Module 1

Study skills and visual organizers

In this Module we will see:

- *Study Skills for a research: typical language present in the materials, taking notes, guessing the meaning of new words*
- *The use of visuals and text in a scientific presentation*
- *Project work: The Ecosystem of the Nashua River*

If we show a Scientist and an Artist a grain of salt, what could they see?



A Scientist will recognize the crystal as sodium chloride, formed by the evaporation of brines. He might probably like to put it under a microscope to admire its symmetry and regularity.

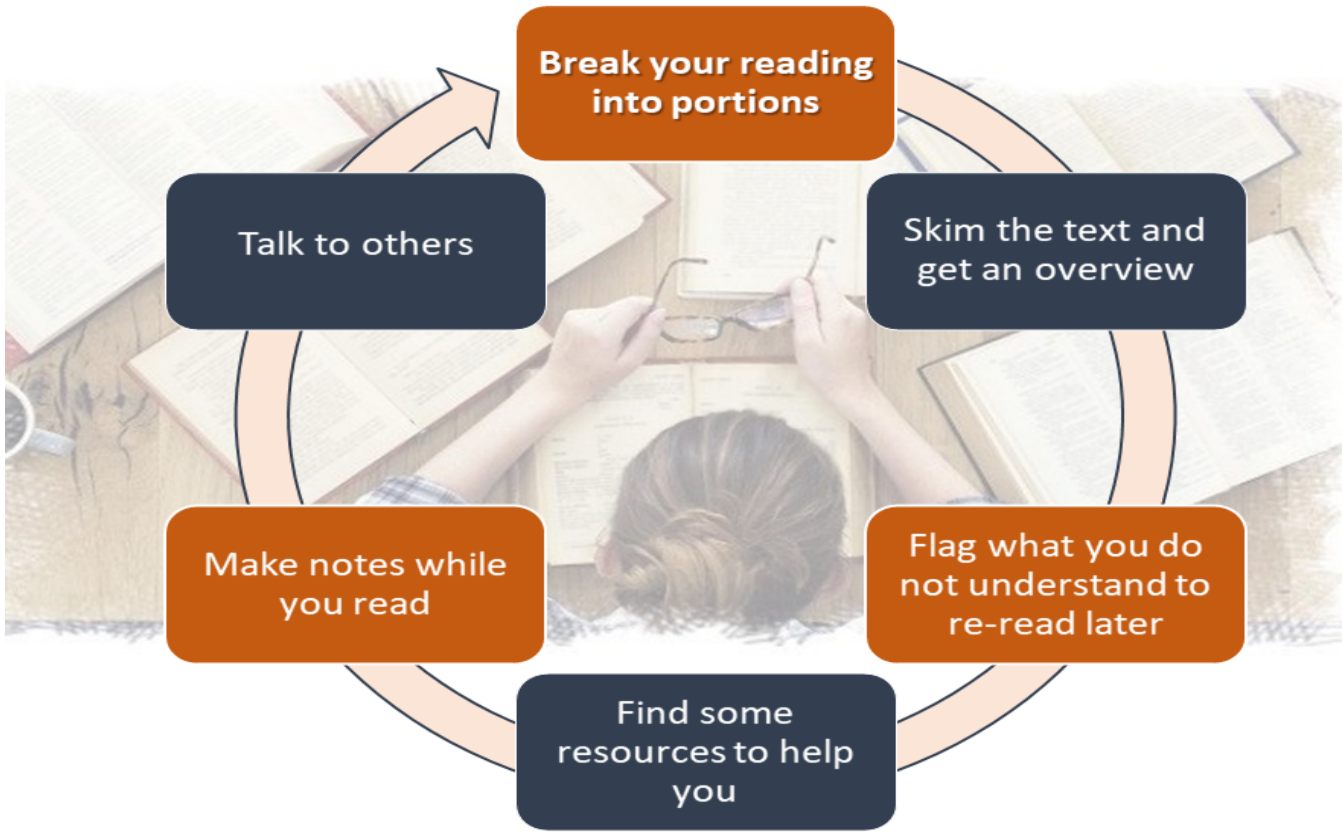
An Artist will probably take it in her hand and look at it as it catches the reflection of the light, and, as it has little smell, might taste it to have a better experience and understanding of it.

What essential skills do you need to have in order to research a scientific subject in a given language?

If you have at least an intermediary level in that language, then you should develop specific study skills, in reading, making notes, putting into practice and collaborating in groups and teams.

1. Study skills

The starting point of most researches is finding material and reading it. You may also attend a lecture or watch a video, but even these two ways of presenting information use visuals and texts to support their point. A tutorial of the Monash University[1] for the new students gives the following sound advice:



1 - BREAK YOUR READING INTO PORTION

Don’t feel overwhelmed on the size or complexity of the reading material. You don’t need at first to understand every word from the beginning to the end. At first you need to have a general idea of the content.

2 - SKIM YOUR TEXT AND GET AN OVERVIEW

Run your eyes over the titles, headings and abstract. Examine any graphs, diagrams, charts. Highlight and read the topic sentence (usually first sentence) of each paragraph. Look for any key words/phrases that are relevant to your topic or what you are wanting to find out.

3 - FLAG WHAT YOU DO NOT UNDERSTAND TO RE-READ LATER

Don’t worry about the parts that you do not understand. A difficult text will always require more than one reading, and a partial understanding will make it easier when you revisit the material a second or third time.

