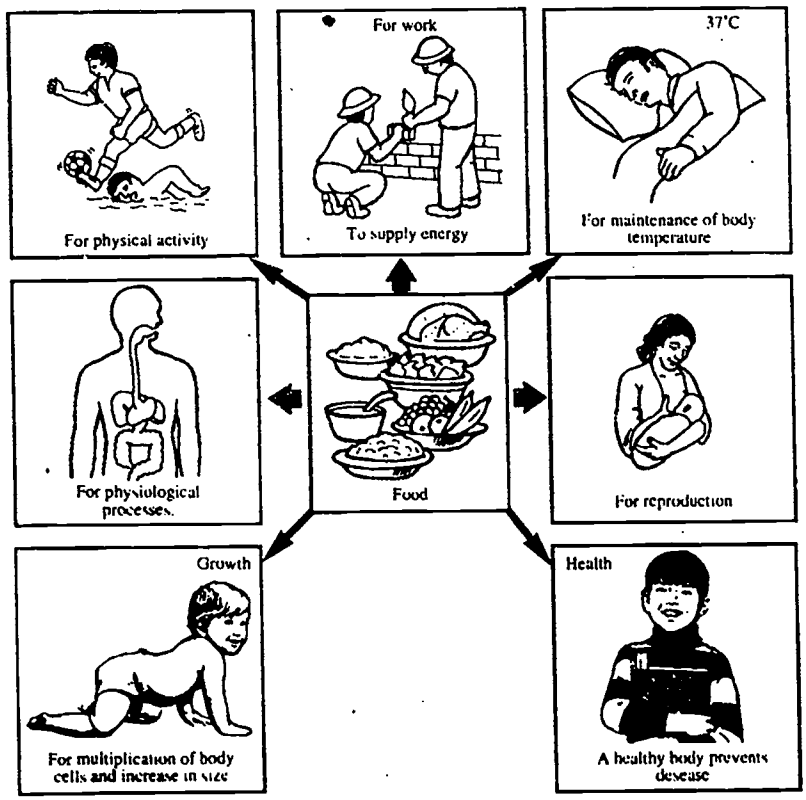


Figure 1. *We need food for many purposes*

When and what you eat is part of the pattern of your daily life. This unit enables you to investigate how students in the different countries of the Asia Pacific region fit eating into a busy school day. It begins by asking you to survey your own eating habits.

Part 2

Food analysis

When and what do you eat during a school day?

Take the last 24 hours as an example.
Complete the table below.

1. Fill in the times you had the meals.
2. Name the meals you ate during the day (for example, breakfast, lunch, dinner and snack).
3. Tick (✓) in the columns of the food components that you think the food contains. Tick at most two main food components.

Table 1 *Analysis of food eaten by a student in a day*

Time	Meal	Name of food	Main food components (tick two **at most**)				
			Car	Pro	Fat	Vit/ Min	Fib

Car : Carbohydrates
Pro : Proteins
Fat : Fats
Vit : Vitamins
Min : Minerals
Fib : Fibres

Part 3

Diet, health and lifestyle

Discussion Activity

1 Based on the last 24 hours as an example again, indicate who chose and prepared your food for each of the following meals by placing a "c" or a "p" in the spaces provided in Table 2.
("c" for chose and "p" for prepared)

Table 2 *Who chose and prepared the food that you ate?*

Meal	Who chose and prepared the food?					
	Myself	Friend	Mother	Father	School cook	Other (if any, please name)
Breakfast						
Lunch						
Dinner						
Snack						
Other meals (if any)						

2 Did you enjoy your lunch?

Yes [ ] No [ ]

Why? _____

_____

3 (a) How often in a week do you eat at **fast food outlets**?
(Fast food means food which is partially or fully prepared and ready to be served in a short time. This includes the hawker/street vendor food and western-style fast food).

_____

(b) Do you prefer hawker/street vendor food or western-style fast food?

_____

Why? _____

_____

4 Do you know of any traditional beliefs concerning the dangers and benefits of foods? Give an example (For example, 'Eat 21 raisins a day to become more intelligent').

_____ 30

_____

5 (a) What kind of information do you find on cans or packages of food?

_____

_____

(b) Do you normally take any notice and read this information?

Yes [ ] No [ ]

(c) Does this influence your decision to eat it ?

Yes [ ] No [ ]

6 What health problems are commonly caused by the wrong diet in your country?

a

b

c

7 How could your diet be made more healthy? You could think about eating

a too little protein
b too much fat
c too much sugar
d too much salt
e more fresh fruit and vegetables
f enough dietary fibre

_____

_____

g others:

_____

8 (a) Do you consider snacks and candies to be 'food' ?

Yes [ ] No [ ]

(b) Explain your answer:

_____

9 Which food do you eat most?

[ ] fresh/raw cooked [ ] processed/preserved (through factory processes)

10(a) Do people in your family get together for a meal at least once a day?

Yes [ ] No [ ]

(b) Do you think it is important to eat together as a family? Why do you think so?

_____

_____

11(a) Measure your height and weight

Height = _____ cm Weight = _____ kg

(b) Refer to tables 3 and 4. Check which category of weight you belong to and put a (✓) in the corresponding space.

Underweight [ ]
Ideal weight [ ]
Overweight [ ]

(c) Calculate the average weight and height of your class.

Average male height = _____ cm

Average female height = _____ cm

Average male weight = _____ kg

Average female weight = _____ kg

Average class height = _____ cm

Average class weight = _____ kg

Part 4

What do they eat across Asia Pacific?

People need to have enough to eat and drink. Some people even eat too much. Others have 'unbalanced' diets, that often mean too much fat, salt and sugar or too little fresh fruit, vegetables and dietary fibre.

Do young people today of your age have similar eating habits? Are they concerned about diet and health? Your teacher has a list of schools across Asia Pacific that are studying the same unit and will exchange their information with you. Use the Exchange Form provided with this unit to make the exchange of information simple.

Your class must decide a typical example of what you ate in the 24 hours in part 2. If your class has students from different ethnic and religious backgrounds who eat very different kinds of food, you may want to send several examples.

You could exchange some food labels too. Choose labels from foods and drinks that can be bought all over Asia Pacific such as milk, bread, flour, margarine, cooking oil, noodle, biscuit, chocolate beverage and canned meat.

Part 5

Eating habits - a comparison

Group discussion activities

Compare the information from other Asia Pacific schools with that from your class.

1 *Compare:*
- a *when breakfast was eaten*
- b *how many snacks are eaten*
- c *largest meal arrangements*
- d *when the large meal of the day is taken*
- e *responsibility for choosing and preparing food*

2 *Were there any differences in the amount of*
- a *fat*
- b *sugar*
- c *fibre*

eaten at breakfast by students in your class and students in other countries?

3 *What do you think is responsible for the*
- a *similarities*
- b *differences*

in the kind of food eaten by students in different countries?

4 *Compare food labels from other countries. What are their similarities and differences?*

5 *Are people concerned about diet and disease? If so, do their concerns differ from country to country?*

6 *Compare the average height and weight of the students in the Asia Pacific region. Do you think diet influences the size of a person ?*

Information Section

Health and nutrition

Diet and disease

Some countries have higher rates of certain diseases.

It is thought that some of these diseases may be linked to diet. The illustration below shows some diet related diseases found in the Asia Pacific region.

