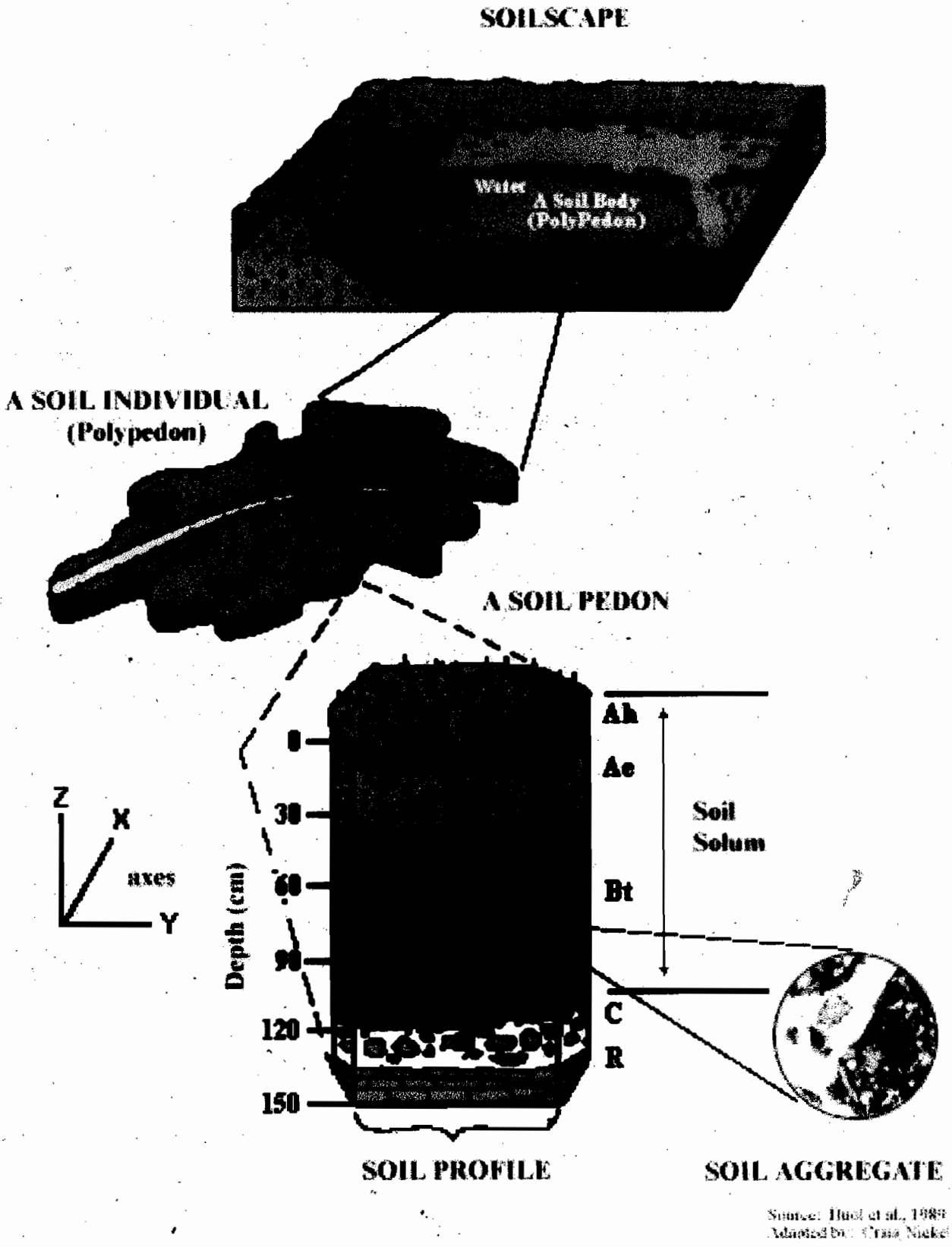
1

The Soils Around Us

For in the end we will conserve only what we love.
We will love only what we understand.
And we will understand only what we are taught.
—Baba Dioum, African Conservationist



