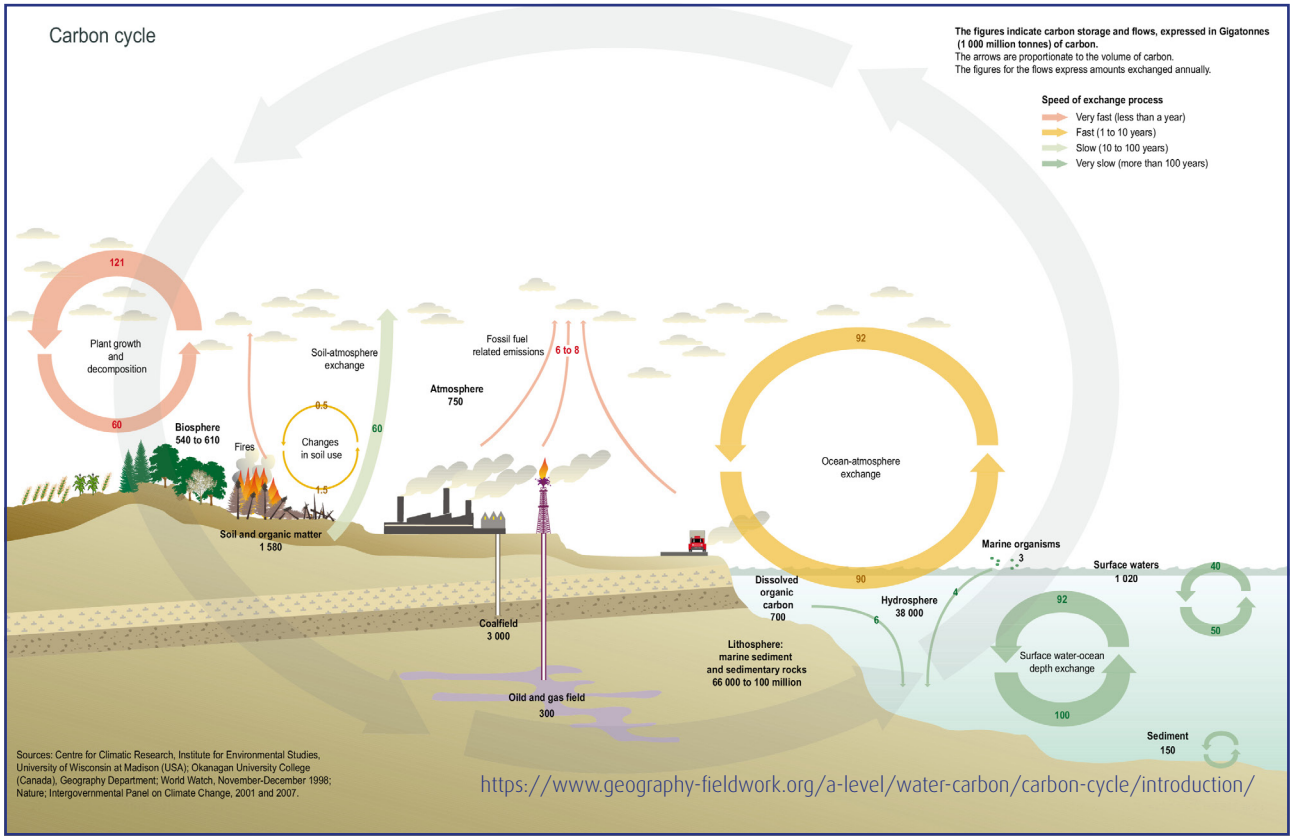
CARBON CYCLE
IN THE IMLIL VALLEY

The carbon cycle is a compulsory element of the new AS/A level specifications. The Imlil valley offers opportunities to study some local scale aspects of the carbon cycle (**Figure 1**).

Figure 1. The carbon cycle



- **Vegetation** – plants act as carbon stores, sequestrating carbon from the atmosphere. At Imlil students can investigate the carbon content of trees such as walnut, apple, cherry and pine. The walnut tree (**Figure 2**) in particular would make a good comparison with trees in the UK. The carbon cycle of individual trees can be considered – inputs (e.g. photosynthesis), stores (tree), transfers (leaf fall, decomposition), outputs (e.g. respiration).

