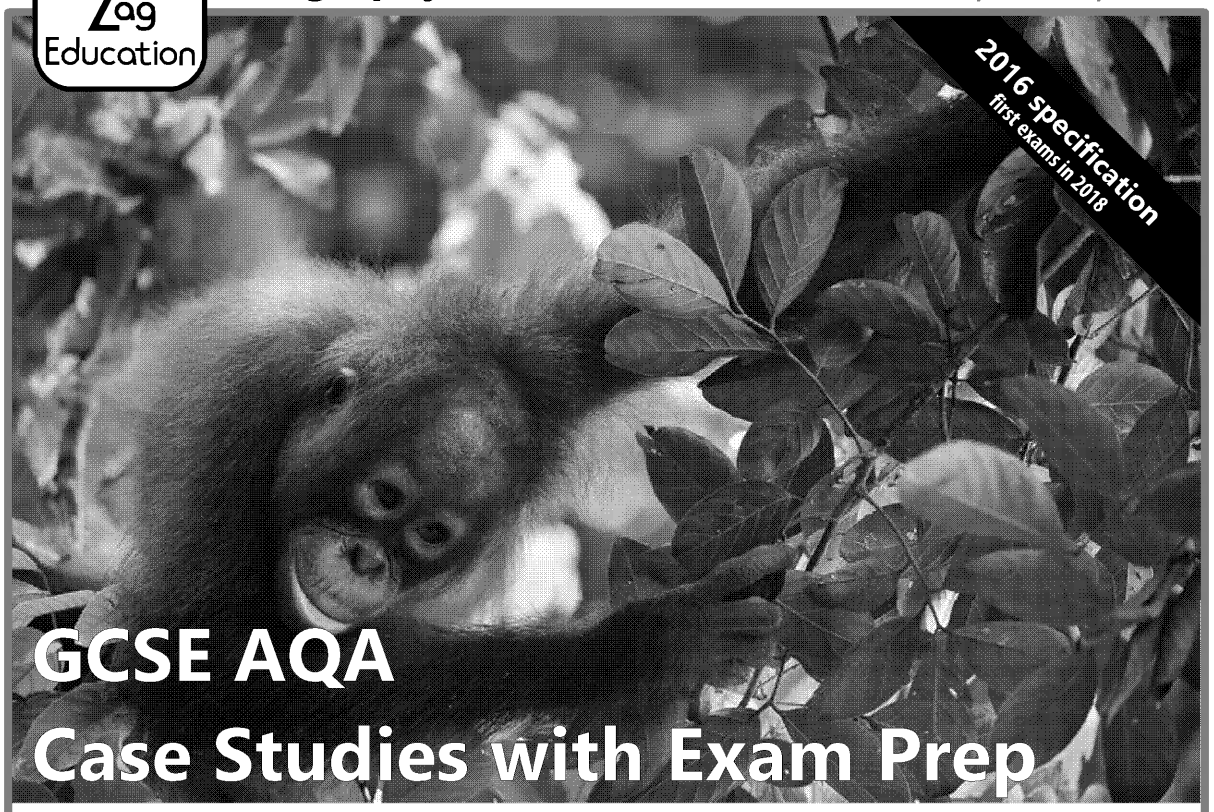
Zig Zag Education

Geography

GCSE (9–1)| AQA | 8035



GCSE AQA
Case Studies with Exam Prep

The Living World

Tropical Rainforest: Sumatra

zigzageducation.co.uk

POD 8794

Contents

Teacher's Introduction

This resource has been developed to provide case studies and exam preparation material to support the GCSE AQA specification (8035) **Section B: The Living World**.

This detailed case study is on **Tropical Rainforest: Sumatra** representing a **tropical rainforest** within a **lower-middle income country** based on World Bank classifications.

The case study includes a main content section which can be used as part of a lesson plan or distributed to students for self-guided research; a selection of ICT interactive links to further students' research around each topic and a set of Springboard Images and discussion questions (also available as a PPT file accessible by digital download) which makes a fantastic starter activity.

*A webpage containing all the links listed in this resource is conveniently provided on ZigZag Education's website at **zzed.uk/8794***

You may find this helpful for accessing the websites rather than typing in each URL.

The exam preparation section which follows the case study contains a summary table, bringing together all of the key facts and figures relating to the case study; rapid-fire revision questions (with answers) to help recall and retention of the main points; and an exam-style question and mark scheme, written in the style of the AQA sample material, so that students can practice answering questions relating to case studies and applying relevant knowledge in their answers.

The resource may be used as a source of reference for the required case studies for individual study, or for group work leading to discussion or debate. Subheadings in the information sections are designed to enable tabulated comparisons of social, economic and environmental impacts.

Four other detailed case studies are available for this topic area (a small-scale ecosystem, an additional tropical rainforest (in a LIC), a hot desert, and a cold environment):

- The River Otter, Devon
- Tropical Rainforests: Madagascar
- The Sonoran Desert, USA
- Sakha (Yakutia) Republic, Russia

A PowerPoint presentation containing the Springboard Images starter activity to accompany this resource is available as a free digital download. Just register for free updates using the link below to download all available content for your school or purchasing site.

November 2018

Part 1 - Case Study

List of Acronyms and Useful Terms

IUCN	International Union for Conservation of Nature
NGO	Non-governmental Organisation
REDD+	Reduced Emissions through Deforestation and Forest Deg
WWF	World Wide Fund for Nature
USAID	United States Agency for International Development
TRHS	Tropical Rainforest Heritage of Sumatra
FSC	Forest Stewardship Council
TRHS	Tropical Rainforest Heritage of Sumatra
UNESCO	United Nations Educational, Scientific and Cultural Orga
RSPO	Roundtable for Sustainable Palm Oil

Content

Introduction

The Sumatran rainforest is a good example of an endangered landscape. Su with rich biodiversity and endemism, and still contains areas of pristine for in south-east Asia. However, deforestation is taking place at an alarming ra even Brazil to become the country with the fastest rate in the world. Over a Sumatra's forest has been destroyed.

