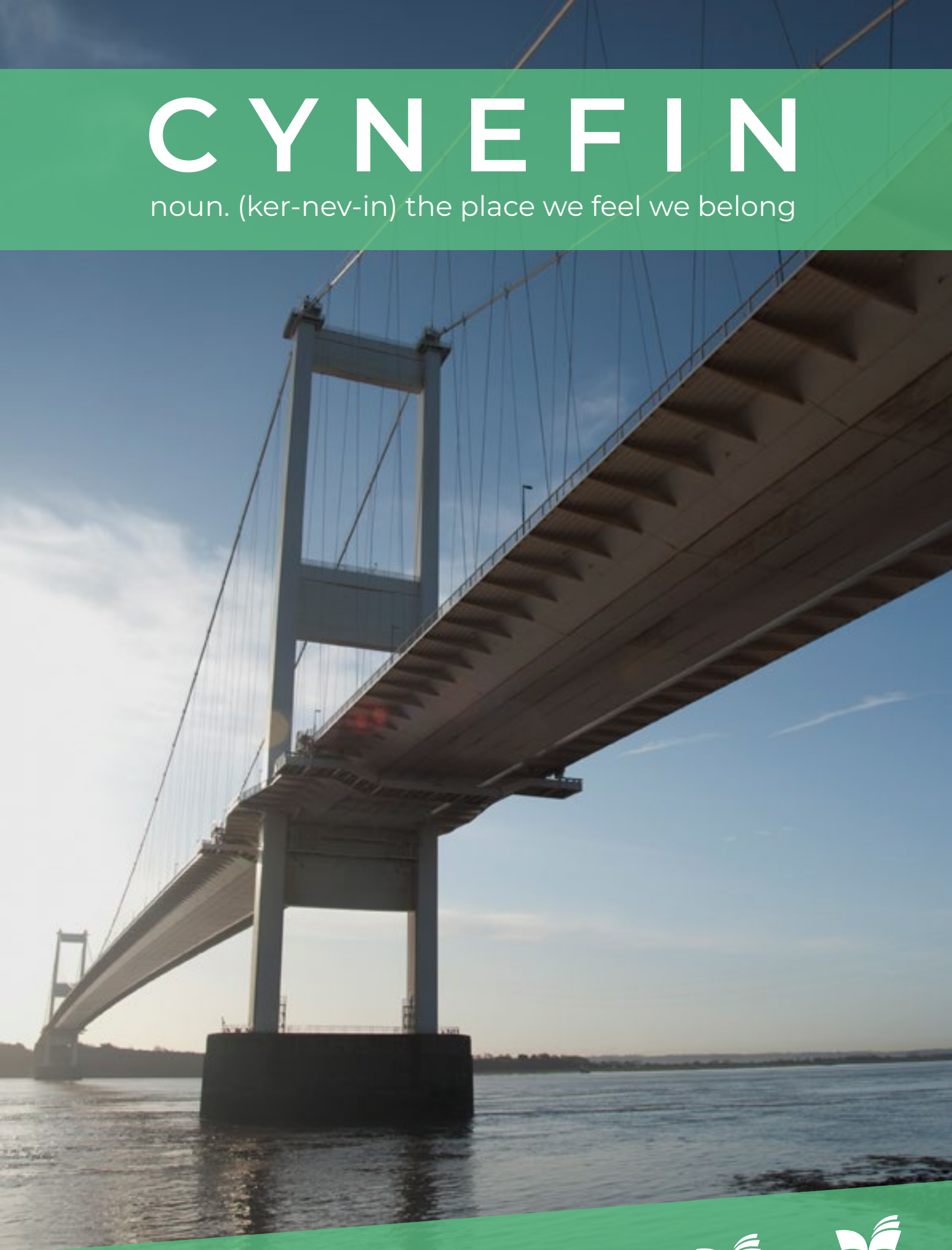
CYNEFIN

noun. (ker-nev-in) the place we feel we belong



Issue 3

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Contents

Introduction

Welcome to the third issue of Cynefin.

Our online magazine aims to provide a mix of knowledge updates, support and practical ideas for those teaching WJEC and Eduqas Geography qualifications and we hope that it continues to be a useful resource for teachers and students alike.

This issue contains a series of GCSE Exam Reviews, reflecting on candidate performance in summer 2023. Thank you to all the senior examiners who have shared their knowledge and experience. We hope that these are useful to all our GCSE candidates as they prepare for this year's exams. Further reflections on other units and components will be published in upcoming issues of Cynefin.

At the 2023 Geographical Association Conference in Guildford, Carly Hill-Banks (Editorial and Accessibility Advisor at WJEC) delivered a fascinating and illuminating session for teachers on dealing with colour blindness (CVD) issues in the classroom. The response was overwhelmingly positive, and in this issue, Carly presents a practical guide for teachers on recognising and tackling CVD issues. 'Colour blindness in the classroom...' is a must read and we hope you will share its messages both with your geography colleagues and with others across your schools and colleges. Also in this issue you will find Laura Roberts from Ysgol Friars sharing her classroom experiences in developing metacognition skills with students as they work on their A level NEA proposals. Sue Warn offers practical guidance for all A level candidates attempting to structure their Unit 4 or Component 3 essays to maximum effect and Professor Mark Whitehead from Aberystwyth University takes an in-depth look at the latest issues concerning urban water resources; this is a very useful read for any candidate preparing for synoptic questions in their upcoming assessments. And finally, we have the first of a new series of articles titled 'Geography works...' where we ask those who have studied geography at GCSE and A level to share their experiences of applying the knowledge, understanding and skills learned to the world beyond the classroom. A special thank you to Nia Jones for being our first contributor.

We are very grateful to all the contributors who have generously supported this edition. If you would like to write an article for our next edition, share some wisdom with your fellow teachers, or ask your students to submit a piece reflecting on their experiences of the past year, please do get in touch. We would love to hear from you. As always, please do not hesitate to get in touch with your WJEC Eduqas subject support teams if we can assist in any way.

With our very best wishes,

Rob and Erin

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Colour blindness in the classroom – five ways to help learners with CVD

Colour can be a useful tool in the classroom, providing contrast in diagrams, graphs and charts or adding interest and vibrancy to teaching materials. But for some learners, it can also be an obstacle. Carly Hill-Banks, Eduqas/WJEC Editorial and Accessibility Advisor explains:

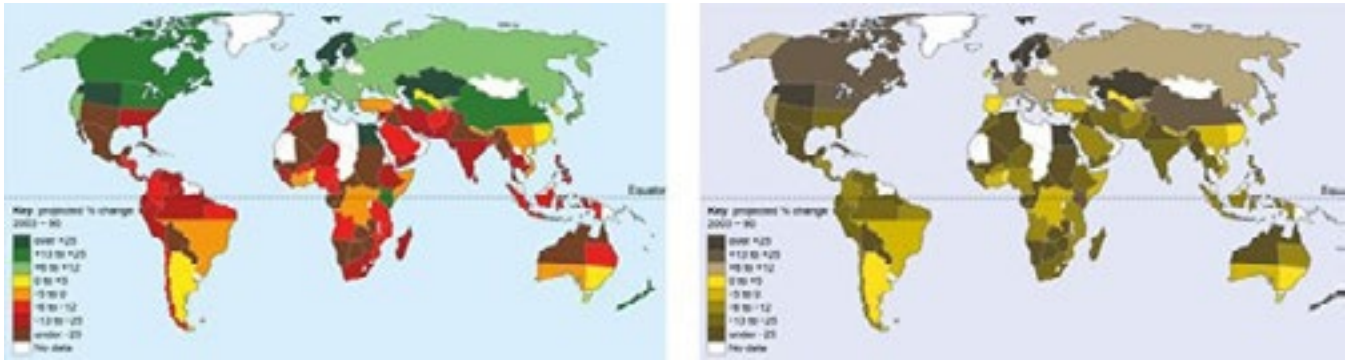
'Colour vision deficiency (CVD), more commonly known as colour blindness, affects 1 in 12 boys (8%) and 1 in 200 girls (0.5%). In the UK there are approximately 450,000 colour blind school age pupils. Statistically speaking, this means at least one child in every classroom will have some degree of colour blindness.'

How CVD affects learners

Due to a combination of factors, including a lack of awareness and the absence of routine screening, most remain undiagnosed throughout their school career. This can put learners with CVD at a disadvantage when exams or classroom activities rely on colour.

Some subject areas are especially difficult for affected learners, such as Geography. Erin Roberts, Subject Officer for AS/A Level Geography at WJEC/Eduqas explains:

'With a range of photographs, graphs, maps and diagrams to interpret, learners with colour vision deficiency may find geography lessons particularly challenging. Colour is often the primary element used to differentiate between different features and datasets.'



Left: Normal colour vision. Right: CVD simulation

While Geography offers some obvious examples of the issues colour blindness can cause students, there are potential pitfalls across all subject areas. This quote from Josh, a young

learner with CVD, highlights the difficulties he faced in maths lessons:

'A lot of my coursework relied on colours for graphs, which I found difficult and I'd be worried about exam papers with coloured sections. When exam papers are black and white I don't have problems understanding information. My current maths teacher uses information in PowerPoint where the background and the text are too similar, so I have to rely on my friends to tell me what they say.'

