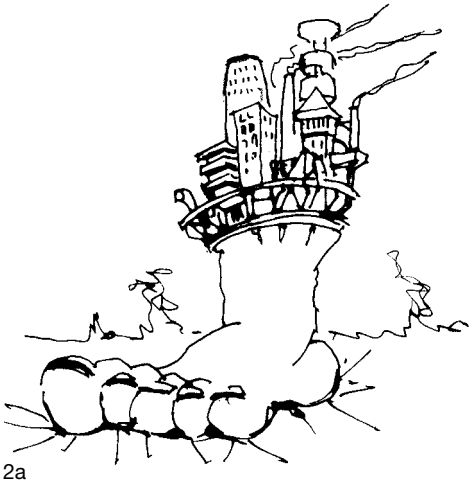
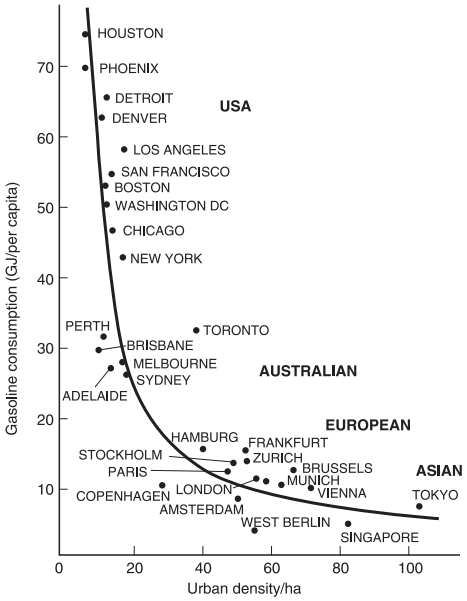
Figure 4.12 (a) Ecological footprint; (b) 'Densification'



4.12a

4.12b

Figure 4.13 Urban density and petrol consumption. Note the increase in petrol consumption particularly when the density drops below 30 people per hectare (ha)



is maximised' (Rogers, 1997, 2000). Increasing densities is not universally accepted as necessarily the only or the best way to reduce the ecological footprint of the city (see Figure 4.12). Increasing urban density is often associated with savings in energy for transport by increasing the viability of public transport and by reducing distances between facilities so encouraging walking and cycling. Figure 4.13 illustrates the relationship between petrol consumption and density: normally, the higher the city density the lower its citizen's per capita use of petrol. This, however, is not a universal truth. For example, Brussels is more than twice as dense as Copenhagen, yet it consumes more petrol than the Danish capital (Bamford, in Birkeland, 2002). There are also obvious savings in land with increased density. But there is also a downside to increasing urban densities. For example, as population densities increase in urban areas, home food production declines and with it the ability to recycle organic waste. 'The contribution that lower densities can make to the productive capacity or output, efficiency and flexibility of the household economy is substantial. Lower densities can also increase the scope and quality of domestic and neighbourhood recreational or social pursuits, and better meet changing household preferences and life circumstances.... Whether space is

wisely allocated in our cities depends on, among other things, what that space is, or can be, used for and what values are fostered by such use' (Bamford, in Birkeland, 2002). The importance of the household economy in urban development should not be undervalued as a study of any city in the developing world would show; see for example, Shalaby's study of 'Income generation by Women in Egypt' (Moughtin *et al*., 1992).

Density alone is a crude instrument on which to base a theory of sustainability. Advocating the compact city or the 'densification' of existing settlements as a panacea for present environmental ills may turn out to be an oversimplified reaction. It may be far wiser to apply to each case the principle of circular metabolism and to attempt to reduce each urban footprint in the most appropriate way. By applying the principle of circular metabolism to the city in its regional setting, and attempting to balance the ecological footprint at this scale, may be more realistic and incidentally may lead also to a more balanced view of the relationship between town and country and between man and his environment (see Figure 4.14).

It has been argued that the bioregion is the proper setting for managing environmental resources for sustainable human settlement (Brunkhorst, 2000). Mumford was advocating bioregional planning as early as the 1930s: he was equally critical of the suburb and the giant metropolis. He thought that suburban sprawl desecrated the landscape and produced stunted communities without an economic or cultural base: they were, according to Mumford, simply sleeping quarters. The metropolis on the other hand is, in Mumford's analysis, a place where

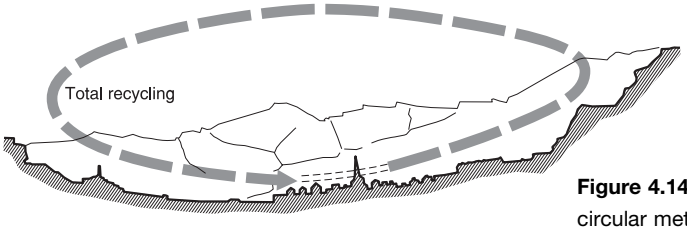


Figure 4.14 The bioregion: circular metabolism

excessive capital investment in transportation systems and other services only increased congestion, forcing up the cost of land which in turn, generated a more intensive use and further congestion: neither metropolitan centralization nor low-density suburban fragments could substitute for community building within a regional structure (Mumford, 1938). Mumford's frame of reference, to some extent, echoed the earlier pronouncements of Ebenezer Howard and the concept of the 'Garden City' and also the regional planning movement inspired by Patrick Geddes (Howard, 1965; Geddes, 1949).

THE BIOREGIONAL BOUNDARY

What is a bioregion? How is its boundary defined? There is no easy or universally accepted answer to these questions. Starting with Mumford, who says, 'The human region, in brief, is a complex of geographic, economic, and cultural elements. Not found as a finished product in nature, not solely the creation of the human will and fantasy, the region, like its corresponding artefact, the city, is a collective work of art.' In terms of regional size and boundary definition, Mumford is circumspect: he sees, 'as a consequence of this recognition of the organic: that is, the disappearance of the boundary walls between the inner and outer, the conscious and unconscious, the external