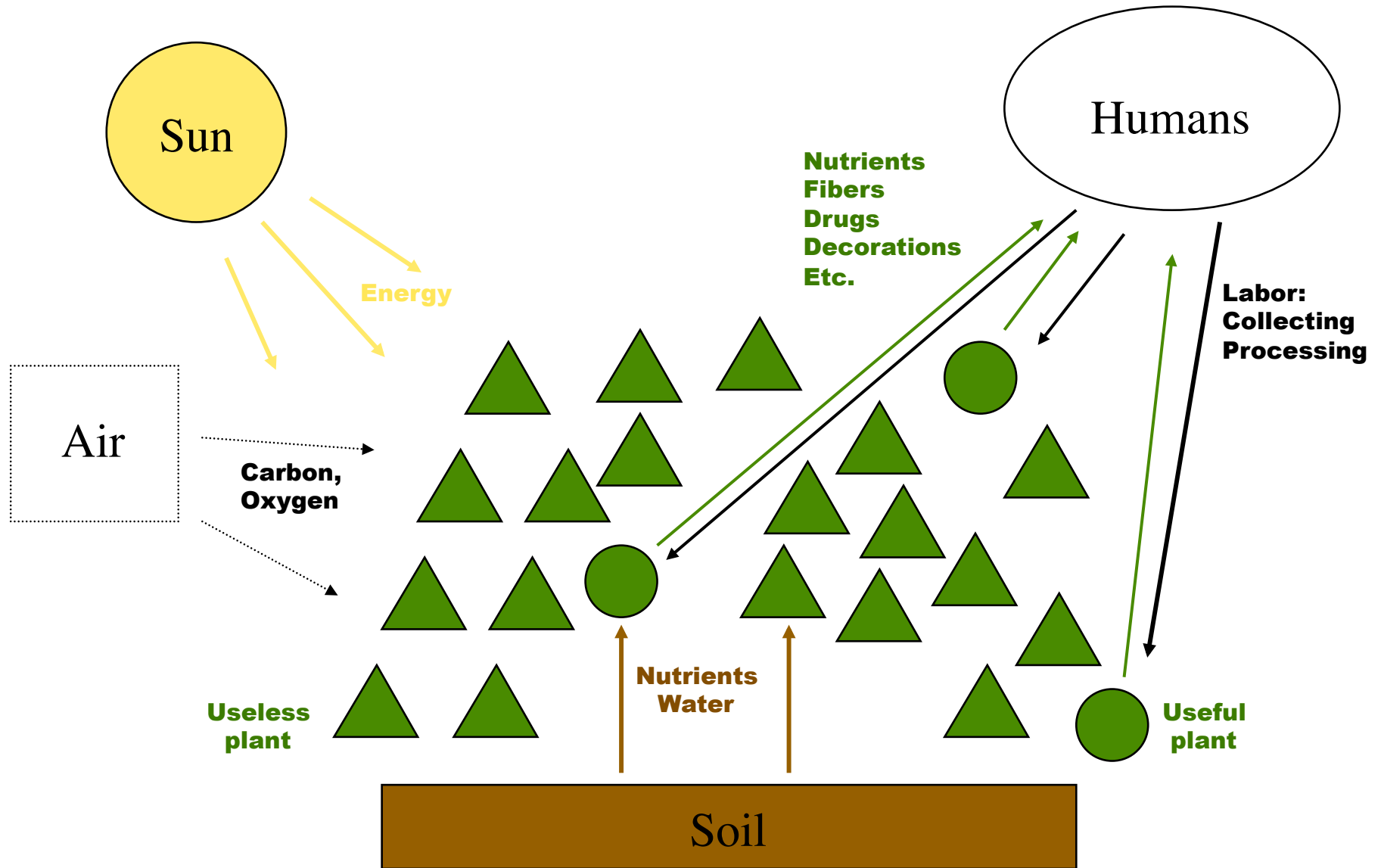