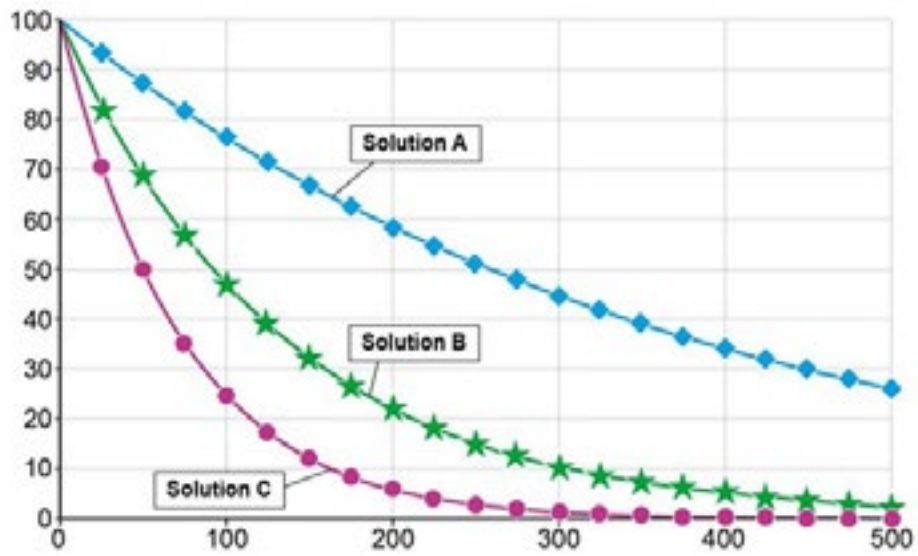
Improving CVD accessibility

At WJEC/Eduqas, we've long been at the forefront of creating accessible assessment materials for learners affected with CVD. In 2020 we worked closely with Colour Blind Awareness to create a comprehensive guide to developing assessment materials, and since then a CVD working group spanning all major exam boards has been established to share expertise and resources.

The lessons we've learned around CVD-friendly content aren't just useful in creating exam papers – they're equally applicable to teachers creating their own content for the classroom. Here are some ideas on how you can make your teaching materials more accessible, illustrated with examples from Geography, a subject area that can be especially challenging for learners with CVD.

Our tips for creating CVD-inclusive teaching materials

1. **Avoid conveying information using colour alone**



Good practice example of using multiple methods alongside colour to convey information in a line graph

CVD makes differences in colour difficult to spot, which can completely obscure the meaning of an image or diagram. Wherever possible include a secondary indicator to highlight key information as well as, or instead of colour. This could include patterns, texture, labelling, underlining, bold or different font sizes. If you need to include a key, make sure it's legibly sized and clearly matches your chosen indicators.

2. **Check your materials in greyscale**

Left: Normal colour vision. Right: CVD simulation

Print out your existing teaching handouts and slides in greyscale/black and white and see if you can still understand them. Better still, ask someone who's never seen them before if they can make sense of them without colour. If not, look at using some of the indicators above to add clarity.

For future materials, consider designing without colour first, then add it later (if it's needed!) once the meaning is already clear.

3. **Don't make assumptions**

Left: Normal colour vision. Right: CVD simulation

It's easy to assume that everyone can tell the difference between two dramatically different colours, but this is not always the case. For example, a bright red line on a map can seem obvious to someone without CVD, but be virtually invisible to people with some types of colour blindness.

The idea that colour blindness is restricted to reds and greens is also a common misconception, when in reality there are many variations on how people with CVD perceive colour.

4. **Be mindful of contrast**

Left: Normal colour vision. Right: CVD simulation

Always ensure that text and any labelling stands out from the background – this is important for accessibility on all levels, but particularly for learners with CVD. Pastels and shades of grey can be particularly challenging to decipher. Black on white or white on black will always offer the highest possible contrast. Photographs can also present problems, as in the above example.

5. **Use the tools and information available**

There are plenty of useful free tools and sources of information online that can help you better understand CVD, and how to design teaching materials to be as accessible as possible:

- Download our guide to designing accessible and inclusive assessment materials for colour blind learners
- This online contrast checker can help you test a colour combination for legibility
- The colour blindness simulator can be used to check how graphics and photos appear to people with CVD
- Learn more about CVD at Colour Blind Awareness' website

Exam Review: GCSE Eduqas A Component 1, 2023

Using stimulus material effectively

Author: Glyn Owen, Senior Examiner

Higher marks are allocated to the more demanding questions in the current GCSE examinations. These 'extended writing' questions may be worth 6, 8 or even 12 marks. Some of these questions require candidates to gather specific evidence from a set of stimulus material presented in a **resource box**.

Tewkesbury is one town in England which has suffered many floods in recent years. This article looks at how you can use the following resources to **analyse** the different factors that might be responsible for these flood events that occur on a regular basis.

Ask yourself two questions:

1. What do each of the resources actually show?
2. What can we then infer or deduce from these resources?

Map 1: The River Severn and the location of Tewkesbury

The course of the River Severn

The source of the River Severn is at Plynlimon (height 752m) in Wales

Photograph A: The River Severn at Tewkesbury in 2012

The River Severn rose to dangerous levels in 2012

Photograph B: Flooding in Tewkesbury in 2019

A view of the main road into Tewkesbury and flooded streets beyond (2019)

Source: Eduqas Geography A Component 1 Paper 2023

What does **Map 1** show?

- Tewkesbury is located on the River Severn where it meets the River Avon
- The River Severn has its source on high land
- The River Severn flows a long distance before reaching Tewkesbury

What can we infer/deduce?

- Upland areas are likely to receive high rainfall totals or rapidly melting snow
- Upland areas are likely to have steep valley sides so there is rapid run-off (overland flow)
- The River Severn is joined by more than two tributaries in such a large drainage basin
- River speeds and discharge are increased as a result

What does **Photograph A** show?

- Tewkesbury is surrounded by a large wide floodplain
- This land is very flat and is covered in water from the nearby overflowing river
- The built-up area of Tewkesbury is very close to the flooded areas

What can we infer/deduce?

- Floodplains provide natural flood protection
- The soil becomes so saturated that it cannot absorb any more water
- Building on flood plains increases the risk to properties and businesses
- New flood defences may have been built in Tewkesbury itself or upstream in places such as Bewdley to alleviate the threat of flooding

What does **Photograph B** show?

- Severe flooding of the built-up area
- The streets resemble rivers of water

What can we infer/deduce?

- The growth of urban areas on floodplains increase the risk of flooding
- Impermeable surfaces are created by the use of tarmac and concrete as housing areas and roads are built
- Drains can also be blocked with sediment and leaves

By making these inferences or deductions you are able to apply previous knowledge and understanding to a location you might not have studied before. In a GCSE examination, analysis is the breaking down of information (in this case a map and two photographs) to find connections by using logical chains of reasoning. The GCSE specification asks the question 'Why do rivers in the UK flood?' Do both physical and human factors play a part? Are physical factors more important? You decide!

Further research

During October 2023 Storm Babet battered much of England, Scotland and Wales.
Research current flood defences along the course of the River Severn.
How effective were they during October 2023?

Exam Review: GCSE Eduqas B Component 1, 2023

Author: Val Davis, Senior Examiner

Last summer the paper returned to its 2019 format, with one compulsory question on each of the three themes, and with a mix of short questions and more challenging extended writing ones. There were some very high scoring responses to all questions, but equally there are several areas that students could work on to easily gain more marks. Below are some suggestions.

Understand the 'command word'

This is critical to answering any question and should determine how the questions is approached.

'Describe' simply means pointing out the key patterns or characteristics, whereas 'Explain' requires more elaboration and should give reasons for a pattern or why something occurs. 'Compare' requires the identification of similarities and/or differences of two features, events or places. Don't just describe them separately, but make a similar point about each one using link words like – 'they both have …' or 'X has more … than Y'. 'Evaluate' and 'Assess' require a weighing up of evidence and making informed suggestions as to the importance or success of something. Try to give different points of view not just your own. 'Justify' means your own views need to be supported with evidence.

Check the mark allocation

If the question asks for **three** basic points and is worth 3 marks, don't waste time giving detailed reasons. However, a 4-mark question that asks for **two** reasons, will need an elaborated point about each one.

Skills questions involving maps and graphs

Many students throw away easy marks because they miss out questions involving the completion of a map or graph, or do not use the correct shading in a pie chart, for example. Questions involving graphs often ask for the use of figures, such as in describing the pattern or trend between two given dates. There is often a mark reserved for the accurate use of figures, so it is important to include them in an answer. Think about quoting the

highest and lowest figures or work out the difference between them. Enhance descriptions with phrases such as 'steady increase/decrease' or 'fluctuates' or 'showed a steady rise until (date) when it started to rise steeply'.

Similarly, questions involving OS Maps often ask for grid references or the use of 'map evidence', which requires specific named places or features from the map. When describing patterns on a map or diagram, such as the distribution of something, or the location of a place, be specific. Use compass points or measurements of distance in metres or kms from the scale of the map. Vague terms such as 'in the middle' , 'on the right-hand side of the map' or 'above the Equator' are not acceptable as a geographical description.

Questions requiring specific knowledge

The specific Assessment Objective, AO1, requires students to demonstrate knowledge of places, locations, processes and environments as outlined in the specification. Sadly, questions that test this are often some of the lowest scoring on the paper, especially those that are of a higher tariff such as 4 or 6 marks. To reach the top bands of a mark scheme, there needs to be evidence of specific knowledge that relates to the named place or feature. Too often examiners only read vague, generic points that could relate to anywhere. When revising, try to learn a few specific facts about each of the examples studied, such as named local places or details of the effects of a cyclone. If the questions refer to a named LIC, NIC or HIC, think about facts that relate to that particular city or place that make it obvious you are demonstrating knowledge. This is equally true if the focus is on a particular ecosystem or landform, where names of specific plants and animals or named processes, such as types of erosion, are required.

