ES 10 March 7 2003
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Topic: Soil Development

Lecture Outline:

1. Origins of soil science
2. General characteristics of soils
3. Soil description and classification
4. Jenny's state factor equation s=f(cl,o,r,p,t)

Figures: 3.10 3.13 Allaby; 3.14 Allaby; 4.14 Schlesinger

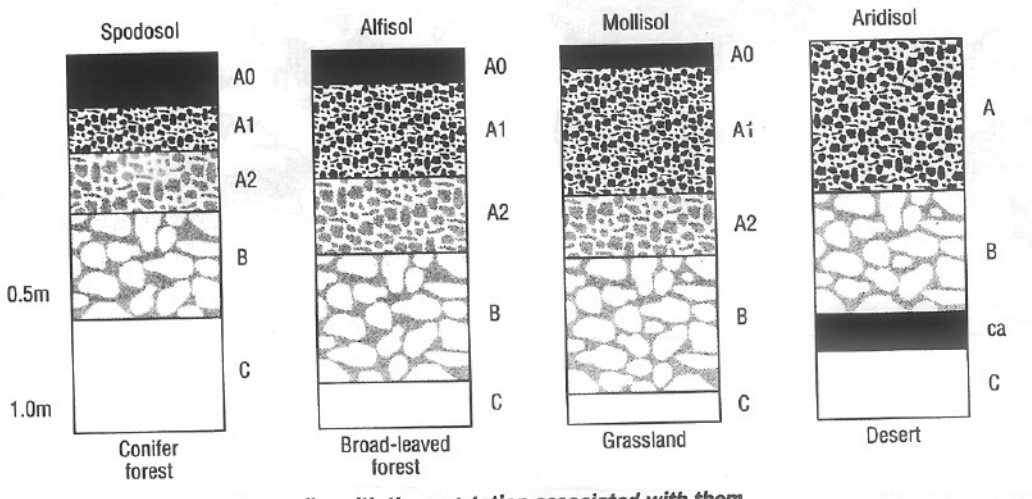

Figure 3.13 ***Profiles of four soils, with the vegetation associated with them***

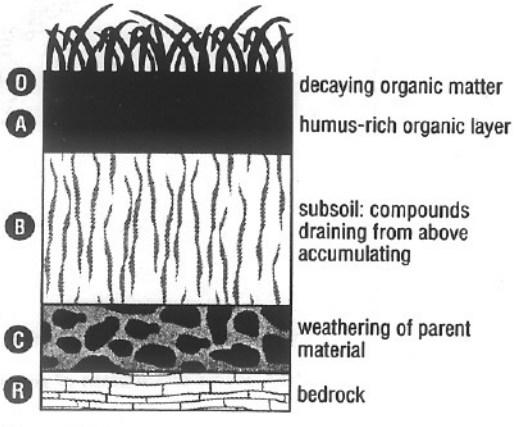

Figure 3.10 ***Profile of a typical fertile soil***

The 11 soil orders of the US soil taxonomy

Alfisols	Soils of climates with 510–1270 mm annual rainfall; most develop under forests; clay accumulates in the B horizon.
Andisols	Volcanic soils, deep and light in texture; contain iron and aluminium compounds.
Aridisols	Desert soils with accumulations of lime or gypsum; often with salt layers; little organic matter.
Entisols	Little or no horizon development; often found in recent flood plains, under recent volcanic ash, as wind-blown sand.
Histosols	Organic soils; found in bogs and swamps.
Inceptisols	Young soils; horizons starting to develop; often wet conditions.
Mollisols	Very dark soils; upper layers rich in organic matter; form mainly under grassland.
Oxisols	Deeply weathered soils; acid; low fertility; contain clays of iron and aluminium oxides.
Spodisols	Sandy soils found in forests, mainly coniferous; organic matter, iron and aluminium oxides accumulated in B horizon; strongly acid.
Ultisols	Deeply weathered tropical and subtropical soils; strongly acid; clay accumulated in B horizon.
Vertisols	Clay soils that swell when wet; develop in climates with pronounced wet and dry seasons; deep cracks appear when dry.

