# Chapter 1. Introduction - Definitions

- **A palaeoenvironment**

A palaeoenvironment refers to an environment (ecosystem) from ancient times, a bygone era, consisting of all the biological characteristics of the biotopes of a given region at a specific point in its history. In fact, any environment, a palaeoenvironment, consists of a milieu (biotope) and the living beings that evolve within it (biocenosis). However, each component of a palaeoenvironment often has to be studied separately using different elements from the "fossil record" and then reconstructed.

It is reconstructed based on sediment accumulations and traces of biological activity.

- **Ecosystem**

An ecosystem is a system formed by two elements in constant interaction : relatively uniform physical and chemical characteristics (physicochemical framework). This environment is home to a set of life forms that make up the biocenosis: flora, fauna, fungi, and populations of micro-organisms.

- **Biocenosis**

Is the set of living beings coexisting in a given ecological space, more their organisations and interactions.

Not all fossils have the same value within the taphocoenosis: marker fossils are chosen from species that are relatively abundant, and are not intended to gather information about the species itself, but about its environment. Facies fossils, in particular, provide us with information about the environment they inhabited.

- **Taphocenosis**

Refers to all living beings (individuals or species) fossilised in the same environment (rock or surroundings). Knowledge of taphocenosis enables paleoenvironments to be reconstructed.

- **Thanatocoenosis**

A group of fossil organisms that lived in the same biotope and were transported after their death to the same deposit site, where they constitute all or part of a sediment.

- **Actualism**

Is a fundamental principle in geology.It explains how a rock or fossil was formed by reconstructing its environment. This assumes that the causes and effects of current geological phenomena were the same in the past. For example, based on the Great Barrier Reef, we can imagine the environment in which corals that are now fossilised lived. What did the seashore look like in the past, which side was the coast on, or even which way did the current flow ? However, the principle of actualism is not infallible, since we cannot establish all the elements of the past with complete accuracy.

- **Biomarker**

Is a measurable biological characteristic linked to a normal or abnormal process.

The principle behind the use of a “biomarker” is to search for the biological signature of the impact (current or past) or the presence of a xenobiotic in the organism The principle behind the use of a ‘biomarker’ is to search for the biological signature of the impact (current or past) or the presence of a xenobiotic in the organism, or the induced effect of an environmental change or stress (e.g. thermal pollution, light pollution).

- **A xenobiotic**

(from the ancient Greek ξενος, meaning ‘foreign,’ and βιος, meaning ‘life’) is a substance present in a living organism but foreign to it: it is produced neither by the organism itself nor by its natural diet.

Certain biomarkers (e.g. tree rings) reveal past events (contact with a toxin, a pathogen, a climatic event, etc.).

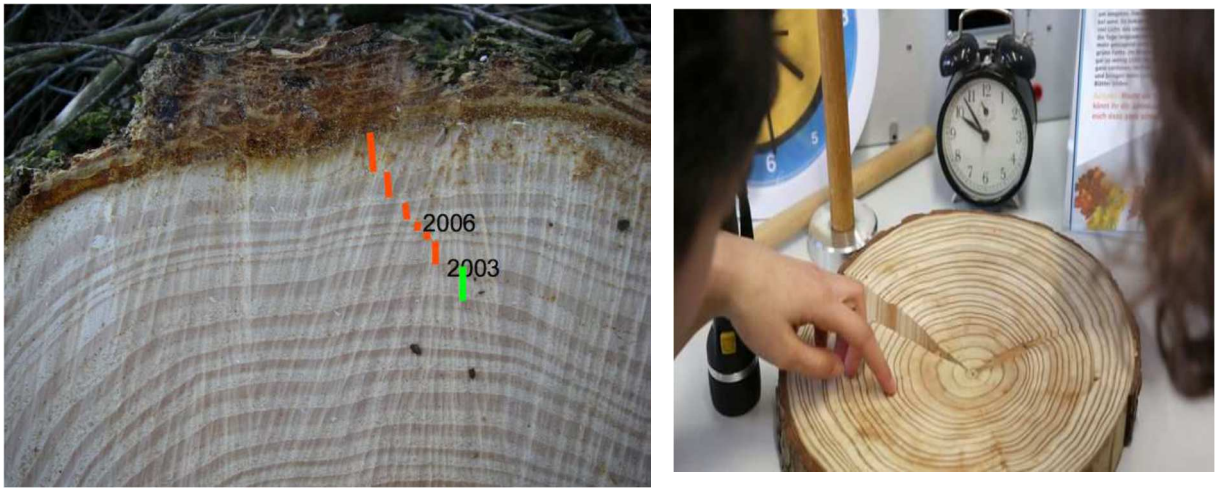



Figure 1. Tree rings

## Environmental parameters (environmental variables) and their geological records

- Salinity (constant or variable)
- Bathymetry: Depth related to light, light spectrum, hydrodynamics, temperature, oxygenation of the environment
- Presence of burrows, tracks