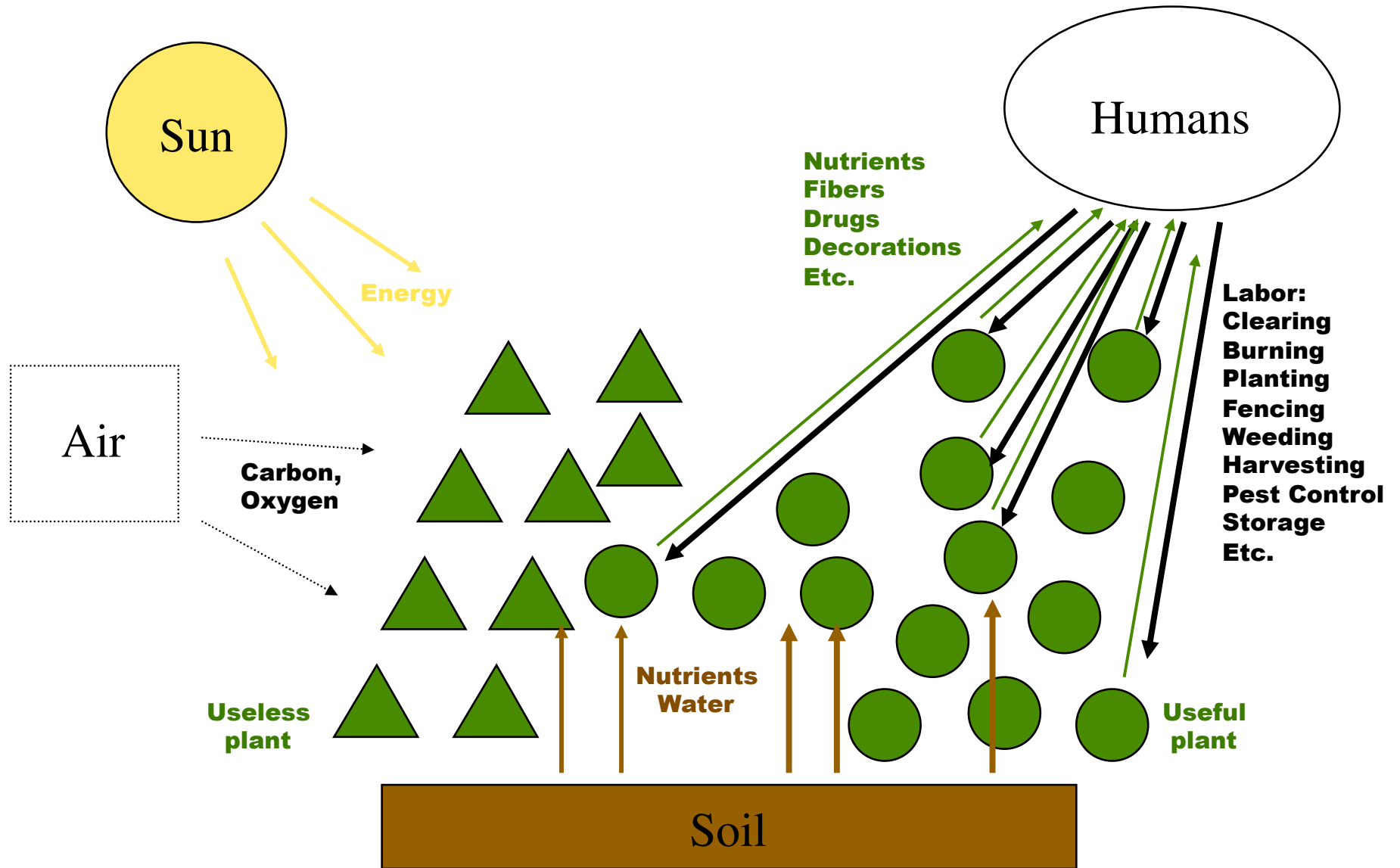


