

BE THE WAVE AR FRIG Y DON

Invisible Pollution

Lesson Plan





Aims
<ul style="list-style-type: none"> To develop knowledge and understanding of invisible pollution
Objectives
<ul style="list-style-type: none"> State examples of invisible pollution Explain the impacts of invisible pollution, especially in the fashion industry Create an upcycled piece to highlight invisible pollution To apply knowledge of invisible pollution to everyday life through action #BeTheWave and Eco-Schools programme

Eco-Schools topic	Global Goals
<ul style="list-style-type: none"> Waste Minimisation 	<ul style="list-style-type: none"> 6 Clean water and sanitation 12 Responsible Consumption 14 Life Below Water

Links to the Curriculum for Wales	
Purpose	
<p>Ambitious, capable learners who:</p> <ul style="list-style-type: none"> Undertake research and critically evaluate what they find Build a body of knowledge <p>Ethical, informed citizens who:</p> <ul style="list-style-type: none"> Engage in contemporary issues, understand, and consider their actions when making choices and acting Show their commitment to the sustainability of the planet. <p>Enterprising, creative contributors who:</p> <ul style="list-style-type: none"> Connect and apply their knowledge and skills to create ideas and products 	
What Matters	Progression Step: Four
<p>Science and Technology:</p> <ul style="list-style-type: none"> I can explain how the impact of our actions contribute to the changes in the environment and biodiversity. I can adopt an iterative process to improve my design proposals, while minimising their negative impact on the environment and society I can evaluate and apply responsible habits of working which consider environmental and societal impacts <p>Humanities:</p> <ul style="list-style-type: none"> I have an understanding of my own and others environmental, economic and social responsibilities in creating a sustainable future 	
DCF	Progression Step: Four
<p>Creating Digital Content:</p> <ul style="list-style-type: none"> I can select and use a variety of appropriate software, tools and techniques to create, modify and combine multimedia components for a range of audiences and purposes. I can explore and develop a range of formal text document structures for different audiences and purposes 	
LNF	Progression Step: Four



Reading strategies:

- I can use inference and deduction to understand more complex texts and consider the reliability of what I read
- I can summarise, synthesis and analyse information to gain in depth understanding

Cynefin

Examples of upcycled products produced in Wales
 Examples of fashion/clothing produced sustainably in Wales

Activity 1	Resources and Equipment
<p>Finding invisible pollution – Scavenger Hunt</p> <p>Students carry out independent research about invisible pollution using the worksheet as a scaffold to find information. This will cover causes, impact and possible solutions for each type of pollution.</p> <p>Information could be printed out and placed around the classroom for students to find the information. Alternatively, a collection of articles and videos could be curated using ICT programmes such as Google Classroom, Wakelet or Padlet. Instructions for activity in PowerPoint</p> <p>You could use music to time the activity linked to the theme of chemical pollution; examples below or get students to suggest some music related to the theme.</p> <p>Chemicals React by Aly & AJ (3:01) Chemical Love by Stevie Wonder (4:30) Chemical Warfare by Dead Kennedys (2:58) Chemical beats by the Chemical brothers Planetary (GO!) by My Chemical Romance (need a radio edit)</p> <p>Review the information and watch https://www.youtube.com/watch?v=Zk1J2EW-nmQ&t=4s to fill in any blanks</p>	<p>Lesson PowerPoint Research sheets</p> <p>ICT equipment</p> <p>Scavenger Hunt Student Worksheet (Teacher Answer sheet)</p>

Activity 2	Resources and Equipment
<p>Past verses the Present – The Dark Side of Fashion</p> <p>Comprehension activity looking at processes required in the fashion industry and the impacts and solutions.</p>	



Logo quiz for sustainable fashion	Comprehension worksheets (differentiated) (Teacher Answer sheet) Logo quiz in PowerPoint
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Activity 3	Resources and Equipment
<p>Upcycled Masterpiece</p> <p>Help minimise invisible pollution by upcycling as these materials have already been produced.</p> <p>Discuss the examples of upcycled products then brainstorm possible ideas for an upcycled product, include annotations describing the upcycled properties of their idea. It should help to highlight awareness of invisible pollution. This could be a group/pair/individual activity.</p> <p>Students could then create their upcycled products.</p>	<p>PowerPoint - Activity instructions</p> <p>Design template worksheet</p>