Extended writing/AO3 application questions

It is always disappointing when the majority of responses seen by examiners only reach the middle bands of a mark scheme. Avoid copying out the question or just lifting information from the resources provided as it wastes precious time and will not be credited.

As already mentioned, think about the command word. Most of these extended writing questions require some sort of evaluation, justification or decision-making. The higher bands of the mark scheme often require evidence of a balance of points for and against, or advantages and disadvantages. Often, only one side of an argument is put forward, or the response is limited to just simple unelaborated statements.

The key to success in this type of question is to constantly ask yourself 'so what?' after making an initial point. This leads to a chain of linked, elaborated development points that demonstrate an ability to reason and argue a case, effectively supported by evidence from the resources or your own knowledge of another example.

Make it legible!

Finally, examiners are well aware of how students are often rushed for time and desperate to get down as much of their carefully revised knowledge as possible but do make sure that it can be read. Examiners are only human, and some handwriting is very difficult to read and while every effort is given to credit correct responses with the marks they deserve, sometimes it can be very challenging.

Using metacognition to develop independent learning and understanding of planning in individual investigations at A level

Author: Laura Roberts, Head of Geography, Ysgol Friars

How can I improve resilience within my pupils? As an A level teacher of eight years, I've increasingly found myself asking this question and it is never more apparent in my teaching than when we approach fieldwork, particularly Unit 5, the Independent Investigation. The word 'independent' strikes fear in many students; they feel abandoned, panicked and overwhelmed when tasked with making decisions for themselves. I've witnessed these emotions affect pupils' investigation focus, time management, concise writing ability and unfortunately create demotivated students. Furthermore, the loss of authentic fieldwork experiences during the pandemic continues to stunt pupils' confidence and risk taking when developing their own fieldwork enquiry.

Additionally, learning in general during the pandemic created pupils that were dependant on teacher guidance, mark schemes and being told answers, further diminishing pupil self-confidence and resilience towards their learning. The impacts continue to ripple through their education today.

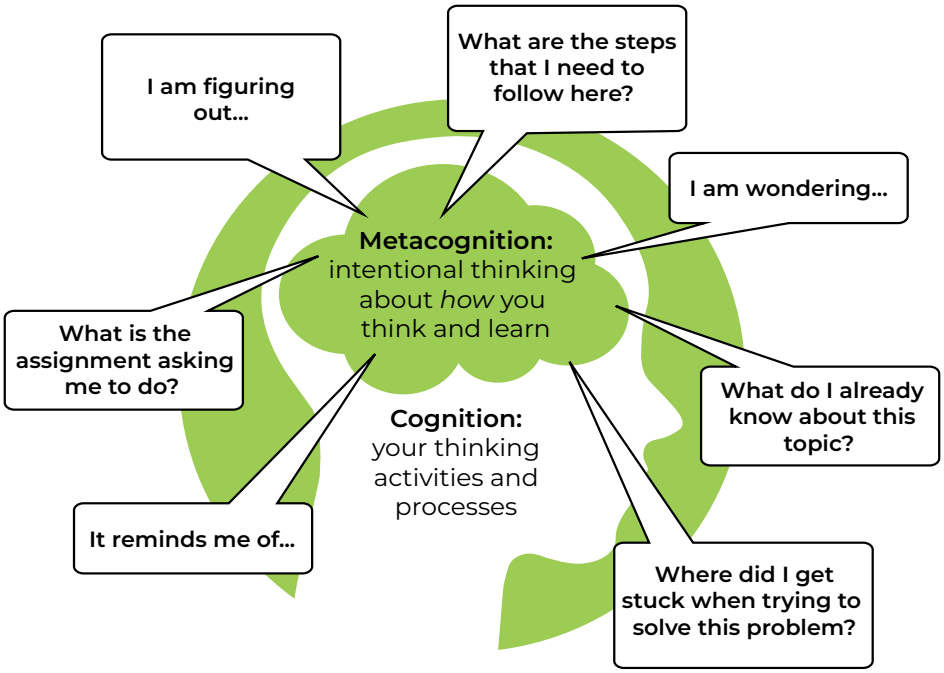
After conducting Unit 5 as normal in 2022–23, the overall quality of the investigations was disappointing; uncertainty could be sensed within their writing, like they didn't trust themselves. I concluded that overall, they had the geographical understanding required to be successful and understood the principles of a six-stage enquiry, so ultimately the barrier to their success rested with their self-confidence. This is where my journey with metacognition began.

What is metacognition?

It is the process of thinking about your own thinking and learning.

'Metacognition involves knowing when you know, knowing when you don't know, and knowing what to do when you don't know. In other words, it involves self-monitoring and correcting your own learning processes.' (Metacognition – gueensu.ca)

At the Llandudno 2023 National Education Show, Jackie Beere delivered a seminar titled 'The Magic of Metacognition'. From this I deduced that developing pupils' metacognitive ability would improve their self-confidence and resilience in fieldwork and potentially level up their independent investigation.



In order to reach mark band 5 in Unit 5 pupil confidence is crucial, as these extracts from the mark scheme confirm:

- 'A confident theoretical and/or contextual background leading to a well-defined research question'
- 'Confident and informed understanding of risk/ethical issues'
- 'Sophisticated and confident summary'

How to integrate metacognition into Unit 5

I decided to challenge myself and grab metacognition by the horns, thrusting it into my lessons to see if it would have a positive impact on their confidence and resilience.

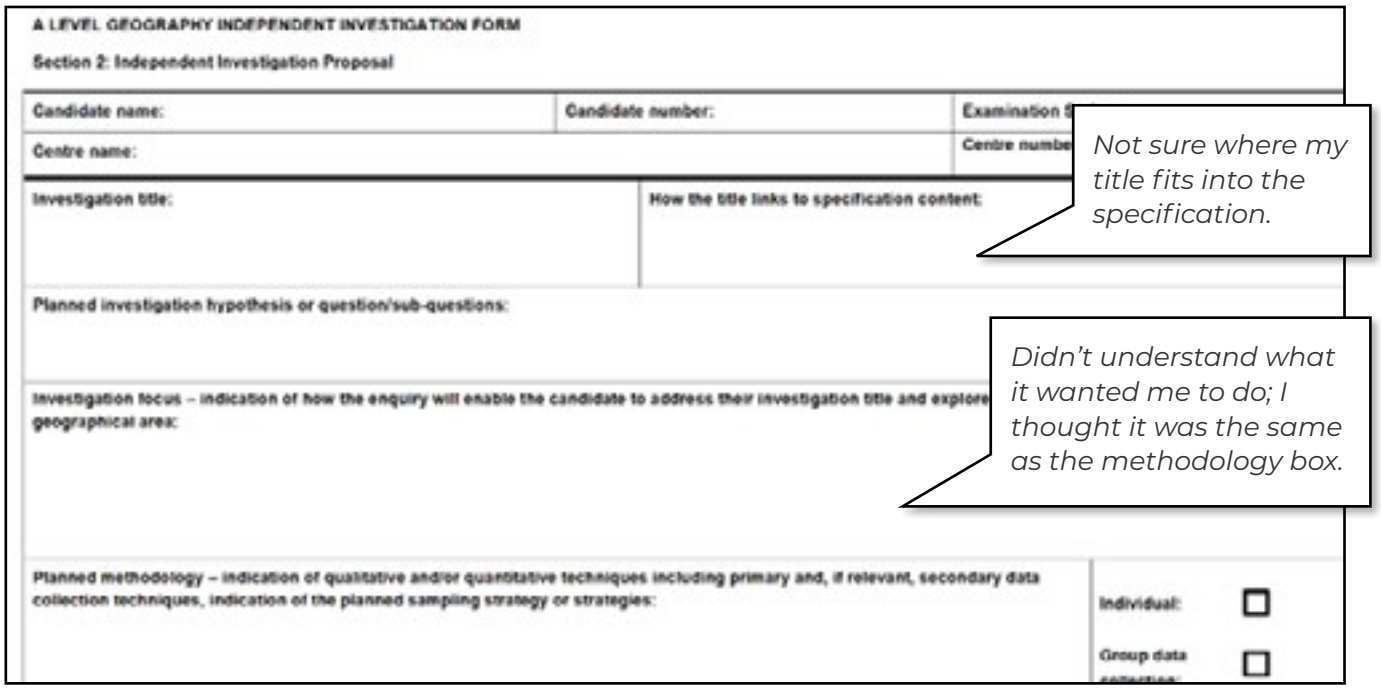
The goal for my department is to have metacognitive knowledge as a natural part of learning within geography, not a bolt on solely for Unit 5 in year 13. As Daric Desautel suggests, 'Robust metacognitive knowledge can help young students consciously apply learning strategies, develop effective work habits, and assess their own performance.' (Becoming a Thinking Thinker: Metacognition, Self-Reflection, and Classroom Practice – Daric Desautel, 2009 (sagepub.com))

Introducing metacognition to the proposal form

To introduce metacognition at proposal stage, the students were tasked with identifying the box they found the most challenging to complete. This prompted reflection and forced them to acknowledge that they were being challenged. This encouraged them to think about why they felt challenged by this box, in the hope that they could recognise the barrier to their success. Some responses can be found in speech bubbles. This reflective questioning highlighted challenges learners were already facing and were likely going to avoid addressing as nobody had asked for specific support when completing their proposal. Pupils then spent time discussing their concerns in peer groups with my input, when necessary, as a first attempt to overcome the challenges.