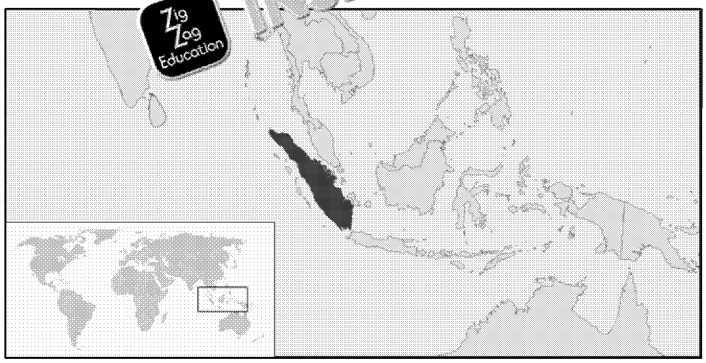


Figure 25: Sumatra's location

The largest cause of ever growing dema paper. There is son Sumatra, such as th which combine to f Heritage of Sumatr production in Suma threat not only to th economy and peopl taxes cannot be gen activity takes place, there is conflict between plantation owners and indige they are forced off their land and have little choice but to seek employment Alternatives are possible, and are discussed within this case study.

Description of the Rainforest

The rainforests of Sumatra have the classic multilayered structure, as trees
light. Emergents, 45–60 metres high, tower above the canopy below, and
trunks. What sets Sumatra apart from other rainforests is the Leuser Ecosy
and Acheh, a rich area – 2.6 million hectares – of forest including mountain
underlain by thick peat – unusual for rainforest soils.

This ecosystem provides a myriad of
goods and services; for example, a water
four million people – provides climate regu
duces flooding, maintains soils, and is of g
importance in terms of biodiversity. This ecosystem
e to the largest populations of the Sumatran tiger, rhino, elephant and orangutan. In total, the ecosystem contains at least 130 mammals and 325 species of bird – eight of which are endemic.

Figure 2

The Leuser Ecosystem falls into the backdrop of Sumatran rainforest. Throughout the large island, which ecoregions, are at least 15,000 plant to be discovered), 580 species of bir mammal. Some of these species ar some are also
emic to Sumatra – on Ea
P
ulation sizes are som
angered and endemic species, s (around 100 individuals), and Sum individuals) (2013 figures). While t tigers are high-profile species, there deer, flying
ats and the clouded leopards.

Protection of rainforest ecosystems is critical to protect the high biodiversit peat – a store of carbon 19 gigatons in size. This is no small number. Peat i accounts for 40% of Indonesia's carbon store. Release of this stored carbon change: the total amount of carbon locked up in the peat is comparative to greenhouse gas emissions. Peat swamp forests are found in coastal areas, cover, and contain 3% of the orangutan population.

Sumatra has a population of 50 million people. The population includes in traditional ethnic groups (whose w also migr
n other parts of A

Figure 27: A clouded leopard

Threats: Farming

One of the biggest threat
largest, to Sumatran rainforest is the cl demand for
satiable appetite for palm oil – edible oil used in is likely to
increase due to population growth and further use as a b that by 2050, demand for palm oil could more than double to 240 Mt yr^{-1}. T used for biofuels too. Plantations are usually allowed (called a concession), three metres deep (a legal requirement to protect areas of pristine forest wi from Sumatra is bought (possibly unknowingly) by large, multinational co names and brands.

Throughout Indonesia as a whole, palm oil production accounts for 25% o
and its neighbour, Borneo, accounts for half the global supply of oil. Local
rainforest is burned by palm oil companies, meaning that their traditional
employment on the plantations. This has been a source of conflict in the pa

Threats from palm oil production include:

- Drainage of wetlands
- Carbon release (including [illegible] in peat fires) contrib[illegible] climate change
- Habit[illegible] fragmentation
- No pr[illegible] of tigers in areas of palm oil production

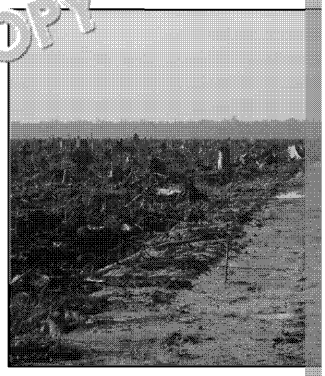


Figure 28: Land clea

Other crops:

- Coffee is also grown in Sumatra
- Timber plantations are also grown for pulp (including for use as toilet paper)

Threats: Logging

Figure 29: Palm trees, used for oil production

Both legal and illegal loggi
used for timber, wood proc
timber demand is increasin
and C[illegible]a. Illegal logging
[illegible]ti[illegible]ted to account for up
operations.

In 2009, the Indonesian go
moratorium (temporary ba
2015 for another two-year
this scheme doesn't extend
only protects primary fores

Two paper mills are attributed for causing a significant amount of deforest
company is estimated to have cleared five million acres of forest since the
unsustainable forest practices, has been banned from carrying the FSC[1] log

[1] FSC is a mark given for timber products to signify that the timber was sourced fr

company involved has counterargued that the land used for timber produc
barren.

Figure 30: Logging in neighbouring Borneo

The environmental damage caused by logging is similar to the threats from
and fragmentation, degradation to carbon sinks and peat, and further dang

Other Threats:

Road Building

Road building opens up the forest for logging and illegal poaching (anothe
becomes accessible, threatening tiger populations (one of the species target
forest also becomes fragmented, broken into smaller, less-resilient areas. F
likely to approach roads; some animals may not cross roads, and there is m
collisions.

