UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education
General Certificate of Education Ordinary Level

ENVIRONMENTAL MANAGEMENT

0680/04
5014/02

Alternative to Coursework

May/June 2004

1 hour 30 minutes

Candidates answer on the Question Paper.
Additional Materials: Ruler (cm/mm)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
Study the appropriate Source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

This document consists of **14** printed pages and **2** blank pages.

UNIVERSITY *of* CAMBRIDGE
International Examinations

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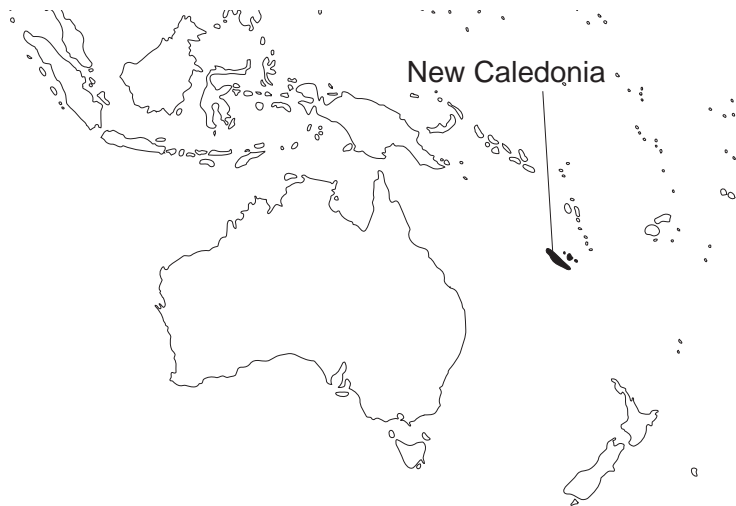
Fig. 1a Regional map
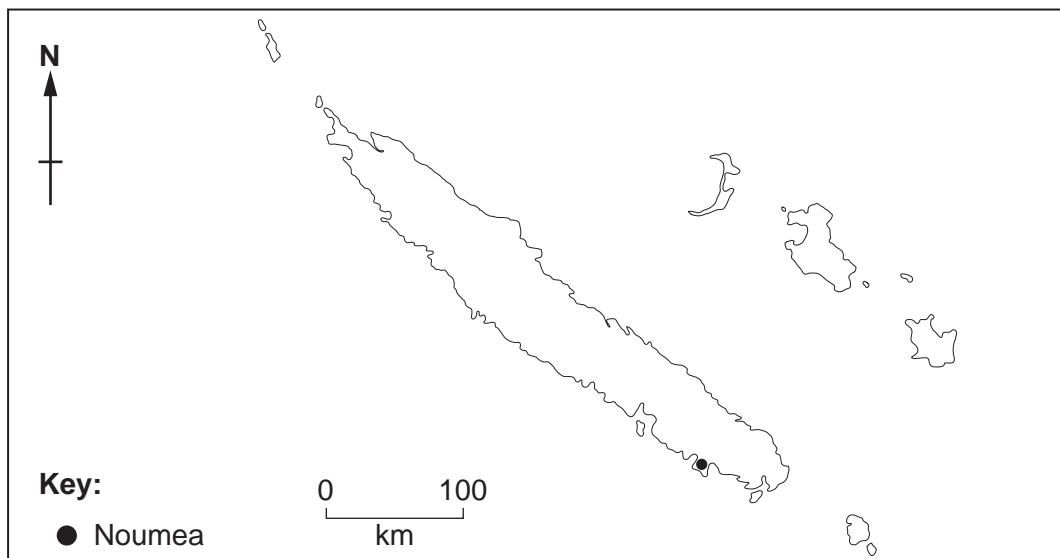
Fig. 1b Map of New Caledonia

New Caledonia is a small island country in the Pacific Ocean. It has a population of 200 000. They are mainly concentrated in Noumea and its surroundings. The main economic activities are mining, tourism and agriculture.

The climate is tropical, hot and humid with trade winds.

- official language French
- 33 local dialects
- literacy rate 91%
- life expectancy 73 years
- birth rate is 20 per 1000 people
- GDP - agriculture 4%
          industry   30%
          services   66%
- non-irrigated arable land 0%
- permanent pasture 12%
- forests 39%
- irrigated arable land 160 km^2

1 Twenty percent of the world's known reserves of nickel are found in New Caledonia. Extracting nickel ore and transporting it to the nickel smelter at Noumea is important to the country's economy.