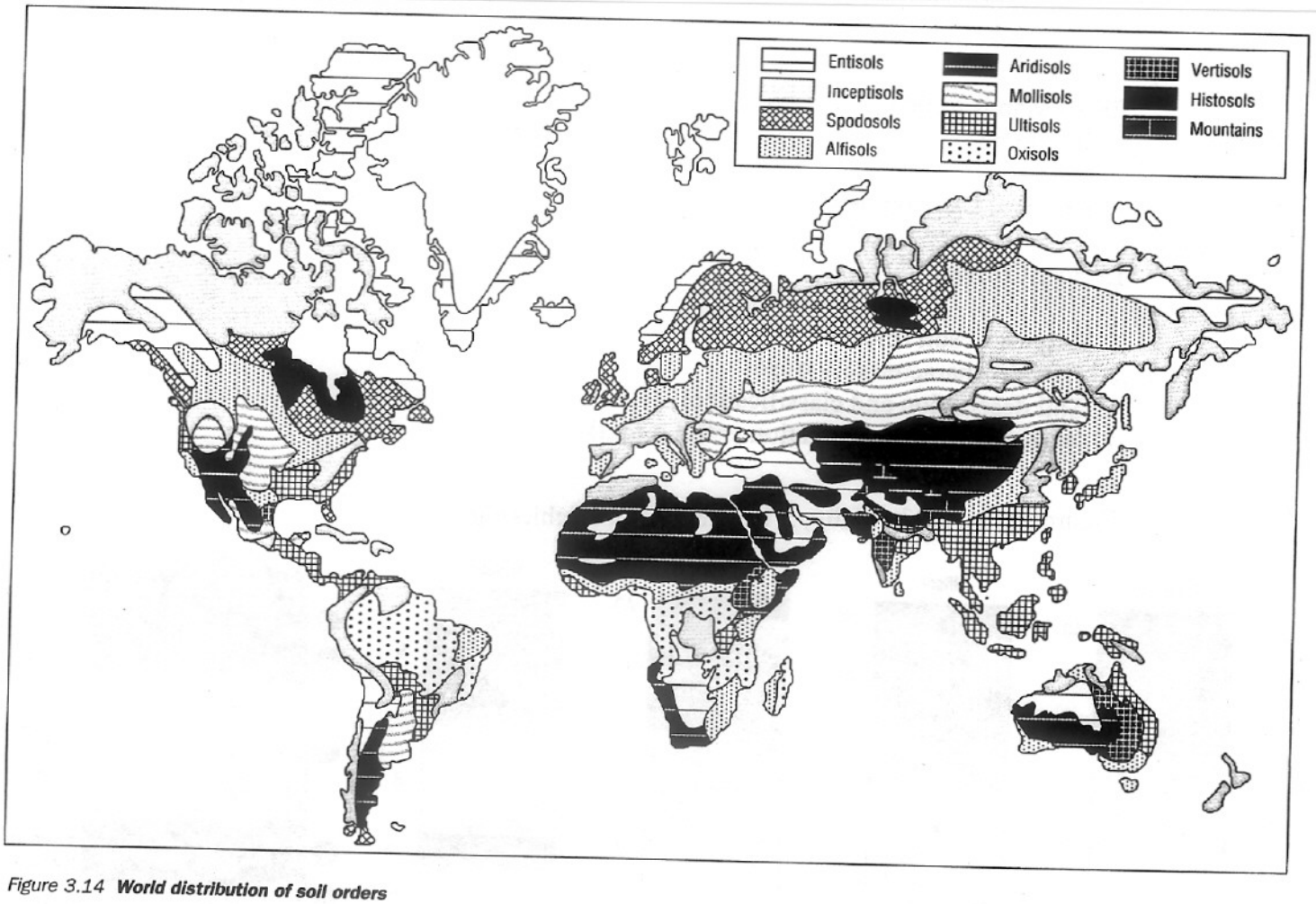

Figure 3.14 ***World distribution of soil orders***

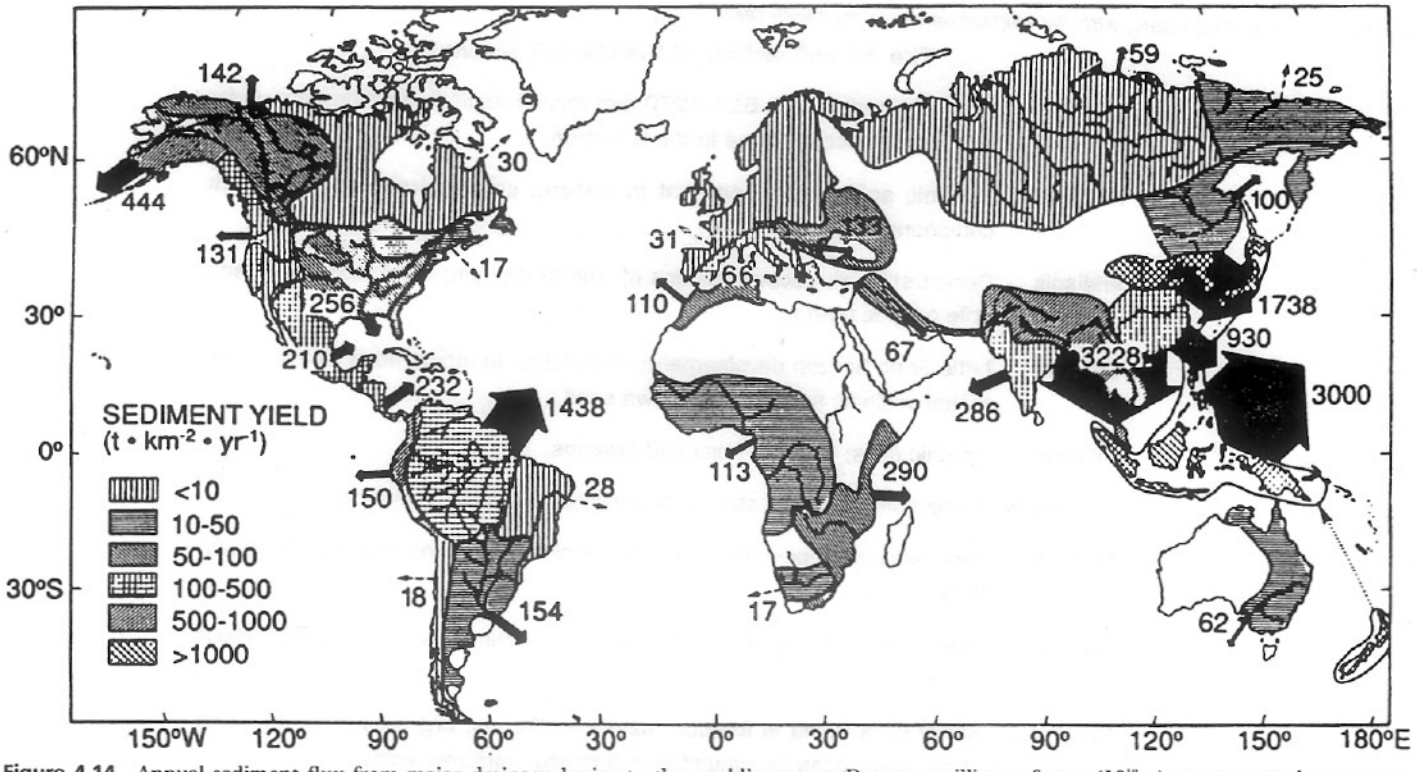

Figure 4.14 Annual sediment flux from major drainage basins to the world's oceans. Data are millions of tons (10^{12} g) per year, and arrows are drawn proportional to the flux. From Milliman and Meade (1983).