Source: Hunt et al., 1988
Adapted by: Craig Nickel

10. THE LAND RESOURCES OF CANADA.

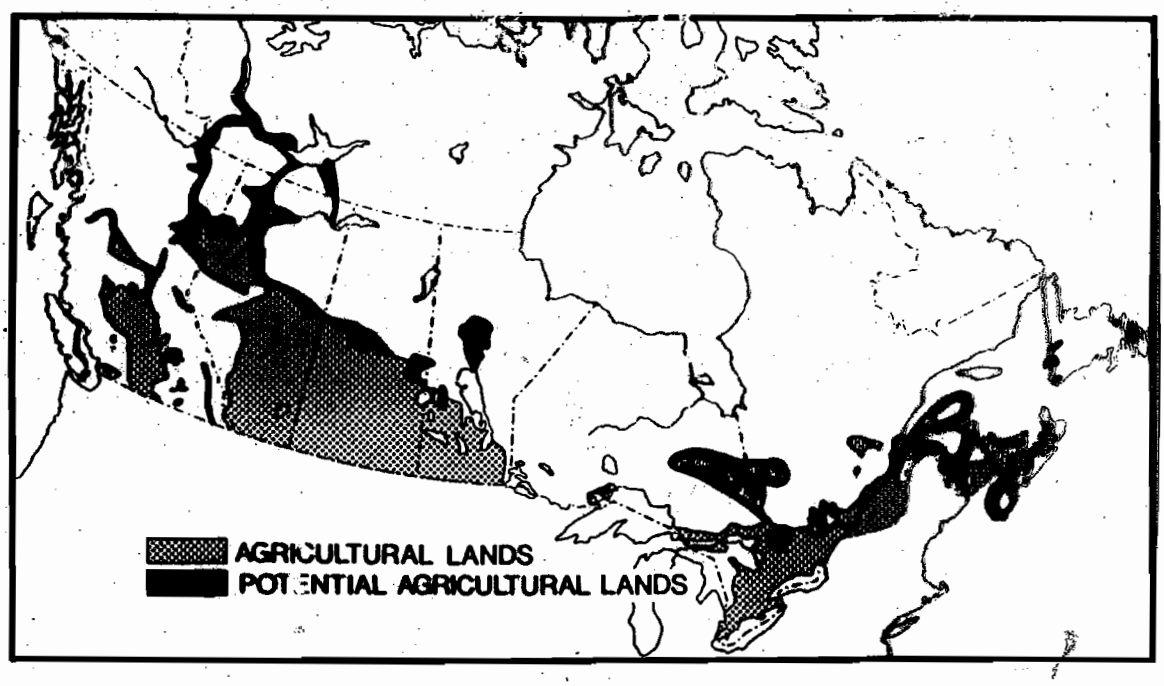


Figure 6: Agricultural lands in Canada. (Adapted from McKeague, J.A., 1975. Agrologist 4/4).