Table 3 *Diseases due to deficiency and excessive nutrition*

Disease	May be caused by	
	too little	too much
Hypertension (high blood pressure)	potassium, calcium	salt, fat
Dental caries (tooth decay)	fluoride	sugar
Goitre (swollen thyroid gland)	iodine	sulfur
Breast cancer		fat
Heart disease	essential fats	saturated fats
Liver disease		alcohol
Colon or rectum cancer	fibre	
Obesity (over weight)		sugar, fat, alcohol
Anaemia	iron	
Kidney stones		calcium, salt
Osteoporosis (thinning of bone/decrease in bone mass)	calcium	
Rickets (in children) or Osteomalacia (in adults)	vitamin D	
Scurvy	vitamin C	
Kidney dysfunction	water	calcium, vitamin D
Jaundice		vitamin K
Pellagra	niacin	
Beri-Beri	thiamin.	

Note :
Individual susceptibility to the prevailing diet is important in both nutritional deficiency and excess. The nutritional components have only been tentatively linked to many of the conditions shown.

Overweight/Underweight

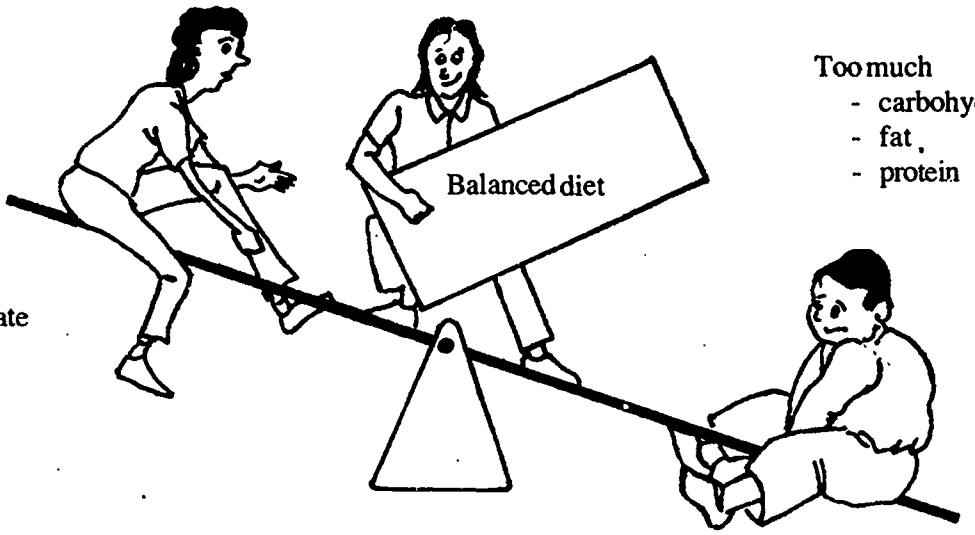


Figure 2 *"You are what you eat!"*

Overweight and underweight are considered cases of malnutrition. A person who weighs 20% more than the ideal is overweight. They have a shorter life expectancy and are more likely to suffer from diseases that include heart disease, diabetes, gallstones, high blood pressure, arthritis and varicose veins.

Similarly, a person who is underweight may also suffer from diseases like beri-beri, tuberculosis, stomach disturbances and general weakness.

Some people put on weight easily. The reasons are not clearly understood but one factor is attributed to fast or slow metabolic processes in the body. Some eat more than their individual need and the excess is stored as fat. Figure 3 and Table 4 give the average weight measurements corresponding to age and sex.

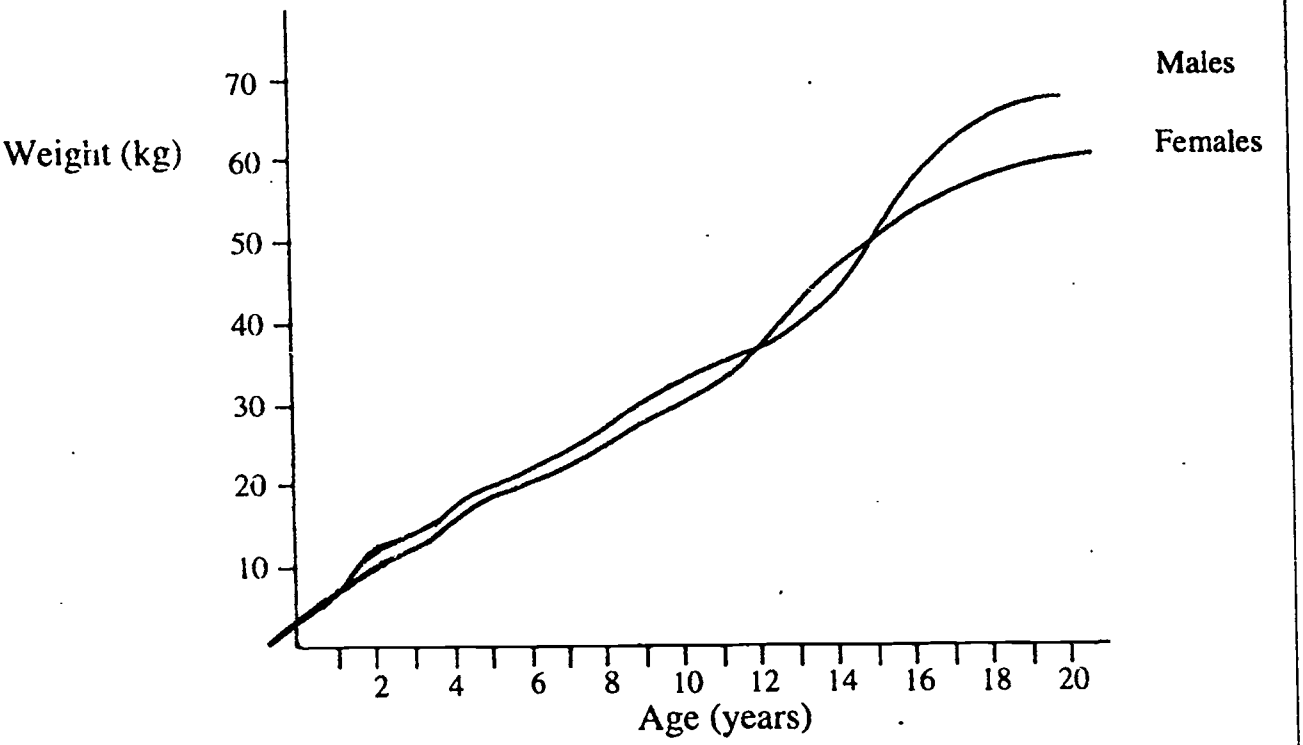


Figure 3 *Graph of average weight measurement corresponding to age and sex*

Table 4 *Average weight measurement corresponding to age and sex*

Age	Boys' weight (kg)	Girls' weight (kg)
Birth	3.4	3.36
1 year	10.07	9.75
2 years	12.56	12.29
3 years	14.61	14.42
4 years	16.51	16.42
5 years	18.89	18.58
6 years	21.9	21.09
7 years	24.54	23.68
8 years	29.26	26.35
9 years	29.94	28.94
10 years	32.61	31.89
11 years	35.2	35.74
12 years	38.28	39.74
13 years	42.18	44.95
14 years	48.81	49.17
15 years	54.48	51.48
16 years	58.3	53.07
17 years	61.78	54.02
18 years	63.05	54.39

Heart Disease

Death rates from coronary heart disease tend to be high in countries where people traditionally eat diets high in 'saturated' fat such as butter, non-poultry meat, milk and cheese. A high fat diet can raise the blood level of a fat-like substance called cholesterol. The body needs cholesterol but when it is deposited in blood vessels, there is a greater risk of heart attack.

Cancer

Some scientists think there may be a link between diet and certain types of cancer.

Breast cancer is increasing in many countries. Its cause is not known, but it appears to be linked to the average mass of fat consumed per person.

Cancer of the bowel may also be linked to a diet high in fat. Eating enough dietary fibre may help protect people from bowel cancer.

Salted fish is said to be linked to cancers of the mouth and esophagus.

