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## WEEK 8 – WATER, ECOLOGY AND LIVABILITY

### Carbon dioxide

Carbon dioxide (chemical formula CO<sub>2</sub>) is a colorless, odorless gas vital to life on Earth. The gas is emitted from volcanoes, hot spring sand geysers and is freed from carbonate rocks by dissolution in water and acids. Since carbon dioxide is soluble in water, it occurs naturally in groundwater, rivers and lakes, in ice caps and glaciers and in seawater. It is present in deposits of petroleum oil and natural gas. It is an important greenhouse gas and burning of carbon-based fuels since the industrial revolution has rapidly increased its concentration in the atmosphere, leading to global warming.

Wikipedia. *Carbon dioxide*. [online] <[https://en.wikipedia.org/wiki/Carbon\\_dioxide](https://en.wikipedia.org/wiki/Carbon_dioxide)> [accessed at 29 June 2015]

### Ecosystem

According to TEEB (2008: 12) an ecosystem is defined as “a dynamic complex of plant, animal, and microorganism communities and their nonliving environment interacting as a functional unit”. Ecosystems can be relatively undisturbed by people, such as natural forests, they can be landscapes with mixed patterns of human use or ecosystems are intensively managed and modified by humans, such as agricultural land and urban areas (TEEB 2008). The Millennium Ecosystem Assessment (MA 2005) defines ecosystem services as the benefits people obtain from ecosystems contributing to human well-being. Human well-being includes basic material for a good life, health, good social relations, security, and freedom of choice and action such as the opportunity to achieve what an individual values doing and being (MA 2005; TEEB 2010).

MA, Millennium Ecosystem Assessment (2005a). *Ecosystems and Human Well-being: Synthesis*. Island Press: Washington, DC. [online]  
<<http://www.millenniumassessment.org/documents/document.356.aspx.pdf>> [accessed at 29 June 2015]

MA, Millennium Ecosystem Assessment (2005b). *Ecosystems and Human Well-being: Wetlands and Water Synthesis*. World Resources Institute : Washington, DC.[online]  
<<http://www.millenniumassessment.org/documents/document.358.aspx.pdf>> [accessed at 29 June 2015]

TEEB (2008) An Interim Report. *European Communities*. [online]  
<<http://www.teebweb.org/publication/the-economics-of-ecosystems-and-biodiversity-an-interim-report/>> [accessed at 29 June 2015]

## Ecosystem services

Humankind benefits in a multitude of ways from ecosystems. Collectively, these benefits are becoming known as ecosystem services. Ecosystem services are regularly involved in the provisioning of clean drinking water and the decomposition of wastes. While scientists and environmentalists have discussed ecosystem services implicitly for decades, the ecosystem services concept itself was popularized by the Millennium Ecosystem Assessment (MA) in the early 2000s. This grouped ecosystem services into four broad categories: *provisioning*, such as the production of food and water; *regulating*, such as the control of climate and disease; *supporting*, such as nutrient cycles and crop pollination; and *cultural*, such as spiritual and recreational benefits. To help inform decision-makers, many ecosystem services are being assigned economic values.

Wikipedia. *Ecosystem services*. [online] <[https://en.wikipedia.org/wiki/Ecosystem\\_services](https://en.wikipedia.org/wiki/Ecosystem_services)> [accessed at 29 June 2015]

## River rehabilitation

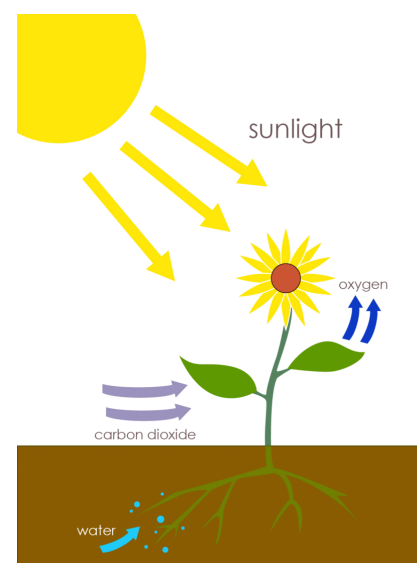
River habilitation is a form of river restauration through a wide range of applications. This includes (usually) small scale processes or features which are identified as absent or degraded in the target river. Consequences typically are insufficient habitat for one or more species or groups of interest. The rehabilitation of the river manipulates the system in a small way.

## Photosynthesis

Photosynthesis is a process used by plants and other organisms to convert light energy, normally from the sun, into chemical energy that can be later released to fuel the organisms' activities.

A leaf is like a small factory, in which water and carbon dioxide are combined into energy-rich molecules using energy from the sun (see image).

Wikipedia. *Photosynthesis*. [online] <<https://en.wikipedia.org/wiki/Photosynthesis>> [accessed at 29 June 2015]



## Stoma(tes)

In the plant science, stomates are tiny pores, found on the undersides of leaves and is used to control gas exchange. The pores are bordered by a pair of specialized “parenchyma” cells, known as guard cells that are responsible for regulating the size of the opening. When the stomates are open, as they usually are during the day, carbon dioxide can diffuse into the leaves and be used to make carbohydrates. This is used in the photosynthesis.

Wikipedia. *Stoma*. [online] <<https://en.wikipedia.org/wiki/Stoma>> [accessed at 29 June 2015]