Date	US $ per tonne
January 2000	9500
June 2000	8000
December 2000	7000
January 2001	6000
June 2001	5000
June 2002	7500

Table1 World price of nickel

(a) Complete the following

The highest price was .... US $ per tonne and

the lowest price was .... US $ per tonne.

The difference in price .... US $ per tonne.

The % change in price from the highest price to the lowest was

....[4]

(b) Explain how changes in the amount of nickel mined in other countries can affect the people and economy of New Caledonia.

....

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....

....

....[3]
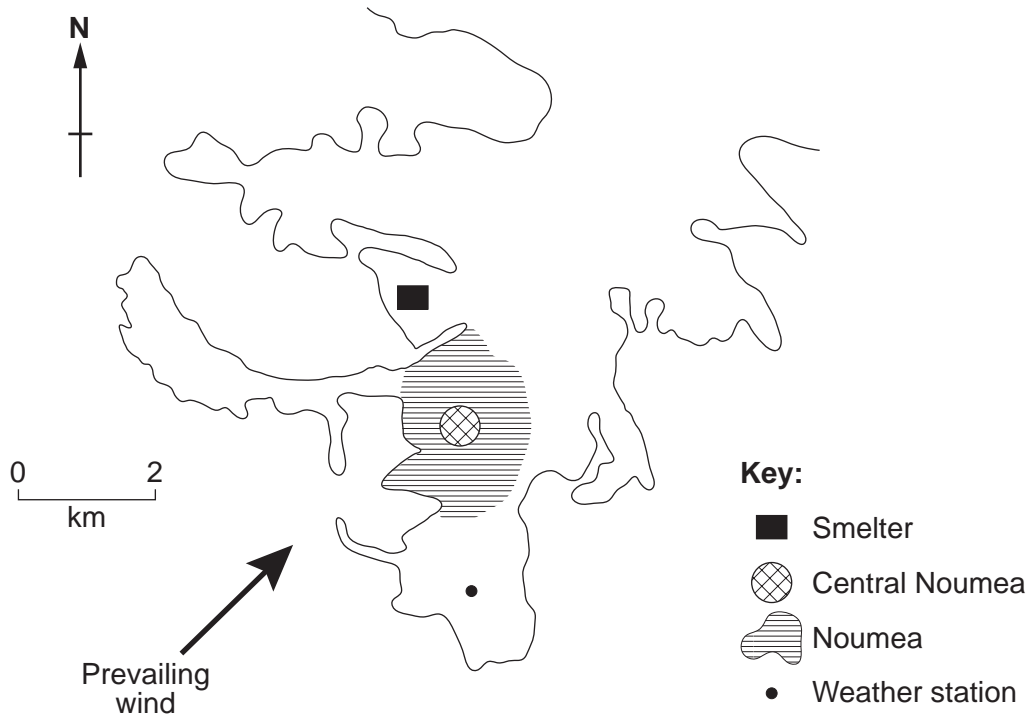
Fig. 2 Map of capital and smelter

Nickel and its compounds

Harmful; causes cancer, category 3
    a) by skin contact
    b) if swallowed

Toxic; causes cancer, category 1   a) by breathing dust

Dangerous to the environment
    a) builds up in soil
    b) builds up in plants and animals

high risk = category 1   *lowest risk* = category 3

Fig. 3 Hazard information

(c) Local people say that living near the nickel smelter makes them ill. More people die at a younger age than in other parts of New Caledonia.

You have been asked to complete the writing of a health questionnaire to find out if these statements by local people are correct.

The first two questions have already been written. Now write questions 3 to 6 of the questionnaire.

Health Questionnaire of New Caledonia

1   Which age range are you?

Under 21 ☐   21 – 30 ☐   31 – 40 ☐   41 – 50 ☐   over 50 ☐

2   How far from the smelter do you live?

0 – 200 metres ☐   201 – 500 metres ☐   501 – 1000 metres ☐

1001 – 2000 metres ☐   more than 2000 metres ☐

3   ....

....

....

4   ....

....

....

5   ....

....

....

6   ....

....

....[5]

(d) If you only had **one day** to use the questionnaire to collect as much information as possible,

(i) suggest areas you would visit to use your questionnaire,

....