1 https://www.monash.edu/rlo/study-skills/

4 - FIND SOME RESOURCES TO HELP YOU

You might need to find some other material to help you with the background to the reading. If you are having trouble with the vocabulary, find a subject-specific dictionary so you can understand the key words. If it is a new topic, it is essential you have a clear understanding of the key words used throughout the text.

5 - MAKE NOTES WHILE YOU READ

It often helps to write while you are reading. Writing ideas down in your own words and organising information in a structure, summary or diagram that works for you will help you grasp the material.

6 - TALK TO OTHERS

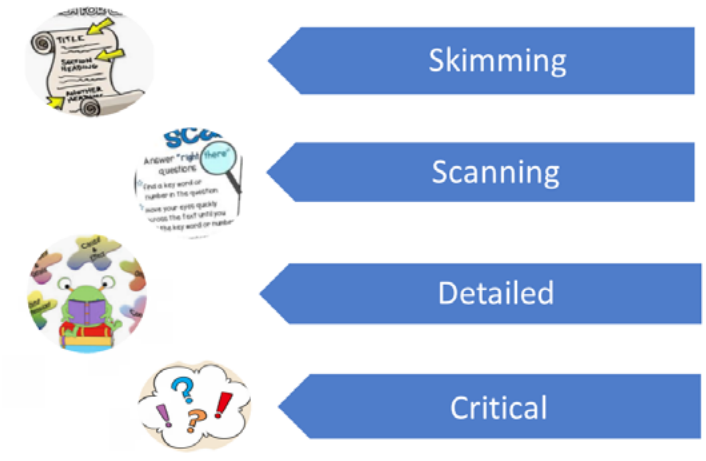
Talk through difficult material with your fellow students or tutor.

7 - DO NOT PANIC

Put the book or article aside, and read it again the next day. This gives your brain a chance to process. You will be surprised by how much you can pick up a second time around!

2. Reading skills

When you have a text in front of you, you should have a purpose in mind before you start reading it. Do you want to know what it is about? Are you looking for some specific information? You need to summarize the main concept present it the article?



For each of these objectives there is a different reading skill to be used.

Skimming a text.

Skimming is reading small amounts from throughout the text.

Skimming is letting your eyes and mind 'skim' over the text to get a quick but very general idea of it. You can't read the text closely when skimming it, but instead you aim to pick out key words and sentences and get the general feel and meaning of the text.



How to skim.

If the introduction is short read it in full. If long, read the first sentence of each paragraph. Then read the first sentence of each subsequent paragraph, or until you find the topic sentence (usually the first or second sentence). This will give you an overview of the content of the passage. It can also be useful to read the concluding paragraph in full.

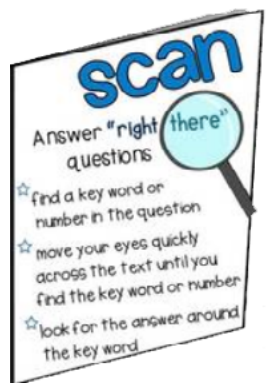
For a report or research paper, first of all read the Abstract. Then look over the section headings and subheadings and any figures or tables before skimming the text. It may also be useful to read the Conclusion.

When should you skim?

When you want to get an overview or the gist of a text. This can help you decide whether or not to read the full text.

Scanning a text

You skim read material to get the general picture. You scan when looking for specific information.



When should you scan?

You may need to find specific details on a topic for a task that. You should scan the text for words related to the topic. You can run your eyes down the page looking for these expressions - in chapter headings or sub-headings, or in the text itself.

Detailed reading

Detailed reading is intensive reading that focuses on the important parts - key chapters, books, poems, pages. This is when you are likely to take detailed notes.

Critical reading

A critical approach to reading does not mean criticising or 'finding fault'. It means asking yourself why this particular author has written this particular text, and evaluating their strengths and weaknesses.

There are several questions to consider when approaching your reading.

The following examples will give you a few ideas on the types of questions you should be asking when reading:

- What is the author's main theme or point?
- What is the main point, thesis or argument?
- What explanations or supporting evidence are drawn on? Do they seem adequate, completely relevant?
- Does any idea/information interest, confuse or intrigue you?
- What is the structure of the text? What does the structure of the text reveal?
- How is the content developed? Is the material developed historically, in order of importance, in terms of a debate?

- How does the conclusion relate to the rest of the material? Does the conclusion work logically, and is it representative of the findings?
- On what style has the material been written? Eg. Is it formal, informal, analytical, narrative, persuasive, argumentative, or didactic?
- How do the style and format influence your reaction to the material?

2. How to get ready for a research

A practical example of how to deal with a scientific text

You have been given the task of researching the topic of Bionics. Here are some guidelines on how to decide what to investigate and how to present your initial idea for a project in order to be approved.

A) To start with find what the topic is about.

Biomimetics, or bionics, involves designing processes, substances, devices, or systems that imitate nature.

B) You are now to read a short text about fog and a possible idea to design a way the properties of water can be used to capture water from fog.

TEXT 1) WHAT IS FOG?



Fog develops in almost the same way as a cloud. However, fog actually touches the ground rather than being above it like a cloud. Fog is made up of tiny water droplets, which are usually around 10 μm in diameter. Fog forms when the air cools to a point where it can no longer hold all of the water vapour it contains (the dew point). The water vapour therefore condenses into tiny liquid water droplets, on surfaces such as the ground, roofs or around microscopic particles such as dust and pollutants in the air. The water droplets are hydrophilic, that is they attract other water droplets, and so once the process has begun, larger drops of water can form.[1]

C) General Questions about the text

- What is the main concept in text about the properties of fog?
- Can you summarise it in just a few simple words?