Extension Activity	Resources and Equipment
<p>Awesome Adverts</p> <p>Create an advertisement for your upcycled product. Look at a range of adverts, these could be print, film or social media and identify features that make them successful.</p> <p>Develop success criteria for the advert, ensuring pupils include environmental impact as one of them as this is a key piece of information regarding their upcycled product.</p> <p>Students could then share their adverts and the class/staff could vote for their top three.</p>	<p>PowerPoint – Activity instructions and selection of adverts.</p> <p>ICT/paper/pens</p>



#BeTheWave

Apply the knowledge gathered in the lesson into action as ethical and informed citizens. It is an important aspect to ensure students know they have the power to enact and make changes within their own lives and within the school and wider community. It is also a positive step which helps to balance some of the negative impacts explored within the lesson.

Decide on an action/actions to take forward either as individuals or as a class, these are some suggestions, or the class could generate their own.

School:

1. Upcycled fashion parade
2. Investigate suppliers of school uniform; are they providing sustainable clothing? Could you switch to a more sustainable supplier?
3. Raise awareness of sustainable fashion logos

Individual:

- Upcycle a piece of clothing
- When buying new clothes look for clothing with sustainable fashion logos
- Make use of charity shops, online preloved clothing sites and clothing rental schemes

Useful Organisations / Resources

Marine Conservation Society

Whale and Dolphin Conservation

[Pollution could drive UK orcas to extinction - Whale and Dolphin Conservation \(whales.org\)](https://whales.org)

National Geographic

[Environmental Responsibility \(patagonia.com\)](https://patagonia.com)

[Chemical Pollution : Ocean Health Index](#)

[Use of Chemicals in Daily Life - Examples of Chemical Reactions in Daily Life \(theworldcounts.com\)](https://theworldcounts.com)

[Detox My Fashion - Greenpeace International](#)

[The Impact of Pollution | The World's Largest Lesson \(globalgoals.org\)](https://globalgoals.org)

Teacher Background Knowledge

See 'Research Pack' presentation

BE THE WAVE AR FRIG Y DON

Invisible Pollution

Worksheets



cadwch keep
gymru'n wales
daclus tidy

**MARINE
CONSERVATION
SOCIETY**



UNDEB EWROPEAIDD
EUROPEAN UNION



Llywodraeth Cymru
Welsh Government

**Cronfeydd Strwythurol a
Buddosodi Ewropeaidd
European Structural
and Investment Funds**



Ariennir gan
Lywodraeth Cymru
Funded by
Welsh Government

Finding Invisible Pollution – Scavenger

Type of Pollution	Causes (Where has the pollution come from?)	Impacts (How does it affect the environment/people?)	Possible Solutions (What is/could be done to fix or stop it?)	Interesting facts & notes (What else did you find out, what surprised/shocked you? How does it make you feel?)	Sources/References (Where has the information come from? Is it reliable/biased?)
PFAS & Dyes					
Raw sewage					
Fertilisers					
Heavy metals					



compromising drinking water and killing fish. Synthetic fibres in the clothes we wear every day affect our oceans, rivers and marine life. When these clothes are washed tiny plastic microfibers too small to be trapped in filters enter not only the water system but also the food chain.

How has this happened?

The textile and fashion industry has always caused pollution but it increased dramatically in countries like Britain as the industry grew in scale during the 19th century. During this period, manufacturers utilised new technologies and faster manufacturing methods, particularly steam power, and retailers developed more sophisticated marketing and sales techniques. At the same time, the audience for fashion grew as the population increased, the middle class expanded, disposable incomes grew and prices fell. As the volume of manufacturing and consumption rose, so did air and water pollution.

Newspaper reports from the 19th century describe the foul conditions we now see in some developing countries. In 1833 the *Manchester Times* vividly evoked the stench and danger of the 'Black Ditch' at Pendleton which overflowed to flood the adjacent footpath with over a metre of mud contaminated with "waste dye stuff and filth" making it impassable and a public nuisance. The British government introduced legislation to control pollution from the 1860s but it was often flawed. Although government and industry

recognised the link between poor health, environmental damage and pollution, these risks tended to be accepted as a necessary price of industrial development and manufacturers were reluctant to spend more than strictly necessary on pollution controls.