'From the off, learners were building awareness and understanding of their own thought processes. This is literally the definition of metacognition.'

L Cook – observer of the lesson



I decided it would be beneficial for the pupils to complete a SWOT analysis, looking at the overall investigation focus (proposal form). SWOT is a useful metacognition tool as it balances and creates opportunities to build confidence from learners' strengths, initiates reflection on their weaknesses, promotes exploration of possible opportunities and provides chances to mitigate potential threats. This task was extremely successful – the learners were fully invested and dug deep. They were thinking in a way I hadn't seen them think before, especially regarding the investigation threats and weaknesses they could

encounter. They were proactive, solution focused, and their confidence grew instantly. I believe this outcome stems from the fact they had not reflected on their investigation before this point and had little to no awareness of how well equipped they are at being successful in this unit.

I intend to use SWOT at every stage of enquiry as a reflection tool and an independent intervention strategy. Learners will strengthen their ability to ask challenging questions, increasing their capacity to be independent learners and building their resilience to amend and resolve any issues they identify.

Learning plan

Context:

Independent investigation proposal review.

Prepare for learning:

Review of first draft of proposal forms before being signed off and planned methodology.

Identify any barriers to collecting the data, be independent in considering obstacles.

Agree the learning outcomes:

To identify strengths, weaknesses, opportunities and threats to their investigation.

Allow learners to identify personal weaknesses that could impact on next stage of their investigation.
Work collaboratively to overcome challenges.

Learners to review how confident they are in collecting their data.

Present new information:

Not a full focus of the lesson as it is to develop reflective skills in particular metacognitive abilities.

Construct, activity:

Starter: Carry out SWOT analysis.

Lesson: They should identify on the form where they were most challenged and consider reasons for the challenge.
If planning the methodology has been a challenge, employ the metacognition theory to develop a reflective framework.
Consider success criteria as a group derived from the mark scheme and previous experience in year 12 and GCSE.

Discuss how they know they can be successful by using and interpreting the mark scheme and build confidence in identifying and overcoming challenges in collecting data.

Think, pair, share activity: Use this to identify from given scenarios what solution and effective methodology can be employed.
Use SWOT analysis to make a decision.

Individual activity: Complete work sheet, linking data collection to success criteria. This will build confidence in individual investigation and enquiry.

Plenary: Learners should finalise their SWOT based on the lesson activities, which will develop metacognitive skills.

Apply to demonstrate:

Discussion and collaborative work on strategies will allow greater depth of understanding of the relevance of possible methodology to collect effective data to measure the agreed title.

To develop solution focused approach to the challenge and express the strategies justified in the context of the title on completion of the proposal form.

The tasks develop better understanding of the focus required on the proposal form.

Review:

A review of the planning should be carried out to demonstrate better understanding and the ability to apply success criteria in an evaluative approach.

The next step is to complete data collection and move on to stage three of the enquiry.

Exam Review: WJEC GCSE Unit 1, 2023

Author: Allan Carter, Senior Examiner

Based on the performance of candidates in the summer 2023 exam, there are three areas where candidates can improve their answers and earn those extra few marks that might make the difference between getting a C or a B or an A or an A*.

1. Giving evidence from maps

Maps are obviously a really important tool in geography – you are unlikely to get through an exam without having to use one. Some map questions will ask you to demonstrate specific skills, such as using a grid reference, direction, or measure distance but another common type of question in GCSE exams is to ask you to describe a pattern or a location like this:

'Suggest how geology has made the Pembrokeshire Coast landscape distinctive. Use map evidence.'

The important thing here is that 'Use map evidence' is a command. That means that some of the marks allocated are for using evidence from the map to illustrate the points made in your answer. It doesn't matter how detailed your answer is, you won't get full marks without using evidence from the map! You can use any evidence from the map to support the points you make. This could be a grid reference if it is an OS map but you can also refer to a direction, a distance, place names or even something from the key, like a rock type as was provided in the above question in 2023. Finally, the important thing to remember when using maps is to be **accurate**! This means:

- Always use north and south, not top and bottom.
- If giving a distance, use a ruler and measure from the scale line provided near the key.
- When using the key, use the same wording as provided in the key.

2. Providing explanations and chains of reasoning

Questions that have the command words 'Explain' or 'Give reasons for...' are asking you to demonstrate how well you understand **why** a place or environment is like it is rather than just **what** it is like. An example of this type of question is:

'The growth of global cities can have positive and negative impacts on the way of life of people who live in them. Explain why.'

Many candidates often just describe the impacts in brief terms, such as saying that global cities 'provide jobs and wealth', 'increase tourism' or 'develop cultural diversity' or they can 'suffer from pollution and congestion' or 'people can suffer from poverty, overcrowding and lack of housing'. All of these points are perfectly valid as part of the answer but on their own, they are unlikely to earn more than 1 or 2 marks in the bottom band of the mark scheme when 6 marks are on offer.

To score the higher marks, you need to develop **chains of reasoning** to explain why some of these positive and negative impacts have occurred. For example, global cities provide jobs and wealth for people who live in them **because** they often attract big businesses like transnational corporations who open factories or locate their headquarters in global cities **because** of the connections that these cities have with other parts of the world or **because** they have important transport links like major airports or seaports. On the other hand, there is often overcrowding in global cities **because** they attract large numbers of people into them **because** of the push and pull factors of migration. **This can lead** to too many people for the available jobs and infrastructure like housing **which means** that many people don't achieve the improved lifestyle they were looking for and can end up homeless and are often forced to live in squatter settlements or find work in the informal economy.

These are just examples of the type of answer you could give and there are many ways of tackling these questions, but they illustrate how to develop chains of reasoning to provide the **why** for the **what**.

3. Applying your learning to new or unfamiliar situations

Some questions ask you to apply your knowledge and understanding to resources provided in the question which may be about a place or environment that you haven't studied. If faced with this type of question, the first thing to do is to not panic and have a think about topics or case studies that you have revised that relate to the example being provided in the resources. It is highly likely that the same issues that you studied will be relevant for you to apply to the question. An example from 2023 is:

'Suggest how the development of Salford Quays may have brought benefits and challenges for this part of Manchester. Use evidence from the map and photograph.'

This question is related to urban redevelopment in a former dockland in Manchester and the previous parts of the question tell you that this development is on a brownfield site. While it is unlikely that you will have studied Manchester, the answer to this question does not require you to know anything about the area. However, you may well have studied somewhere like Cardiff, Bristol, or London Docklands, all of which are similar developments on brownfield sites where old industry or docks have been replaced with modern housing, offices, leisure facilities and retailing. What you need to do is to **apply** your learning from whatever redevelopment area that you have studied to the clues that are in the resource for Manchester – in this case a map and a photograph, because the benefits and challenges are likely to be very similar. It is also worth pointing out that the command word of 'suggest' means that there isn't really a right or wrong answer and the examiner simply wants to see if you can apply what you already know to a different context. For example, the benefits in many of this type of development include the provision of new jobs to replace the old jobs in industry which may have gone, but a challenge of this is that they tend to be in modern service-based occupations requiring different skills than those which may have once existed. Equally, old, terraced housing may have been knocked down and replaced by more modern accommodation which may be seen by some as a benefit, but this housing might be more expensive and lead to the influx of highly paid professionals as the area becomes **gentrified**, rather than providing homes for the local people who have always lived in the area.

Geography works...

Author: Nia Jones, PhD researcher, specialising in coastal modelling and plastic pollution, Bangor University

I have always had a solid appreciation of the opportunities Geography could offer; however, when I look back on my studies and the start of my career it really is astounding to think of the opportunities being a 'Geographer' has afforded me. In high school at Ysgol Gyfun Cwm Rhymni in South Wales, GCSE and A Level Geography was a firm favourite. I loved learning about faraway glaciers and hurricanes and came to appreciate the global issues that could and would affect me in the future, like climate change and flooding. When it came to university where I was advised to try and find a balance of what I enjoyed, and what I was good at, choosing Environmental Geography at Cardiff University seemed exciting, challenging and highly relevant for a long list of careers. This seemed like a good option considering, at 18, I was still debating which career path to choose.

My three years studying Environmental Geography confirmed that I wanted to keep working in the environmental sector. Studying Geography at this level gave me the opportunity to travel to the Netherlands, Switzerland, Iceland and Honduras where I was able to study and work within a range of environments. I was able to touch upon geology, oceanography, hydrology, policy and environmental management, giving me a broad and solid foundation on the issues our environment faces. I found a particular interest in ocean conservation and the growing issue of plastic pollution. Being a Geographer gave me the confidence to make connections and find solutions to some of these issues and so I began campaigning to reduce the consumption of single-use plastic in and around Cardiff. Being able to bring Geography out of the classroom in this way made me realise I had found a passion that could lead to an impactful and fulfilling career.