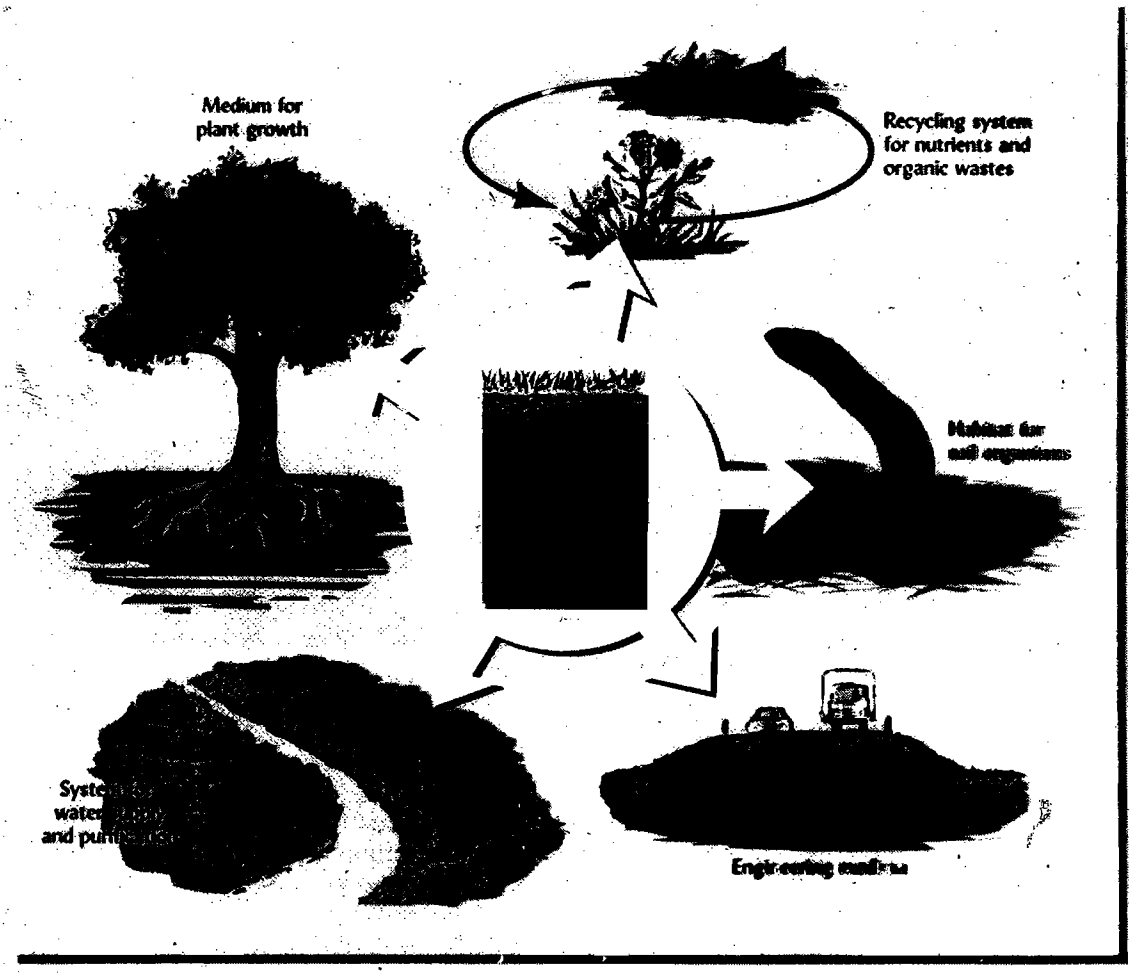
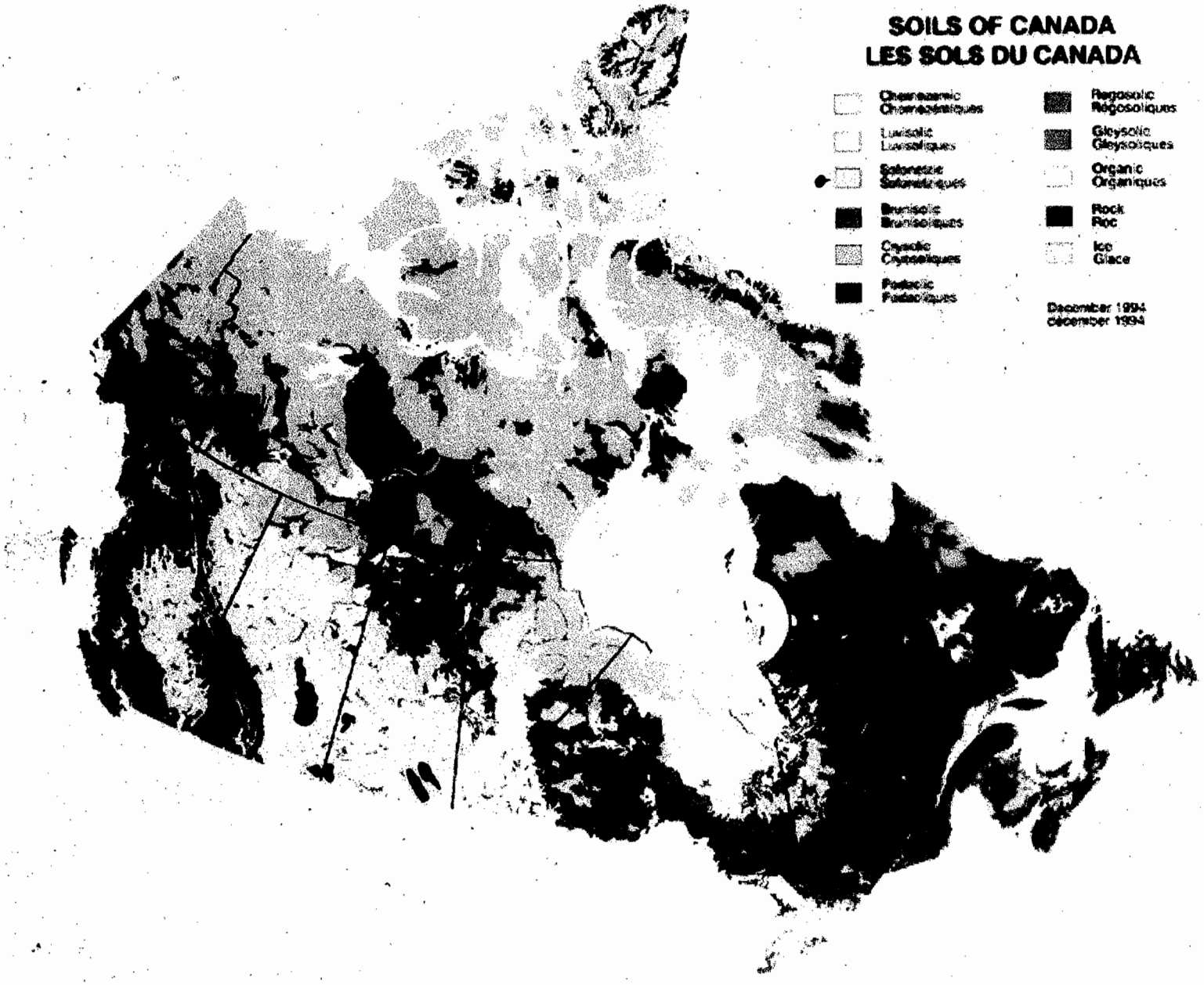


FIGURE 1.3 The many functions of soil can be grouped into five crucial ecological roles.