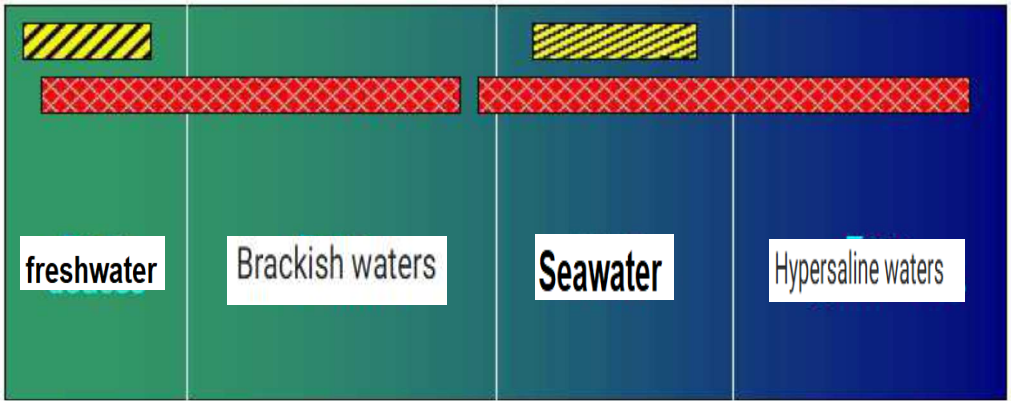
**Salinity**

The sea is saltier in the tropics and less salty at the poles. Where salinity is high, evaporites will be found.

The best indications are provided by fossils.

A euryhaline organism is an aquatic species capable of withstanding large variations in the salinity of the surrounding water, typically in an estuary. A species is euryhaline, and therefore halotolerant, as opposed to stenohaline.

A stenohaline organism is an organism that can only survive in water with a certain degree of salinity.




Stenohaline species: narrow tolerance towards salinity

Euryhaline species: wide tolerance to salinity

**Bathymetry**

There is a clear relationship between depth and the distribution of fauna and flora in aquatic environments. Near the coast, certain sedimentary structures are linked to bathymetry.

Influencing factors: light spectrum, hydrodynamics, temperature, oxygenation of the environment.

**Presence of burrows, tracks**

Activities of certain organisms related to the tide.

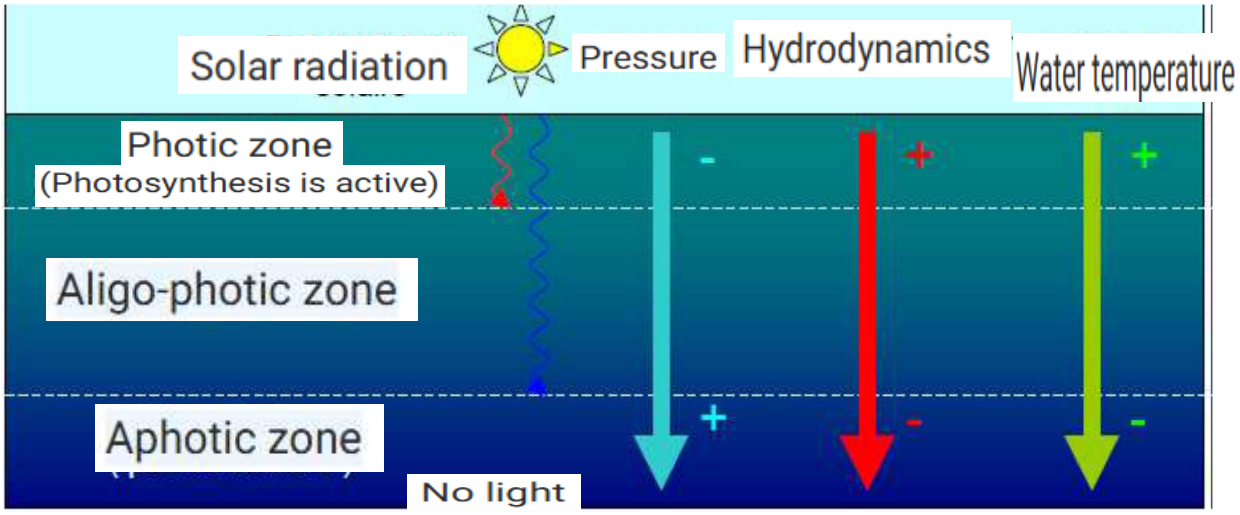



Figure 3. Light spectrum, hydrodynamics, temperature, oxygenation of the environment