....[1]

(ii) describe how you would ensure that you interview a representative sample of the population.

....

....

....[2]

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(e) The local weather station records the wind direction every day. The data for one year is
Shown in the diagram.

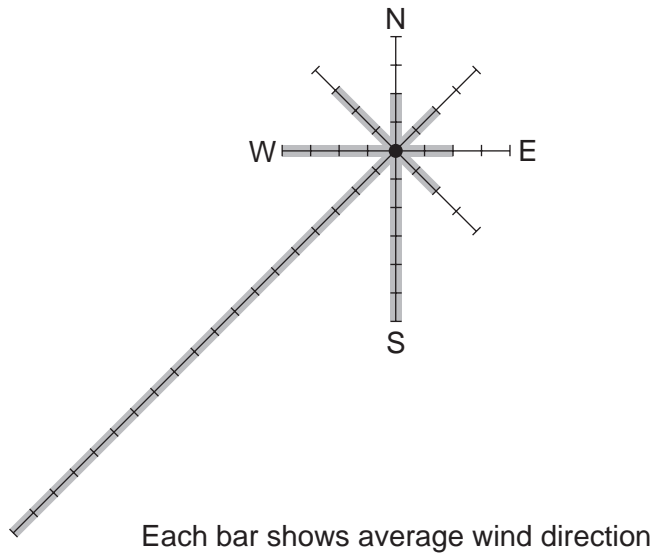
Each bar shows average wind direction

Fig. 4 Wind rose for one year

Mark on the copy of Fig. 2 below an **X** to indicate an area likely to have the highest % of
premature deaths and a **Z** to indicate an area likely to have a low % of premature
deaths.

Key:

◼ Smelter

⊗ Central Noumea

▤ Noumea

• Weather station
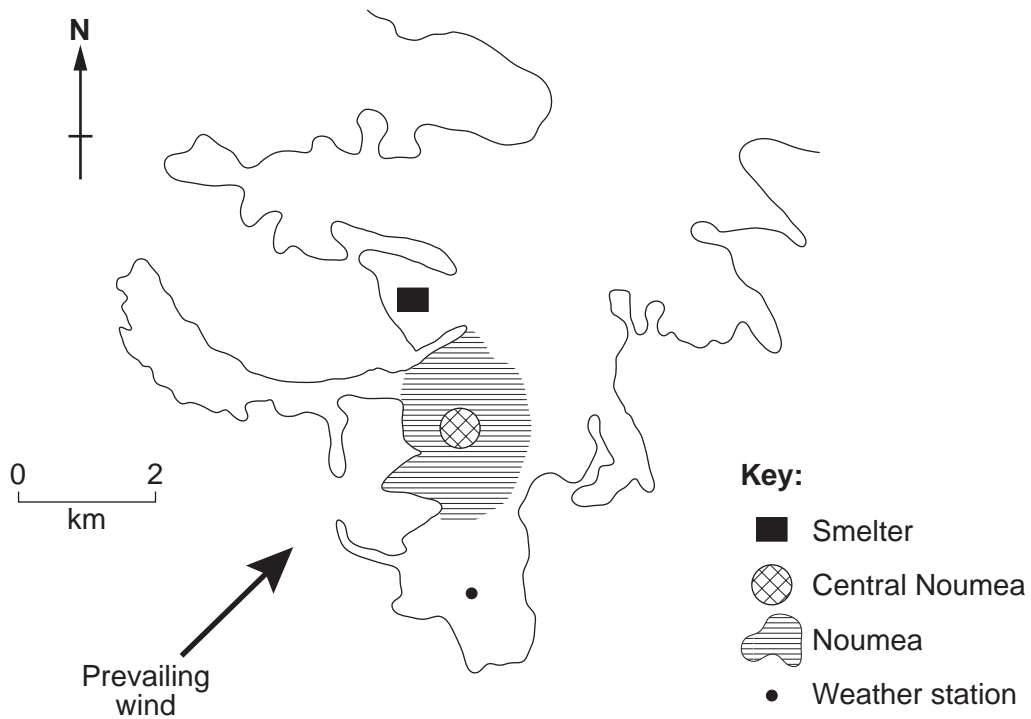
[2]

(f) A student measured the amount of nickel dust in the air and the rainfall each day when the nickel smelter was working.

