Figure 1: The Linear Approach to Food

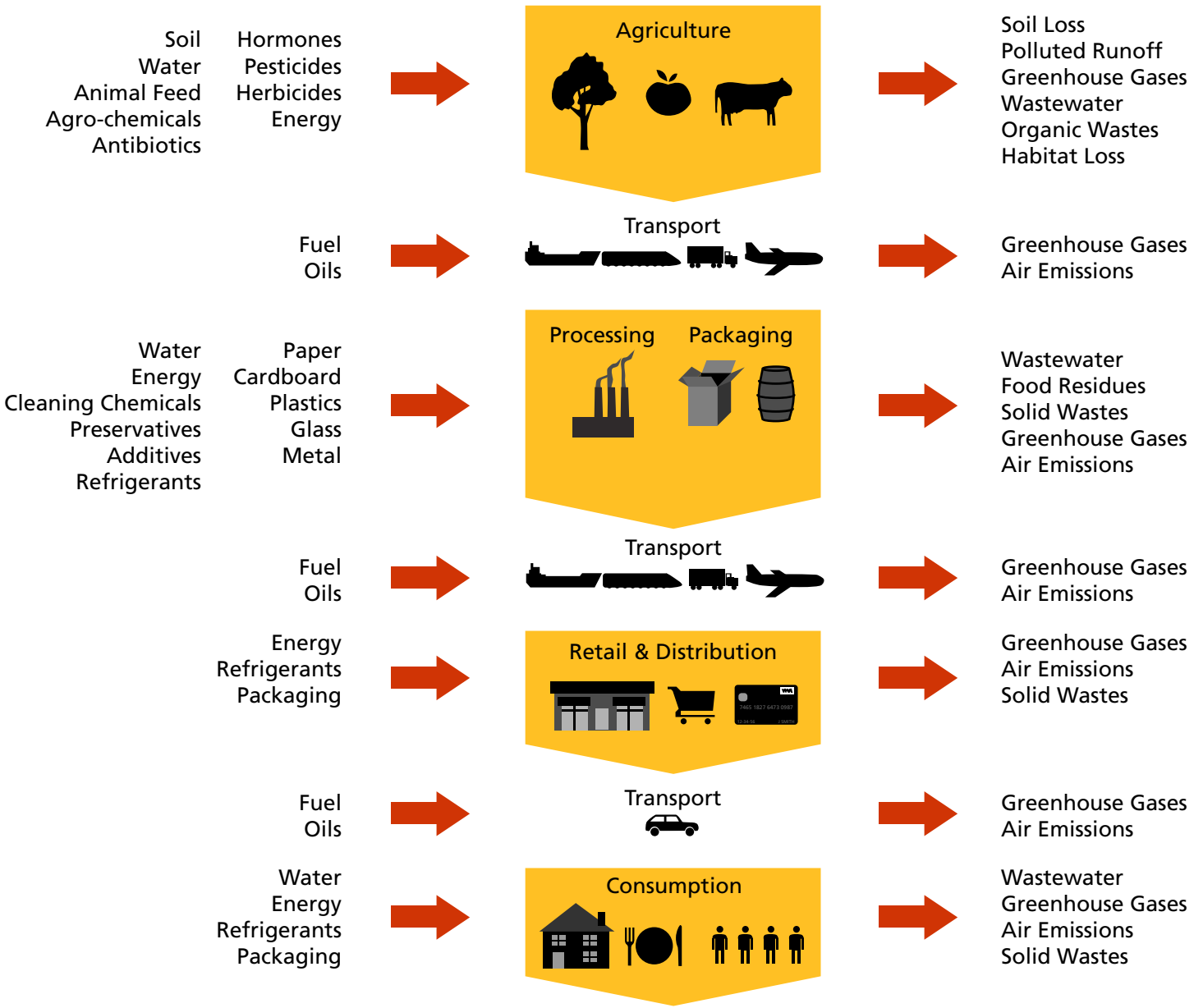