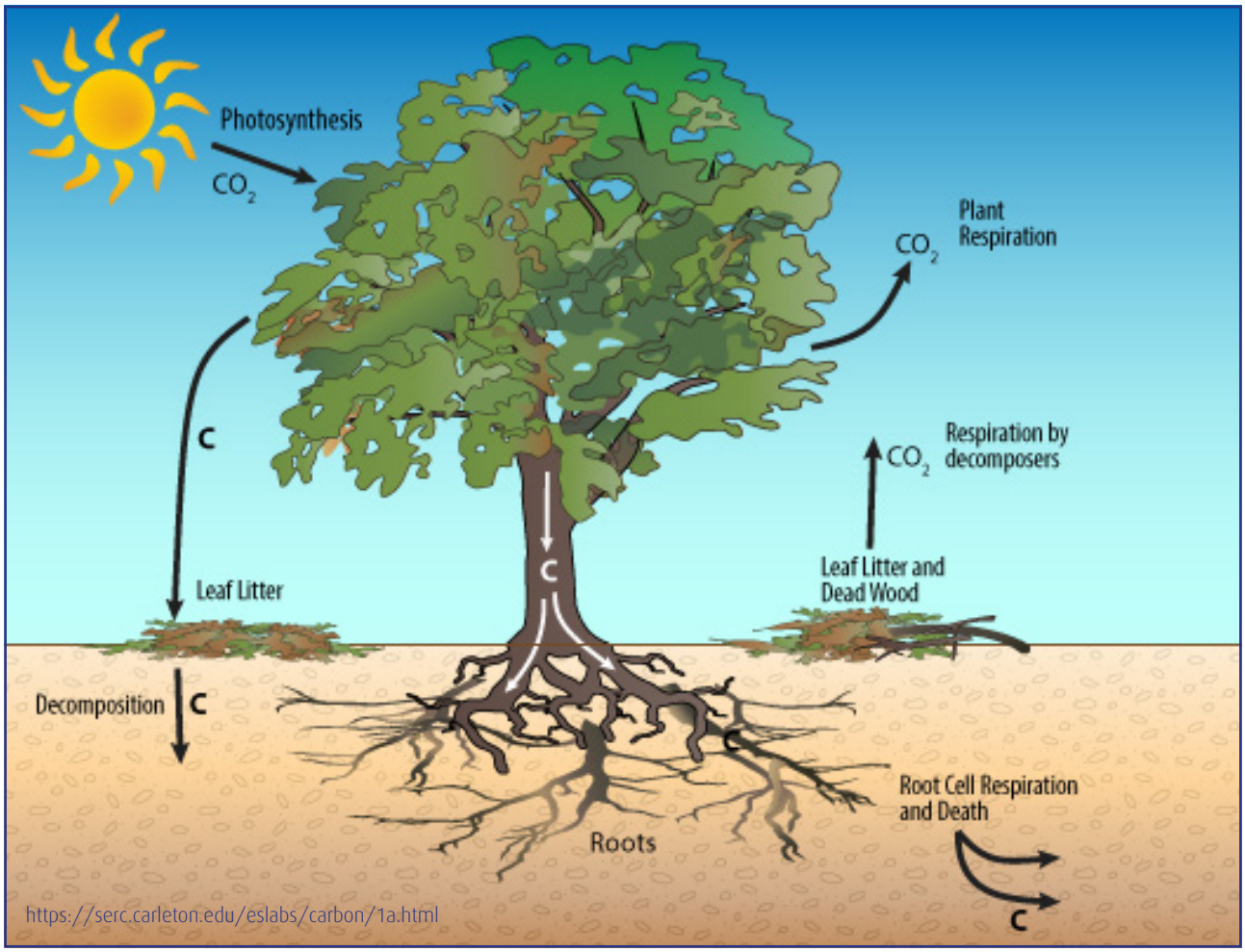
Figure 2. Walnut trees in the Imlil valley

Photo: Simon Ross

Carbon cycle of a tree

Figure 3 outlines the carbon cycle of an individual tree. It shows the stores and transfers of carbon. Aspects of this can be studied in Imlil.

Figure 3. The carbon cycle of a tree



- **Decomposition and soils** – in the context of the carbon cycle of a tree, students can consider the role of decomposition in a semi-arid mountain environment and infer soil carbon capture and storage. The relatively aridity and low humidity conditions do not promote decomposition resulting in a build-up of leaf litter. The role of bacteria, fungi and animals is somewhat limited due to the climatic conditions.
- **Combustion** – whilst wildfires are uncommon due to the lack of vegetation, some combustion of waste takes place in the valley.
- **Climate change** – seasonal and long-term – can be considered in the Imlil valley. Winters are very cold especially at altitude and this affects the magnitude of stores and transfer processes. In the warmer summers, transfer processes will be faster and this will affect the magnitude of the stores.

Human causes of change in the local carbon cycle

Human activity, such as land use change and farming practices affect stores and transfers in the carbon cycle. In the Imlil valley, afforestation (pine trees) on the upper slopes has taken place to stabilise the slopes, reducing the risk of mass movement and flooding (**Figure 4**). This has increased the potential for carbon capture and storage. The area has become more urbanised (roads, buildings) and farming land use has also changed from predominantly subsistence maize and wheat to tree fruit (apples, cherries). These changes affect the small scale carbon cycle.

Figure 4. Afforestation of pine trees above the Imlil valley

Photo: Simon Ross