Through campaigning and studying, I soon realised that there was so much still unknown about our environment and more specifically our plastic pollution problem. So, following my undergraduate degree, I decided to apply for a PhD in Physical Oceanography at Bangor University, concentrating on the transport of microplastic pollution; the tiny plastic particles which have become so common throughout our environment. For the last four years my research has concentrated on building computer models and developing tools to investigate how plastic pollution is exported from estuaries in North Wales and how this moves around our coastline. Here I was able to build on my foundational knowledge

of plastic pollution and environmental science and develop so many more skills, including how to code, how to use and interpret numerical models on supercomputers and distil all this data into new knowledge about our plastic pollution problem. As with many graduate positions, the learning curve with the PhD was steep and consistent; however, I felt as if my approach as a Geographer: to gather evidence, create connections across disciplines and view problems holistically instead of within a silo has been one of the main contributors to my enjoyment and success as a PhD student.

In addition to my research, I've also been fortunate enough to share what I've learned about the plastic pollution problem and the wider environment with so many different audiences. I've been able to communicate my research on radio, television and at in-person events discussing plastic pollution, the increasing pressures on our oceans and climate change. I have been able to share my passion about the environment and how, despite the fact that we as humans have had a negative impact on our environment, we also have the huge opportunity to restore, improve and protect it. As I move on from the PhD, I hope to continue to bring with me what I have learned as a Geographer and be a champion for the environment.

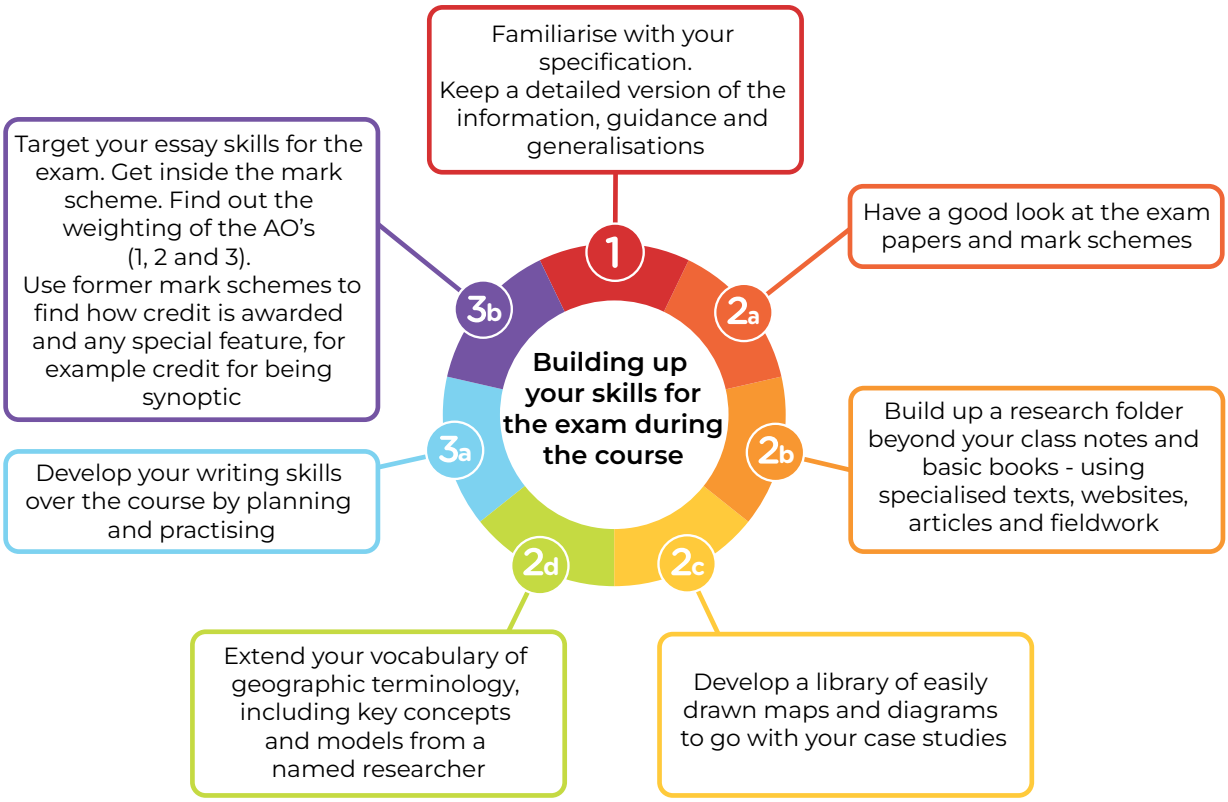
A level essays: How do you structure yours?

Author: Sue Warn, Senior Examiner

At A level, essay questions require students to think about information they have researched and collated during their course and weave it into an argument in time-constrained exam conditions. They are asked to analyse, criticise, examine and, above all, evaluate ideas in a logical, structured way, using appropriate information, with examples, diagrams and maps to support and illustrate their arguments.

Figure 1 summarises the steps students need to take for success, in the longer term during their course, and in the short term during the exam.

Figure 1. The road to success



Effective longer term preparation over the year should focus on two main facets: **research skills** (2a–d) and **essay writing skills** (3a and 3b). See Figure 1.

Developing research skills – advice for students

This involves reading around each topic over the year, developing and building on class notes.

Starting with the specification detail and then adding to this as students research and read, build up a list of geographical **terminology** and relevant **concepts**, for example Nye's concept of hard and soft power (superpower geopolitics – India and China) or prediction, forecasting and monitoring primary and secondary hazards. Complex concepts, such as jet streams, desertification and ecosystem succession are especially important.

For WJEC/Eduqas, the specialised concepts identified by Ofqual and the specification developers are especially important as they promote synopticity (drawing together aspects of the specification) which is rewarded in the mark scheme. Examples include adaptation and mitigation, risk, vulnerability, resilience, globalisation, interdependence, and sustainability, so extra time needs to be spent on understanding these specialised concepts and how they can be used effectively.

Encourage students to work on their researched case studies. Classic case studies, such as the 2011 Haiti earthquake or even very historic cases, such as Nevado del Ruiz (1985) or the Indian Ocean tsunami (2004) are very relevant, largely because of their mega disaster status, but these must be combined with up to date, more recent case studies, for example White Island Volcano (2022) where a phreatic eruption exposed the issue of risk management, or the Japanese earthquake (2024) in the Noto peninsula in Honshu.

For each case study, students need to make a fact file of causes, profile, impacts, management and what was of special note about the event, for example the Japanese earthquake (2024) – over 80 deaths in a HIC country with maximum resilience built into its system is the interesting perspective here which needs close analysis of intrinsic and extrinsic factors.

Updating can be achieved via reading a range of reports, for example Dasgupta Report on Biodiversity 2020 or reports from COP28 Dubai (IPCC) as well as quality newspapers, journals and well-established websites that keep you up to date, for example the BBC.

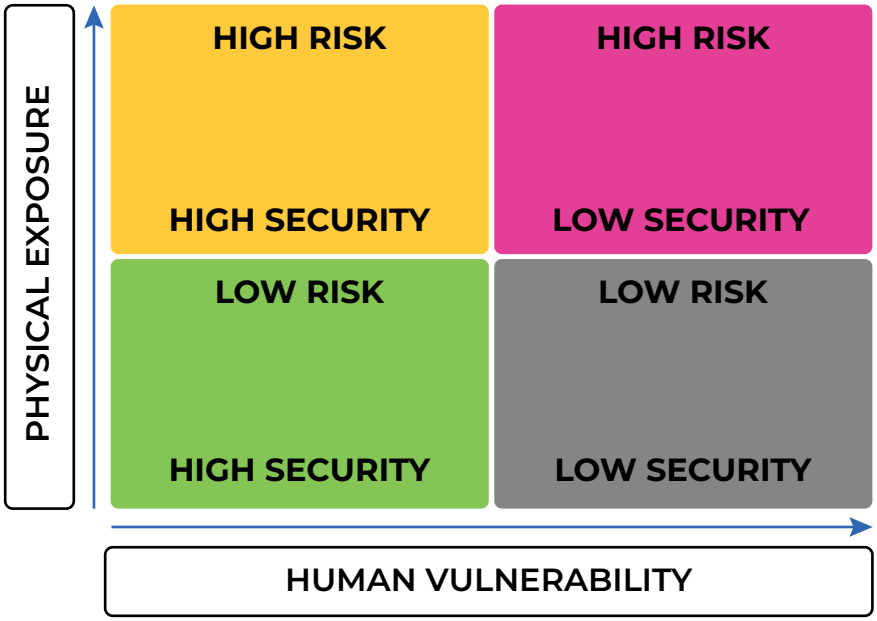
Develop a well-ordered research strategy, for example making summaries of articles by highlighting key points, and always noting author and source and the date when

consulted. Sometimes when the article is complex, draw a diagram to summarise the key points.

Use a range of sources, from specialist text books, for example Advanced Topic Masters or Top Spec to designated student resources, such as Revision Guides, Geofile, Geofactsheets, Geographical Magazine (Dossier) and Geography Review and, where controversial, an opinion spectrum can be created, for example which type of energy source should be used in the energy mix?

Prepare easy to draw, well-annotated diagrams that can also serve as a framework for an essay, for example Degg or Parks Model, Risk Equation, Hazard Management Cycle or Energy Transition Model. Take time to annotate them well and refer to them in your essay. Maps are more contentious, but they can be particularly useful for showing distributions. Figure 2, The Disaster Matrix, shows how various countries in the world vary according to their level of risk from hazards and would form a good framework for an essay. Reference to your own fieldwork can also enhance your essay, as it shows originality.

Figure 2. The Disaster Matrix – the quadrant model shows the combination of physical exposure to hazards and human vulnerability in relation to risk and security.