Dental Caries

Dental caries or tooth decay has been linked to eating foods containing sugar. The mouth contains bacteria that break down sugars to produce acids. Acid attacks tooth enamel, making it more porous. Tooth decay begins as the enamel wears away. Fluoride in the diet strengthens the enamel and reduces tooth decay.

Table 5 *Nutritional values of some foods per 100g edible portion*

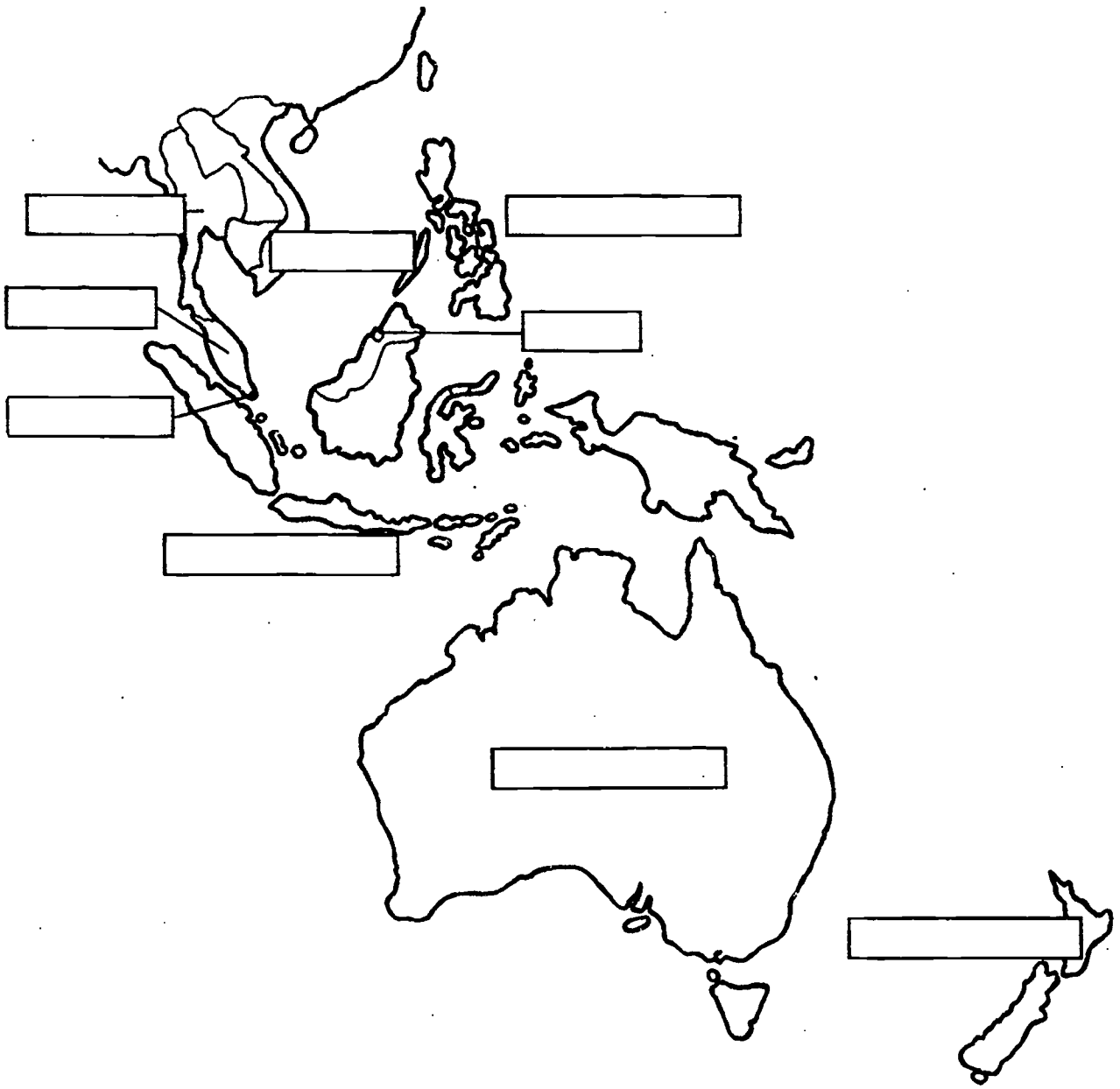
	Energy	Protein	Fat	Carbohydrates	Minerals		Vitamins		
					Ca	Fe	A	B	C
	kcal	g	g	g	mg	mg	mcg	mg	mg
Apple	51	0.3	0.0	3.9	4	0.3	24	0.28	25
Banana	88	1.2	0.2	22.4	8	0.6	258	0.79	10
Bean sprouts	23	2.9	0.2	3.4	29	0.8	6	0.66	15
Beef (average)	234	15.3	18.8	0.0	10	4.0	18	5.33	0
Biscuits (plain)	431	9.1	9.6	74.1	22	1.5	0	0.82	0
Bread (white)	244	7.0	0.8	52.2	12	0.8	0	0.76	0
Butter	739	1.0	81.6	0.0	15	0.1	1680	0.11	0
Cabbage	24	1.4	0.2	4.3	46	0.5	48	0.41	50
Cauliflower	33	3.0	0.2	5.0	30	1.0	12	0.27	80
Chicken(matured)	302	18.0	25.0	0.0	14	1.5	316	8.24	0
Coffee (instant)	129	4.0	0.7	35.0	179	5.6	0	0.57	0
Cucumber	12	0.6	0.0	2.0	15	0.3	Tr	0.26	10
Egg (hen)	162	12.8	11.5	0.7	54	2.7	444	0.49	0
Fish (oily) e.g. Tuna, Mackerel	162	15.9	10.9	0.0	20	0.7	50	3.38	0
Fish (lean) e.g. pomfret	71	16.6	0.5	0.0	20	0.7	0	0.57	0
Fish (dried & salted)	192	42.0	1.5	0.0	65	2.5	0	4.43	0
Ham (cured, cooked)	304	22.8	22.7	0.0	9	2.7	0	6.37	0
Honey	296	0.4	0.0	76.4	5	0.4	0	0.24	0
Jam	254	0.2	0.0	75.0	12	0.3	12	0.22	1
Lettuce	15	1.2	0.2	2.3	62	1.1	972	0.32	18
Margarine (fortified)	765	0.0	35.0	0.0	4	0.0	900	Tr	0
Milk (full cream)	67	3.3	3.6	4.6	85	0.1	54	0.28	Tr
Mushroom (fresh)	13	2.5	0.3	0.0	20	1.0	0	6.42	3
Onion (big)	48	1.5	0.0	11.0	30	0.5	Tr	0.36	10
Orange	48	0.8	0.0	12.6	41	0.3	180	0.31	50
Papaya	39	0.6	0.1	9.1	20	0.3	1050	0.37	56
Pineapple	52	0.4	0.2	13.3	16	0.3	78	0.30	24
Pork (average)	456	11.9	45.0	0.0	7	1.8	0	1.22	0
Prawns (fresh)	84	17.9	0.8	0.1	63	1.6	20	2.39	0
Potato (sweet)	117	1.3	0.4	24.1	34	1.0	300	0.21	23
Rice (cooked)	130	2.4	0.0	29.6	1	0.2	0	0.02	0
Rice noodles (uncooked) (Beehoon)	350	11.3	0.1	81.1	6	0.3	0	0.02	0
Sago	353	0.7	0.2	84.5	11	1.5	0	0.01	0
Sugar (white)	400	0.0	0.0	100.0	0	0.0	0	0.00	0
Tapioca (fresh)	153	0.7	0.2	37.0	25	1.0	Tr	0.80	30
Tomato	21	0.8	0.3	4.0	7	0.6	360	0.81	23
Watermelon	28	0.8	0.2	7.0	7	0.2	354	0.30	6
Wheat noodles (Mee)	165	4.5	0.8	35.0	19	0.5	Tr	Tr	0