Manufacturing methods and the widespread use of toxic chemicals can also be hazardous. The new aniline dyes, developed in the second half of the 19th century, created bright, low cost colours but caused skin problems and, in some cases, an increased risk of cancer for those who worked with them. Some wearers suffered from sickness, swelling and rashes. The felt hatting industry was dangerous because most workshops used mercuric nitrate to speed up the felting process. Mercury can be absorbed through the lungs, skin and stomach and it stays in the body. Mercury poisoning affects the neuro-motor system, causing long-term tremors, anxiety and irritation. Our collection of hats that have been created using mercury are stored in labelled, sealed bags to contain any remaining toxic contaminants.

The environmental damage and occupational health hazards that were once common in Britain have now shifted elsewhere. The modern textile and fashion industry is global and most mass-manufacturing is outsourced to countries with low labour costs which often have weak labour and environmental laws.

The use of toxic chemicals remains a serious issue. In 2011 the environmental charity [Greenpeace](#) called the industry to account. Its Detox campaign challenges big clothing brands to take responsibility for the environmental impact of their supply chains and to commit to achieving zero discharges of hazardous chemicals by 2020. Only 80 companies signed up and progress has been made but they represent just 15% of the global industry.



What can we do to change this?

Today designers, scientists, business, government and campaigners are coming together to develop a range of high and low-tech solutions, tested and experimental, which together have the potential to create a cleaner, greener, less wasteful industry. Instead of the take, make, dispose model of the linear system of manufacturing, research is focussing on circular systems, which take, make and re-make.

Other approaches include reducing waste by designing products to be more durable and offering consumers the option of customisation; using sustainable materials like linen grown in Western Europe more widely; investing in the development of commercially viable methods of recycling blended materials, and converting waste from non-textiles sources like food into materials suitable for clothing and accessories; reducing carbon emissions by employing energy sources other than fossil fuels, using local centres of production and utilizing more energy efficient methods; reducing water consumption and the use of toxins in dyeing and finishing processes by developing new technologies; and developing bio-fabricated materials and alternative processes based in synthetic biology as an alternative to synthetic materials made in the petro-chemical industry.

As wearers, we can also make a difference by choosing and looking after our clothes more carefully, wearing them longer, having smaller wardrobes, re-cycling the clothes we no longer want and thinking about alternatives to buying such as swapping or renting outfits.



Task - Answer the following questions

1. What resources does fashion need?

2. Give 2 problems and the impacts that the modern fashion industry can cause?

3. What effect did new technology have on the fashion and textile industry during the 19th century?



4. We use the term 'mad as a hatter' use the text to suggest reasons for this term.

5. What are Greenpeace campaigning for?

6. Give 3 ways we can make the fashion industry more sustainable



Task - Summarising

Write a summary of the information in the article using **no more than 50 words**.

To help you do this write one word per box



Invisible Pollution Comprehension Task (version two)

Read through the information and use this to answer the questions and complete the tasks that follow.

Task - Decoding

- Crack the code.
- Each letter has been replaced with a number.
- Some letters and numbers have been given to get you started.
- HINT: Look for little connectives 'of' 'a' 'and' 'the'

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
			24										13	9				17	19						

T N T O D S

 19 7 8 13 23 19 15 14 23 25 18 9 14 25 24 21 17 23
 O N S T N T S O O N S T O N

 2 9 13 17 19 23 13 19 17 9 15 14 2 8 9 22 21 13 17 11 21 14 23 19 21 9 13
 O T T N D S O N

 22 9 14 19 8 26 19 21 25 8 23 13 24 22 23 17 7 21 9 13
 D S N S

 24 8 17 21 4 13 8 14 17

Today the fashion industry's processes and practices often harm environments, ecosystems and human communities around the globe.

The modern linear system of manufacturing and the promotion of fast, disposable fashion puts pressure on non-renewable and threatened resources. It needs lots of water, and produces huge quantities of waste, most of which goes to landfill or for incineration.



The use of fossil fuels generates carbon dioxide that contributes to global warming by trapping heat in the atmosphere.

Many dyeing and finishing processes rely on toxic chemicals that affect the health of workers and leach out into rivers and ground water systems, compromising drinking water and killing fish.