Day	Rainfall (mm)	Nickel dust (parts per million)
1	0	25
2	10	20
3	20	10
4	15	10
5	5	15
6	5	20
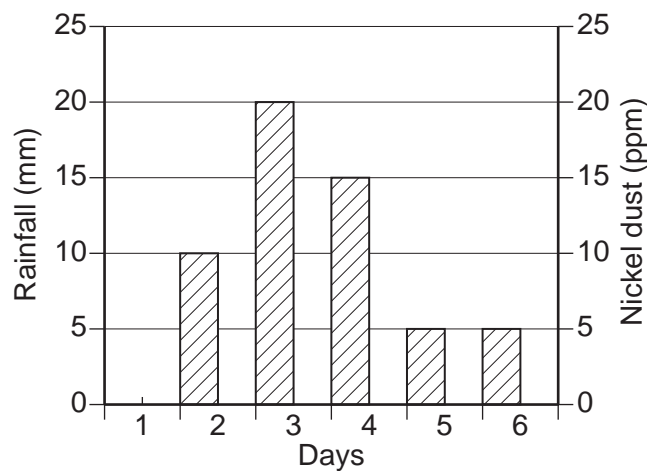
Fig. 5 Graph with rainfall plotted as bars

(i) Complete the graph by plotting the data for nickel dust. [2]

(ii) Describe the relationship between levels of nickel dust and rainfall.

....

....[1]

(iii) The smelter only needs to work 200 days to produce enough nickel for export.
The smelter cannot be moved.
You are asked to describe when the smelter should work. Explain how you would do this to reduce the risk to human health

....

....

....

....

....[3]

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2 New Caledonia uses irrigated land to help feed its population.

Two small irrigated gardens, of the same size, were used to grow tomatoes.

(a) Complete Table 2 to show the average weigh of a tomato in each garden.

	Garden A	Garden B
Number of fruits	1000	1000
Weight of fruit (kg)	100	120
Average weight of each fruit (kg)		

Table 2

[2]

(b) Complete the list below to suggest **two** other possible differences between garden **A** and **B**.

Differences between garden **A** and **B**

1 variety of tomato plant

2 amount of water

3...

4... [2]

(c) Irrigation increases the salt content in soil. Some crop plants survive better than others in salty soils.

Key:
[ ] soil with salt

3 m
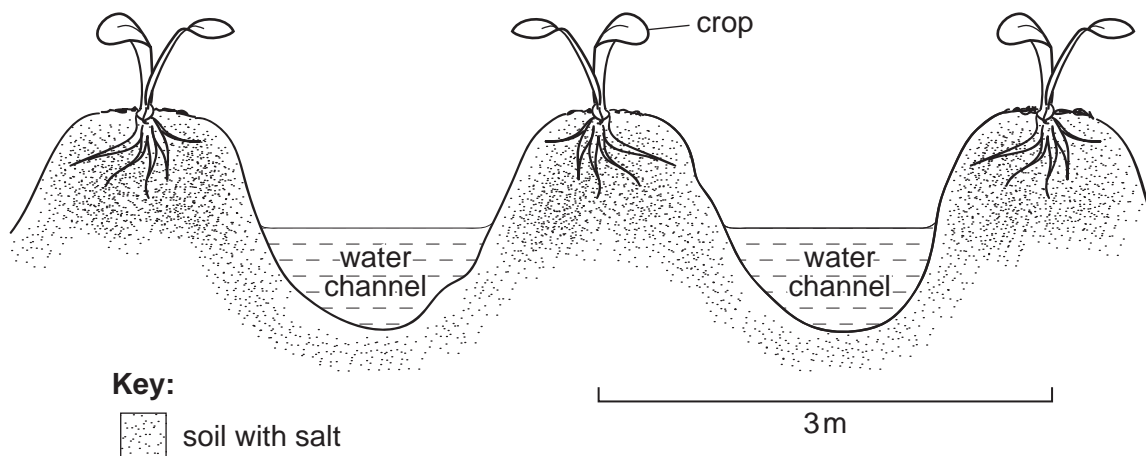
Fig. 6

(i) Where does the salt come from?

....[1]

(ii) Describe the processes that lead to increased amounts of salt around the roots.

....

....

....[2]

(iii) Students decided to measure the different flow rates of water in the water channels of garden **A** and **B**.
The students had the equipment shown below.