Be prepared to learn short tables, for example, of hazard events and their profile (see Figure 3) which challenges the assumption that their magnitude is the only factor influencing social and economic impacts.

Figure 3. Hazard events for appropriate countries

Year	Location	Magnitude	Fatalities	Damage (US$ millions)
1992	Erzican, Turkey	6.8	540	3,000
1999	Izmit, Turkey	7.4	17,225	12,000
1989	Loma Prieta, USA	7.1	68	10,000
1994	Northridge, USA	6.8	61	44,000

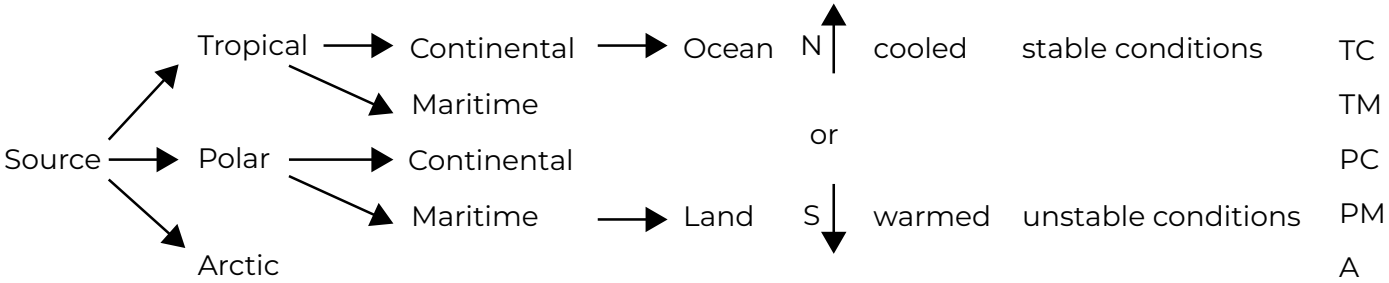
Honing your writing essay skills over the year

Initially, early in Year 12, students need help, especially at the planning stage, which can be done as a group in class. They can therefore be confident that their product has some structure. A **sound plan** usually leads to a **sound essay**. Figure 4 shows an example of a sensible plan.

Figure 4. An example of an essay plan suitable for use in an exam

Always dissect the question and use the **bounce-back** technique to **structure** your answer, as shown below. Highlight the key command word and key content words. Beware of having too long a plan as it can take up valuable writing time. You could also add examples to Figure 4 of weather events brought by each air mass, for example storms and intense cold periods (Beast from the East).

Assess how the **source** and **track** of air masses influence the **weather** they bring to **mid-latitude locations**, such as the UK.



Command | **BOLD** Key content and words

Possible techniques to help you develop a well ordered, logically structured essay include:

- Ordering: Using an example of an essay which could be improved, by attempting to put the sentences/paragraphs in a more logical order.
- Consolidating: Classifying and ordering a series of threats of ecosystems, such as rainforests, by classifying them, for example global/local, direct/indirect, scale of damage.
- Text analysis of downloads or articles by using articles to highlight directly relevant points to include.
- Using a writing frame or other support structure (scaffolding) to order the various paragraphs to discuss the arguments in support of the question and those against.
- Developing the skill of writing an introduction which defines the issues and uses key terms from the title by looking at the command word and other key words.
- Practising using evaluative language. Figure 5 shows some examples – this will enhance AO2 marks.
- Ensuring that case studies are used effectively to support the general argument. The extended example fact file system works well with a wide range of examples, as opposed to just two or three descriptive case studies (one HIC/one LIC).
- All diagrams, maps, fact files and tables of prepared statistics should be inserted carefully for maximum effect and referred to in your essay, as opposed to in a contrived way or as an afterthought.
- Practising and allowing time for an effective conclusion which refers back to the original question for a summative evaluation, linked to the arguments and evidence in the essay.
- Working with the mark scheme to ensure that the generic mark schemes which show the required balance of AO1 (knowledge and understanding) and AO2 (application of knowledge and understanding by analysis and evaluation) and AO3 (skills).

Figure 5. Phrases and terminology to include **if** appropriate

Changes such as these may be viewed as **potentially harmful** to the diversity of the ecosystem.

Short-term gain should not be prioritised over **long-term environmental sustainability**.

This view is supported by...

This view is opposed by...

An **example** of this is...

This may have more significant **social/environmental impacts** because...

This may be **more important** because...

Some **groups of people** may feel...

Overall, **this data suggests**...

This **evidence clearly suggests**...

It is **clear** that...

Conversely...

On the other hand...

It is **vital** to give consideration to...

In order to **lessen any potential conflicts**...

This is a **particularly strong argument** because...

This is an **idea supported by**...

This is a **widely debated issue** and is considered highly **controversial**...

On balance...

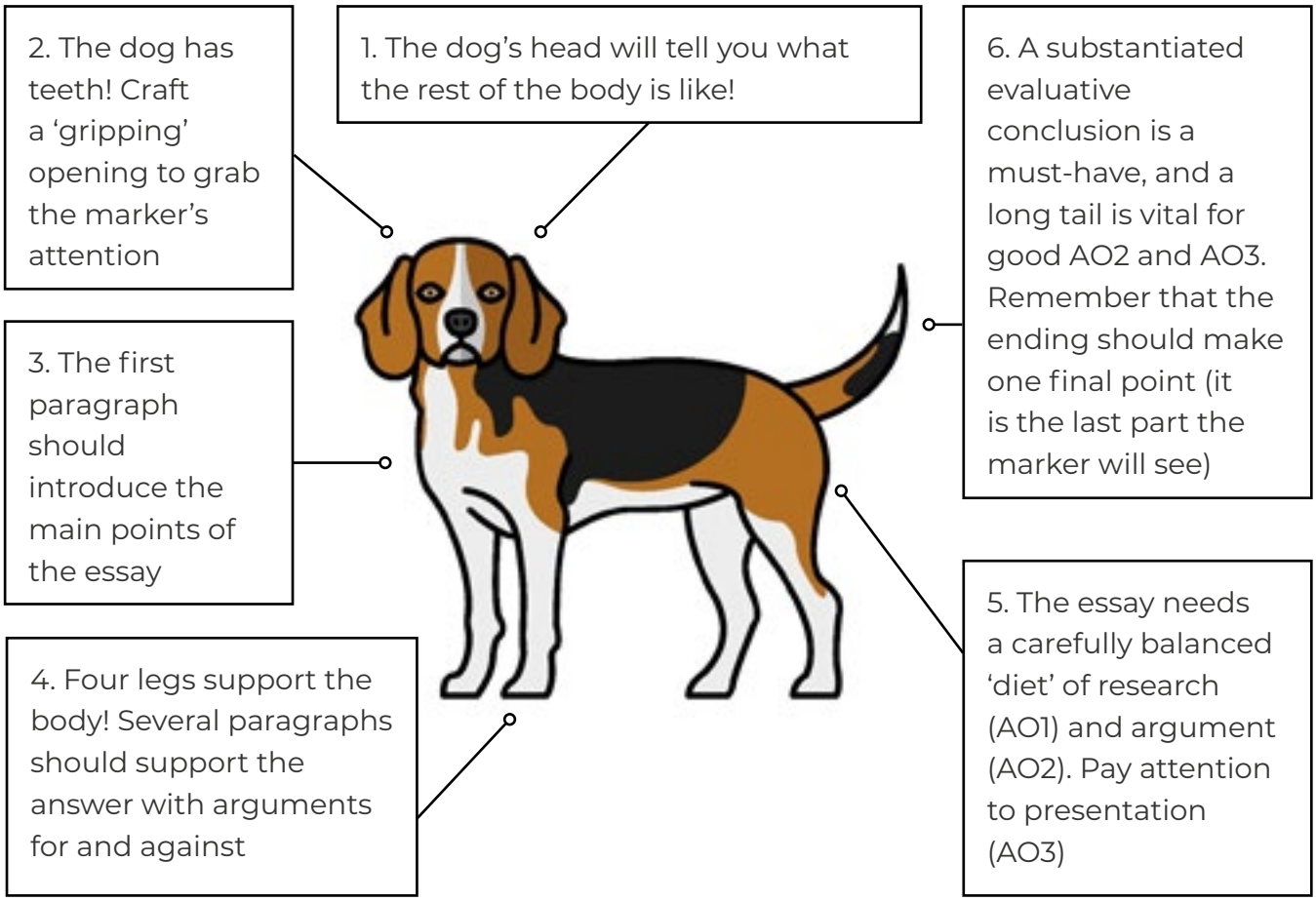
To conclude...

In the exam

Figure 6 compares the exam essay to a dog and is a reminder of all the key skills you have developed during the course. Have a good look at the advice shown.

In the exam all sorts of things can go wrong. One important piece of advice is to look at the whole paper where you have to answer a number of questions within an allocated time. An even performance across all questions is actually very difficult to achieve as some questions have different assessment tariffs and weight of assessment objectives, but it is very important to aim for that. Therefore, here, all the advice on exam technique you have learned and used in practise answers and mock exams is of vital importance.

Figure 6: How to structure an essay in an exam



Lastly, a number of organisations, including all the exam boards as well as the RGS and Geographical Association and some student sites have a huge range of resources which can support you in your A level course.

Good luck with your essays!

What's on the websites: A guide to all our Geography resources

We appreciate that busy teachers and support staff may not always have the time to search our website for new and useful resources. The following will provide you with a brief guide to what is available to support teaching and learning as you prepare for the next examination series.