* Tr - Trace

Source: *Department of Social and Preventive Medicine, Faculty of Medicine, University of Malaya, Kuala Lumpur, 1971*

Map 1 *Countries of the Asia Pacific region*

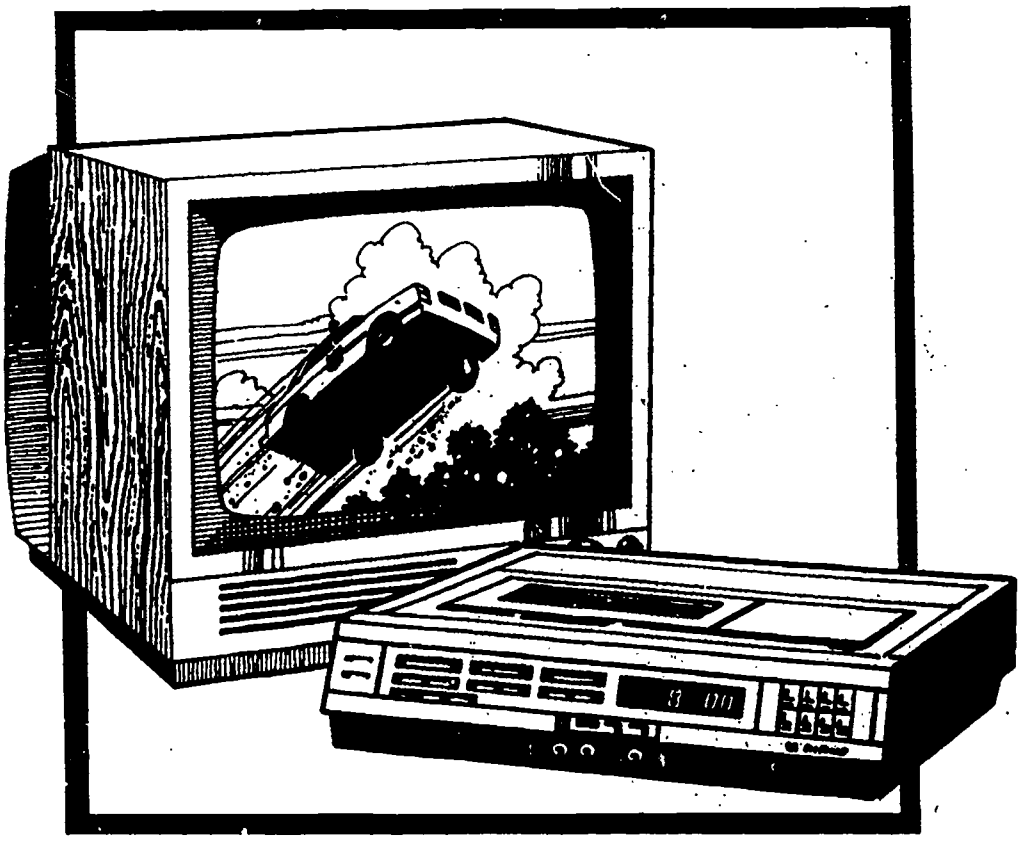
Complete the map by filling in the country names.



Science across Asia Pacific

key issues for society

Using energy at home



Using energy at home

The purpose of this unit is to enable students in Asia Pacific schools to exchange information about energy use at home and in their country. The information acquired should help students to gain an insight into how other people use energy, their perspectives on future developments and their environmental concerns.

This unit is in four parts:

Part 1 How do you use energy at home?

Information about how students in your class use energy at home.

Part 2 How do people across the Asia Pacific region use energy at home?

Exchanging information about energy use in the home with students in other countries.

Part 3 Comparison of energy use in the home across Asia Pacific

Comparing the responses from different countries and discussing the results.

Part 4 Information section

This part includes statistics about countries in the Asia Pacific region.

The aims of the unit are:

- to extend prior work on energy and energy sources
- to provide a progression of contexts in which energy is used, from personal to local, from local to other Asia Pacific countries, and finally to the understanding of our mutual interdependence on a global scale.

Prior knowledge and skills

The material is intended for use by students in the age range 14 to 17 years. It is assumed that they will have already studied energy and be familiar with, and know how to use, the following:

- **Concepts and knowledge**
  forms and sources of energy
  power
  primary sources for generation of electricity
  unintended outputs (waste) from harnessing energy
  national sources of energy
  national concerns for the environment
  general geography of the Asia Pacific region
  units: joule (J), kilowatt-hour (kWh), watt (W), degree Celsius (^{o}C), kilogramme (kg) (and tonne), second (s), hour (h), year (a/annum), cubic metre (m^3), litre (L)
  currencies - local and US dollars.
- **Skills**
  be able to calculate averages, ratios (exchange rates) and percentage
  reading and interpreting diagrams, tables, maps and graphs
  reading meters

Instructions for teachers

Requirements

Each student will need copies of pages 1 to 5 as well as copies of the data sent by participating schools.

Teachers will need to make copies of the Exchange Form to send to participating school(s). It would be helpful if an overhead transparency or large visual copy can be made of this page so that data can be entered on it during the lesson.

The Exchange Forms received from partner schools as well as the class's own Exchange Form should be reproduced for students to analyse.

For the discussion activities at the end of the work, teachers may also wish to have available overhead transparencies or large display copies of the maps.

Procedure

Part 1 How do you use energy at home?

The teacher introduces the unit and its purpose. Students take home and complete a student questionnaire about the use of energy in their home.
(NB. The use of home surveys and student questionnaires may sometimes touch on private family matters. Teachers need to be sensitive to problems that might arise and have alternative data available for students who do not wish to contribute personal data).

Although the questionnaire has a space for the student to write his/her name at the bottom, this could be blanked out when the form is copied for class use.

The results of individual student questionaires are then discussed and combined to give a class opinion to enter on the Exchange Form. For costs use local currency and/or US dollars.

Part 2 How do people across the Asia Pacific region use energy at home?

Copies of the Exchange Form should be sent to one or more partner schools. When Exchange Forms have been received from partner schools, they should be reproduced for students to analyse and compare with their own data by answering questions 1 to 6. This could be a homework and/or a classroom activity.

Part 3 Comparison of energy use in the home across Asia Pacific

Four topics are suggested for group discussion. Students may be divided into groups of four or five to discuss the points and make recommendations. A spokesperson from each group could present the group's opinions to the class. Alternatively teachers may wish to do this part as a full class discussion. It would be helpful at this stage for students to have access to the maps.

Part 4 Information section

There are many possibilities for extending this study and for linking it with subjects such as geography and economics.

The following maps are provided:

Map 1 *The countries of the region (The names need to be added by the students)*
Map 2 *Distribution of Energy Resources across Asia Pacific*
Map 3 *Climatic information for Asia Pacific*

Further activities

Here are some suggestions

1 Comparing insulation properties
Devise experiments to test the insulating properties of different materials

2 Comparing heating fuels
Compare the effectiveness of different fuels in heating water.

Science across Asia Pacific

Using energy at home Exchange form

Date

To (teacher's name)

School

Address

Tel No. Fax No.

From (teacher's name)

School

Address

Tel No. Fax No.

Please indicate preferred method of communication by circling the appropriate word.