Energy

As Indonesia is located on the Pacific Ring of Fire, the region is tectonically
geothermal energy plants have been set up on Sumatra. In the future, furth
built, increasing the pressure to expand into forested areas.

Changing Rates of Deforestation

The amount of forest cover is rapidly decreasing in Sumatra, and across Ind
is now deforesting its trees at a faster rate than any other country in the wo

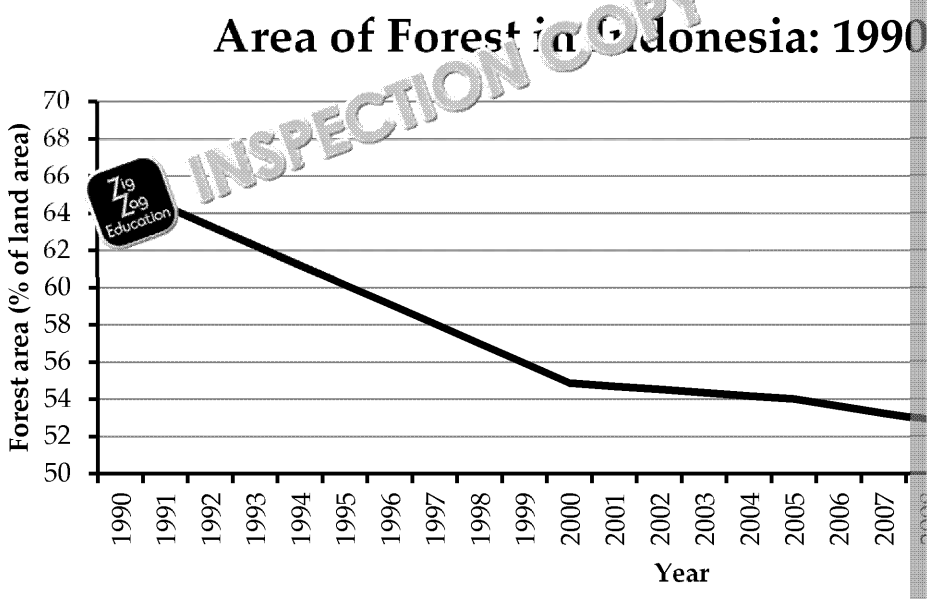


Figure 31: Source: The World Bank

Sumatra has lost half of its forest since 1[illegible] there are only 31 million acres
Sumatra itself lost 7.5 million hectares, 2.6 million of which was primary fo
what is called 'primary degraded forest'.

Lowland forests are rapidly declining; however, as this more accessible forest
increasing in less accessible, mountainous areas.

Perhaps the worst affected region of Sumatra is Riau, which had lost two-th
2011. In the three short years between 2009 and 2011, tiger habitat was sign
The largest causes of the deforestation were palm oil and pulpwood, reflect

Conservation

Conservation is vital to the protection of Sumatra's rainforest. Numerous s
have been introduced by different stakeholders (governments and NGOs.

Schemes include:

Thirty Hills (WWF)

Thirty Hill[illegible] set up in August 2015 with the Orangutan Project a
Society. Its[illegible] to protect 100,000 acres of forest that would otherwise be
protecting biodiversity and saving carbon from being released. The area w
peoples (with assistance from WWF and provision of alternative livelihood
areas will be restored. Protection will be provided by use of drones to map
inhabited, and an 'eyes on forest' unit will be set up, using satellites to mon
of the scheme is to work with Michelin, a large rubber-producing company
rubber plantations on surrounding land, and for indigenous peoples to sell
have produced in the Thirty Hills area.

Natural Capital Project (WWF)

This scheme is a collaborative venture between WWF, several universities,
The aim is to provide free computer software including policy tools to anal
economic and environmental issues relating to manag[illegible]ents. The softwar
by government at different scales to plan land[illegible] – [illegible]otecting the most im
they are kept free from logging and o[illegible]rms of disturbance.

Moratorium on Logg[illegible] 2[illegible] – at least 2018)

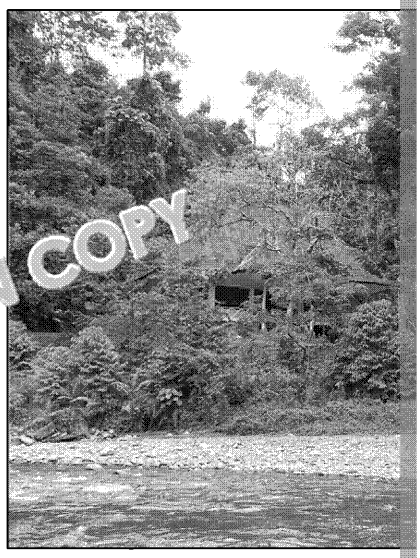
Figure 32: Sumatra's rainforests are an imp[illegible]ater source

Since 2009, the Ind
placed a moratori
pristine areas. Alt
across Indonesia h
criticism has been
doesn't extend far
protects primary f
important habitats
licences, and cann
because a lot of de
Critics allege gove
enforcement, and
forest protected un
already protected,
logging operations

National Go[illegible]rn[illegible]tection

To help pr[illegible]ological[illegible]ly important areas, 'strategic areas', such as the L
government passed an act allowing fines and imprisonment for those unde
part, this was to reduce government corruption (for example, government
activity).