Figure 2: Vicious Cycles: The Hypothesis

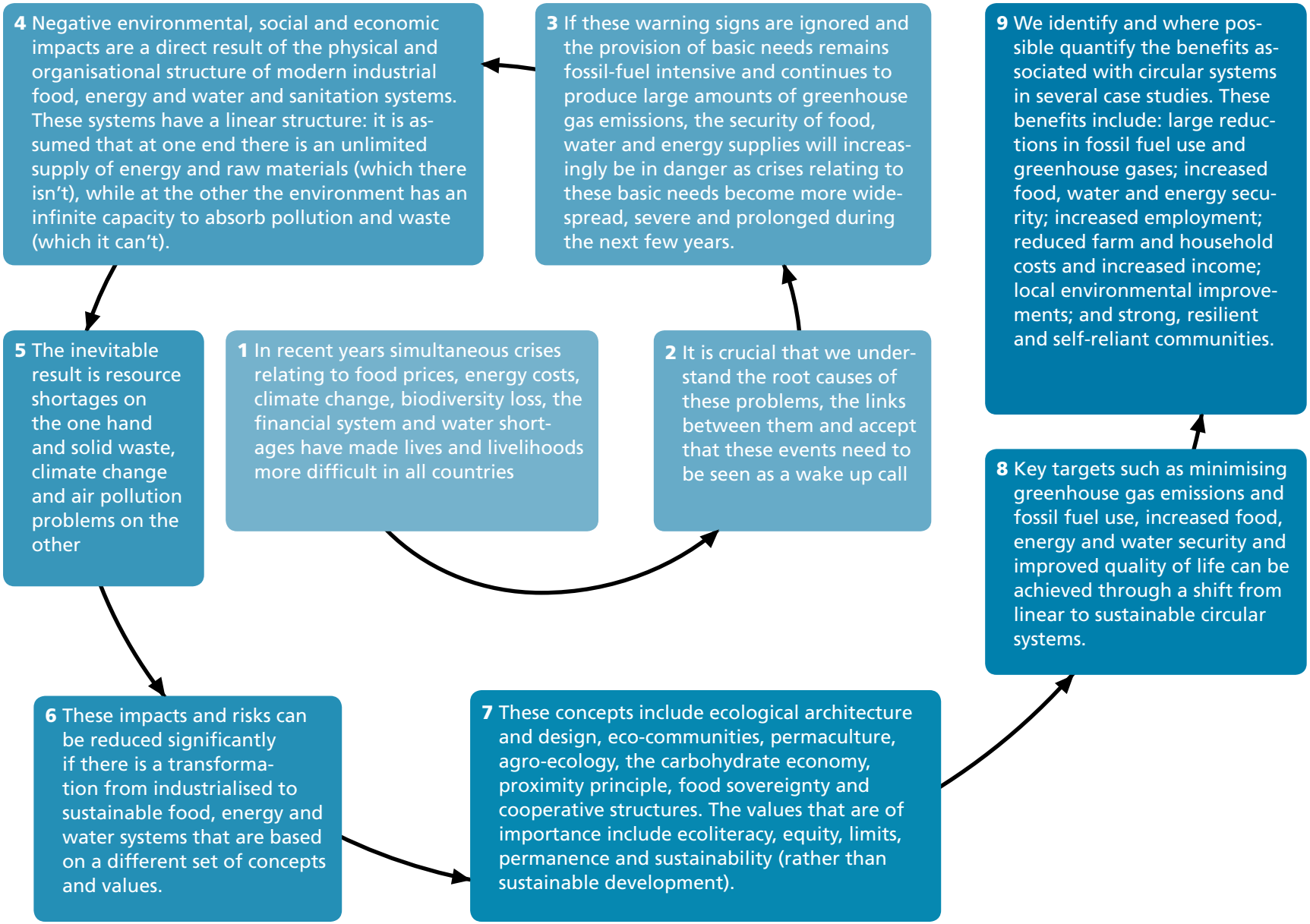
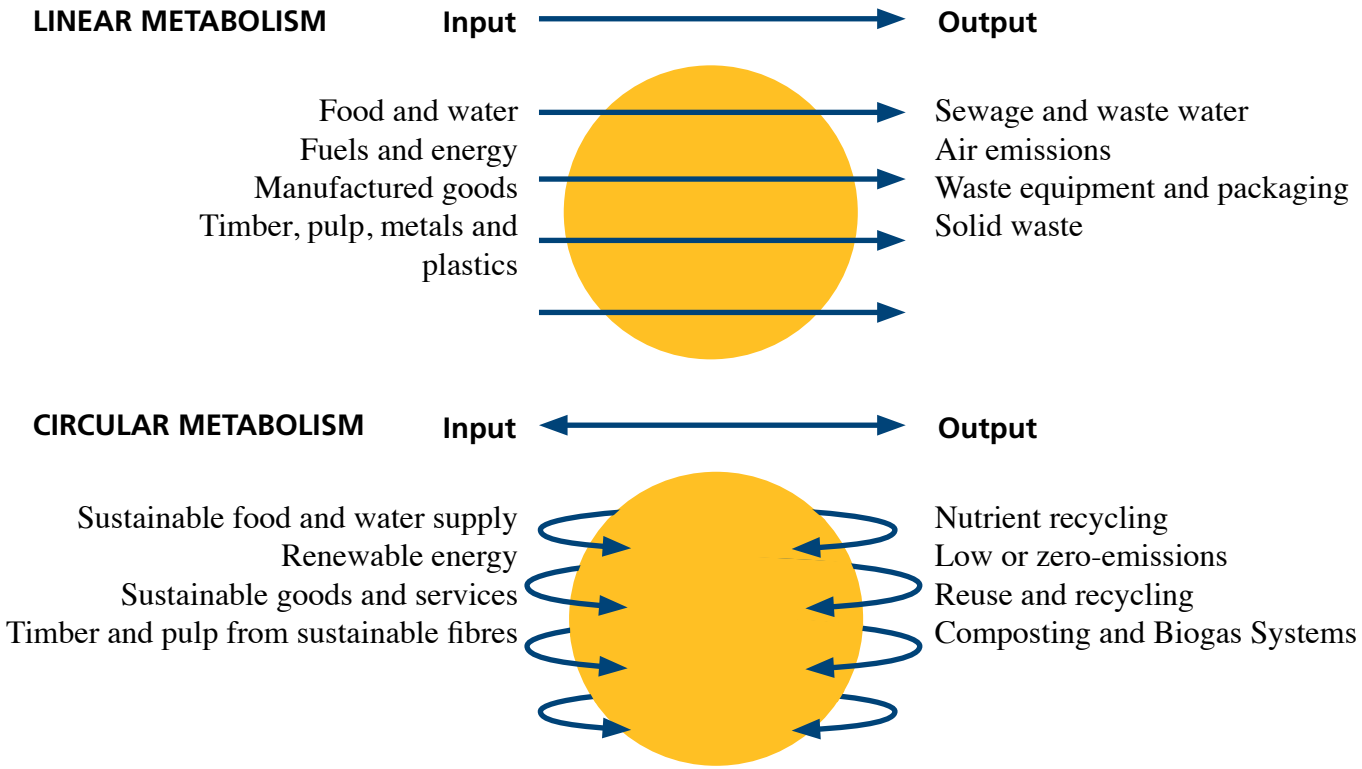