Fax Air mail E-mail

Please supply E-mail address if available

The results of our class survey are:

Number in class: _____

1 Fuels used in the home (tick boxes as appropriate)

	Electricity	Gas	Oil	Coal	Wood	Other e.g. solar
Home cooling						
Home heating						
Cooking						
Heating water						
Lighting						
Appliances						

2 Quantities and costs of fuels.

	Electricity	Gas	Oil	Coal	Wood	Other e.g. solar
Quantity used	kWh	m^3 or kg	litre	kg or tonne	m^3 or kg	
Price per unit	/kWh	/m^3 or kg	/litre	/kg or tonne	/m^3 or kg	
local currency						
in US dollars						
Cost per year for your home						
local currency						
in US dollars						

3 Uses of energy in our homes, listed in order of quantity used.

1 _____

2 _____

3 _____

4 _____

5 _____

4 Our three best ways of saving energy are:

a _____

b _____

c _____

5 The sources of energy used for generating electricity in our area (district / province / state / country) are:

_____

_____

6 The environmental problems caused by using energy resources in our area (district / province / state / country) are:

_____

_____

7 The changes in energy we expect by the year 2020 are:

a In the home _____

_____

b In the country _____

_____

8 Energy Experiments
We carried out additional energy experiments as follows:

_____

_____

_____

The results were:

_____

_____

_____

Please also find enclosed a copy of a typical electricity bill from a member of our class.

Using energy at home

Part 1

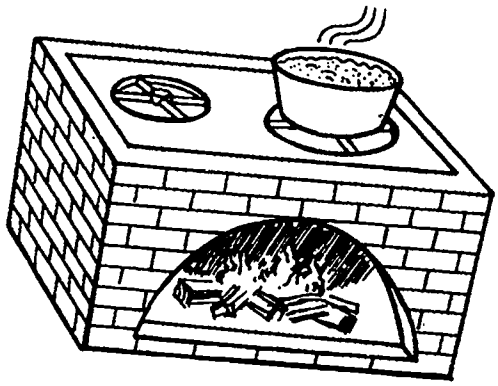
How do you use energy at home?

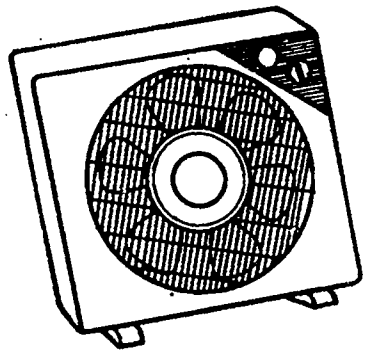
You are going to contact a class in another Asia Pacific country and exchange information about using energy at home.

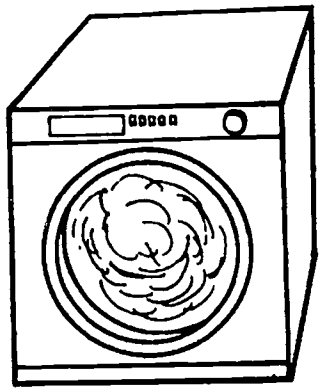
Before you do so you will need to collect together information about how members of your class use energy at home.

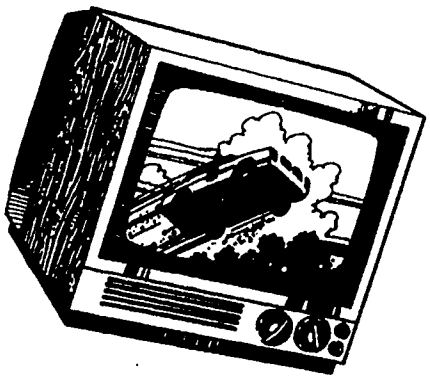
On the next page there is a survey for you to fill in. It asks how you use energy at home and for your opinions on energy conservation and use. Why not get other members of your family to help you fill out the survey? If you cannot provide some of the answers, just leave the space blank.

Your class will discuss the answers and ideas it collects and decide what information to send to other schools. You will receive similar information in return.









Here are some examples of uses of energy in the home.
What others can you think of?
How can they be grouped or classified?

Survey

1 Put a (✓) in the box if you use these sources of energy at home, for each of the purposes shown.

	Electricity	Gas	Oil	Coal	Wood	Other e.g. solar
Home cooling						
Home heating						
Cooking						
Heating water						
Lighting						
Appliances						

2 (a) How much energy do you use?
(b) What is the price per unit of these sources?
(c) How much do they cost your family in a year?

	Electricity	Gas	Oil	Coal	Wood	Other e.g. solar
Quantity used	kWh	m^3 or kg*	litre*	kg or tonne*	m^3 or kg*	
Price per unit local currency	/kWh	/m^3 or kg*	/litre*	/kg or tonne*	/m^3 or kg*	
in US dollars						
Cost per year for your home local currency						
in US dollars						

* delete or modify as appropriate

3 List the uses of energy in your home in order of quantity used.

e.g. 1 Heating water
2 Cooking
3 etc

(Your local power company or supplier may be able to help with this have useful information about the amounts of energy used by various appliances etc)

1 _____

2 _____

3 _____

4 What are the three best ways of saving energy at home?

a _____

b _____

c _____

5 What sources of energy are used for generating electricity in your area? (district / province / state / country)

_____

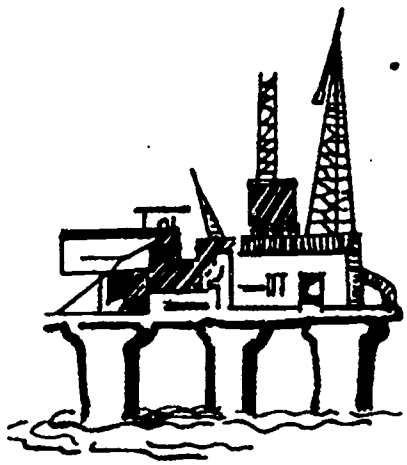
_____

6 Does using energy resources (electricity, gas, oil, wood etc) cause any environmental problems in your area? (district / province / state / country)
If so what are the most important problems?

_____

_____

_____



Offshore production of oil/gas

7 What changes in energy use do you expect by the year 2020?

a In your home _____

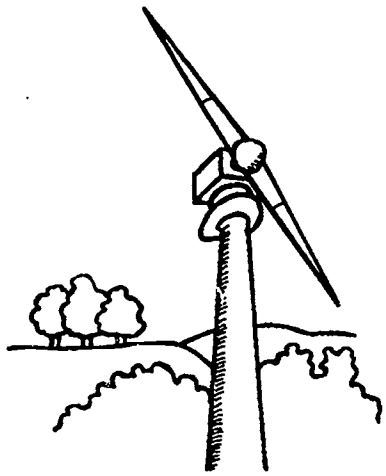
_____

_____

b In your country _____

_____

_____

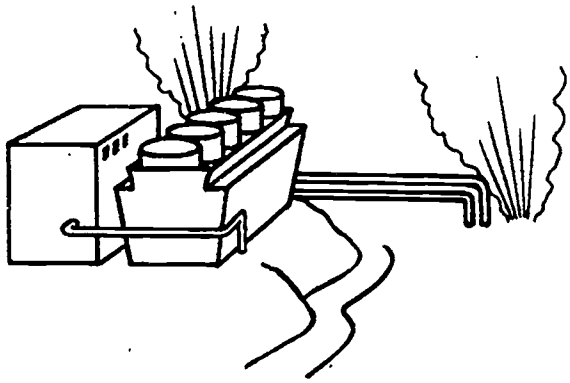


Wind generator

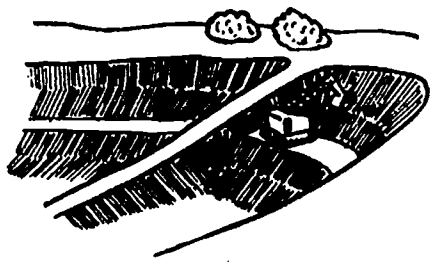
Name: _____

Class: _____

Number of people living in your home: _____



Geothermal power station



Open cast (open cut) coal mine

Part 3

Comparison of energy use in the home across Asia Pacific

Questions on the surveys

Use a map, to find the location of the school(s) from which you received information. Compare the results of your survey with those of your partner school(s) and then answer the following questions.