The Tropical Rainforest Heritage



In 2004, a UNESCO world heritage site was established in Sumatra, covering three mountainous national parks along Sumatra's south-west coast. The combined protected area covers 25,000 km², and conservation is in-situ – i.e. protecting the genetic biodiversity of the parks – important for their high biodiversity (10,000 plant species between the... high level of endemic species. Threatened / endangered species. Buffer zones add further protection.

Although the parks themselves are protected by law – no logging or saw m roads are permitted (those existing are only used for patrols) – outside thre logging, poaching and the introduction of invasive species are still an issue may also attempt to encroach into the protected areas, converting land fro mineral extraction sites, or renewable energy installations. Additionally, b missing in the past and require replacement.

The parks are protected through patrols (from police, army and local peop SPOT imaging and camera traps) and DNA analysis. The parks cost mone sets of emergency funding totalling $96,000.

Voluntary Action:

In 2004, the Roundtable for Sustainable Palm Oil (RSPO) was established t adhere to sustainable practices. As this is a voluntary scheme, uptake ha 2012, only ... of palm oil was certified by RSPO.

Education

Education is important in protecting rainforest – ensuring that people kno the importance of the forest.

A success story is an example of an illegal logger who was arrested. The ec police enabled him to persuade the police to release him so that he could i effects, and he has now set up a large coffee cooperative in South Sumatra. former illegal loggers who have now bought up small areas of land for lega

Community Programmes

An example of a community programme is the Sumatran Orangutan Societ protect the rainforest. This is achieved through ecotourism, fish farming, o and biogas.

Ecotourism as Alternative Livelihoods

Ecotourism is a form of niche tourism where local residents provide small- accommodation and tours to visitors, with the aim of reducing tourists' en allowing tourists to experience village life – tourists are sometimes welcom and join in with everyday activities. Ancillary employment is also gained, interpreters. Ecotourism is a type of alternative livelihood – a substitute fo

damaging activities – and is encouraged by the government. Additionally, of income for conservation activities.

Figure 34: One of Sumatra's iconic species – the Sumatran orangutan

WWF works with local people, the government and industry to reduce the impact on wildlife in Sumatra. Ecotourism also takes place in TNBBS. An ecotourism success story is the establishment of an elephant camp. Due to habitat destruction by humans, elephants' territories have been reduced in size, making elephants aggressive towards humans. These elephants were rounded up and are now used to patrol areas with locals to help stop illegal logging by educating the loggers. A downside of the initiative is that local people do not have any legal power to stop the loggers.

Sustainable Farming

The ethos of sustainable farming is to reduce the environmental impact, all conserved for future generations. This can be applied to palm oil productio

- Apply fertiliser at the right time
- Regular pruning
- Increased efficiency – reduce wastage
- Application of mulch

A method to ensure that sustainable practices are adhered to can be applied and has been seen in the Sumatran pulpwood industry – buyers stop purch their environmental practices have improved and the full supply chain can

International Agreements and Action

International agreements are forms of intervention or protection initiated b and charities.

An example is a global initiative called REDD (Reducing Emissions from D Degradation). Under this scheme, countries who want to emit carbon diox rainforest to preserve their trees to offset their emissions. An agreement be government and the President and Norway was signed in 2010; however, it convincing the government to commit, cited by some as a result of corrupti governance.

In 2015, UNESCO held talks with 42 participants, which included governm promote sustainable management through conservation, protection of heri mitigation.

Conclusion

Sumatra is an important region – its forests are home to thousands of differ and endemic, and it still houses sections of intact ecosystem. The habitats i

importance due to their high genetic biodiversity and the vast stores of carb
them – helping to regulate global climate.

Sumatran ecosystems are under threat – from rapid increases in palm oil pr
pulpwood, which both destroy and fragment the forest. However, there ar
and initiatives to reduce the threat – for example, by implementing protecti
ecotourism, education and community engagement.

Fact Table

Area of Leuser Ecosystem:	2.6 million ha
Number of plant species in Sumatra:	15,000
Species of bird:	580
Species of mammal:	200
Remaining Sumatran rhino:	100
Remaining Sumatran tigers:	250–400
Carbon store of the rainforest:	19 gigatons
Demand for palm oil by 2050:	240 Mt yr^{-1}
Population of Sumatra:	50 million
Forest clearance for palm oil:	25%
Percentage of illegal logging in Indonesia:	80%
Year logging moratorium was imp	2009
Area of Sumatra deforested between 1990 and 2010:	7.5 million ha
Area protected by T[illegible]:	10,000 acres
Area of T[illegible]	25,000 km^2
Participa[illegible] the 2015 UNESCO talk:	42

ICT Interactive Page

Rather than type out these web

Videos:

Guardian article with video – does the Sumatran rain[illegible]t only have 20 yea
- **http://www.theguardian.com/world/2013/[illegible]sumatra-borneo-defore**

Greenpeace: Saving Sumat[illegible]
- **https://ww[illegible]om/watch?v=EJt3LbccdC0**

RSPB: Save [illegible]umatran Rainforest
- **https://www.youtube.com/watch?v=gISW2dSepJM**

Ecotourism and conservation – *Sydney Morning Herald*
- **http://www.smh.com.au/world/the-fight-for-a-forest-paradise-20130906-**

News Stories:

Mongabay – a great source of news and rainforest resources
- **https://news.mongabay.com/list/rainforests/**

Earth Day, 2016
- **https://www.rainforesttrust.org/news/protecting-[illegible]tras-last-great-wil**