Float

1 metre measuring stick

Stop clock

2 marker sticks
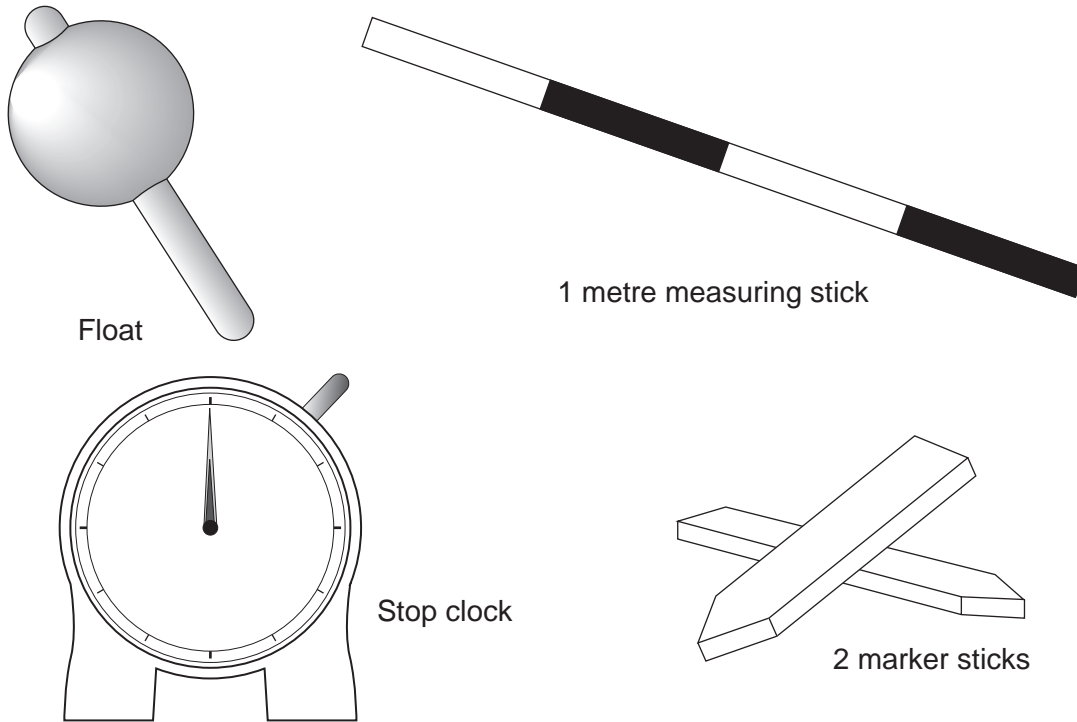
Fig. 7

Describe how the students could use the equipment to measure flow rates.

....

....

....

....

....

....

....

....[5]

(d) Some statements about irrigation include:

crop yields per hectare are higher with irrigation

several crops can be grown in one year

salt is very difficult to remove from fields

very few crops grow well in salty soil

longer growing season

nutrients are leached from soils

water demands increase human disease

controlling water supply can control the rate of crop growth
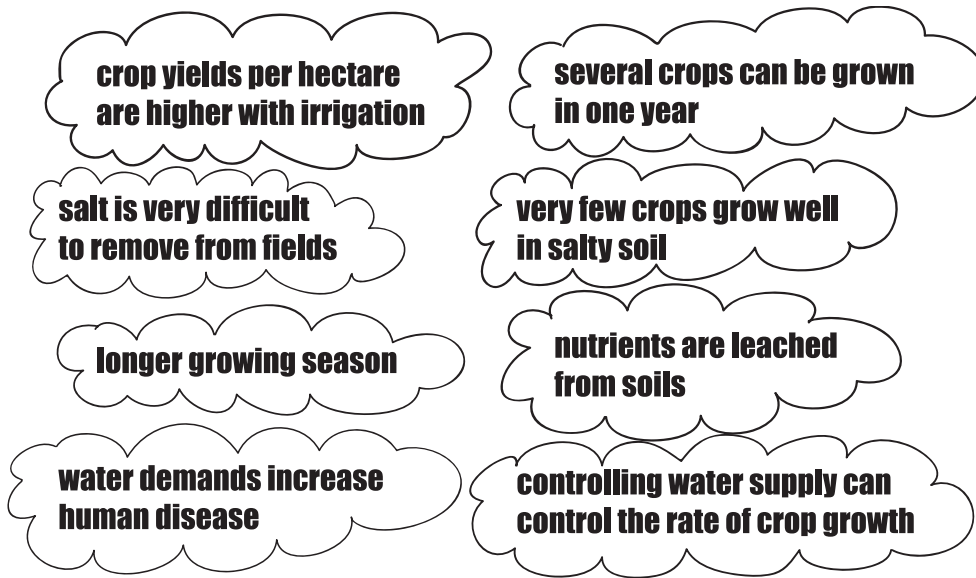
Fig. 8