1 Cambridge English for Scientists – Chapter 3

D) What to do when you find new scientific words

Here is a practical example of how to deal when you find new key words in a text.

TEXT 2 – RESEARCH PROPOSAL

A student, Rayna, is doing a research in environmental science. She has been investigating water-harvesting mechanisms. She is writing to Bryn, her supervisor. Read an extract from her email and then answer the questions below.

> *…… I'm wondering if I could arrange a meeting with you some time next week? I'd like to discuss an idea for a possible new direction to take our research in.*
>
> *Basically, I've been doing some reading on the Namib Desert Beetle and I think there might be a way to design some kind of **water-harvesting** material based on its wings. They are covered in **hydrophilic bumps** which attract water **droplets** in the fog. The drops get larger and when they become too heavy to stay on the bump they **roll off.** The bumps are surrounded by **hydrophobic** channels so the water **rolls down** into the the beetle's mouth. I really think it might be possible to develop a s**uperhydrophobic** material which has a surface in **superhydrophilic** bumps to trap water droplets in fog and this is what I'd like to ….*

1. What is the difference between (super-)hydrophilic and (super-)hydrophobic?

Tip

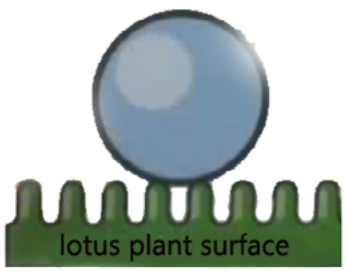
These are long compound words, made of different parts. As many words is Science originate from Greek or Latin, maybe you could <u>infer their meaning, without using a dictionary.</u> For example, think of other words with similar words:

Philosophy, Phobia, Fire Hydrant

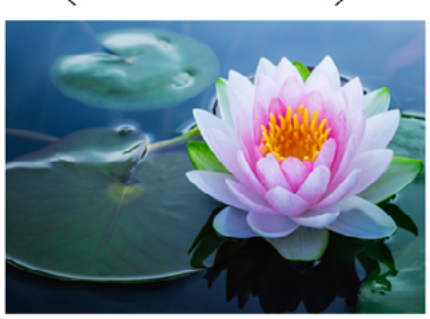
If you are not sure, look at the images below to consolidate your understanding.



Here are some other visuals that might help you clarify their meaning.

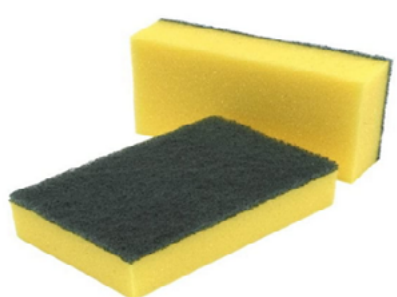


Hydrophobic
(scared of water)





Hydrophillic
(loving water)



2. There are some other key words of general use in that text: ***droplet; roll off / down; water-harvesting***. Let's see for each one a different strategy to infer their meaning.

a) ***droplet***: if you divide the word in two parts you have drop – let;

If you don't know its meaning, look at the relative image.



a drop

The second part is a suffix, similar to others you already know, for example:

cigar -> cigarette (a small cigar) ***piglet*** (=a young pig), ***kitchenette*** (=a small kitchen)."

b) ***roll off / down***: when you find a verb followed by a preposition, the meaning of the verb is often different from the one it has on its own. Even so, prepositions have a general meaning as well. So, if a drop of water ***rolls down***, it moves down into something. If it ***rolls off***, it gets away, separated from something.



to harvest

c) ***Water-harvesting:*** harvest originally means to gather, collect what is produced in fields, such as fruit, cereals, etc. In this case we have the process of gathering water.

3. Now that you know the meaning of the key words present in the text, are you able to answer the following comprehension question:

What does Rayna hope to design?

Express her idea in a simple way. Look at the images above that represent the phenomenon.

General guidelines to summarise a text.

- look for the key information
- look at each paragraph, locate the topic sentence (often the first one) and decide what the main point is
- list the key points
- only include the main ideas of the text

For the moment, don't feel discouraged if you don't understand the new technical words.



While-reading strategies: Guessing words in context

The topic of the project at the end of this Unit is the Environment and its survival. You will find new words that are used in relating about this topic. Even if at first they might appear completely new to you, try guessing their meaning from the context. Here are some examples.



a chain

- Using related words

Sometimes a word in general English has a special meaning in a Scientific contest.

Example: ***Food chain, food web, life cycle, green belt***

If you recognize a word but don't understand it in context, think:

What is the basic meaning of the word?

Does that help to understand the special meaning?

Example:

A ***chain*** is a set of connected or related things. So a food chain must mean a series of things which are connected (each group eats the group below it).

- Removing prefixes

A ***prefix*** = letters at the start of a word

A prefix changes the meaning of a word.

Examples:

Redo = do again

Miscalculate = calculate wrongly



If you don't recognize a word, think: is there a prefix? Remove it.

Do you recognize the word now?

What does the prefix mean?

Add it to the meaning of the word.