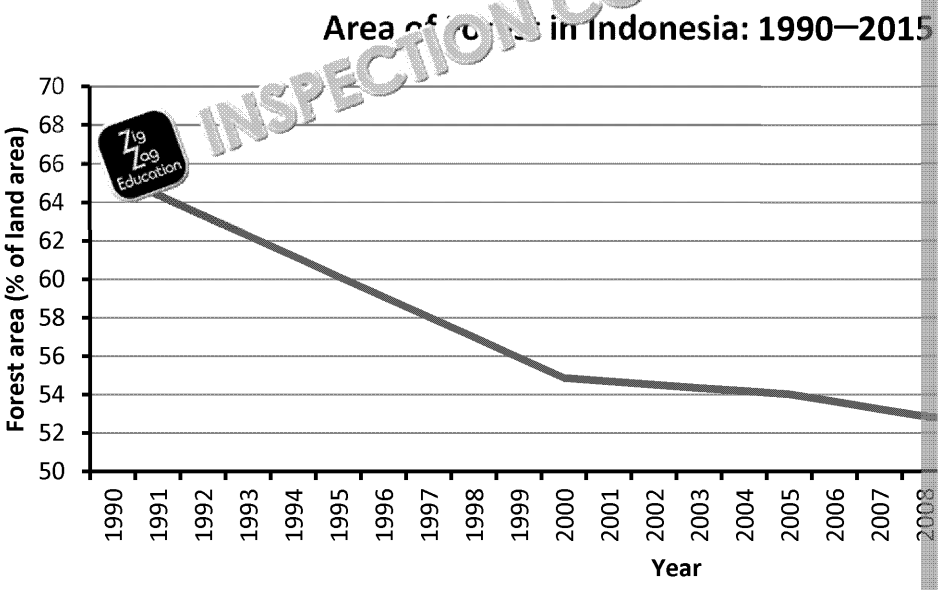
Protecting Sumatra's orangutans – BB[illegible]
- **http://www.bbc.co.uk/n[illegible]europe-jersey-23185404**

Protecting [illegible]tra[illegible]elephants – Rainforest Trust
- **https://[illegible]rainforesttrust.org/news/new-protection-sumatran-elephan**

Deforestation in the Leuser Ecosystem – *Daily Mail*
- **http://www.dailymail.co.uk/news/article-3569263/How-human-greed-de[illegible]**
  rainforest-dubbed-earth-s-lungs-pushing-Sumatran-orangutan-one-step

Springboards

Springboard 1



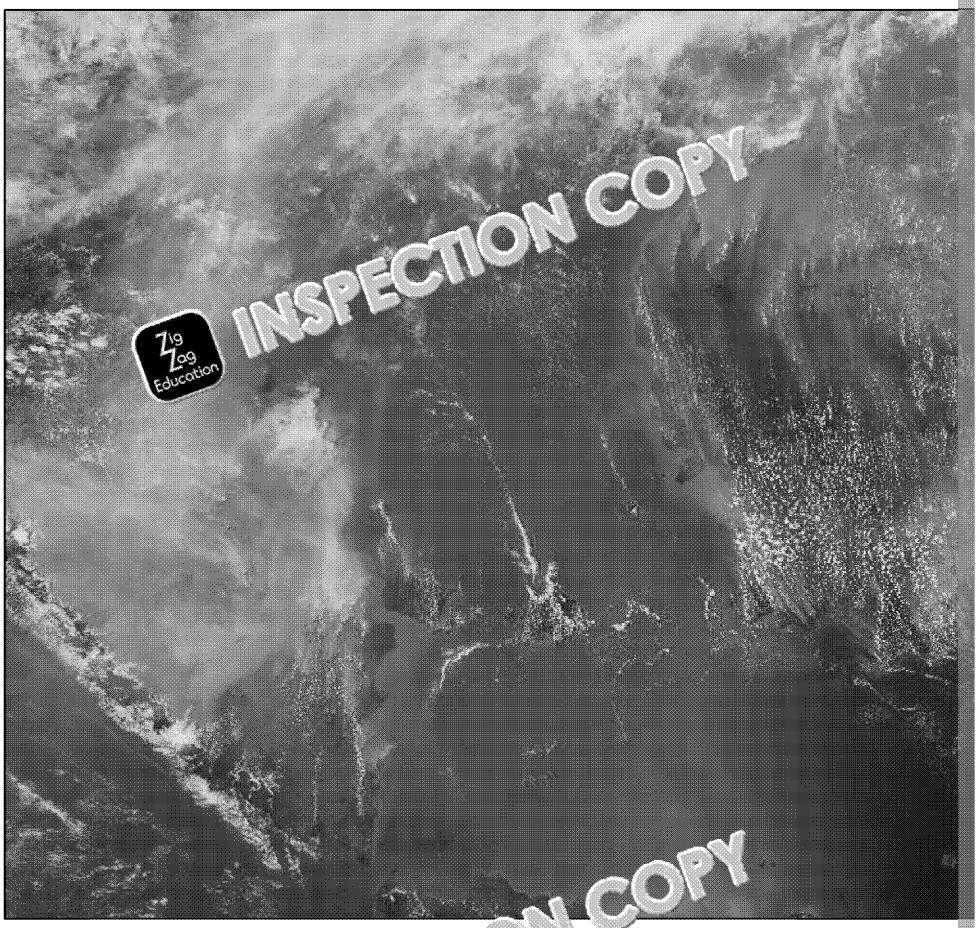
Source: The World Bank

1. Describe the data. Can any of the trends be explained?

2. Discuss how reliable you think that data is.

3. How useful is this data in identifying deforestation rates in Indonesia?

1. What does this image show?
2. Why is this land use so damaging to the environment?
3. Why might this type of land use become more prevalent in the future?



1. What does this photograph show?
2. Name the type of land clearance which is taking place in this photograph.
3. Describe the impact of this type of land use.

1. Describe the TRHS scheme.

2. What are the benefits of protected areas?

3. What are the challenges in enforcing the protection of such areas?

1. What do you think is happening in this photograph?
2. Why do you think that this method of protection is more effective than
3. Why do you think that illegal activity is so difficult to police?