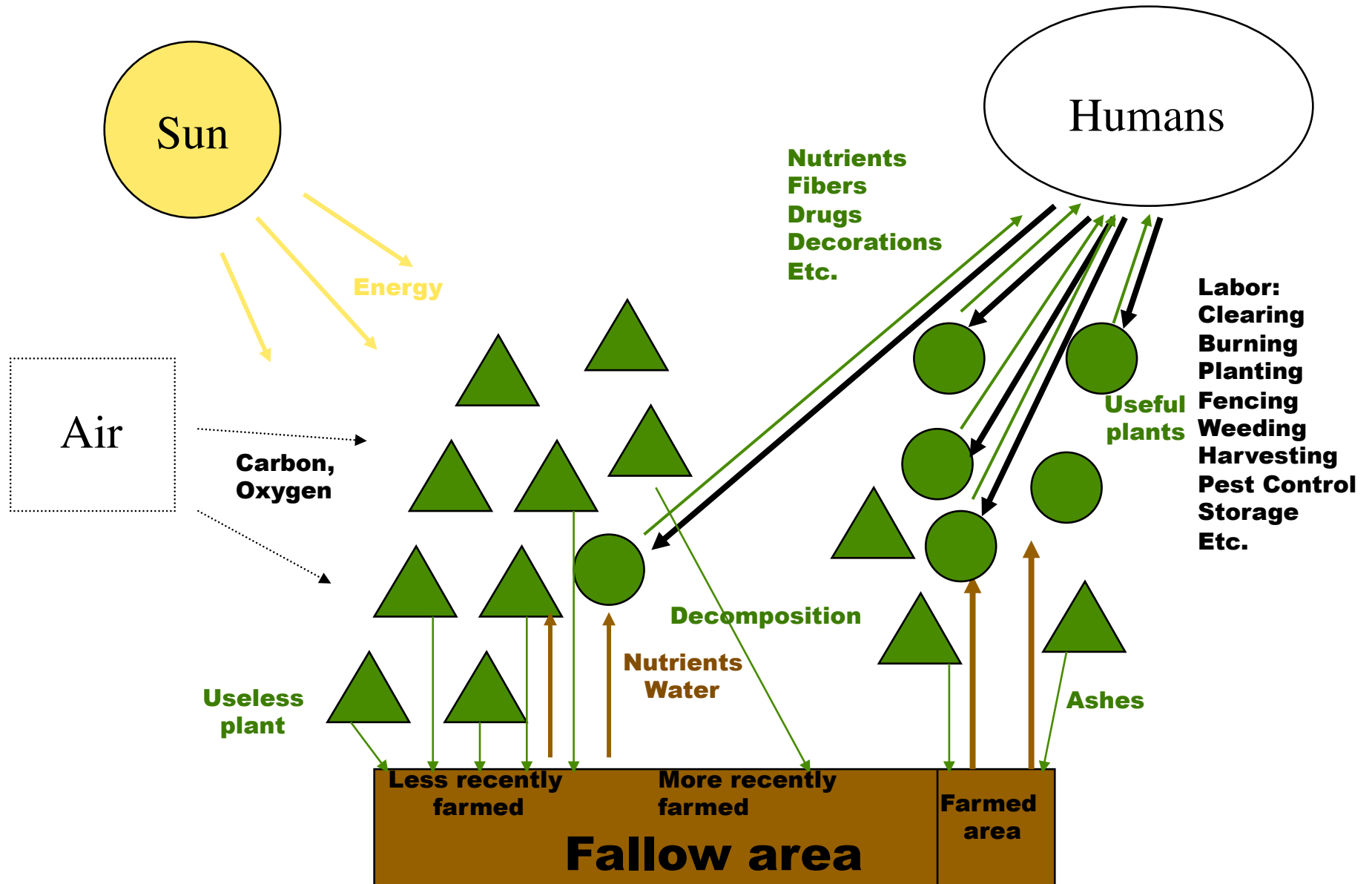
Foraging Ecosystem



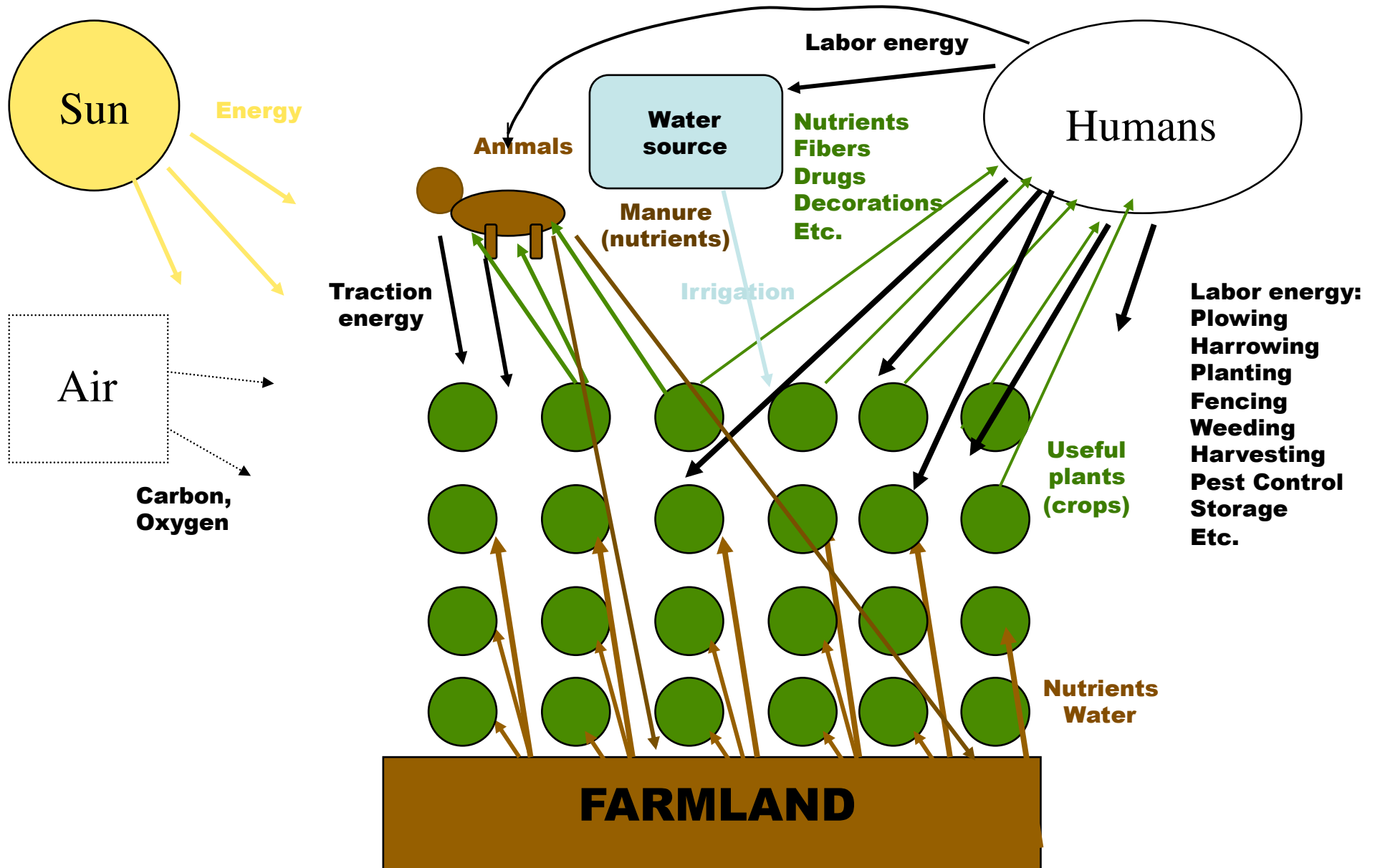
Shifting Agricultural Ecosystem



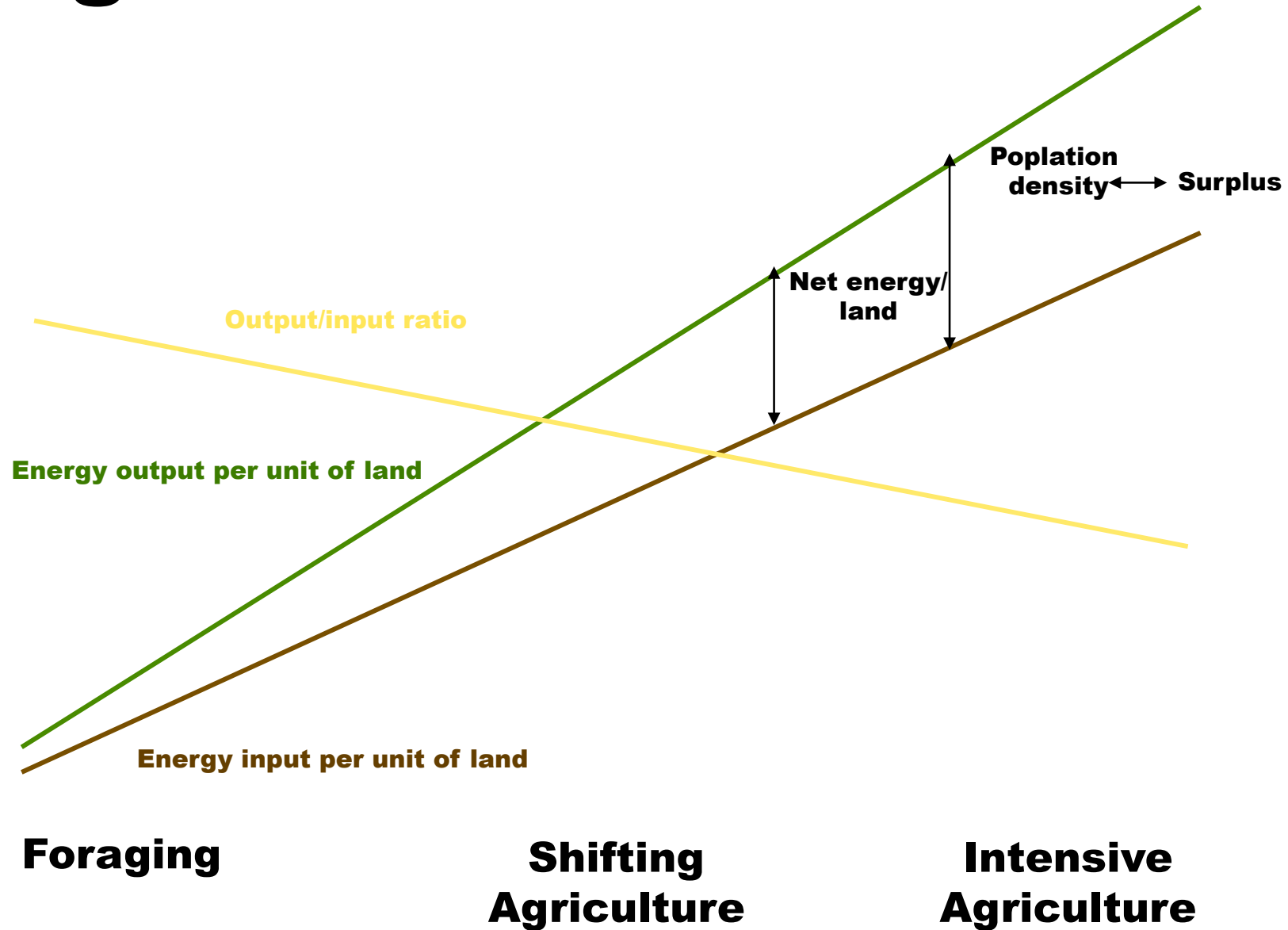
