Reading 50

The Dams That Changed Australia

Inland Australia has had a problem with drought from the time of white settlement in 1788 until today, and this is why the Snowy Mountains Scheme was conceived and founded. Before the Snowy Scheme a large proportion of the snowfields on Australia's highest mountains (the Snowy Mountains) melted into the Snowy River every year. Hence, Snowy River water flowed, ultimately, into the sea, not toward the dry interior of the country, where people needed it so desperately. This was first recognised by the Polish geologist and explorer Strezlecki in 1840, who commented that there could be no development of the inland without adequate water supply. The rivers would have to be diverted if irrigation were to succeed.

Before Federation in 1901, Australia consisted of a group of colonies, all anxious to protect their own interests. After Federation the states retained rights to the water, and thus to what might happen to the rivers. Arguments between New South Wales, Victoria and South Australia led to a deadlocked Premiers' Conference in 1947. Despite this serious dispute, the Federal Parliament passed the Snowy Mountains Hydro-electric Power Act just two years later, on July 7. The project was officially commenced on October 17 that year, barely three months after the act had been passed.

The scheme set out to harness water for electricity and to divert it back to the dry inland areas for irrigation. To do this, thousands of kilometres of tunnels had to be drilled

through the mountains, and sixteen major dams and seven hydro-electric power stations built over a period of nineteen years. The first of these was Guthega

Power Station, which was commissioned in 1954. and the last one to be finished was Tumut III.

SECTION TWO

The Snowy Mountains Scheme was to alter the face of Australia forever. One important change was the recruitment of people from outside Australia to work on the scheme. In 1949, while the world was still recovering from the effects of World War II (1939 to 1945), the Australian government needed immense numbers of people to work on the Snowy. It sought labour from overseas, and 60,000 of the 100,000 people who worked on the scheme came from outside the country.

They came from thirty different countries: from Italy, Yugoslavia, and Germany, from sophisticated cities like Budapest, Paris and Vienna, and from tiny hamlets. These European workers left countries which had fought against each other during the war, and which had vastly different cultures, and they found themselves in a country which was still defining itself. They were adventurous young men, some highly skilled, some not, and they came to a place which offered both enormous challenges and primitive conditions. Many were housed in tents in the early days of the scheme, although some fortunate men were placed in barracks. The food was basic, female company extremely scarce and entertainment lacking.

SECTION THREE

Many new arrivals spoke only limited English, and were offered English classes after work. The men needed primarily to understand safety instructions, and safety lectures were conducted in English and other languages. In fact, a great deal of communication underground was by sign language, especially when the conditions were noisy. The

signs were peculiar to the business at hand: for instance, a thumb placed near the mouth meant water, but did not indicate whether the water was needed on

the drill the man was using, or for a drink.
The constant reference to the men who worked on the Snowy is appropriate because few women worked on the scheme, and those who were employed usually held office jobs. Women, however, were active in the community, and the members of the Country Women's Association gave English lessons. Other English instruction was provided by the Australian Broadcasting Commission, which ran daily broadcasts to help the newcomers with the language.

SECTION FOUR

These circumstances could have caused great social trouble, but there were relatively few serious problems. The men worked long and hard, and many saved their money with a view to settling in Australia or returning home. At a reunion in1999, many were happy to remember the hardships of those days, but it was all seen through a glow of achieve-ment. This satisfaction was felt not only by the men who worked directly on the project, but by the women, many of whom had been wives and mothers during the scheme, and indicated that they had felt very much part of it.

The children of these couples went to school in Happy Jack, a town notable for having the highest school in Australia, and the highest birth rate. In one memorable year there were thirty babies born to the eighty families in Happy Jack. Older children went to school in Cooma, the nearest major town.

SECTION FIVE

The scheme is very unlikely to be repeated. The expense of putting the power stations underground would now be prohibitive, and our current information about ecology would require a different approach to the treatment of the rivers. Other hydro-electric schemes like the Tennessee Valley Authority preceded the Snowy Mountains Scheme, and others have followed. The Snowy Mountains Scheme is the only hydro-electric scheme in the world to be totally financed from the sale of its electricity.