Read this article after you have completed your discussion!

https://www.newscientist.com/article/mg21829205-600-old-smartphones-forests/

Springboard Suggested Answers

Springboard 1

1	• Forest area declined rapidly between 1990 and 200[illegible] from just over 65% 10 years. • Deforestation considerably slower until 2014, only decreasing by 5% in • Forest cover stayed the same between 2014 and 2015. • This data [illegible] odds with the fact that the deforestation rate in Indo[illegible] the fastest deforesting country. • It is possible that the growth in palm plantations (which are essentially increased the forest cover; likewise plantation forest for use as pulpwo • Recent conservation efforts, such as the creation of national parks and t have been a cause.
2	• The data is from the World Bank, and, therefore, likely to be reliable. H ambiguity over the sources of the original data – for example, if data o governments.
3	• No differentiation between primary and secondary forest. • Cannot tell whether the forest is degraded in quality. • Data covers the whole of Indonesia – some countries may increase fore cover.

Springboard 2

1	• A palm oil plantation – with a ha[illegible] a [illegible]t in the centre.
2	• Destroys natural rainf[illegible]res a[illegible], therefore, habitats. • Excludes wil[illegible] such as tigers and orangutans, no protection for these • [illegible] fr[illegible]mentation – the remaining forest is split into ever smaller a • [illegible] underlying peat to degrade and increased risk of peat fires. Bot atmosphere and contribute to climate change.
3	• Increase in demand for edible oils – many food products now contain p • Increase in population also increases demand. • Potential use as a biofuel and, therefore, a new market.

Springboard 3

1	• Smoke rising from the islands of Sumatra and neighbouring Borneo – f possibly forest/peat fires.
2	• Slash-and-burn – used by small-scale farmers. Although, fire is someti plantations.
3	• Destroys all habitat • Damages peat below • Fires can spread out of [illegible]

Springboard 4

1	• Three national parks on Sumatra's mountainous coast • High biodiversity – 10,000 plant species • Established in 2004 by UNESCO • Covers a combined area of 25,000 km² • No logging or other activities are allowed • In-situ conservation • Threats are from outside the park • Buffer zone • Ecotourism within the park
2	• [illegible] species • [illegible]ng activities cannot take place • Alternative livelihoods are possible – e.g. ecotourism • Policing is possible
3	• Requires money to fund • Requires rangers to patrol – the park is large and, therefore, difficult to • Much of the logging in Sumatra is illegal • Local residents who patrol don't have any power to stop the illegal log • Constant pressure from outside • Boundary posts are removed

Springboard 5

1	• This is a trial where a microphone is being installed – powered by solar a mobile phone, which detects the sound of chainsaws and alerts autho
2	• Alerts authorities/rangers in real time so that the trees can be prevented images only show that trees have been cut down! • Cheaper than satellite image interpretation • Can be used in very remote areas which are difficult to monitor • [illegible] areas of 500 metres
3	• [illegible]s are spread thinly on the ground • Difficult to reach remote areas • Much of the logging is illegal

Summary

Sumatran Rainforest

Question	An
Where is Sumatra located?	*The large island to the west of In*
Where is the Leuser Ecosystem located?	*Northern Sumatra*
How many species are found on the island?	*15,000*
Is this number accurate?	*Accurate in terms of known spec more yet to be discovered!*
Some species, such as the Sumatran tiger, are endemic species. What does this mean?	*The animal is found only in Sum makes the population inherently*
Why is the Sumatran rhino particularly vulnerable to extinction?	*There are very few individuals le*
How much carbon is stored in peat?	*19 gigatons*
Why is this carbon significant globally?	*This is an important store of carb atmosphere would cause climate*
What are the two biggest threats to Sumatran rainforest?	*Palm oil production and logging*
Why is the threat of logging difficult to alleviate?	*Most of th logging (up to 80% i th e, unregulated.*
How many paper mills cause the majori logging damage?	*Two*
What is FSC?	*Certification meaning that the ti from sustainable forests.*
Why are roads damaging to the rainforest?	• *Increased accessibility into t* • *Facilitates the removal of tim* • *Breaks up the rainforest into* • *Some animals won't go nea* • *Increased risk of death from t*
Which form of energy may be further developed in Indonesia?	*Geothermal*
When did the rate of forest loss begin to decrease in Indonesia?	*2000*
When was Thirty Hills started?	*August 2015*
How long is Thirty Hills estimated to last for?	*60 years*
What form does the Natural Capital Project take?	*Comp oftware*
When was a moratorium on logging first established?	*2009*
Why might the moratorium be less effective then was hoped	• *Only covers primary forest* • *Only covers new concessions* • *Poor enforcement* • *Government corruption* • *Forest is already protected o*
When was TRHS established?	*2004*
Who established TRHS?	*UNESCO*

Question	
How many national parks are combined to form TRHS?	*Three*
How large is TRHS in total?	*25,000 km²*
Between the national parks of TRHS, how many plant species may be found?	*10,000*
In 2012, how much palm oil was certified by the RSPO?	*15%*
Give an example of an alternative livelihood.	*Ecotourism, bee keeping,*
What is sustainable farming?	*Farming which reduces th that the land can be used*
Name an international agreement which could affect Sumatra.	*REDD*
How does this scheme work?	*Rainforest is protected to generated in other countr*

Quick-fire Questions

1	How many people li[illegible]ra?	
2	What [illegible] so[illegible] underlays rainforest in Sumatra?	
3	What types of rainforest are found in Sumatra?	
4	What is the name of the ecosystem in northern Sumatra?	
5	How many plant species are found in Sumatra?	
6	What is the largest cause of deforestation in Sumatra?	
7	Why is this land use dama[illegible]g fo[illegible]tive peoples?	
8	Name [illegible] other crop planted in Sumatra.	
9	In Indonesia, what percentage of logging is thought to be illegal?	
10	Why is road building so damaging to rainforests?	
11	How much of Sumatra's f[illegible] ha[illegible]been destroyed since 1985?	
12	Why i[illegible]nd[illegible] being chopped down the fastest?	