1 *Are there any important differences between their uses of energy and your own? Comment on any you found especially interesting.*

2 a *Compare the costs of energy. (It may be best to work in US dollars)*

b *What percentage (%) of the total cost is electricity?*

3 *How do people in your partner countries try to save energy? Do they save it in the same way as you do in your homes?*

4 *Suggest reasons for:*
a *similarities*

b *differences between the answers given by your class and your partner schools.*

5 *Do you think your partner countries produce electricity in a better way than your own country? Why?*

6 *Compare the suggestions your partners made for 2020 and suggest reasons for any differences or similarities.*

Group discussion activities

Using the information you have gained from your surveys and those supplied by exchange schools discuss the following.

Dependence on sources

1 *Which other countries do we depend on for energy resources?*
2 *Which other countries depend on us for energy resources?*
3 *What are the answers to the same questions for the country/ countries we contacted?*

Effects of dependence

4 *In what ways, if any, are we affected by the use of energy resources in other countries?*
5 *Which countries in Asia Pacific are affected by our use of energy resources, and how?*
6 *Answer the same questions for the country/countries we contacted.*

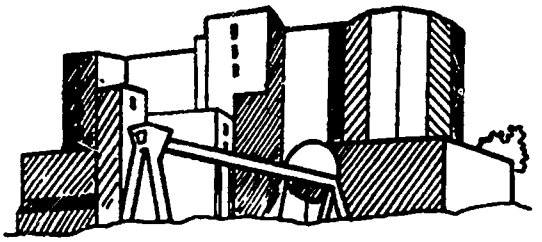
Change of sources

7 *Do you think we need to change the kind of energy sources we are using in our country? Why?*
8 *Which sources do you favour and which ones should be used less or not at all? Why?*

Asia Pacific measures

9 *Do you think we need to take strong action to reduce energy consumption in the countries in Asia Pacific? Why?*
10 *If so, what actions do you think would be most effective?*
11 *Who could or should act or make the decisions?*
- *individuals,*
- *national governments,*
- *a conservation agency,*
- *a group such as a 'Regional Commission on Energy'*

12 *What measures could be taken in your partners' country to reduce environmental problems arising from energy use?*



Nuclear power station

Hyroelectric power station

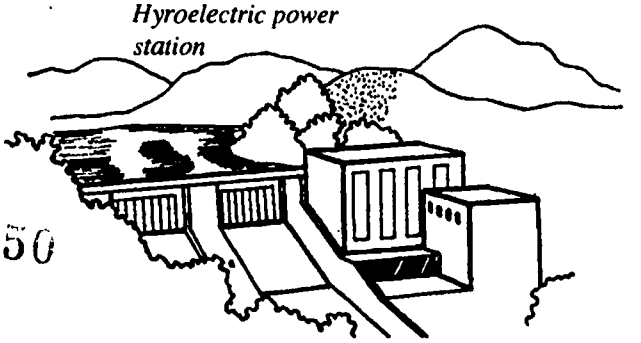


Table 1 *Statistics about countries in the Asia Pacific region*

Countries	Area in sq. km.	Population (millions)	Per Capita GDP in US$	Energy consumption (1991) (million tonnes oil eqivalent)						Energy production (1991) (million tonnes oil equivalent)					
				Oil	Gas	Coal	Hydro	Nuc	Total	Oil	Gas	Coal	Hydro	Nuc	Total
Australia	7,686,848	17.3	14,500	31.1	16.5	39.9	1.3	*	88.8	25.9	15.5	110.5	1.3	*	153.2
Brunei	5,765	0.29	15,390	*	*	*	*	*	*	8.0	8.7	*	*	*	16.7
Canada	9,976,140	26.3	19,030	74.8	57.2	25.3	26.4	22.1	205.8	93.9	95.1	38.4	26.4	22.1	275.9
China	9,596,961	1,100.0	370	117.9	13.4	543.8	10.6	*	685.7	139.6	13.4	491.6	10.6	*	655.2
Indonesia	1,904,569	182.0	570	32.4	8.1	3.9	0.6	*	45.0	72.9	45.7	*	0.6	*	119.2
Japan	372,313	123.0	25,430	247.3	49.5	78.7	8.6	54.1	438.2	*	1.9	5.5	8.6	54.1	70.1
Malaysia	329,749	17.8	2,320	11.3	8.1	0.5	0.3	*	20.2	32.1	20.4	*	0.3	*	52.8
New Zealand	268,676	3.36	12,160	4.7	4.1	1.3	2.1	*	12.2	1.9	4.7	1.9	2.1	*	10.6
Philippines	300,000	60.0	710	11.1	*	1.2	0.4	*	12.7	*	*	*	0.4	*	0.4
Singapore	579	2.9	10,450	19.9	*	*	*	*	19.9	*	*	*	*	*	*
South Korea	98,484	42.0	5,400	56.1	3.5	24.1	0.4	14.1	98.2	*	*	10.6	0.4	14.1	25.1
Taiwan	35,961	20.5	6,333	27.9	1.9	14.0	0.3	9.2	53.3	*	*	*	0.3	9.2	9.5
Thailand	514,000	56.3	1,220	21.1	6.8	4.7	0.3	*	32.9	2.5	5.1	2.4	0.3	*	10.3
Vietnam	329,556	66.0	220	*	*	*	*	*	*	0.5	*	4.0	0.2	*	4.7

Sources: *BP Statistical Review of World Energy June 1992*
Third World Guide 93/94, Institute del Tercer Mundo