As well as being a great engineering feat, the scheme is a monument to people from around the world who dared to change their lives. Some are living and working in Australia, many have retired there, some have returned to their countries of origin. Every one of them contributed to altering Australian society forever.

Questions 1-5

Reading Passage contains five sections.

Choose the correct heading for Sections One to Five from the fist of headings below.

Write the correct number, i-x, in boxes 1-5 on your answer sheet.

List of Headings

i Using sign language on the Snowy Mountains
ii The workers and their families
iii Development of inland Australia
iv. The cost of the Snowy Mountains Scheme
v The unique nature of the scheme
vi Housing the Snowy Mountains' workforce
vii Why the Snowy Mountains Scheme began
viii Learning new ways to communicate
ix Recruiting people for the Snowy Mountains Scheme
x Social problems of the workers

1. Section one

2. Section two

3. Section three

4. Section four

5. Section five

Questions 6-10

Complete the table below.

Choose ONE WORD AND/OR A NUMBER from Reading Passage for each answer.

Write your answers in boxes 6-10 on your answer sheet.

Year Event

1788 White settlement begins

1840 Awareness that the 6 ....

could not be developed

without irrigation

1901 Federation

1947 Dispute between the states on

the rivers' future, resulting in a

7..............

Premiers' Conference

8 ....

Snowy Mountains Scheme

begins Recruitment of 9 ....

people from abroad

1954 Work on Guthega Power

Station begins

10 .... Tumut Ill Power Station

completed

Questions 11-13

Complete the sentences.

Choose NO MORE THAN THREE WORDS from the passage for each answer.

Write your answers in boxes 11-13 on your answer sheet.

● Communicating using 11.................. was necessary for the labourers because of

the conditions.

● The workers reminisced about the 12.......................... endured in the early days

at their reunion.

● The Snowy Mountains Scheme was considered an 13...... which altered

Australian society thereafter.

Power From the Earth

A. Geothermal power refers to the generation of electrical power by making use of heat sources found well below the earth's surface.As is well-known, if a hole were to be drilled deep into the earth, extremely hot, molten rock would soon be encountered. At depths of 30 to 50 km, temperatures exceeding 1000 degrees Celsius prevail. Obviously, accessing such temperatures would provide a wonderful source for geothermal power. The problem is, such depths are too difficult to access: drilling down some 30 or more kilometres is simply too costly with today's technology.

B. Fortunately, sufficiently hot temperatures are available at considerably shallower depths. In certain areas, where the earth's surface has been altered over time—through, for example, volcanic activity-temperatures exceeding 300 degrees Celsius can be found at depths of a mere 1 to 3 km, which can be feasibly accessed. These particular areas are potentially ideal for the generation of electricity through geothermal means.

C. It is possible to explain geothermal power generation as a steam power system that utilizes the earth itself as a boiler. When water is sent down to the depths of 1 to 3 km, it returns to the surface as steam and is capable of generating electricity. Electricity generated in this manner hardly produces any carbon dioxide or other waste materials. If the steam and hot water are routed back underground, the generation of electricity can be semi-permanent in nature.

D. Furthermore, geothermal power can provide a stable supply of electricity unlike other natural energy sources such as solar power and wind power, which both rely heavily on weather conditions. Accordingly, the generation of electricity through geothermal power is four to five times more efficient than through solar power.As for wind power, geothermal power is some two times more cost effective. Only the generation of hydroelectric power comes close— the cost of power production from each is about the same.

E. Although geothermal power generation appears to be a most attractive option, development has been slow. The world's first successful attempt at geothermal power generation was accomplished in Italy in 1904. Power generation in Japan first started in 1925 at Beppu City. Since that time, countries as diverse as Iceland and New Zealand have joined the list of nations making use of this valuable source of energy. In the year 2000, Beppu City hosted the World Geothermal Congress, whose goal was to promote the adoption of geothermal energy production throughout the world.