13	Which is the region of Sumatra where deforestation is occurring fastest?	
14	What are the aims of the Thirty Hills programme?	
15	What is the aim of the Natural Capital Project?	
16	When did the Indonesian Government first impose a moratorium on logging?	
17	How effective has the moratorium been?	
18	Who established TRHS?	
19	Name an outside threat to TRHS.	
20	How effective is RSPO?	
21	Why is education important in protecting rainforests?	
22	What is an alternative livelihood?	
23	What is sustainable farming?	
24	Name an international agreement to help protect rainforests.	
25	What did UNESCO do in Sumatra in 2015?	

Quick-fire Answers

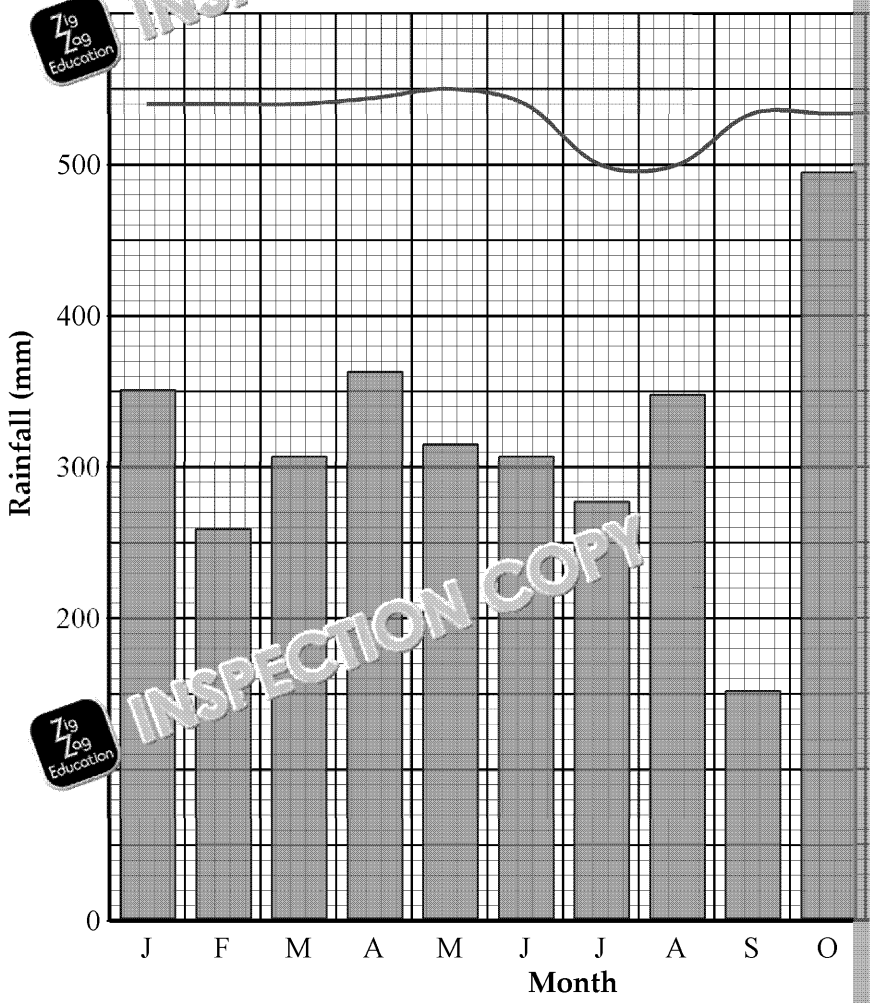
1	How many people li… …tra?	*50 million*
2	What … so… underlays rainforest in Sumatra?	*Peat*
3	What types of rainforest are found in Sumatra?	*Lowland forest, and m*
4	What is the name of the ecosystem in northern Sumatra?	*The Leuser Ecosystem*
5	How many plant species are found in Sumatra?	*15,000*
6	What is the largest cause of deforestation in Sumatra?	*Palm oil plantations*
7	Why is this land use dama…ing fo… …tive peoples?	*They are forced off lan life because the plants peoples sometimes clai this reason.*
8	Name one other crop planted in Sumatra.	*Coffee* *Trees for pulpwood*
9	In Indonesia, what percentage of logging is thought to be illegal?	*80%*
10	Why is road building so damaging to rainforest…?	*Open up the forest for people to move in and Roads scare away ani*
11	How much of Sumat… …s… …as been destroyed since 1985?	*Half*
12	Why i… …nd …orest being chopped down the fastest?	*It is more accessible th*

13	Which is the region of Sumatra where deforestation is occurring fastest?	*Riau*
14	What are the aims of the Thirty Hills programme?	*To protect 10,000 acres of forest [illegible] the forest, and alternative livelih[illegible] produced.*
15	What is the aim of the Natural Capital [illegible]?	*To provide software tools to bett[illegible]*
16	When did the Indonesian G[illegible] first impose a moratorium on logging?	*2009*
17	How effective has the moratorium been?	*Some people question the effecti[illegible] new permits; the majority of the [illegible] log. Furthermore, the majority [illegible]*
18	Who established TRHS?	*UNESCO*
19	Name an outside threat to TRHS.	*Mining, illegal logging/poachin[illegible]*
20	How effective is RSPO?	*Limited, because the scheme is v[illegible]*
21	Why is education important in pr[illegible]ng rainforests?	*It teaches local people and illegal [illegible] hopefully discourage their damag[illegible]*
22	What is an alter[illegible]e livelihood?	*A form of employment which is [illegible] partake in damaging activities s[illegible]*
23	What is sustainable farming?	*Practising agricultural methods [illegible] that the environment is protecte[illegible]*
24	Name an international agreement to help protect rainfo[illegible]sts	*REDD* *FSC*
25	What did UNESCO do in Sumatra in 20[illegible]?	*Held talks with 42 participants [illegible]*