- Removing suffixes

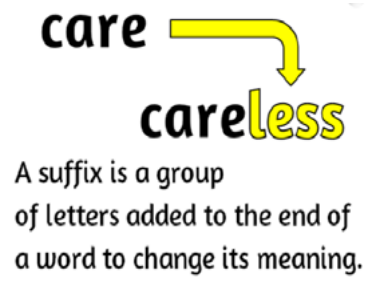
A ***suffix*** = letters at the end of a word

A suffix sometimes changes the part of speech of the word.

Examples:

Prevent -> ***prevention*** = verb -> noun

Environment -> ***environmental*** = noun -> adjective



If you don't recognize a word, think: is there a suffix? Remove it.

Do you recognize the word now?

What does the suffix mean?

Add it to the meaning of the word.

3. How to present your findings to your team or tutor.

From the initial text about fog (Text 1), let's notice how the writer uses certain phrases to advance her own ideas, without being too direct (Text 2). Especially when you work in a team, you have to present your ideas in a polite way, without trying to impose them on the others.

Not only, but we also need to use evidence to support our point of view. We can use 'because' or 'because of' to give a reason or 'so' to show a result of a situation

Here are some examples that show how to do that.

*I think nets must be less efficient **because** they have holes in them.*

*I think nets must be less efficient **because of** the holes in them.*

*They have holes in them, **so** I think nets must be less efficient.*

Text 3 – How to propose your ideas without imposing on others

Here is an extract from Rayna and Bryn's conversation; circle the phrase in bold that the speakers should use in order to sound more polite and not imposing on others.

*Rayna: I **think we could / We can** create a material which **will / could be** used to harvest water from fog.*

*Bryn: Yes, that **might be possible / we can**, but it **wouldn't be / I don't believe it would be** any better than the lotus-inspired surfaces Meera and Zein are working on.*

*Rayna: That's true, but it **seems to me that / but this would be** more efficient*

Guidelines to propose your ideas without imposing on others

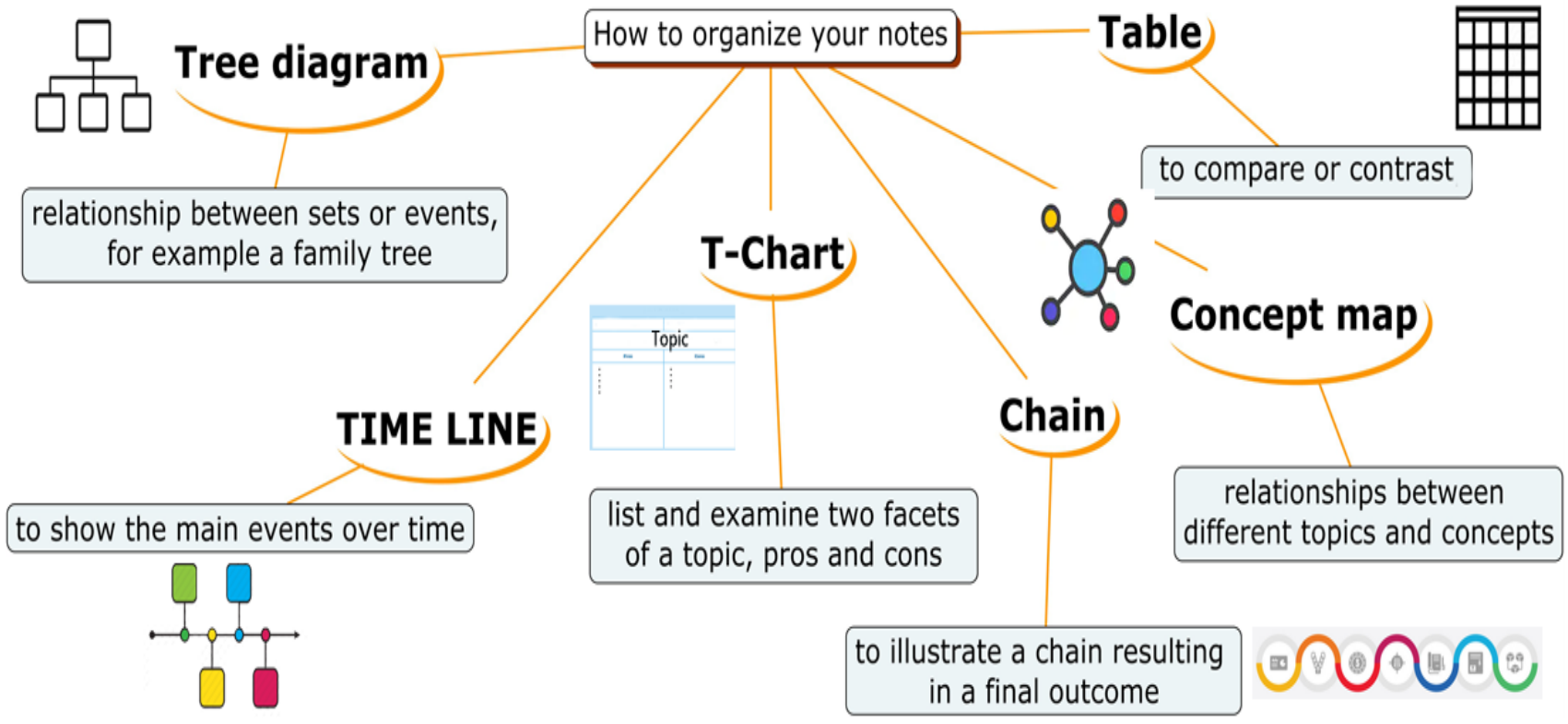
- present your proposal in a way that makes sense to the others
- provide evidence to support it
- anticipate questions they might ask you
- keep it short