GCSE: Key documents

- **Specification Documents** and **Sample Assessment Materials**.
- **Examiners Reports** for you to use in reviewing performance and setting future targets.
- **Fieldwork Guidance Documents**. Now that all fieldwork approaches have been used at least once, there are documents, slide shows, ideas for tasks, FAQs and webinars for you to look back on and use and/or adapt for your own fieldwork ideas. The annual fieldwork statement to send to us can also be found here.
- Examples of annotated scripts in **Marking Exercises** for you to use as revision aids.
- **Personal Learning Checklists** for revision and organisation of learner knowledge as the course progresses.
- **Key Term Lists** in the Programmes of Study tab for WJEC and Eduqas A. We are working on an Eduqas B list at present. All these complement the glossary lists at the back of WJEC and Eduqas A and the Eduqas B textbooks.
- Our joint GCSE and A Level, **Cynefin**, magazine issues can be found under 'Resources for Teachers'.
- The **GCSE Teacher Handbook** in the **Guidance for Teachers** tab, which is a useful document especially if you are teaching GCSE Geography for the first time.

GCE: Key documents

- **Specification Documents** and **Sample Assessment Materials**.
- **Examiners Reports** for you to use in reviewing performance and setting future targets.
- **Resources for Teachers** – find additional sample questions and mark schemes for A level units here.
- **Fieldwork Declaration and Independent Investigation Guidance** – here you will find a link to our Title Advice form if you are unsure of any approaches suggested by your students. You will also find exemplar proposal forms to guide you on assisting your candidates while allowing them to maintain an independent approach.
- **Independent Investigation Submission forms** and guidance on the submission process.

Overview

- Link to **Online Exam Review (OER)**. Search for GCSE or GCE Geography to find a comprehensive bank of past paper questions with answers, annotations and mark scheme extracts. This is an invaluable resource to aid your teaching, especially when it comes to exam practice and revision.
- Link to our free **Digital Resources**. Search for Geography KS4 or KS5 to access our EDI notes, student planners and a whole range of **blended learning resources** and interactive activities linked to the GCSE and GCE courses. Much of this material was developed during the Covid lockdowns and is an invaluable source of material and ideas for you as you develop and refine your teaching of the courses.
- Links to the **Secure Website** and guides to **Grade Boundaries** for specific examination series.

Resources

- **Knowledge Organisers** linked to all course topics can be found here. These are fantastic up to date resources to aid student revision and for you as teachers to check your understanding of the course content.
- **Exam walk throughs** can also be found here. These have the Principal Examiners commenting on past papers that you can complete and check as you go. Another fantastic revision resource.
- A link to the **Blended Learning resources** found in the Overview section can also be found here.
- Another way to access key resources directly is to use the **dedicated WJEC resources website**: Geography – Educational Resources – WJEC. You can search for and sort all GCSE and GCE digital resources.

Past Papers and Mark Schemes

All **past papers and mark schemes** for 2018, 2019 and 2022 can be found here. 2023 papers will be posted here at the end of March but can currently be accessed via the secure website.

Assessment Feedback Package 2024

The link to this can be found on the main Geography homepages and will take you to where you can access examiners reports, online feedback, training and Professional Learning information and perhaps most importantly **free access to marked student scripts**. All student scripts from 2023 can be accessed; all you need is your centre's login for the secure website.

Urban water resources: Management and security

Author: Professor Mark Whitehead, Aberystwyth University

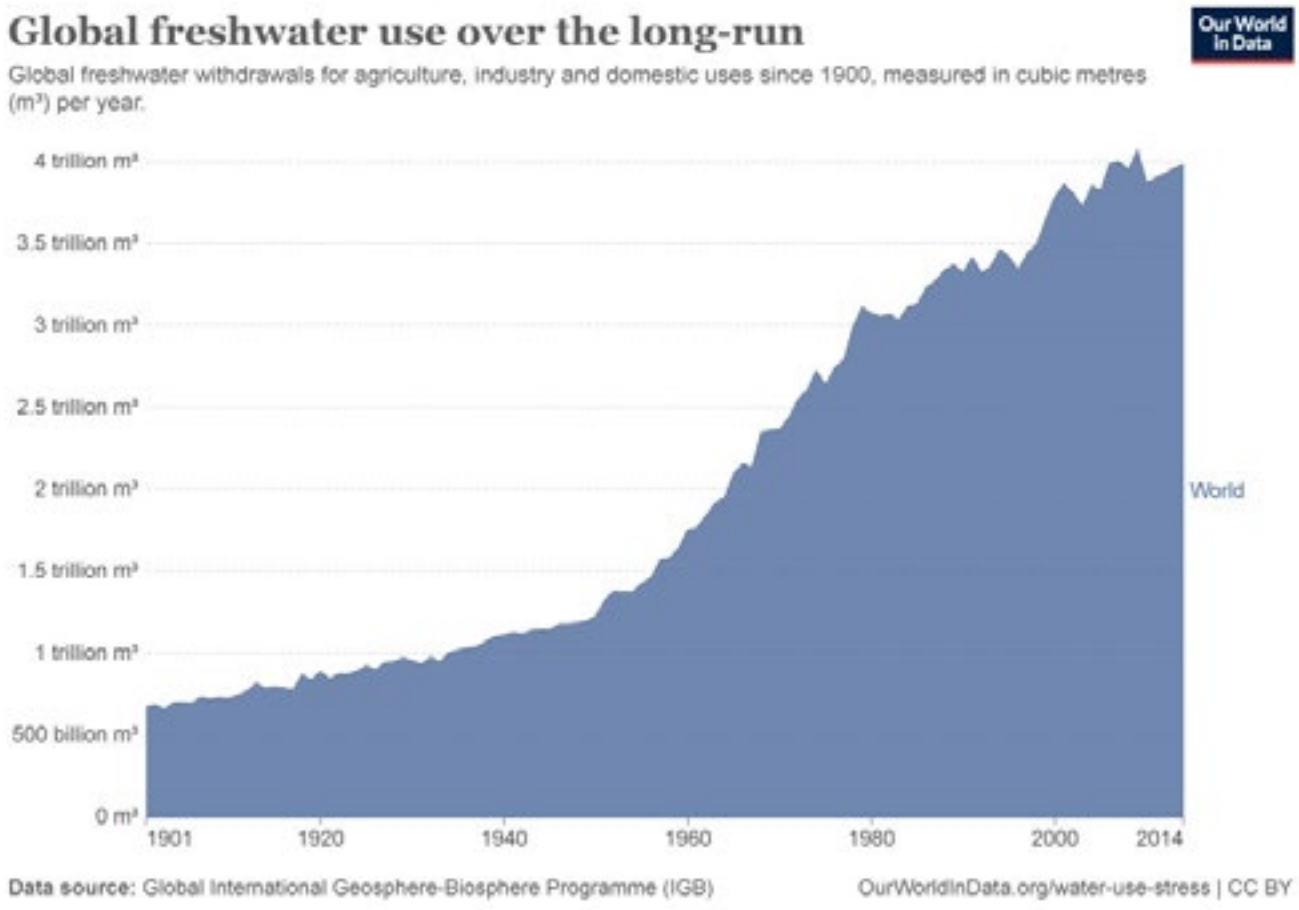
Introduction

The secure supply of affordable water to urban areas is one of the defining challenges of the 21st century. The unerring growth of cities throughout the world has put increasing pressure on metropolitan authorities to expand their networks of water treatment and supply. It is estimated that cities supply 504 billion litres of water to their residents every day (MacDonald et al, 2014). One of the reasons that cities can now supply such vast quantities of water is because they have extended their water supply networks. Cities collectively move water over 27,000km (+ or – 3,800 km) (MacDonald et al, 2014). Notwithstanding the movement of this much water over such long distances, it is estimated that 1 in 4 cities (with economic activity in excess of $US4.2 trillion) are in water stress (MacDonald, 2014). This article explores changing historical patterns of urban water consumption. It then considers the drivers of water stress and the different water management strategies that cities are using to address them. In exploring these themes, this article considers the examples of Las Vegas (USA) and Cape Town (South Africa). This article provides insights and case studies that could be useful when delivering GSCE Geography Core Theme 6 (Development and resource issues) and Key Idea 6.3 (Water resources and their management).

Changing patterns of urban water consumption

Unsurprisingly, there has been a clear increase in the urban use of freshwater resources over the last one hundred years. This pattern mirrors overall increases in the utilisation of freshwater resources in urban and rural areas throughout the world (see Figure 1, p.34). The post Second World War period has seen the most rapid rise in global freshwater use. This period has been described as the Great Acceleration: the period of time when rapid economic growth has placed unprecedented demands on the global biosphere. The rapid growth in the use of water has been particularly pronounced within the BRICS countries (see Figure 2, p.35). Approximately 70% of global freshwater is used within agriculture. Urban water use (which includes household use and industry) is below 29% of global freshwater use. However, with over half of the global population now living in cities, it is clear that the growth in the use of water is the agricultural sector is part of the wider water footprints of cities.