Shifting Agricultural Ecosystem



Intensive Agricultural Ecosystem



Agricultural Intensification

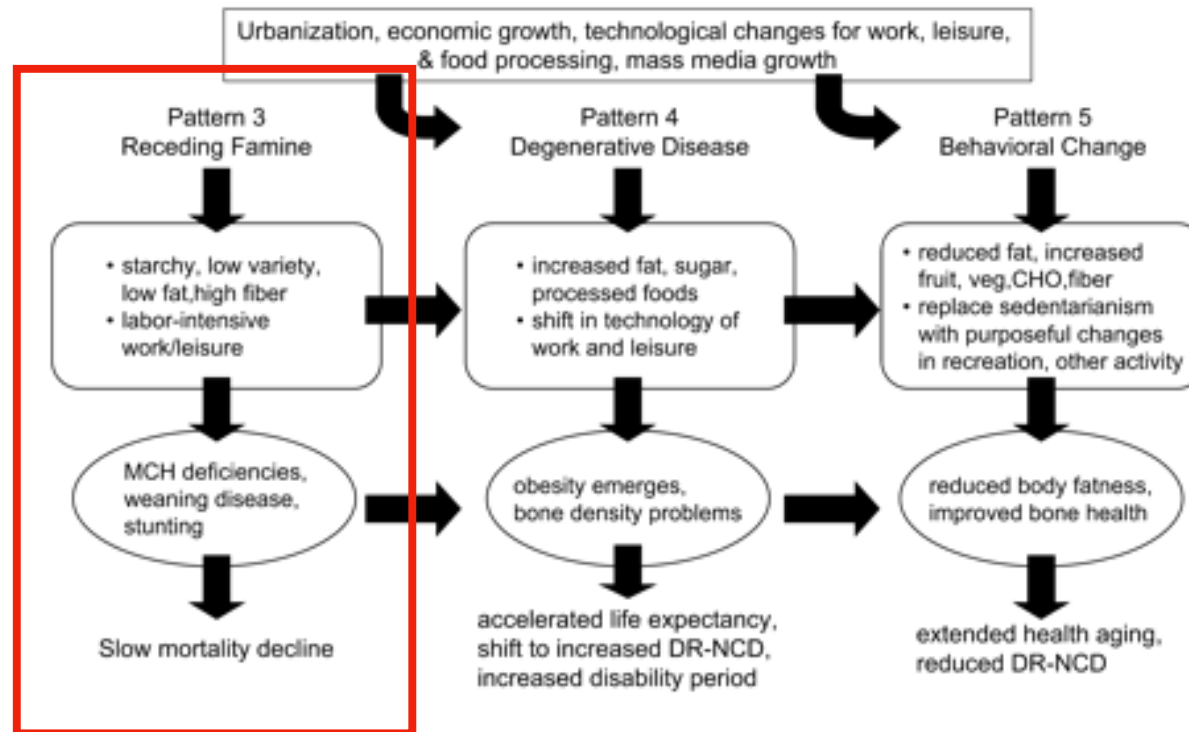


Agricultural Intensification

TABLE 3.2 Factors influencing agricultural intensification in African regions where shifting cultivation is practiced (Protheroe 1972).