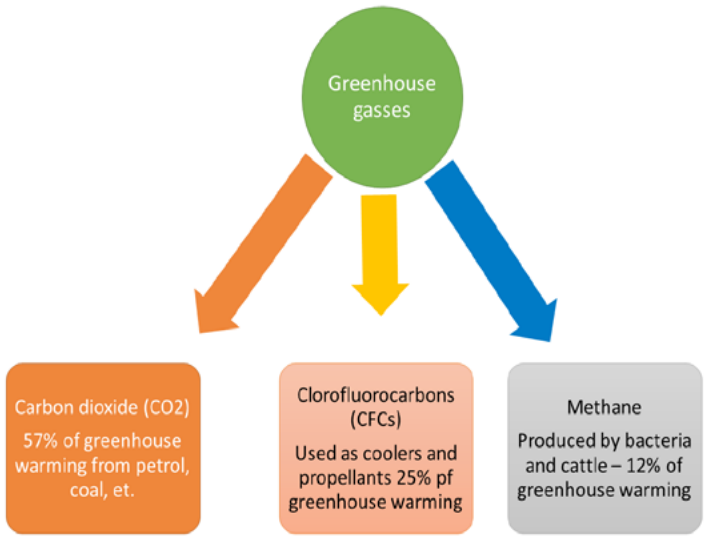
4. Extending skills for Environmental Science

HOW TO TAKE NOTES DURING A LECTURE.

How can you organize information in a presentation? The following outlines are different examples you may use to take essential notes while you listen or read a presentation of a topic



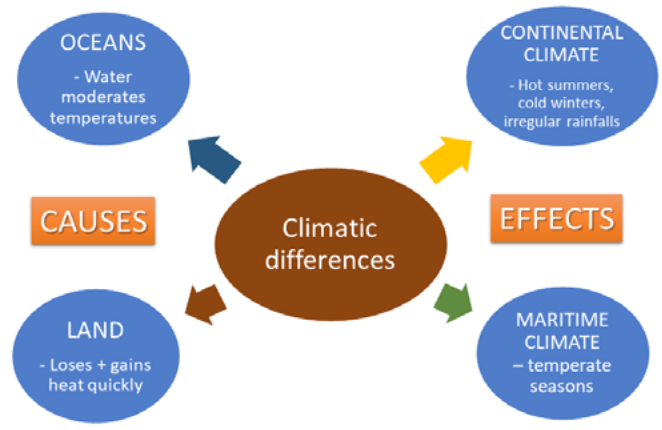
Here are some practical examples of how to use them for different kinds of information.

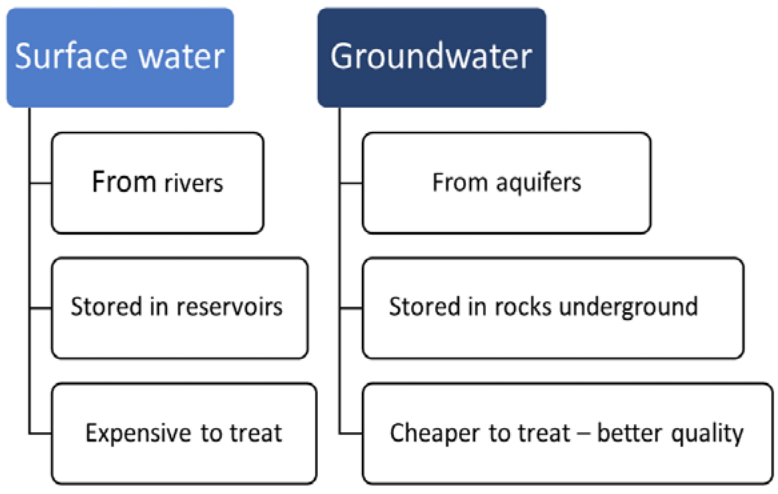


A tree diagram is used to depict the components of an organization or a phenomenon. Use a tree diagram to break down a process into manageable parts, or discover the detailed components of any complex process.

They're called tree diagrams because they have lots of branches

A concept map is a diagram that visually represents relationships between concepts and ideas. In the example, causes and effects of Climatic differences.

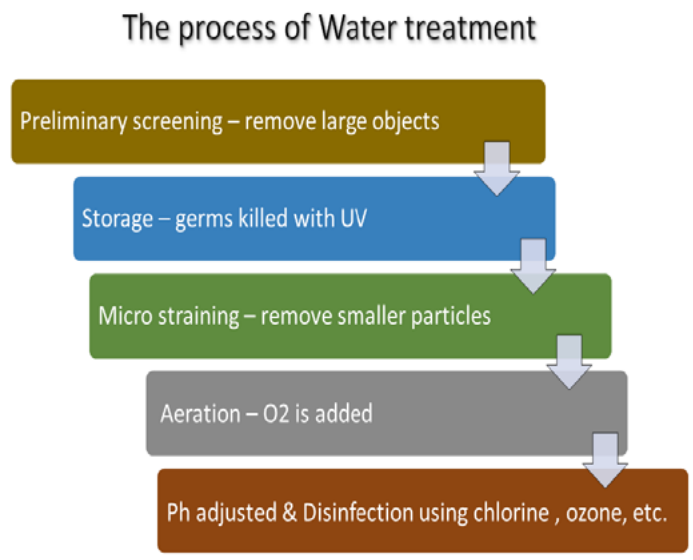




This diagram is used to compare two similar things. Here are expressed only their differences.