F. The international geothermal community at the World Geothermal Congress 2000 called upon the governments of nations to make strong commitments to the development of their indigenous geo-thermal resources for the benefit of their own people, humanity and the environment. However, several factors are still hindering the development of geothermal power generation. Firstly, it has a low density of energy which makes it unsuitable for large-scale production in which, for example, over 1,000,000 kilowatts need to be produced. Secondly, the cost is still high when compared to today's most common sources of energy production: fossil fuels and atomic energy.

G. A further consideration is the amount of risk involved in successfully setting up a new geothermal power production facility. The drill-ing that must extend 2,000 to 3,000 m below the surface must be accurate to within a matter of just a few metres one side or the other of the targeted location. To achieve this, extensive surveys, drilling expertise and time are needed. It is not uncommon for a project to encompass ten years from its planning stage to the start of operations. The extent of the risks involved is clear.

H. Although it has long been considered a resource-poor nation, Japan, which is thought to have about 10% of the world's geothermal resources, may well have considerable advantages for tapping into geothermal power. It does have one of the longest serving power stations using geothermal energy. The station, built in 1966, pointed the way to the future when the country was affected by the two global oil shocks in the 1970s. Now there are some 17 plants in operation throughout the country which are responsible for a total output of over 530,000 kilowatts. This figure, though impressive, accounts for a mere 0.4% of Japan's total generation of electricity.

I. Clearly then, further progress needs to be made in the development of geothermal energy. As long as costs remain high in comparison to other sources of energy, geothermal power wilt struggle to match the efficiency of existing power sources. Further research and inno-vation in the field, as well as government support and a sense of urgency, are needed to help propel geothermal energy towards its promising future.

Questions 14-19:
Reading passage, 'Power of the Earth' has 9 paragraphs A-I.
Which paragraph contains the following information? Write the appropriate letter A-I for the space in your answer sheet.

14_________ the history of the development of geothermal power.

15. **_________ one country's use of geothermal power.**

16.**_________ a comparison between various energy sources.**

17.**_________ how geothermal energy can produce electricity.**

18.**_________ conditions which permit access to geothermal power.**

19.**_________ problems of geothermal exploration.**

Questions 20-26:

Do the following statements agree with the writer's opinion in the passage

YES, if the statement agrees with the writer's opinion
NO, if the statement does not agree with the writer's opinion
NOT GIVEN, if it is impossible to understand the opinion of the writer on this

20.Accessing geothermal energy at depths greater than 3 km is currently not possible.

21.**The generation of geothermal power produces a considerable amount of by-products that can be damaging to the environment.**

22.**The World Geothermal Congress has been able to raise money for research in this area.**

23.**Geothermal energy is still relatively expensive to generate.**

24.**It can take a decade to develop a single geothermal power station**

25.**Japan is capable of generating one-quarter of its energy needs using geothermal energy.**

26.**The future of geothermal energy depends upon the decline of fossil fuel resources.**

Are we Managing to Destroy Science?

1. The government in the UK was concerned about the efficiency of research institutions and set up a Research Assessment Exercise (RAE) to consider what was being done in each university. The article hich follows is a response to the imposition of the RAE. In the year ahead, the UK government is due to carry out the next Research Assessment Exercise (RAE). The goal of this regular five-yearly check-up of the university sector is easy to understand: to increase productivity within public sector research. But striving for such productivity can lead to unfortunate consequences. In the case of the RAE, one risk attached to this is the creation of an overly controlling management culture that threatens the future of imaginative science.

2. Academic institutions are already preparing for the RAE with some anxiety—understand-ably so, for the financial consequences of failure are severe. Departments with a current rating of four or five (research is rated on a five point scale, with five the highest) must maintain their score or face a considerable loss of funding. Meanwhile, those with ratings of two or three are fighting for their survival. The pressures are forcing research management onto the defensive. Common strategies for increasing academic output include grading individual researchers every year according to RAE criteria, pressurising them to publish anything regardless of quality, diverting funds from key and expensive laboratory science into areas of study such as management, and even threatening to close departments. Another strategy being readily adopted is to remove scientists who appear to be less active in research and replace them with new, probably younger, staff.