Figure 3.
Settlements with a linear and a circular metabolism



Source: adapted from Girardet, H (1996) *The Gaia Atlas of Cities: New Directions for Sustainable Urban Living*. Gaia Books Ltd., London

Figure 4. A composting and biogas system to provide food; household and farm energy needs; fertiliser for crops and trees; and construction materials

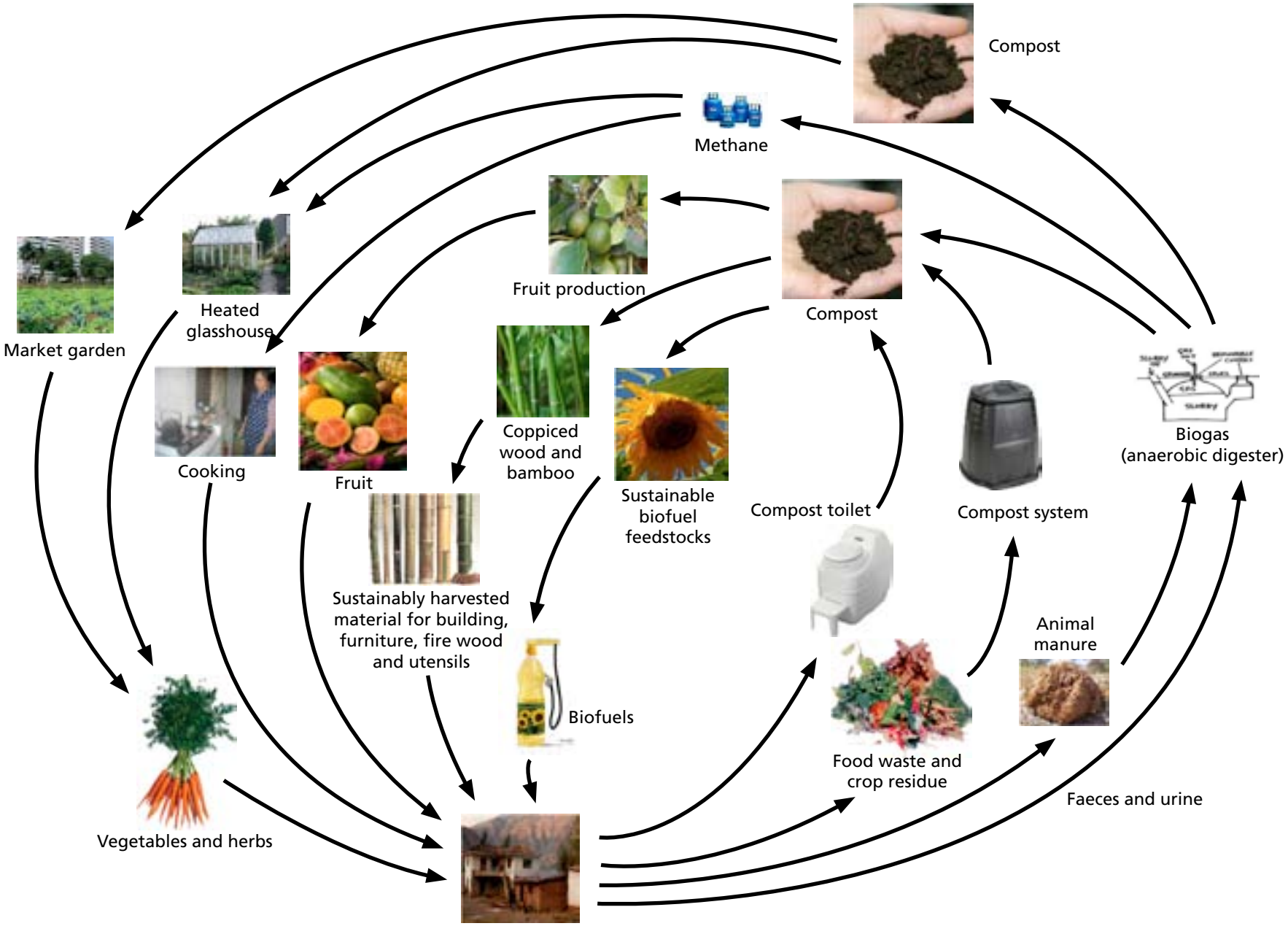


Figure 5. Sustainable water systems, greening the landscape and the production and processing of natural fibres and honey in Ecuador

Notes: Severe erosion caused by over-grazing and the clearance of vegetation to produce charcoal makes livelihoods and food production increasingly difficult. These photographs are from projects on the Ilalo mountain area near Quito in Ecuador. To harvest rainwater, trenches are dug across contours in the landscape (2) as well as ditches to collect runoff from roads (3). These are linked in a network of trenches and storage pools (4). This, together with rainwater collected from roofs (5) provides water to irrigate the trees, plants and grasses that have been reintroduced (6).

Alpaca and llama are now able to graze (8) and there is sufficient water for herb, flower and vegetable beds (7). The animal manure (10) together with green manures, mulch, compost and biogas fertilizer improves soil structure, fertility and water-retention. Alpaca and llama hair comes in many colours, but can also be dyed using natural plant dyes (13). The fibres are spun (15) and woven (16) into clothes and other fabrics (17). Bees (18) can also be introduced to produce honey and beeswax (19) and to pollinate plants and fruit trees.

In many places rainwater collection, storage and use can be totally based on gravity - where water flows into a series of pools then to areas requiring irrigation. If this is not possible, solar, wind or hand pumps are used. Water can be channelled to where it is required, connected to drip irrigation and sprinkler systems and piped under roads and paths. Settlement tanks are used to reduce blockages and trap valuable nutrients. These are cleared as required and the sediment used as compost on nearby beds.