To show also points in common use a different diagram, such as Venn.

This is a progress diagram, used to show a downward progression through stages.



VOCABULARY BANK

It's a good idea to learn words that go together. In this way they are easier to remember and you can avoid repetition of the same term.



Every time you meet a word with similar meaning to one you already know, write them together or mentally match them repeating them inside you.

Words can be connected in different ways:

- Synonyms, words with the same meaning: e.g., material/matter/substance
- Antonyms, words with opposite meanings: e.g., organic/inorganic
- Hypernyms, a general word for a set of words: e.g., animal = horse, lion, shark, etc.
- Linked words: e.g., energy, fuel, generate, electricity, power

Key words in Environmental Science

Before you start reading the material on the Nashua River, you need to familiarize with the key words that are used in Environmental Science.

Here are two online resources you might find useful:

→ A short video, so you can also listen to their pronunciation

https://www.youtube.com/watch?v=PbBR1sNc6C4

→ A webpage with their list, definition and use.

https://www.englishclub.com/reading/environment/environment-vocab.htm

As you are dealing with a natural disaster, consider the following table, with the differences between Natural and Man-made disasters.

NATURAL DISASTER vs MAN MADE DISASTER	
Natural disasters are caused by natural forces	Man made disasters are caused by the activities of men
Examples: tsunamis, floods, landslides, hurricanes, wildfires, droughts, volcanic eruptions, etc.	Examples: hazardous material spills, explosions, chemical or biological attacks, etc.
Steps can be taken to minimize the effects	Can be avoided with careful planning and prevention methods

5. Project work: facing an ecological disaster



The Nashua River: An ecological disaster once considered "hopeless"

For this assignment you have to watch a short video on the environmental disaster of the river Nashua in Pennsylvania, US, and prepare a written summary.

Your task will be to find an answer to the following questions:

1) How come a beautiful natural environment like the Nashua river became one of the most polluted in the country?

2) Why was its condition defined as "hopeless", a "lost cause".

3) What did one single woman do in order to change that situation?

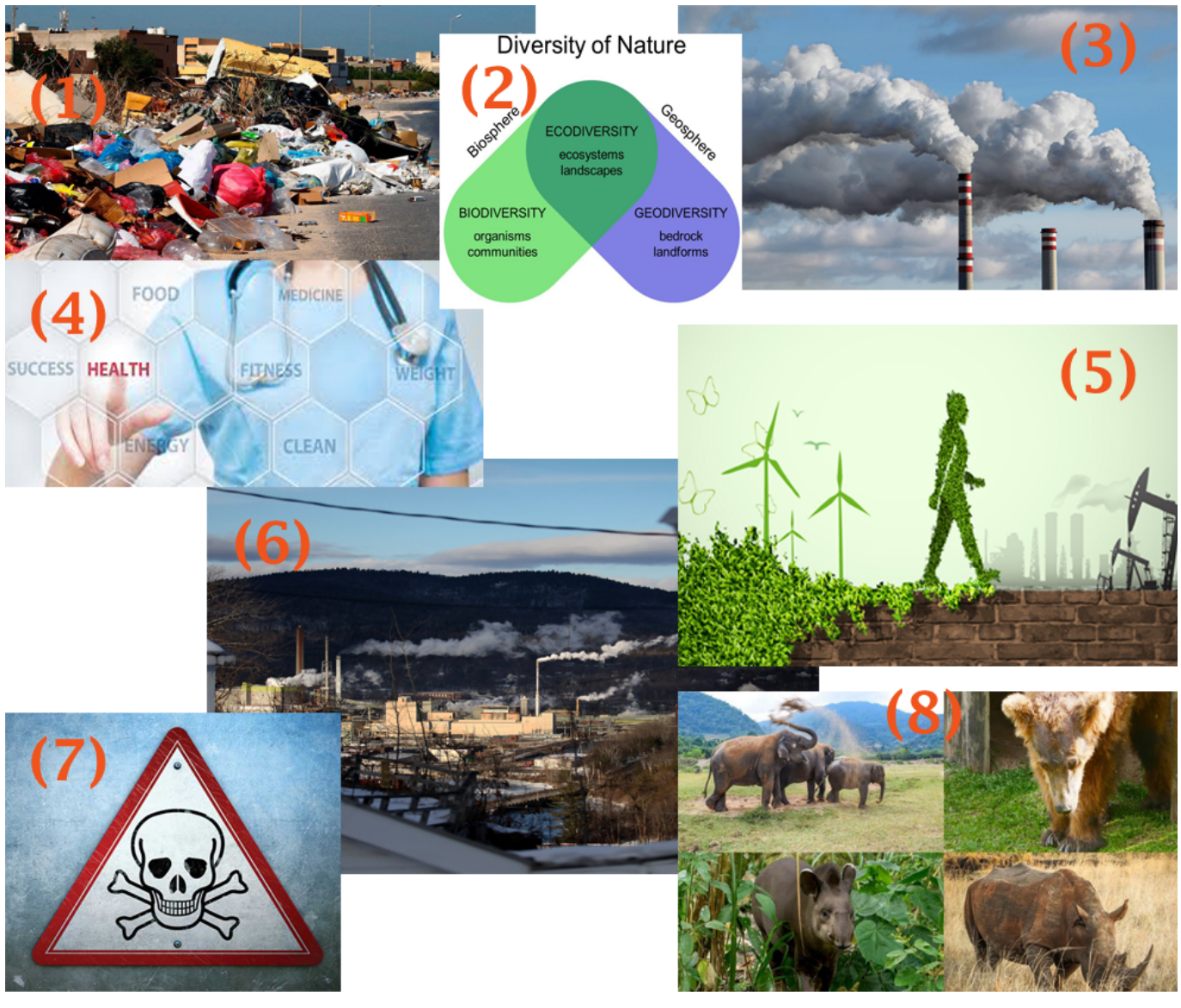
4) In your personal opinion, what are 3 messages we can learn from Marion's inspiring story?