(i) Choose **three** of the statements that show that the use of irrigation may **not** be an example of sustainable development.

Statement:

1 ....

....

2 ....

....

3 ....

....[3]

For **one** of the statements, explain the long term problems.

....

....

....

....[2]

(ii) Select **three** statements that suggest irrigation benefits the people of New Caledonia.

Statement:

1 ....

2 ....

3 ....[3]

For **one** of the statements,explain the long term benefits.

....

....

....[2]

3
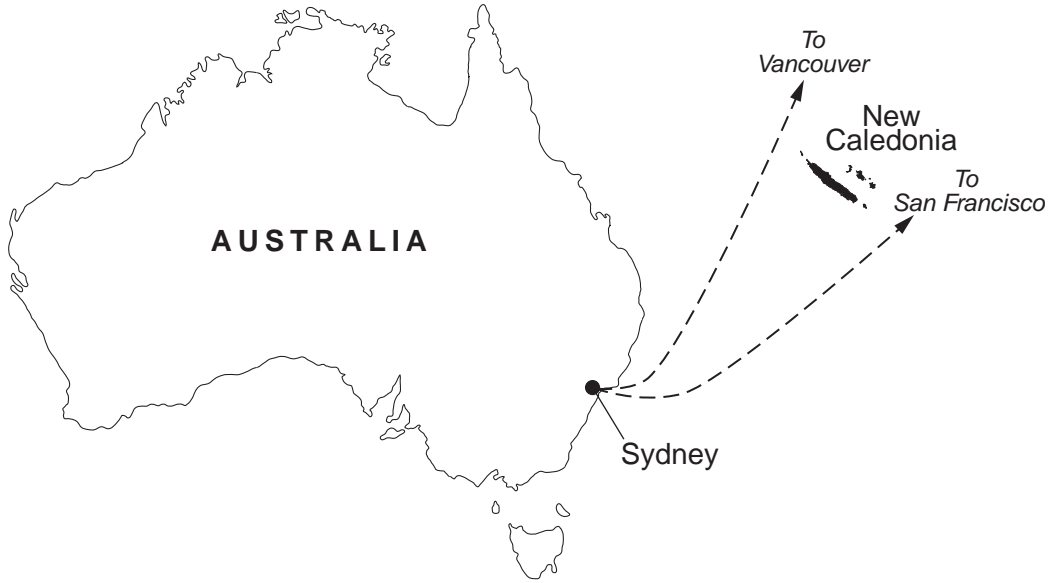
Fig. 9 Australia and shipping lanes

Shipping lanes pass on either side of New Caledonia. The greatest danger to shipping is in the cyclone season between December and March.

Oil pollution is a potential risk to the coastlines of Australia and New Caledonia.

(a) Describe **two** short term effects of oil pollution for each of

(i) beaches,

....

....

....

(ii) five miles offshore.

....

....

....[4]

(b) A survey of an unpolluted lagoon was carried out to identify feeding relationships. The same survey was repeated twice after an oil spill.

Number of species

	Before the oil spill	One year after the oil spill	Five years after the oil spill
microscopic plants	200	75	185
corals	84	27	62
small fishes	56	15	45
large fishes	23	5	18

Table 3

(i) Explain why all the numbers of different species decreased after the oil spill.

....

....

....

....[3]

(ii) Suggest **two** reasons why all the different species had not fully recovered their numbers after five years.

....

....

....[2]

(iii) If you repeated the survey ten years after this oil spill, what would you expect to record?

....

....

....[2]

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(c) Describe how an oil spill affects local people

    (i) in the first six months following the oil spill,

       ....

       ....

       ....

    (ii) five years after the oil spill.

       ....

       ....

       ....[4]

15

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