Figure 1. Changing patterns of global freshwater use

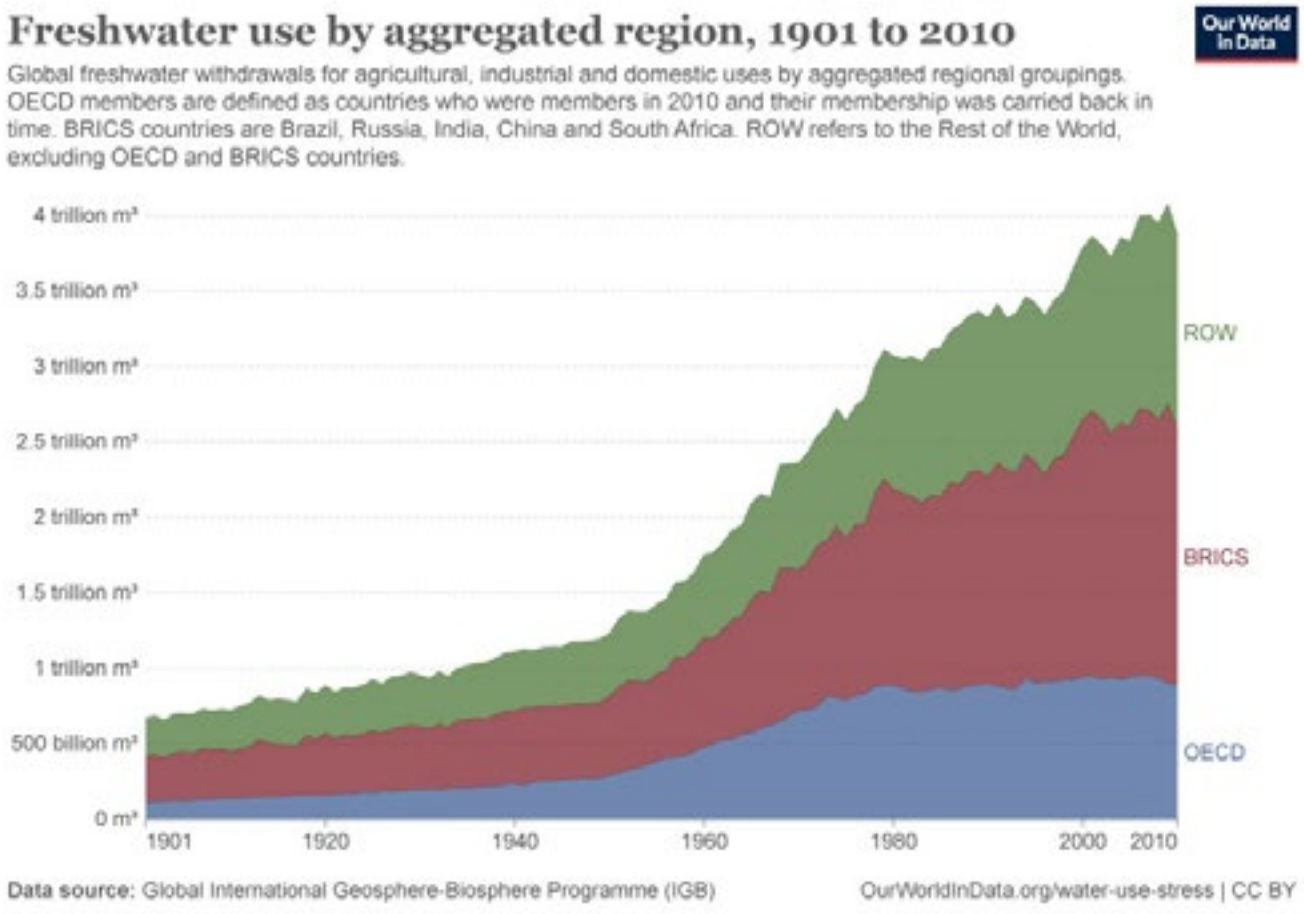


Urban Water Footprints

According to the Water Footprint Network, the water footprint of a city measures the amount of water that is used to produce all of the goods and services that an urban centre uses. The water footprint of a city includes the water that is used directly within an urban area (for drinking, washing and sanitation) and the water which is used outside of a city to produce the products that urban citizens need (including bread, clothes and rice) (for more information about Water Footprints see https://www.waterfootprint.org/water-footprint-2/what-is-a-water-footprint/).

The expanded supply of water to the industries and households of urban areas has been facilitated by a series of measures. Firstly, the extraction (often over extraction) of local groundwater supplies. Secondly, municipal authorities have made significant investments in dam building and reservoir and aqueduct construction. These hydrological investments have enabled cities to draw on water sources that are located at great distances for urban centres themselves. As the recharge capacities of reservoir and aqueduct systems have reached their limits, cities have deployed a series of strategies: sometimes extending existing dam networks; and/or taping into ground water sources in rural areas; and/or investing in desalination facilities.

Figure 2. Changing patterns of global freshwater use by international region



The city of Las Vegas provides a typical example of the expansionist logics of urban water supply. Las Vegas is situated in Mojave Desert and owes it location to available ground water in the area. Following the expansion of the city in the second half of the 20th century, groundwater now only accounts for 10% of Las Vegas water use (this is generally pumped in the hot summer months to compensate for peak demand pressures) (Las Vegas Water Supply District, 2023). Now Las Vegas relies on the Hoover Dam and Lake Mead for approximately 90% of its water. Constructed in the 1930s, the Hoover Dam is subject to overextraction. Consequently, during the 21st century, Las Vegas has been exploring the possibility of drawing on groundwater from agricultural areas in rural Nevada. Las Vegas's pursuit of rural groundwater has inevitably brought it into conflict with farmers who rely on that water for food production.

Water stress and management

The story of Las Vegas's struggle for water security is shared by many cities throughout the world. Water stress is a measure of water withdrawals relative to available renewable water sources in a catchment. High water stress occurs when water extraction is somewhere between 40% and 80% of renewable water capacity. When water use exceeds renewable water supply, a city is said to be in a state of water scarcity. With 1 in 4 cities (with economic activity in excess of $US4.2 trillion) now finding themselves in various states of water stress, it is important to consider the factors that are contributing to this situation and what can realistically be done to combat such risks.

Perhaps the most obvious factor contributing to urban stress is demographics. With the rapid growth of cities (particularly now in Africa and Asia), urban areas are attracting more water consumers to already stressed watersheds. However, population is only one part of the story. In addition to population growth, changing water cultures are also driving up urban demand for water. During the 20th and 21st centuries, there has been significant transformations in the ways in which people use water in the home. The emergence of showers has made washing more convenient. This in turn has generated new norms around personal hygiene and the expectation of taking a daily shower. Additionally, technologies such as the washing machine and dishwasher have led to an increase in urban domestic water use. In OECD countries like the UK, most increases in water demand are now largely being caused by population increases. But in emerging economies, water use increases in the 21st century are likely to also be driven by the increasing use of labour-saving household technologies.

A final key factor contributing to water stress in cities is climate change. Climate change is becoming a factor in both driving up seasonal demand for water (in the form of hotter summers), while also compromising seasonal aspects of water supply (in the forms of more regular droughts). The city of Cape Town offers a troubling example of the potential impacts of climate change on water stress. In the early months of 2018, Cape Town came close to becoming the first major industrial city to run out of freshwater. Population growth is a water stress factor in Cape Town (Cape Town has grown to become the 10th most populous city on the continent of Africa, with a population of over 4 million people). However, it appears that climate change is beginning to impact on seasonal patterns of rainfall in the surrounding area. Since 2015 the summer months have been marked by a significant reduction in rainfall (relative to the forty-year average). This corresponds to months when water demand is particularly high. This combination of reduced freshwater

supply and increased demand resulted in the Theewaterskloof dam and reservoir being drained to dangerously low levels in 2018 (see Figure 3).

Figure 3. Theewaterskloof Dam February 2018 (Antti Lipponen, Creative Commons)

Cape Town was able to advert hydrological catastrophe by imposing a 50 litres per person per day limit on water consumption (average daily water use for a single person household in the UK is approximately 150 litres). In the longer term, Cape Town is considering a series of water management strategies which are common among cities facing water stress and scarcity. Firstly, it is looking to diversify its water supply systems. This will involve greater investment in boreholes (as potentially valuable local sources of water during periods of water stress or scarcity) and the potential construction of a desalination plant. Demand management tools will also play an important role in Cape Town's water governance systems. In this context, the provision of water meters are seen as a useful tool to more carefully monitor household water use and to facilitate unit payments systems within which people are financially incentivised to reduce their water use. However, given that drinkable water is a basic human right, the introduction of water meters and

new pricing systems for water is proving controversial in cities throughout the world. Controlling demand for water through more stringent pricing regimes is seen as having a disproportionate impact on the poorest in society.

As cities continue to expand and the regional impact of climate deepens, the management of water stress and scarcity in urban areas will become an ever more significant issue throughout the world. The examples of Las Vegas and Cape Town demonstrate the opportunities and challenges that cities are likely to face when managing the supply and demand of freshwater in the future. These case studies also indicate the importance of building greater resilience in water supply systems before acute water crises arrive.

References and resources:

McDonald, R.I. Weber, K. Padowski, J. Florke, M. Schneider, C. Green, P.A. Gleeson, T. Eckman, S. Lehner, B. Balk, D. Boucher, T. Grill, G. Montgomery, M. (2014)

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Las Vegas Water Supply District (2023) 'Where your water comes from': https://www.lvvwd.com/water-system/where-your-water-comes-from/index.html

Interesting reflections on the consequences of the Cape Town Water Crisis are available here: https://time.com/cape-town-south-africa-water-crisis/

Acknowledgements

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Water Use and Stress - Our World in Data

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