READING

READING PASSAGE 1

*You should spend about 20 minutes on **Questions 1–13**, which are based on Reading Passage 1 below.*

Bats to the rescue

How Madagascar's bats are helping to save the rainforest

There are few places in the world where relations between agriculture and conservation are more strained. Madagascar's forests are being converted to agricultural land at a rate of one percent every year. Much of this destruction is fuelled by the cultivation of the country's main staple crop: rice. And a key reason for this destruction is that insect pests are destroying vast quantities of what is grown by local subsistence farmers, leading them to clear forest to create new paddy fields. The result is devastating habitat and biodiversity loss on the island, but not all species are suffering. In fact, some of the island's insectivorous bats are currently thriving and this has important implications for farmers and conservationists alike.

Enter University of Cambridge zoologist Ricardo Rocha. He's passionate about conservation, and bats. More specifically, he's interested in how bats are responding to human activity and deforestation in particular. Rocha's new study shows that several species of bats are giving Madagascar's rice farmers a vital pest control service by feasting on plagues of insects. And this, he believes, can ease the financial pressure on farmers to turn forest into fields.

Bats comprise roughly one-fifth of all mammal species in Madagascar and thirty-six recorded bat species are native to the island, making it one of the most important regions for conservation of this animal group anywhere in the world.

Co-leading an international team of scientists, Rocha found that several species of indigenous bats are taking advantage of habitat modification to hunt insects swarming above the country's rice fields. They include the Malagasy mouse-eared bat, Major's long-fingered bat, the Malagasy white-bellied free-tailed bat and Peters' wrinkle-lipped bat.

'These winner species are providing a valuable free service to Madagascar as biological pest suppressors,' says Rocha. 'We found that six species of bat are preying on rice pests, including the paddy swarming caterpillar and grass webworm. The damage which these insects cause puts the island's farmers under huge financial pressure and that encourages deforestation.'

The study, now published in the journal *Agriculture, Ecosystems and Environment,* set out to investigate the feeding activity of insectivorous bats in the farmland bordering the Ranomafana National Park in the southeast of the country.

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Rocha and his team used state-of-the-art ultrasonic recorders to record over a thousand bat 'feeding buzzes' (echolocation sequences used by bats to target their prey) at 54 sites, in order to identify the favourite feeding spots of the bats. They next used DNA barcoding techniques to analyse droppings collected from bats at the different sites.

The recordings revealed that bat activity over rice fields was much higher than it was in continuous forest – seven times higher over rice fields which were on flat ground, and sixteen times higher over fields on the sides of hills – leaving no doubt that the animals are preferentially foraging in these man-made ecosystems. The researchers suggest that the bats favour these fields because lack of water and nutrient run-off make these crops more susceptible to insect pest infestations. DNA analysis showed that all six species of bat had fed on economically important insect pests. While the findings indicated that rice farming benefits most from the bats, the scientists also found indications that the bats were consuming pests of other crops, including the black twig borer (which infests coffee plants), the sugarcane cicada, the macadamia nut-borer, and the sober tabby (a pest of citrus fruits).

'The effectiveness of bats as pest controllers has already been proven in the USA and Catalonia,' said co-author James Kemp, from the University of Lisbon. 'But our study is the first to show this happening in Madagascar, where the stakes for both farmers and conservationists are so high.'

Local people may have a further reason to be grateful to their bats. While the animal is often associated with spreading disease, Rocha and his team found evidence that Malagasy bats feed not just on crop pests but also on mosquitoes – carriers of malaria, Rift Valley fever virus and elephantiasis – as well as blackflies, which spread river blindness.

Rocha points out that the relationship is complicated. When food is scarce, bats become a crucial source of protein for local people. Even the children will hunt them. And as well as roosting in trees, the bats sometimes roost in buildings, but are not welcomed there because they make them unclean. At the same time, however, they are associated with sacred caves and the ancestors, so they can be viewed as beings between worlds, which makes them very significant in the culture of the people. And one potential problem is that while these bats are benefiting from farming, at the same time deforestation is reducing the places where they can roost, which could have long-term effects on their numbers. Rocha says, 'With the right help, we hope that farmers can promote this mutually beneficial relationship by installing bat houses.'