FACTOR	PROCESS
POPULATION	LOW DENSITY → <i>Increasing numbers</i> → HIGH DENSITY
SYSTEM	SHIFTING CULTIVATION → <i>Increasing length of cultivation period</i> → ROTATIONAL CULTIVATION/FALLOW → <i>Decreasing length of fallow period</i> → SEMI-PERMANENT/PERMANENT CULTIVATION → <i>Manuring and fertilizing</i>
CROPS	SUBSISTENCE FOOD CROPS → <i>Decreasing importance</i> → CASH (FOOD AND EXPORT) CROPS → <i>Increasing importance</i> →
TENURE	COMMUNAL RIGHT TO LAND (individual usufructory rights) → <i>Communal rights decreasing individual rights increasing</i> → INDIVIDUAL RIGHTS TO LAND Land allocation by need → Land transfer by pledge, rent, lease, and sale Fragmented/dispersed holdings → Consolidated holdings No permanent demarcation of holdings → Permanent demarcation of holdings
SETTLEMENT	IMPERMANENT/MIGRATORY → <i>Increasing permanence and nucleation</i> → PERMANENT/FIXED NUCLEATED AND DISPERSED SMALL VILLAGES/DISPERSED
EXCHANGE	NONEXISTENT/LOCAL → <i>Increasing involvement at local, regional, national, and international levels</i> → MARKETS