In the video you'll find the following key words related to the environment. Try to understand their meaning from the context.

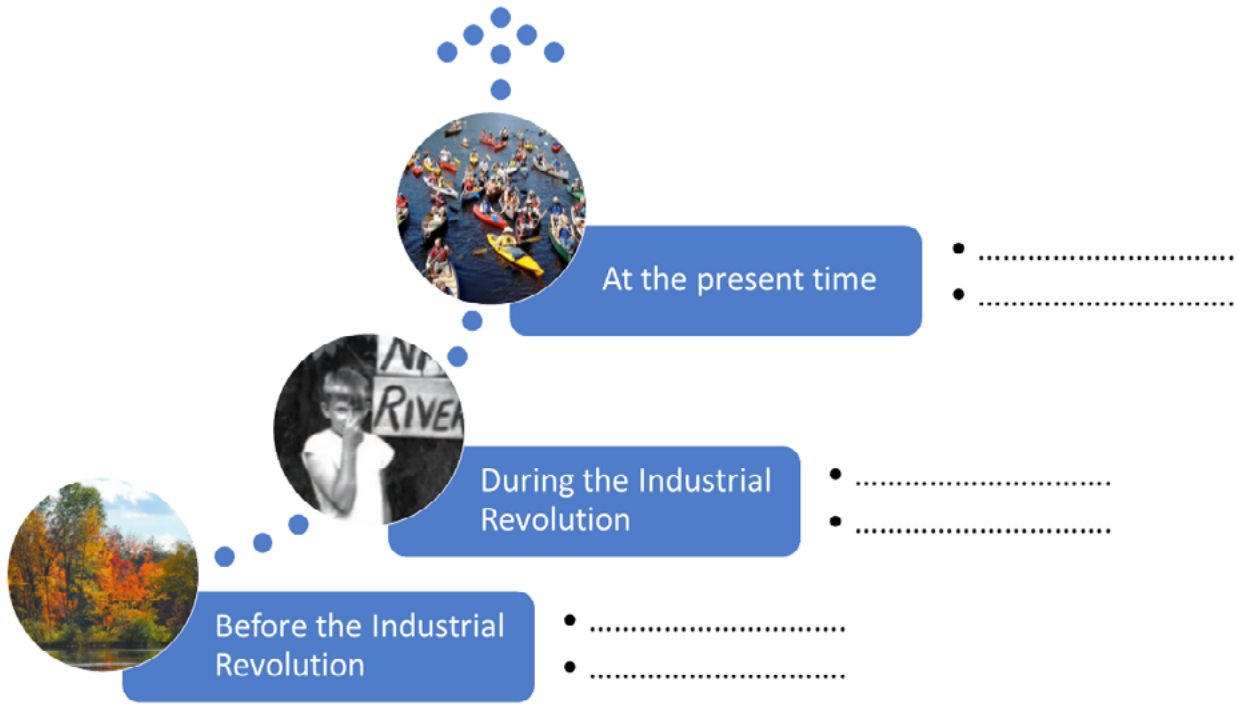
The images below show what these words represent.

Use a dictionary if you are not sure of one meaning.

(1) Waste (2) Ecodiversity (3) Pollution (4) Health
(5) Sustanaible (6) Mill (7) Hazardous (8) Wildlife



Here is an example of diagram you may use to help you take notes for this assignment.



TIP

The presentation of the results of this project work could be done individually or in teams, in presence or online using a multimedia space where to collect the reports.

See here an example with Padlet.

How to prepare for the assignment

BEFORE YOU START READING …

- Think of research questions. In other words, ask yourself:

What must I find out from my research?

- Look at headings, sub-headings, illustrations. What information do they give me?
- Decide how to record information from your reading.
- You may choose one or more methods of notetaking we have seen earlier.

WHILE YOU ARE READING ….

- If you have the material in pdf format use the function to highlight sentences. If it is just web page, some browsers allow you to print it, choose to do it in a digital format, as a pdf file.
- Highlight the topic sentences, that is sentences that express the main idea of the paragraph in which they occur.
- Think: which paragraph(s) will probably give me the answer to my research questions?
- Make notes.

After reading …

Think: *Did the text answer all my research questions?*

- If the answer is no, look at the other paragraphs to see if the information is there.
- Use the topic sentences to summarize.