Rocha and his colleagues believe that maximising bat populations can help to boost crop yields and promote sustainable livelihoods. The team is now calling for further research to quantify this contribution. 'I'm very optimistic,' says Rocha. 'If we give nature a hand, we can speed up the process of regeneration.'

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Questions 1–6

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1–6 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*

1 Many Madagascan forests are being destroyed by attacks from insects.

2 Loss of habitat has badly affected insectivorous bats in Madagascar.

3 Ricardo Rocha has carried out studies of bats in different parts of the world.

4 Habitat modification has resulted in indigenous bats in Madagascar becoming useful to farmers.

5 The Malagasy mouse-eared bat is more common than other indigenous bat species in Madagascar.

6 Bats may feed on paddy swarming caterpillars and grass webworms.

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Questions 7–13

Complete the table below.

*Choose **ONE WORD ONLY** from the passage for each answer.*

Write your answers in boxes 7–13 on your answer sheet.

The study carried out by Rocha's team	
Aim	• to investigate the feeding habits of bats in farmland near the Ranomafana National Park
Method	• ultrasonic recording to identify favourite feeding spots • DNA analysis of bat **7** .....
Findings	• the bats – were most active in rice fields located on hills – ate pests of rice, **8** ....., sugarcane, nuts and fruit – prevent the spread of disease by eating **9** ..... and blackflies • local attitudes to bats are mixed: – they provide food rich in **10** ..... – the buildings where they roost become **11** ..... – they play an important role in local **12** .....
Recommendation	• farmers should provide special **13** ..... to support the bat population

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READING PASSAGE 2

*You should spend about 20 minutes on **Questions 14–26**, which are based on Reading Passage 2 below.*

Does education fuel economic growth?

A Over the last decade, a huge database about the lives of southwest German villagers between 1600 and 1900 has been compiled by a team led by Professor Sheilagh Ogilvie at Cambridge University's Faculty of Economics. It includes court records, guild ledgers, parish registers, village censuses, tax lists and – the most recent addition – 9,000 handwritten inventories listing over a million personal possessions belonging to ordinary women and men across three centuries. Ogilvie, who discovered the inventories in the archives of two German communities 30 years ago, believes they may hold the answer to a conundrum that has long puzzled economists: the lack of evidence for a causal link between education and a country's economic growth.

B As Ogilvie explains, 'Education helps us to work more productively, invent better technology, and earn more … surely it must be critical for economic growth? But, if you look back through history, there's no evidence that having a high literacy rate made a country industrialise earlier.' Between 1600 and 1900, England had only mediocre literacy rates by European standards, yet its economy grew fast and it was the first country to industrialise. During this period, Germany and Scandinavia had excellent literacy rates, but their economies grew slowly and they industrialised late. 'Modern cross-country analyses have also struggled to find evidence that education causes economic growth, even though there is plenty of evidence that growth increases education,' she adds.

C In the handwritten inventories that Ogilvie is analysing are the belongings of women and men at marriage, remarriage and death. From badger skins to Bibles, sewing machines to scarlet bodices – the villagers' entire worldly goods are included. Inventories of agricultural equipment and craft tools reveal economic activities; ownership of books and education-related objects like pens and slates suggests how people learned. In addition, the tax lists included in the database record the value of farms, workshops, assets and debts; signatures and people's estimates of their age indicate literacy and numeracy levels; and court records reveal obstacles (such as the activities of the guilds*) that stifled industry.

Previous studies usually had just one way of linking education with economic growth – the presence of schools and printing presses, perhaps, or school enrolment, or the ability to sign names. According to Ogilvie, the database provides multiple indicators for the same individuals, making it possible to analyse links between literacy, numeracy, wealth, and industriousness, for individual women and men over the long term.