Synthetic fibres in the clothes we wear affect our oceans, rivers, and marine life. When these clothes are washed tiny plastic microfibers too small to be trapped in filters enter the water system and the food chain.

1. What resources are needed to produce fashion/clothing?

2. Give 2 problems the modern fashion industry causes?



How has this happened?

Pollution increased dramatically in countries like Britain as the industry grew during the 19th century. Manufacturers used new technologies, such as steam power and shops and retailers developed more sophisticated marketing and sales techniques.

At the same time, the population increased, disposable incomes grew and prices of clothes fell.

Newspaper reports from the 19th century describe the foul conditions. In 1833 the *Manchester Times* reported the stench and danger of the 'Black Ditch' at Pendleton which overflowed to flood the adjacent footpath. Over a metre of mud contaminated with "waste dye stuff and filth" making it impassable and a public nuisance.

The British government introduced legislation to control pollution from the 1860s but it didn't really work. The risks tended to be accepted as a necessary price of industrial development and manufacturers were reluctant to spend more than strictly necessary on pollution controls.

3. What effect did new technology have on the fashion and textile industry during the 19th century?

Manufacturing methods and the widespread use of toxic chemicals can also be hazardous. The new dyes, created bright, low cost colours but caused skin problems. In some cases, it caused an increased risk of cancer for those who



worked with the dye. Some wearers suffered from sickness, swelling and rashes.

The felt hatting industry was dangerous because most workshops used mercuric nitrate to speed up the felting process. Mercury can be absorbed through the lungs, skin and stomach and it stays in the body. Mercury

poisoning affects the neuro-motor system, causing long-term tremors, anxiety and irritation.

4. We use the term 'mad as a hatter' What health problems did mercuric nitrate cause for people who made hats?



What can we do to change this?

Today designers, scientists, business, governments and campaigners are coming together to develop a range of solutions. Instead of the take, make, dispose model of the linear system of manufacturing, research is focussing on circular systems, which take, make and re-make.

Other approaches include:

- Reducing waste by designing products to be more durable.
- Using sustainable materials like linen.
- Reducing carbon emissions by employing energy sources other than fossil fuels.
- Reducing water consumption.
- Reducing the use of toxins in dyeing and finishing processes

As wearers, **we** can also make a difference by choosing and looking after our clothes more carefully, wearing them longer, having smaller wardrobes, re-cycling the clothes we no longer want and thinking about alternatives to buying such as swapping or renting outfits.

5. Give 3 ways we can make the fashion industry more sustainable



Task – Summarising

- Write a summary of the information in the article using **no more than 50 words**.
- To help you do this write one word per box.

HINT: Think about - what are the 3 most important facts from the information you think people should know.

The information is taken from an article written by the V&A 'The Dark Side of Fashion'
<https://www.vam.ac.uk/articles/pollution-the-dark-side-of-fashion>



Finding Invisible Pollution Comprehension Task - Teacher Guide and Answers

Task - Decoding

HINT: Discuss which letters are high frequency e.g. vowels low scoring letters in scrabble
Students could then look for small connectives such as 'I' 'a' 'of' 'the' 'can' this will help with identification of vowels and high frequency letters.

AND/OR

Students can look for key words e.g. fashion and identify them in the text.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
		7		13	20				8										10						5	

T E T

10 22 13 16 14 10 24 17 14 18 15 9 17 18 11 25 23 14

C T T C E F T

7 9 16 23 10 14 16 10 23 9 24 17 7 13 9 20 25 16 23 4 25 17 14 10 25 9 16

F T E T E T E F

20 9 17 10 22 13 10 13 12 10 25 18 13 14 16 11 20 14 23 22 25 9 16

E E

11 13 23 25 21 16 13 17 23

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
14	2	7	11	13	20	21	22	25	8	3	18	26	16	9	4	1	17	23	10	24	6	15	12	5	19

T H E N A T U R A L W O R L D I S A

10 22 13 16 14 10 24 17 14 18 15 9 17 18 11 25 23 14

C O N S T A N T S O U R C E O F I N S P I R A T I O N

7 9 16 23 10 14 16 10 23 9 24 17 7 13 9 20 25 16 23 4 25 17 14 10 25 9 16

F O R T H E T E X T I L E A N D F A S H I O N

20 9 17 10 22 13 10 13 12 10 25 18 13 14 16 11 20 14 23 22 25 9 16

D E S I G N E R S .