The topic sentence of a text normally makes a good basis for a summary. Follow this procedure:

- Locate the topic sentences
- Paraphrase them – in other words, rewrite them in your own words so that the meaning is the same. Do not simply copy them. (This is a form of plagiarism.)
- Add supporting information – once again, in your own words.
- Check your summary. Check that the ideas flow logically. Check spelling and grammar. Divide a longer summary into paragraphs.

Extra material on water pollution

A. Introduction to Water Pollution

This is an introductory text on the phenomenon of Water pollution.

What questions should you answer before you start reading it?

After you have read it, do you have a general idea of how water is polluted? If not, read it again to find it.

Water pollution[1]

The most common sources of water pollution are discharges from industrial processes, household sewerage, storm-water drains and run-off from agriculture. Waterborne wastes from industrial processes may include trace metals, nutrients, solvents, oils, organic substances, acids and suspended solids

Water pollution can have a visual impact, but it can also be hazardous or toxic to aquatic life. Suspended solids in water reduce water clarity, and turbid waters are poor habitats for fish and other aquatic life. Trace metals can be toxic to aquatic life and can bioaccumulate in the food chain.

Industries contributing to waterborne emissions of trace metals include electro-plating, leather tanning, and the use of batteries with high concentrations of heavy metals. Solvents are widely used in industry to remove scale, rust and other surface contaminants from metals.

Water pollution is also generated during the use of some appliances (e.g. detergents in waste-water from washing machines and dishwashers). These impacts can be minimised through use of biodegradable detergents or through better design of the appliance to minimise water use.

When products are disposed of to landfill they can generate water pollution by leaching metals or other toxic substances into ground-water.

1 Lewis H., Gertsakis J. - Design + Environment
A Global guide to designing greener goods.

B. Video on the ecological disaster of Nashua River

This is a video that introduces the natural disaster that hit the Nashua River, in the United States and how one single person made it possible to regenerate the environment thanks to her commitment.

https://www.youtube.com/watch?v=i0goQOlcCZ8

C. The story behind the video on Nashua River

This text is a passage from a book on saving the environment, OUR EARTH, OUR SPECIES, OUR, SELVES, by Ellen Moyer [2]. It tells the story that is briefly described in the video above.

While the previous two resources have offered you an overview of the Nashua River campaign to recuperate the area, the following text will give you extra information that you might find useful.

In the 1960s, the Nashua River was starved of oxygen, biologically dead, and one of the ten most polluted rivers in the United States. The river, which flows through New Hampshire and Massachusetts, was a different colour every day, depending on what chemicals had been discharged. People could smell its stench from a mile away. At that time in the United States, it was legal to dump sewage and industrial waste into rivers. In 1962, Marion Stoddart moved to the area with her family. Stoddart made it her life mission to restore the river to its preindustrial condition—running clean and clear, with fish and wildlife. One of Stoddart's initial tasks was to push hard for federal and state legislation that made the clean-up of the river possible and set the stage for other states to follow suit. Wastewater treatment plants were constructed and put into service in the 1970s.

In 1969, Stoddart founded the Nashua River Watershed Association (NRWA) to protect the river and educate the public. A key objective was to permanently protect the land adjacent to the river—continuous "greenways" extending at least three hundred feet back from the river and major tributaries.

These buffer zones protect the river from storm water overflow — which often contains agricultural chemicals, and other contaminants.

Greenways also provide wildlife habitat and corridors, protect the floodplain and wetlands, and enable people to enjoy the river.

Fish, turtles, mink, otters, ospreys, and bald eagles returned to the river. People now gather there to fish, boat, hike, and bicycle. The clean river boosted the economy of cities along its route, increasing property values and attracting new businesses. Ordinary citizens learned that they have the power to create change.

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2 OUR EARTH, OUR SPECIES, OUR, SELVES, by Ellen Moyer

Stoddart attributes her success to the following factors:

- *Longing for a larger purpose - She wanted to do more than simply make her family happy.*
- *Inspiration - Stoddart was inspired by a radio program she heard. It asserted that with vision and commitment, one person can do the work of a thousand people.*
- *Vision - Stoddart created a vivid picture in her mind of the river and adjacent land restored to its original beauty, abundant with wildlife and attracting people as in times past. The vision came easily and never left her mind.*
- *Commitment - She made a lifetime commitment to herself to restore the river without initially discussing the idea with anyone or knowing how she was going to do it.*
- *Homework - She informed herself on the issues, players, politics, existing laws, and process for creating new laws. She studied ways to change the laws to stop the polluting.*
- *Collaboration - She contacted the leaders of every local industry or organization.*
- *Seeing challenges as opportunities - When blocked she simply looked for another way.*

Learning outcomes at the end of the chapter

The first part of this module aimed at help you orientate yourself and find support referring to basic reading skills, and taking notes, to simplify the content and highlight the most important concepts in a text.

As you are working in a team, it is relevant to know how to work with others. How you present your ideas / proposals is important, because it helps to consolidate a team spirit and may also be considered a good example of interacting in a group by the others.

Visual organizers make communication much easier and effective. According to what you need to express, there are different structures to choose from. They all require understanding the major points of a concept, simplifying it, and displaying the major elements in a way that can easily perceived and understood.

The Project work on the ecological disaster of the Nashua River is a great lesson to learn. This activity not only allowed you to become familiar with the vocabulary related to environmental disasters, but also to reflect on how a single individual, if armed with enough commitment and willing to prepare for the task, is able to change a hopeless situation in something that can be a benefit for all the people who are suffering the consequences of the same problem.