* Insignificant

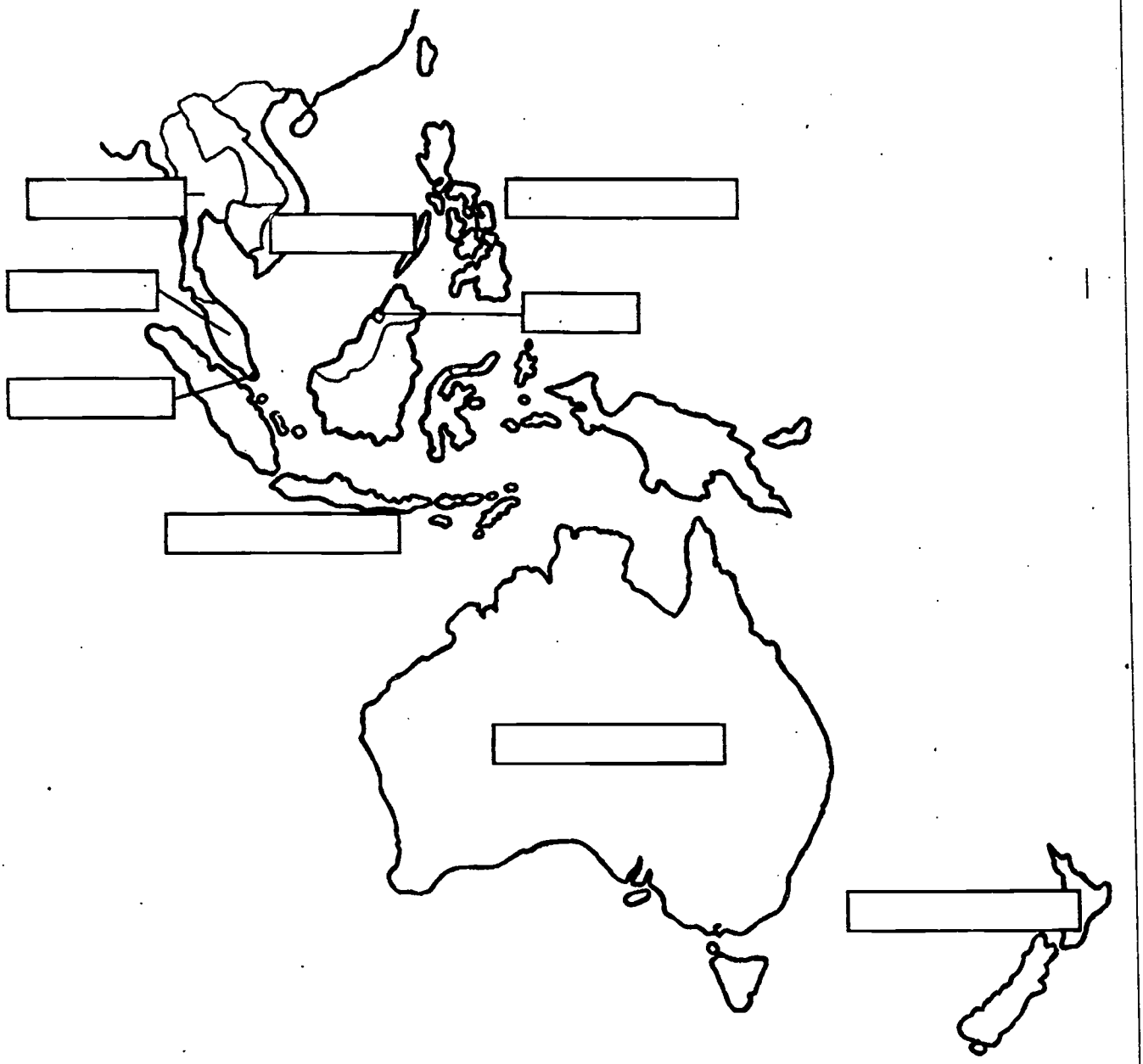
The BP Statistical Review of World Energy is produced annually and may be obtained from BP Headquarters in your country or from:

BP Educational Service
PO Box 30
Blacknest Road
Blacknest
Alton
Hampshire GU34 4BR
ENGLAND

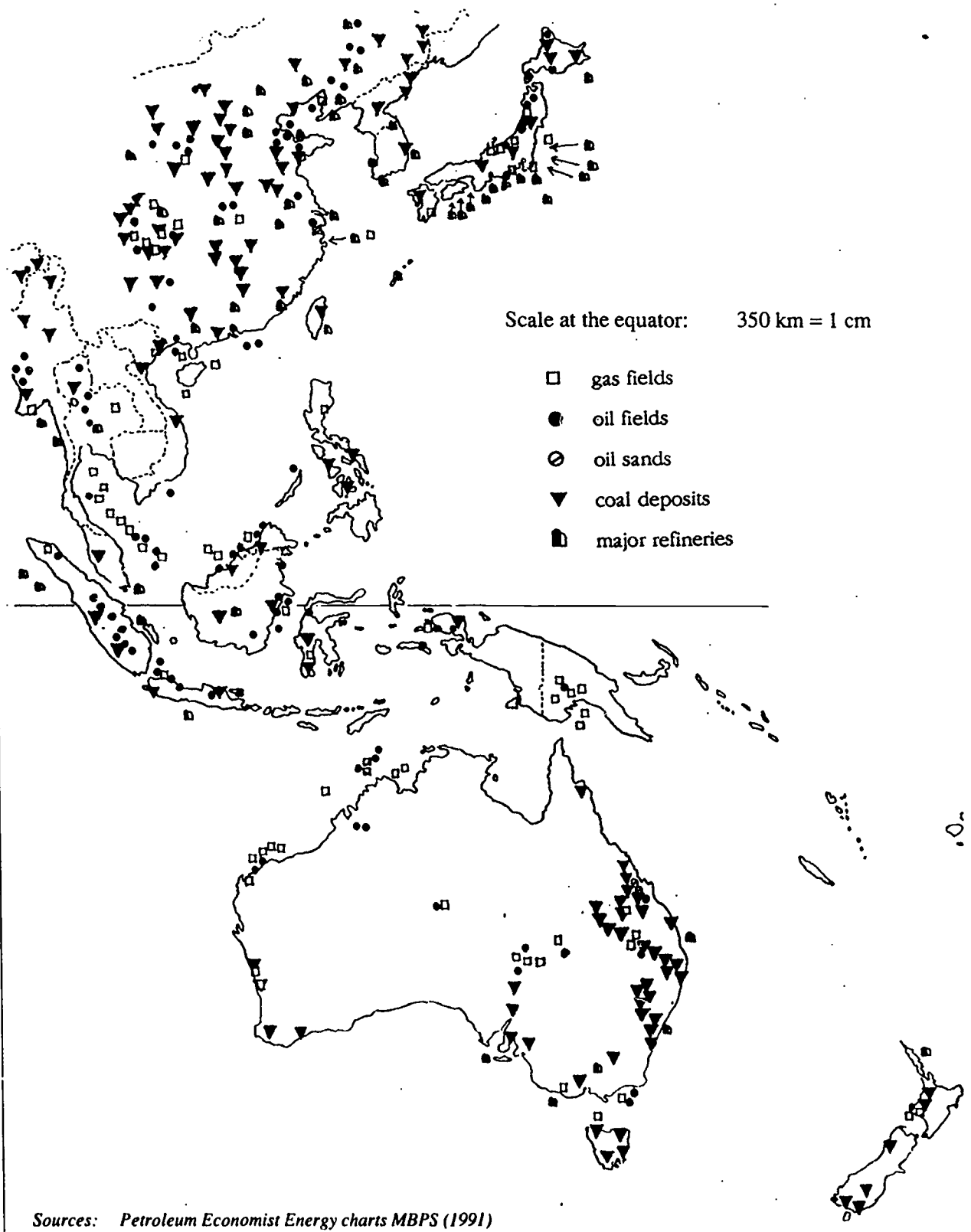
(single copies are free of charge)

Map 1 *Countries of the Asia Pacific region*

Complete the map by filling in the country names.