SOILS OF CANADA
LES SOLS DU CANADA
Chernozemic
Chernozémiques
Luvisolic
Luvisoliques
Solonetzic
Solonetziques
Brunisolic
Brunisoliques
Cryosolic
Cryosoliques
Podzolic
Podzoliques
Regosolic
Régosoliques
Gleysolic
Gleysoliques
Organic
Organiques
Rock
Roc
Ice
Glace
December 1994
décembre 1994

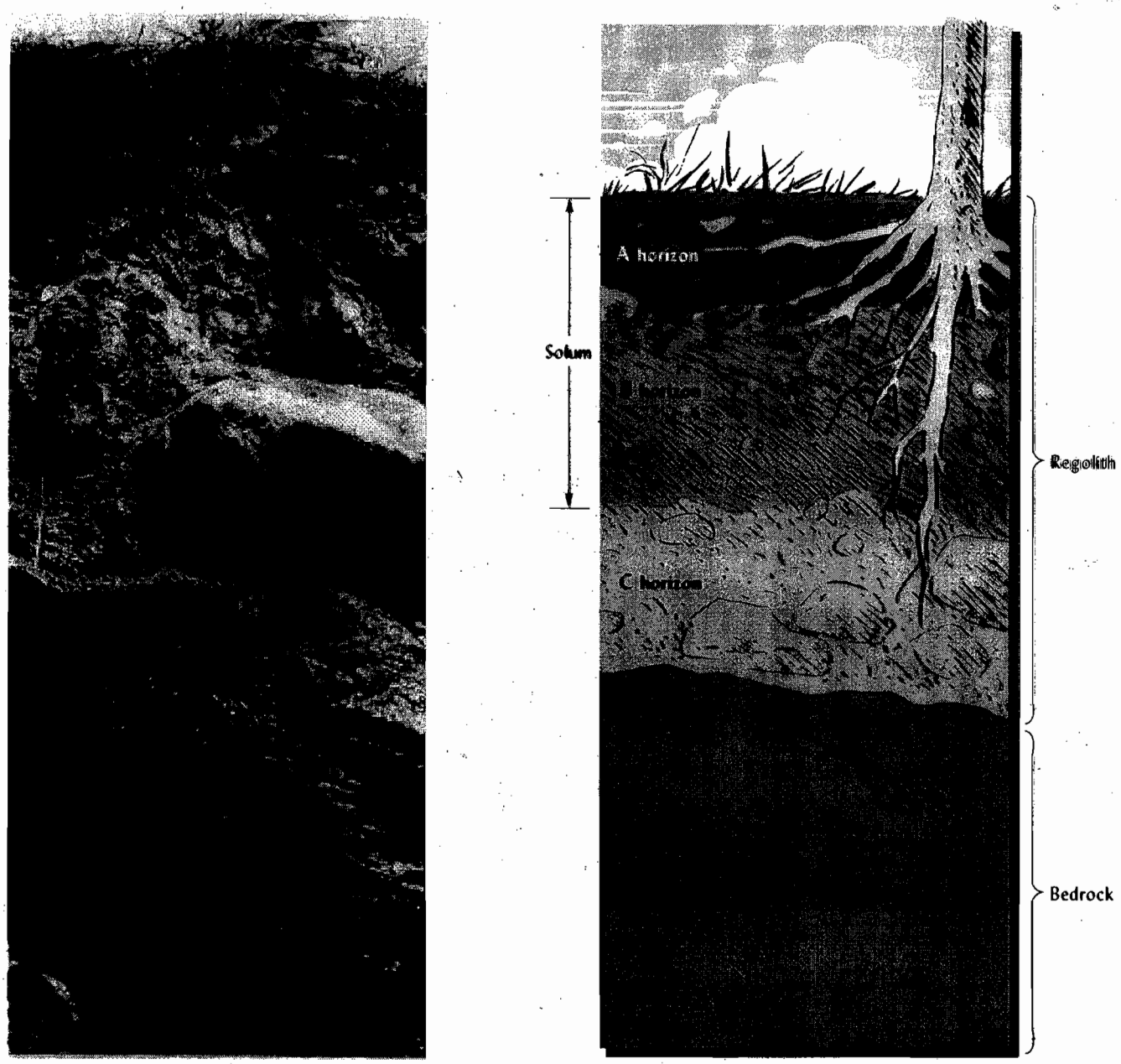
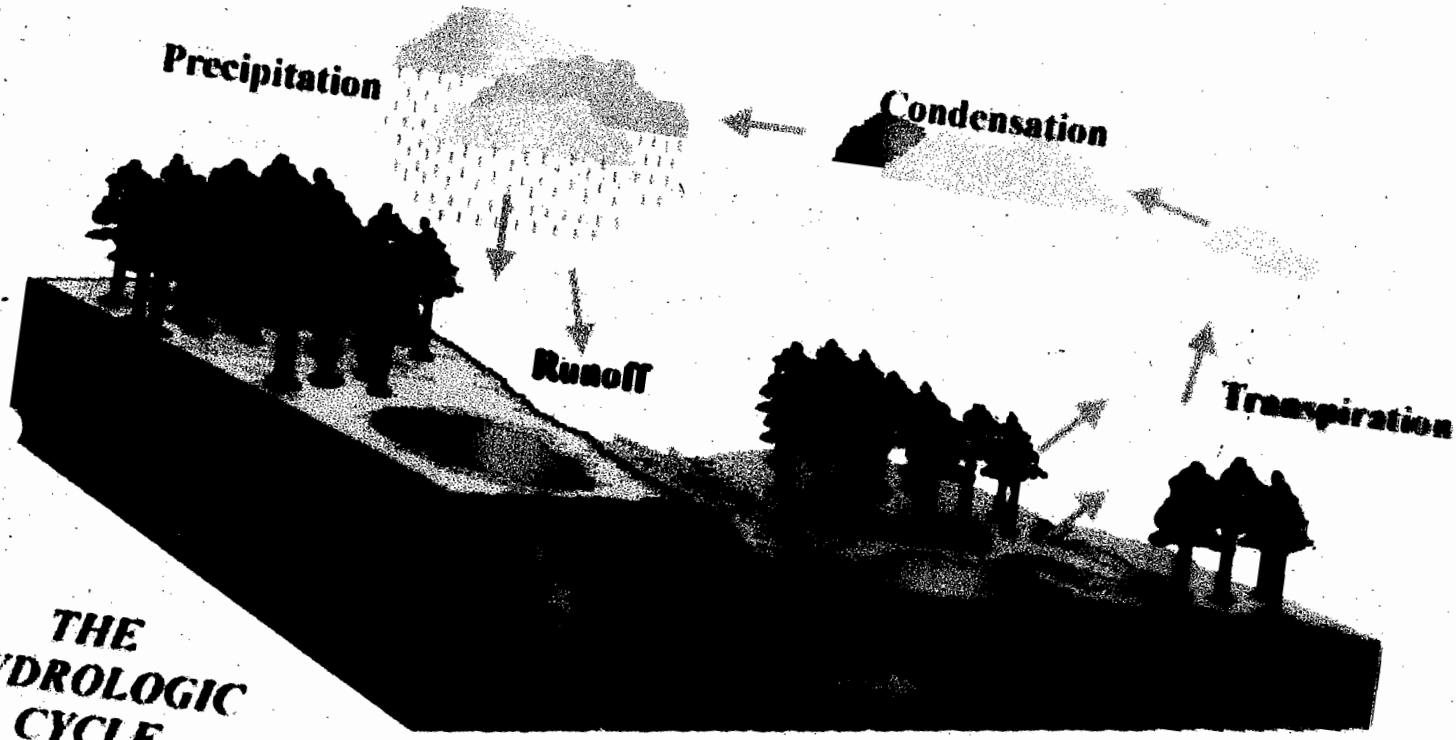