11 13 23 25 21 16 13 17 23

Line numbers have been added to support navigation through the text and guided reading



Task - Answers

1. What resources does fashion need?

Water

Waste disposal – needs to go to landfill or for incineration

Fossil fuels for energy

Dye/chemicals

2. Give 2 problems and the impacts can the modern fashion industry cause?

Fossil fuels generate carbon dioxide which contributes to global warming trapping heat in the atmosphere. Lines 6-7

Dyes produce toxic chemicals which can affect the health of workers leach into rivers and the groundwater killing animals in the rivers. Lines 8-10

Microfibers - tiny plastic(synthetic) fibers washed off clothing end up in the water system and foodchain (washed in to rivers and the oceans). Lines 10-12

3. What effect did new technology have on the fashion and textile industry during the 19th century?

Grew in scale as retailers developed 'more sophisticated marketing and sales techniques'

Steam power allowed faster manufacturing and a fall in prices.

Increase in pollution. (some legislation but it was flawed)

Increase in poor health due to toxic chemicals.

4. We use the term 'mad as a hatter' use the text to suggest reasons for this term.
(HINT: lines 31 – 35)

Felt hatting was dangerous as they used mercuric nitrate to speed up the process. Mercury can be absorbed through the skin, lungs, and stomach and then it stays in the body.

Mercury poisoning affects the neuro-motor system causing long term tremors, anxiety, and irritation.

5. What are Greenpeace campaigning for?

Take responsibility for the environmental impact of their supply chains

Commit to achieving zero discharge of hazardous chemicals by 2020



6. Give 3 ways we can make the fashion industry more sustainable

<p>Circular systems Reduce carbon emissions by using more energy efficient systems (not using fossil fuels) Bio fabricated materials Swapping or renting outfits</p>
<p>Making items more durable/last longer Recycling clothes Reducing water consumption Reduce toxins in dye</p>
<p>Recycling blended materials Sustainable materials like linen Smaller wardrobes Wearing clothes/them longer</p>

Name:

Date:

Activity 3 Upcycled Masterpiece

Brief: Design a product made using recycled materials

Purpose: Help minimise invisible pollution by upcycling.
Upcycling uses products that have already been produced so reimagining them minimises the impact they have had on the planet and stops them from going into the waste stream.

Notes:

Feedback:

Design 1

Aesthetics:

Cost:

Customer:

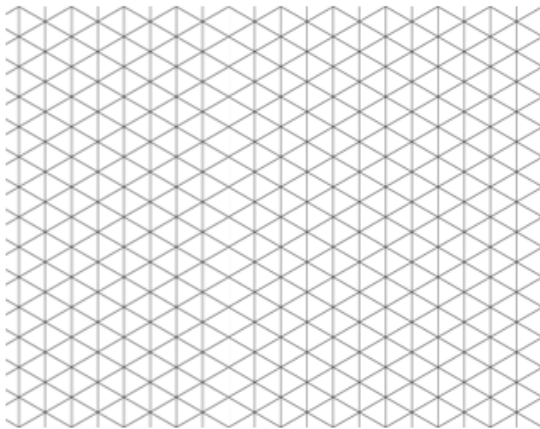
Environment:

Safety:

Size:

Function:

Materials:



Design 2

Aesthetics:

Cost:

Customer:

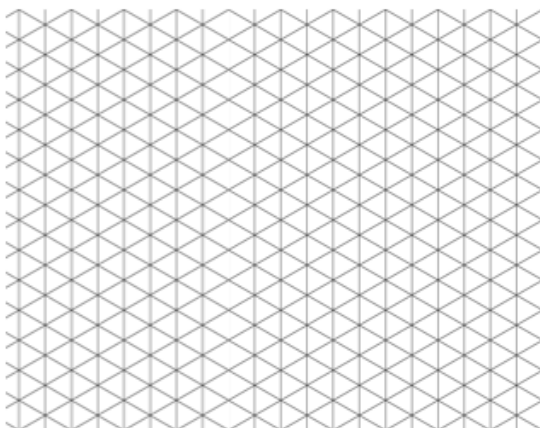
Environment:

Safety:

Size:

Function:

Materials:





cadwch keep
gymru'n wales
daclus tidy