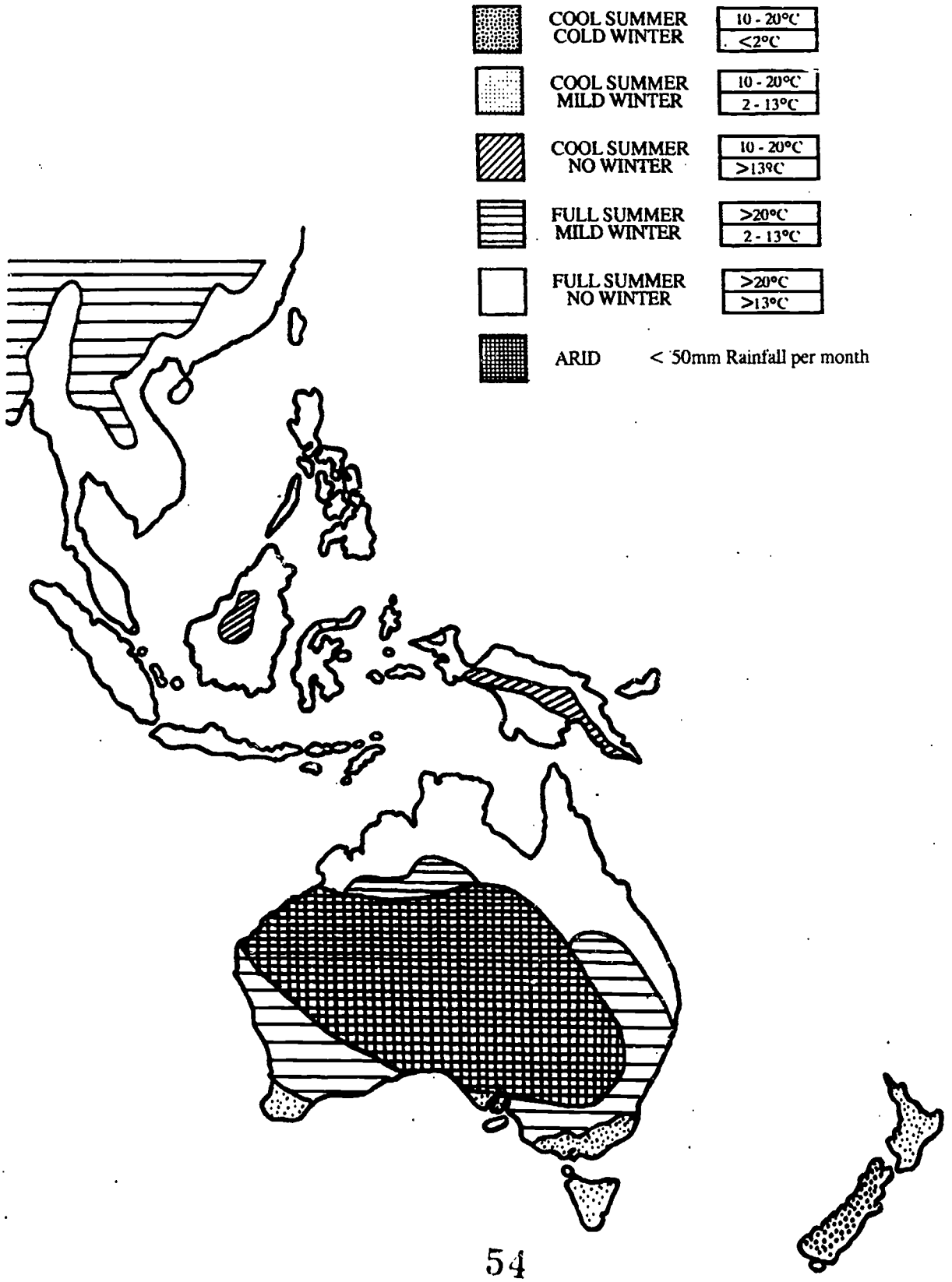


Map 2 *Distribution of energy sources across Asia Pacific*



Sources: *Petroleum Economist Energy charts MBPS (1991)*
Chase
BP

Map 3 *Climate information for Asia Pacific*



Science across Asia Pacific

Registration Form

For Office Use Only

Please fill in and return to the appropriate contact your country as listed over the page.

Teachers' name

School

Address

Country

Telephone

Fax:

(If possible, give your country's code + area code + telephone number)

E-mail
(if available)

If your school has links with a local organization which can help with fax or electronic mail, please give their details above.

Name of the unit you will use

Language you will use in the exchange

Please tick (✓):

Average age of students in your science class: 14( ) 15( ) 16( ) 17( )

Ability in science: above average ( ) average( ) below average( )

During what period would you like to exchange information ? Please put a tick (✓) in the months when you wish to exchange with other school, Please put an (X) in the months when you cannot exchange.

Jan	Feb	May	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )

For the school year : _____ 199 ___ to _____ 199 ___

Teachers' signature

Date:

Please remember that a response is always required to any information request from other schools. If possible, send your own up-to-date information, but if this is not possible you should either send information from an earlier year, or a simple acknowledgment.

This form should be forwarded to the Science across Asia Pacific contact in your country as listed below. Your contact can also supply further information and details on the project.

AUSTRALIA
Mr Alan Marshall
Science across Asia Pacific project
c/o BP Australia
1 Albert Street
South Melbourne, Victoria 3205, Australia
Tel No: 61 3 7049479
Fax No: 61 3 2683467

BRUNEI
Haji Kamaluddin Awang
Office of Director of Planning
Development & Research, Ministry of Education
Negara Brunei Darussalam

CANADA
Mr Reginald Wild
Department of Mathematics and Science Education
The University of British Columbia
2125 Main Mall, Vancouver, B.C. Canada V6T 1Z4
Tel No: 1 604 8225315
Fax No: 1 604 8225422

INDONESIA
Hadiat
Head, PPG - IPA (Science)
Bandung, Jawa Barat
Indonesia
Tel No: 62 22 447922

MALAYSIA
Mr Abdul Halim Ismail
Assistant Director (Science)
Schools Division, Ministry of Education
Paras 5, Block J (South), Pusat Bandar Damansara
50604 Kuala Lumpur, Malaysia
Tel No: 60 3 2555690
Fax No: 60 3 2562389

NEW ZEALAND
Mr Steve Benson
Curriculum Facilitator, Ministry of Education
45-47 Pipitea Street, Thorndon
Private Box 1666, Wellington, New Zealand
Tel No: 64 4 4716130
Fax No: 64 4 4716193

PHILIPPINES
Dr Avelina T Llagas
Director IV, Bureau of Secondary Education
Department of Education, Culture & Sports
University of Life Complex, Meralco Avenue
Pasig, Metro Manila, Philipinnes
Tel No: 63 2 6321362 to 70
Fax No: 63 2 6320805

SINGAPORE
Mr Lim Poh Seng
Assistant Director Sciences
Curriculum Planning Division, Ministry of Education
Kay Siang Road, Singapore 1024
Tel No: 65 4709227
Fax No: 65 4756128

THAILAND
Miss Laddawan Kanhasuwan
Director, Environmental Education
Pranakorn Teachers' College
Bangkhen, Bangkok 10220, Thailand
Tel No: 66 2 5210151 Ext 1437
Fax No: 66 2 5527117

VIETNAM
Prof. Tran Ba Hoanh
Director of Research, Centre on Teacher Training
4 Trinh Hoai Duc Street, Hanoi
Socialist Republic of Vietnam
Tel No: 84 4 232561
Fax No: 84 4 263243

Further information and details on the programme are also available from:

SEAMEO-RECSAM
Dr Ashari bin Che Mat, Centre Director
Prof Perla S Roxas, Deputy Director
SEAMEO-RECSAM
Jalan Sultan Azlan Shah, 11700 Gelugor, Penang
Malaysia
Tel No: 60 4 883266/7
Fax No: 60 4 872541

BP ASIA PACIFIC
Mr Toby Littlewood
Manager, Community & Education Relations
BP Asia Pacific Pte Ltd
Fax No: 65 3718795

Information on the sister project Science across Europe can be obtained from:

Evelyn Van Dyk
The Association for Science Education (ASE)
College Lane, Hadfield, Herts AL10 9AA. UK
Fax 44 707 266532

SCIENCE ACROSS ASIA PACIFIC

Why 'Science across Asia Pacific'?

As the countries of Asia Pacific draw closer together both economically and politically, it is important to raise awareness in students for one another's societies. Many of the issues faced in the environment, such as energy supply, water quality and pollution are of common concern and related to scientific problems, yet perspectives as to their causes and resolution may differ.

The Science across Asia Pacific project aims to:

- introduce an Asian Pacific dimension into science education by raising awareness of different perspectives, ways of life and national traditions of students in other Asia Pacific countries
- raise the awareness of the ways in which science and technology interact with society, industry and the environment
- provide opportunities to develop communication skills in the widest sense, including in languages other than their own
- provide opportunities for schools in different countries to collaborate.

SCIENCE ACROSS ASIA PACIFIC

A partnership between SEAMEO-RECSAM and BP in collaboration with education ministries and science teachers from across Asia Pacific, with support from the British Council and CIDA.

SEAMEO recsam

Printed by : Practical Printers Sdn Bhd, Penang