Extension Questions

1. The climate graph below uses data from Padang in Sumatra. Padang i
Sumatra's south-west coast.

Comment on the characteristics of th li. e in Sumatra, and explain
found in Sumatra.



2. Which type of species is the most vulnerable? Explain why.

3. Peat is a carbon sink – what does this mean?

4. Describe the structure of a tropical rainforest.

5. Why might animals only emerge at night within a tropical rainforest?

6. Study the image below and outline how the plants are adapted to t

7. Outline the threats witnessed in the Sum[illegible]nforest.

8. Suggest why conservation in countries such as Sumatra is often difficu

9. How [illegible]people help protect rainforest?

10. Suggest different scales on which rainforest can be protected.

Extension Answers

1. High temperature throughout the year – usually around 26 to 28 °C, with a sli
and September (still above 24 °C). High annual rainfall between approximate
driest in September, and wettest in December.

   These conditions are excellent for ... warm and wet all year (little, if an
are few limiting factors for ... owth. A rich ecosystem is maintained, with high
biomass.

2. Endem... ...es, especially those with very few individuals, such as the Sum
is likely to be small, and the few individuals left could easily be wiped out.

3. Peat is made from dead plant matter, but because the conditions are waterlog
Therefore, the dead plant material (which contains many carbon products as
photosynthesising) is stored for a long time, locking up carbon from the atmo
of climate change.

4. Rainforests have a layered structure – e.g. a few very tall trees called emergen
below, up to 40 or 50 metres. Under the canopy are smaller, understorey tree
found shrubs and below, herbs.

5. Some animals are nocturnal because there are fewer predators around at nigh

6. The tree on the left clearly has buttress roots – ...ll ... are emergent and, ther
grow very tall. Climbing plants can ... – these use tree trunks for suppor
the light. Leaves have drip ti... ... waxy – this is to increase run-off to d
growing on the surf... ... would reduce light.

7.
   - A... ...re, e.g. coffee, rubber, pulp trees
   - Log...ing – both legal, and, more commonly, illegal logging
   - Road building
   - Mining
   - Energy production (renewable)
   - Invasive species
   - Illegal poaching
   - Any other valid point(s)

8.
   - Lack of funding
   - Large area to police
   - Corruption (e.g. government)
   - Local people may be powerless to stop illegal activ...es
   - Much of the activity is illegal and, therefore, ... gulated

9. Develop alternative livelihood... ... increase sustainability. Undertake patrol
authorities.

10. Interna... – e.g. international agreements such as REDD, also international
FFC.

    Countrywide – e.g. government laws, moratorium on logging, etc.
    Local – e.g. small-scale initiatives such as Thirty Hills.

Exam-style Question

Evalua[illegible]e success of sustainable strategies used to mana[illegible] rainforest you have studied.

Level Marking

Level	Mark	Description
1	1–3	• The student evidences basic knowledge o (AO1) • The student evidences limited understandi that exist between p[illegible]s, environments a • A limited abil[illegible]aluate is evidenced th knowl[illegible]a[illegible]understanding. (AO3)
2	4–6	• The student evidences some knowledge o (AO1) • The student evidences good understandin exist between places, environments and p • A reasonable ability to evaluate is evidenc application of knowledge and understandi
3	7–9	• The student evidences thorough knowledg (AO1) • The student evidences a firm understandi exist between places, environments and p • A strong ability to evaluate is evidenced th of knowledge and understanding. (AO3)

Indicative Content

- The student should offer an evaluation of the success of sustainable st rainforests.
- The student should clearly identify the successes and failures of the sc the tropical rainforest. They should then conclude how successful the s

Suggested Content

	Successes	
Sumatran Rainforest	• Various conservation schemes have been set up to try to protect the Sumatran rainforest. • One of these is Thirty Hills, which was set up in 2015 with the aim of protecting 100,000 acres of forest for 60 year • UNESCO have also est[illegible] they are aiming to protect [illegible],000 km² of mountain[illegible] national parks in Sumatra. • [illegible]overnment also set up a ban in 2009 [illegible] logging happening in certain areas. • The increase in education and ecotourism has helped some illegal loggers find legal ways to make money.	• There has bee[illegible] up by the gove[illegible] enough area. [illegible] law enforceme[illegible] poaching are s[illegible] • Despite there [illegible] national parks, [illegible] land used for [illegible] encroaching in[illegible] • In some areas [illegible] gone missing.

Spelling and Grammar (SPaG) – Total of 3 marks

For 1 mark:

- Student shows some ability to spell and punctuate correctly.
- Student shows limited use of grammar to convey their argument.
- Student utilises a basic range of geographical phrases.

For 2 marks:

- Student generally uses good spelling and punctuation throughout.
- Student shows some accurate use of grammar to [illegible]nvey their argume[illegible]
- Student utilises an adequate range of geo[illegible]al phrases.

For 3 marks:

- Student uses corre[illegible] and punctuation throughout.
- Stude[illegible] use of grammar to clearly convey their argum[illegible]
- Stude[illegible]es a broad range of geographical phrases.