3. Although such measures may deliver results in the RAE, they are putting unsustainable pressure on academic staff. Particularly insidious is the pressure to publish. Put simply, RAE committees in the laboratory sciences must produce four excellent peer-reviewed publications per member of staff to meet the assessment criteria. Hence this is becoming a minimum requirement for existing members of staff, and a benchmark against which to measure new recruits. But prolific publication does not necessarily add up to good science. Indeed, one young researcher was told in an

interview for a lectureship that, although your publications are excellent, unfortunately, there are not enough of them. You should not worry so much about the quality of your publications.'

4. In a recent letter to Nature, the publication records of ten senior academics in the area of molecular microbiology were analysed. Each of these academics is now in very senior positions in universities or research institutes, with careers spanning a total of 262 years. All have achieved considerable status and respect within the UK and worldwide. However, their early publication records would preclude them from academic posts if the present criteria were applied. Although the quality of their work was clearly outstanding—they initiated novel and perhaps risky projects early in their careers, which have since been recognised as research of international importance— they generally produced few papers over the first ten years after completing their PhDs. Indeed, over this period, they have an average gap of 3-8 years without the publication or production of a cited paper. In one case there was a five-year gap. Although these enquiries were limited to a specific area of research, it seems that this model of career progression is widespread in all of the chemical and biological sciences.

5. It seems that the atmosphere surrounding the RAE may be stiffing talented young researchers or driving them out of science altogether. There urgently needs to be a more considered and careful nurturing of our young scientific talent. A new member of academic staff in the chemical or biological laboratory sciences surely needs a commitment to resources over a five- to tenyear period to establish their research. Senior academics managing this situation might be well advised to demand a long-term view from the government. Unfortunately, management seems to be pulling in the opposite direction. Academics have to deal with more students than ever and the paperwork associated with the assessment of the quality of teaching is increasing. On top of that, the salary for university lecturers starts at only £32,665 (rising to £58,048). Tenure is rare, and most contracts are offered on a temporary contract basis. With the

mean starting salary for new graduates now close to £36,000, it is surprising that anybody still wants a job in academia.

6. It need not be like this. Dealings with the many senior research managers in the chemical and water industries at the QUESTOR Centre (Queen's University Environmental Science and Technology Research Centre) provided some insight. The overall impression is that the private sector has a much more sensible and enlightened long-term view of research priorities. Why can the universities not develop the same attitude? All organisations need managers, yet these managers will make sure they survive even when those they manage are lost. Research management in UK universities is in danger of evolving into such an overly controlled state that it will allow little time for careful thinking and teaching, and will undermine the development of imaginative young scientists.

Questions 27-34

Choose NO MORE THAN ONE WORD from the passage for each answer.

In the UK, every five years, the Research Assessment Exercise (RAE) inspects research institutions to determine their rate of (27)........... . This tends to cause (28)........... . in academic institutions because any failure would lead to (29)........... - financial consequences. RAE’s purpose, however, is to increase the academic output within research institutions. In response to the (30)........... of RAE, the research institutions are changing the way they do things. Some are forcing their research staff to (31)........... almost anything, while others are moving (32)........... from a laboratory focus to that of management. Another common approach utilised by management is to remove and (33)... underperforming research staff. The authors of this paper feel that the pressure on UK research institutions is (34).......... .

Questions 35-38

Do the following statements agree with the writer's claims in the Reading Passage? In boxes 35-38 on your answer sheet, write

TRUE - if the statement agrees with the information

FALSE - if the statement contradicts the information

NOT GIVEN - if there is no information on this

35. Good researchers are usually prolific publishers.
36. People in industry seem to understand the long-term nature of research.
37. The private sector has produced more in the way of quality research than universities.
38. Management may be the only winners under the new system.

Questions 39-40

Choose the appropriate letter, A, B, C or D.

39. The early publishing records of senior researchers would

A. prevent institutions from employing them.

B. rule out their chances of achieving any status using the current standards.

C. support their application for an academic posting under the present criteria.

D. hinder their academic prospects under the current criteria.

40. Gifted new scientists need to be

A. managed over a decade by senior academics.

B. guided over a ten-year period to develop their research.

C. supported with resources over a decade to establish their research.

D. advised of the government's long-term view on research.