FIGURE 1.10 **Relative positions of the regolith, its soil, and the underlying bedrock. Note that the soil is a part of the regolith, and that the A and B horizons are part of the solum (from the Latin word solum, which means soil or land). The C horizon is the part of the regolith that underlies the solum, but may be slowly changing into soil in its upper parts. Sometimes the regolith is so thin that it has been changed entirely to soil; in such a case, soil rests directly on the bedrock. (Photo courtesy of R. Weil)**



THE HYDROLOGIC CYCLE

Source: CAESA, 1995
Adapted by: Craig Nickel

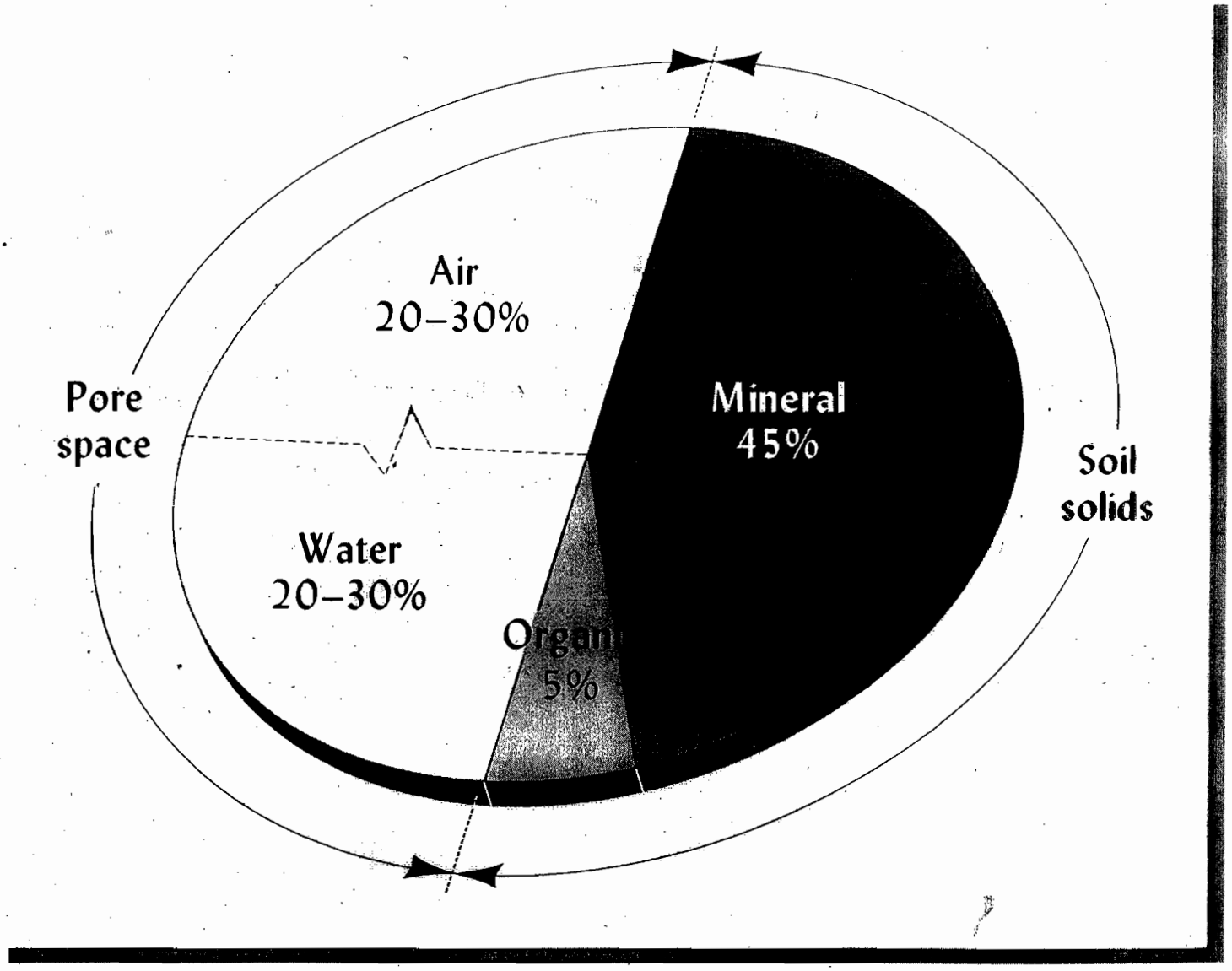


FIGURE 1.17 Volume composition of a loam surface soil when conditions are good for plant growth. The broken line between water and air indicates that the proportions of these two components fluctuate as the soil becomes wetter or drier. Nonetheless, a nearly equal proportion of air and water is generally ideal for plant growth.