Dietary Implications of Intensification





Map Source: http://anthro.palomar.edu/subsistence/sub_5.htm

The First Intensive Agricultural Societies



Construction of the Aztec Chinampas, Mexico, 14th Century

Rice around the world

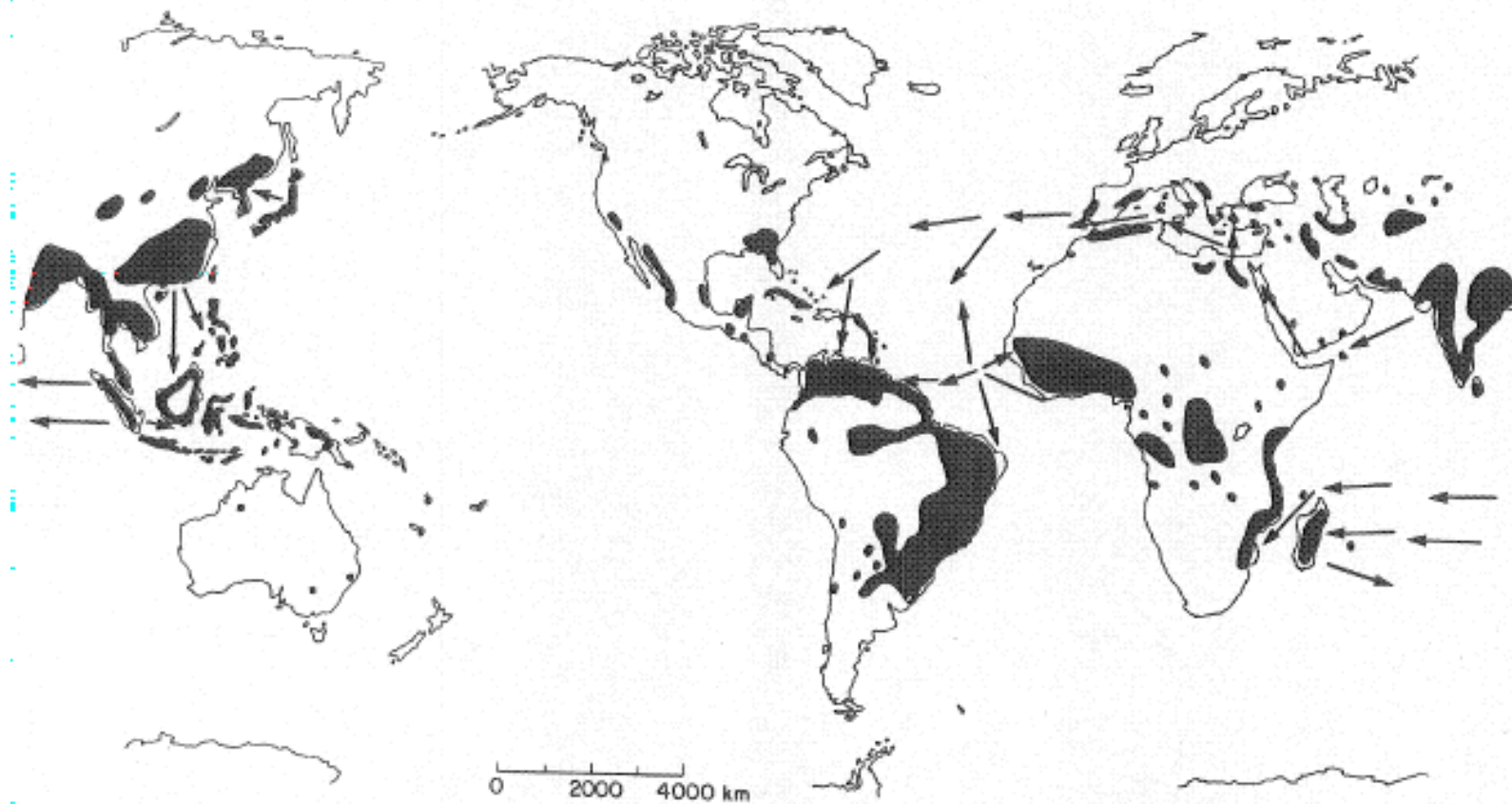


Fig. 1. Rice-growing areas of the world. Arrows indicate the spread of rice cultivation from its origin in the Indochinese area (*Oryza sativa*) and the Upper Niger (*O. glaberrima*).

So what else lives in rice paddies?