* guild: an association of artisans or merchants which oversees the practice of their craft or trade in a particular area

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D Ogilvie and her team have been building the vast database of material possessions on top of their full demographic reconstruction of the people who lived in these two German communities. 'We can follow the same people – and their descendants – across 300 years of educational and economic change,' she says. Individual lives have unfolded before their eyes. Stories like that of the 24-year-olds Ana Regina and Magdalena Riethmüllerin, who were chastised in 1707 for reading books in church instead of listening to the sermon. 'This tells us they were continuing to develop their reading skills at least a decade after leaving school,' explains Ogilvie. The database also reveals the case of Juliana Schweickherdt, a 50-year-old spinster living in the small Black Forest community of Wildberg, who was reprimanded in 1752 by the local weavers' guild for 'weaving cloth and combing wool, counter to the guild ordinance'. When Juliana continued taking jobs reserved for male guild members, she was summoned before the guild court and told to pay a fine equivalent to one third of a servant's annual wage. It was a small act of defiance by today's standards, but it reflects a time when laws in Germany and elsewhere regulated people's access to labour markets. The dominance of guilds not only prevented people from using their skills, but also held back even the simplest industrial innovation.

E The data-gathering phase of the project has been completed and now, according to Ogilvie, it is time 'to ask the big questions'. One way to look at whether education causes economic growth is to 'hold wealth constant'. This involves following the lives of different people with the same level of wealth over a period of time. If wealth is constant, it is possible to discover whether education was, for example, linked to the cultivation of new crops, or to the adoption of industrial innovations like sewing machines. The team will also ask what aspect of education helped people engage more with productive and innovative activities. Was it, for instance, literacy, numeracy, book ownership, years of schooling? Was there a threshold level – a tipping point – that needed to be reached to affect economic performance?

F Ogilvie hopes to start finding answers to these questions over the next few years. One thing is already clear, she says: the relationship between education and economic growth is far from straightforward. 'German-speaking central Europe is an excellent laboratory for testing theories of economic growth,' she explains. Between 1600 and 1900, literacy rates and book ownership were high and yet the region remained poor. It was also the case that local guilds and merchant associations were extremely powerful and legislated against anything that undermined their monopolies. In villages throughout the region, guilds blocked labour migration and resisted changes that might reduce their influence.

'Early findings suggest that the potential benefits of education for the economy can be held back by other barriers, and this has implications for today,' says Ogilvie. 'Huge amounts are spent improving education in developing countries, but this spending can fail to deliver economic growth if restrictions block people – especially women and the poor – from using their education in economically productive ways. If economic institutions are poorly set up, for instance, education can't lead to growth.'

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Questions 14–18

Reading Passage 2 has six sections, **A–F**.

Which section contains the following information?

*Write the correct letter, **A–F**, in boxes 14–18 on your answer sheet.*

14 an explanation of the need for research to focus on individuals with a fairly consistent income

15 examples of the sources the database has been compiled from

16 an account of one individual's refusal to obey an order

17 a reference to a region being particularly suited to research into the link between education and economic growth

18 examples of the items included in a list of personal possessions

Questions 19–22

Complete the summary below.

*Choose **ONE WORD** from the passage for each answer.*

Write your answers in boxes 19–22 on your answer sheet.

Demographic reconstruction of two German communities

The database that Ogilvie and her team has compiled sheds light on the lives of a range of individuals, as well as those of their **19** ....., over a 300-year period. For example, Ana Regina and Magdalena Riethmüllerin were reprimanded for reading while they should have been paying attention to a **20** ..... There was also Juliana Schweickherdt, who came to the notice of the weavers' guild in the year 1752 for breaking guild rules. As a punishment, she was later given a **21** ..... Cases like this illustrate how the guilds could prevent **22** ..... and stop skilled people from working.

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Questions 23 and 24

*Choose **TWO** letters, **A–E**.*

Write the correct letters in boxes 23 and 24 on your answer sheet.

Which **TWO** of the following statements does the writer make about literacy rates in Section B?

A Very little research has been done into the link between high literacy rates and improved earnings.
B Literacy rates in Germany between 1600 and 1900 were very good.
C There is strong evidence that high literacy rates in the modern world result in economic growth.
D England is a good example of how high literacy rates helped a country industrialise.
E Economic growth can help to improve literacy rates.

Questions 25 and 26

*Choose **TWO** letters, **A–E**.*

Write the correct letters in boxes 25 and 26 on your answer sheet.

Which **TWO** of the following statements does the writer make in Section F about guilds in German-speaking Central Europe between 1600 and 1900?

A They helped young people to learn a skill.
B They were opposed to people moving to an area for work.
C They kept better records than guilds in other parts of the world.
D They opposed practices that threatened their control over a trade.
E They predominantly consisted of wealthy merchants.

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