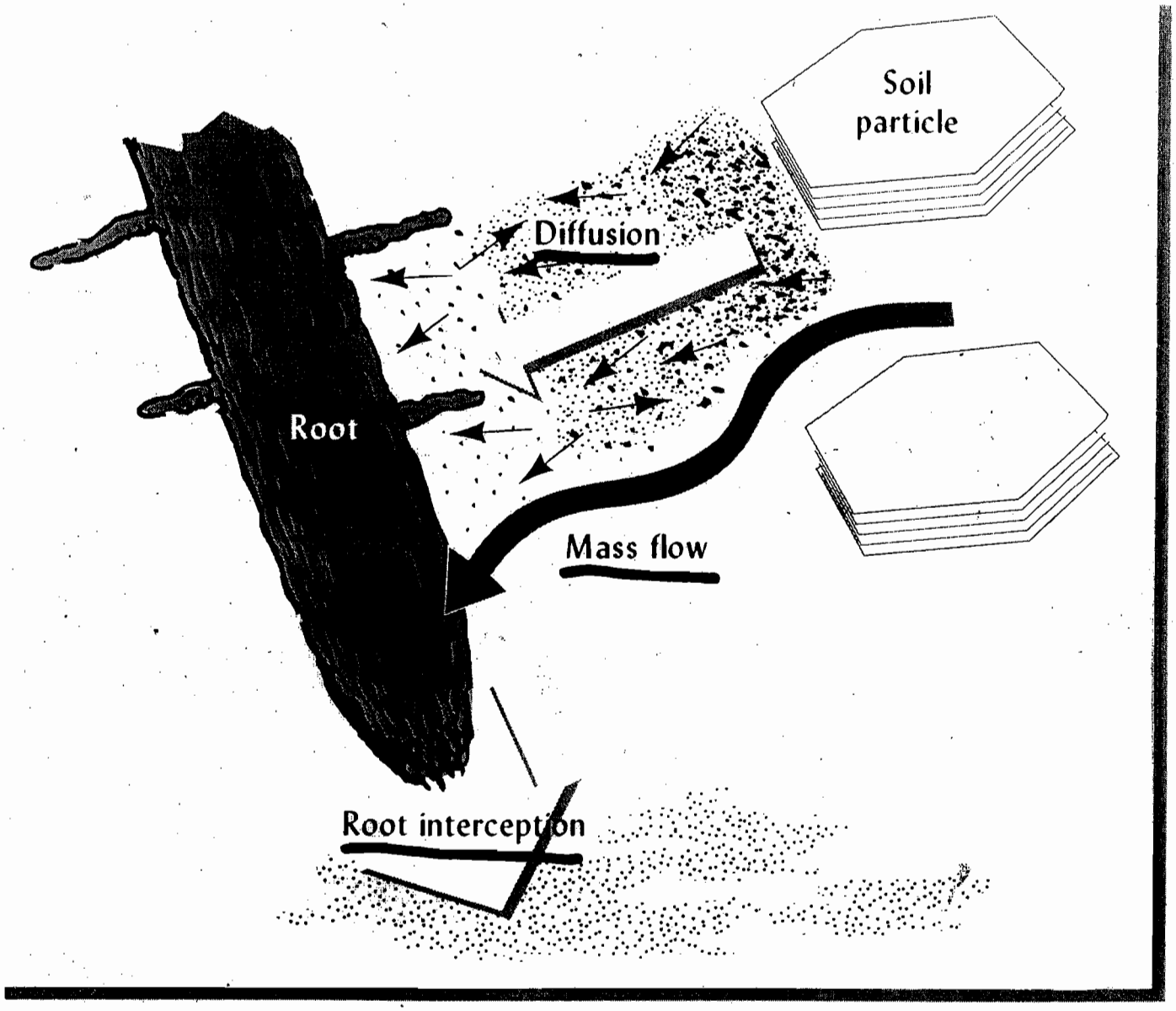


FIGURE 1.26 Three principal mechanisms by which nutrient ions dissolved in the soil solution come into contact with plant roots. All three mechanisms may operate simultaneously, but one mechanism or another may be most important for a particular nutrient. For example, in the case of calcium, which is generally plentiful in the soil solution, mass flow alone can usually bring sufficient amounts to the root surface. However, in the case of phosphorus, diffusion is needed to supplement mass flow because the soil solution is very low in this element in comparison to the amounts needed by plants.

Air

- Approximately half of the volume of the soil consists of pore spaces of various sizes which are either filled with air or water.
- When water enters the soil, it displaces air from some of the pores.
- Metabolic activity of plant roots, microbes and soil fauna later the composition of soil air.
- The relative humidity of soil approaches 100% unless the soil is very dry.
- Carbon dioxide in soil air is often several hundred times more concentrated than the 0.03% found in the atmosphere.
- The amount and composition of air in a soil are determined to a large degree by the water content of the soil.

Ref: http://129.128.49.169/Pedosphere/content/section01/page06.cfm (1998)

Organic Matter

- Soil organic matter consists of living organisms (soil biomass), remains of organisms and organic compounds produced by current and past metabolism in soil.
- Decomposition and nutrient cycling are important activities of soil biomass.
- OM influences physical, chemical and biological properties of soil.

Water

- Water is the major transport agent for fluxes within and between terrestrial ecosystems.
- It is a prerequisite for all active life, and participates in geochemical cycles by weathering geological substrates, by leaching materials to groundwater and by moving ions and particles through the soil profile.
- Plants and other organisms within soil alter the suite of solutes in percolating water which reach the groundwater system.
- A dynamic equilibrium is maintained despite the fact that very different types of substances are exchanged and stored (Schulze and Zwolfer, 1987).