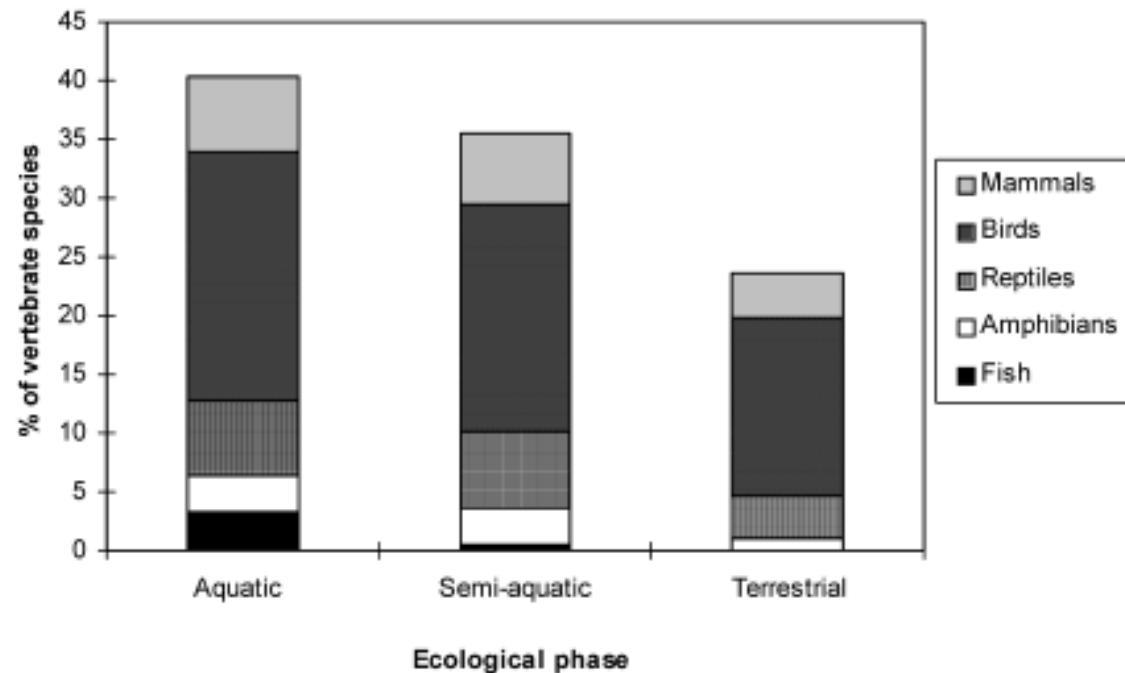
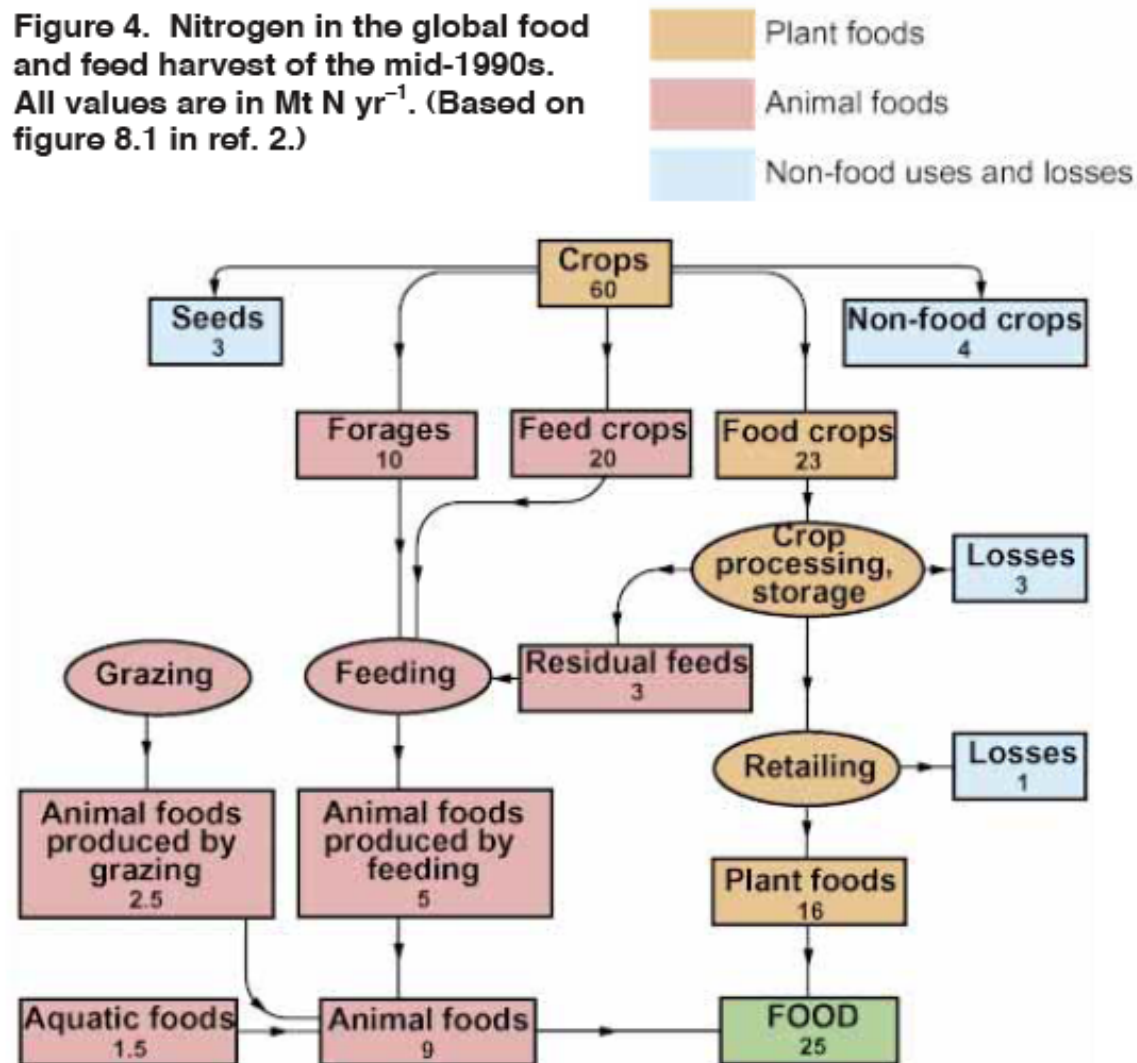


Figure 2. Proportion of different groups of vertebrate species at the three ecological phases of a rice cultivation cycle, in an irrigated rice field in Bathalagoda, Sri Lanka.

Nitrogen Sources

Figure 4. Nitrogen in the global food and feed harvest of the mid-1990s. All values are in Mt N yr⁻¹. (Based on figure 8.1 in ref. 2.)



Dietary Tradeoffs







	 Milk	 Carp	 Eggs	 Chicken	 Pork	 Beef
Feed conversion (kg of feed/kg ⁻¹ of live weight)	0.7	1.5	3.8	2.3	5.9	12.7
Feed conversion (kg of feed/kg ⁻¹ of edible weight)	0.7	2.3	4.2	4.2	10.7	31.7
Protein content (% of edible weight)	3.5	18	13	20	14	15
Protein conversion efficiency (%)	40	30	30	25	13	5

Figure 5. Protein contents of major animal foods and feed conversion efficiencies of their production. (Based on Figure 8.4 in ref. 2.) Calculations of feed conversion efficiencies based on the latest (1999) average US feed requirements from ref. (49); they include the feeding requirements of entire breeding and meat-producing populations.

Industrial Monocrop Agricultural Ecosystem