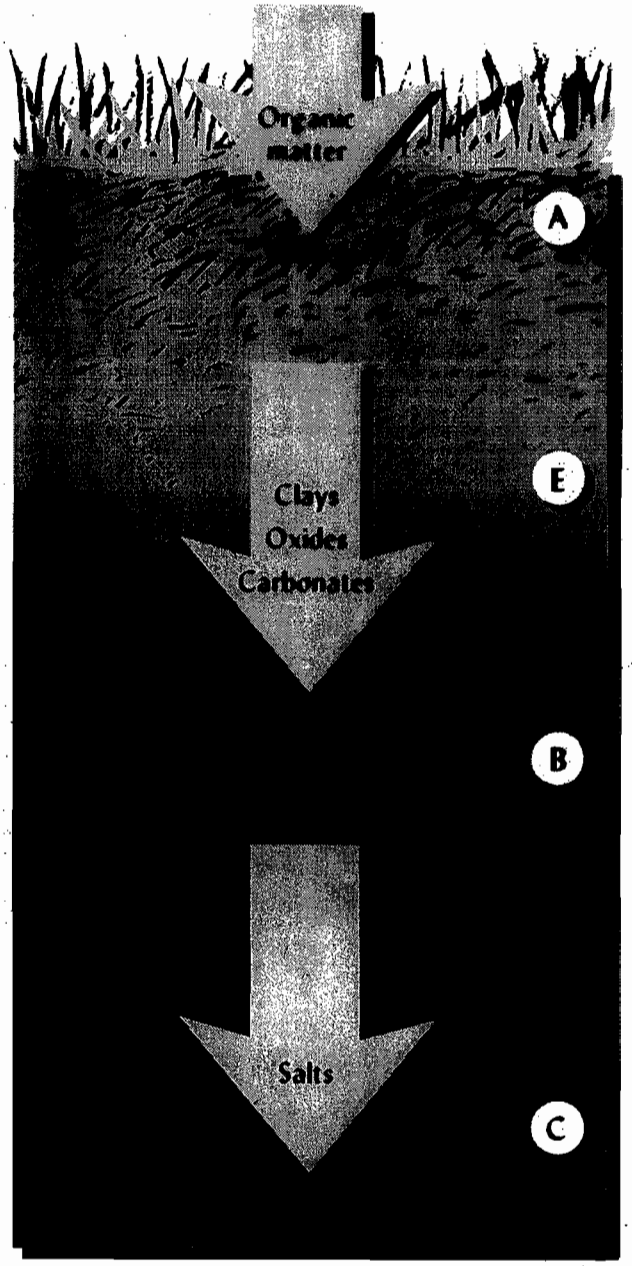


FIGURE 1.12 Horizons begin to differentiate as materials are added to the upper part of the profile and other materials are translocated to deeper zones. Under certain conditions, usually associated with forest vegetation and high rainfall, a leached E horizon forms between organic-matter-rich A and the B horizons. If sufficient rainfall occurs, soluble salts will be carried below the soil profile, perhaps all the way to the groundwater.

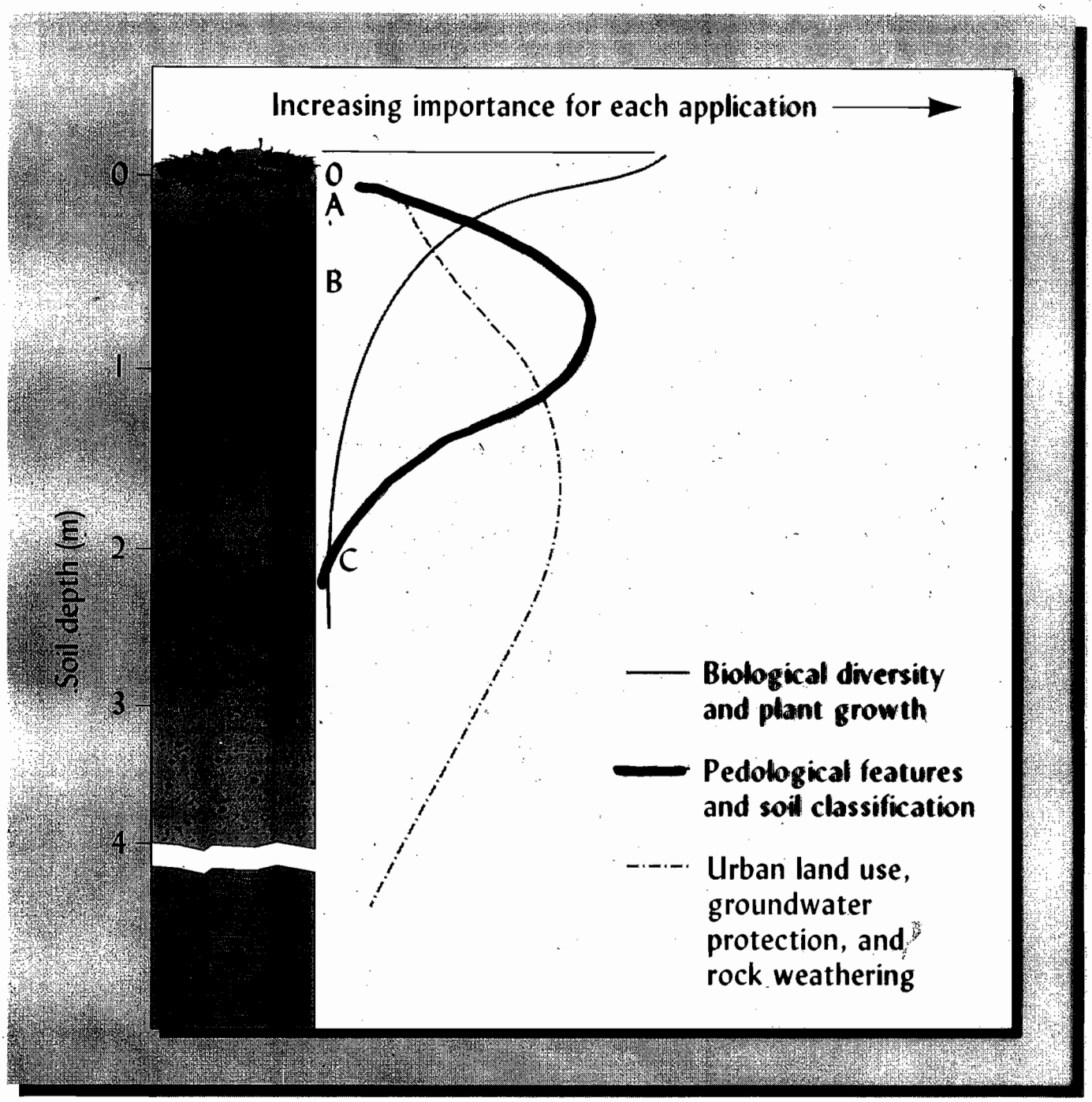


FIGURE 1.16 Information important to different soil functions and applications is most likely to be obtained by studying different layers of the soil profile.