The terrestrial N and P cycles summarized

TABLE 5.15 Terrestrial Nitrogen Cycle

Process	Total Flux (Tg N/yr)	Percent of Total Input or Output	Anthropogenic Flux (Tg N/yr)	Reference
Land input				
Biological fixation	139	49	44	Burns and Hardy 1975
Fertilizers & industry	85	30	85	FAO 1989
Precipitation and dry deposition	61	21	37	Table 3.15
Total input	285	100	166	
Land output				
River N	49–62	19	13–27	Table 5.16
Denitrification to N_2, N_2O	179	63	?	To balance (see text)
NH_3 gas loss	37	13	27	(See Chapter 3)
NO_x: soil gas loss and biomass burning	14	5	5	(See Chapter 3)
Total output	279–292	100	>45	

Note: Tg = 10^6 metric tons = 10^{12} g.

Berner and Berner, "Global Environment"

TABLE 5.16 River Nitrogen Transport (in Tg N/yr)

	Natural	Pollution	Total
Dissolved N			
DIN			
NO_3^-N	4.0		
NH_4^-N	0.5		
DON	10.0		
Total dissolved	14.5	7[a]–21[b]	22[a]–36[b]
Particulate N (PN)	21	6[b]	27–33[c]
Total N (TN)			49–63
Reactive N[d]			28–42

Inorganic

Organic

Inorg + Org

Note: [a] Meybeck 1993.

[b] Wollast 1993.

[c] Meybeck (1993), 21 Tg; Ittekkot and Zhang (1989),33 Tg; Wolast (1993), 27 Tg.

[d] Total dissolved N plus 22% of PN; see text.

Source: Meybeck 1982; 1993, except where noted.

Berner and Berner, "Global Environment"

TABLE 5.17 Phosphorus Fluxes in Rivers and Rain (in Tg P/yr)

Source	Total Flux		Polluted Part	Reference
P in river runoff				
Dissolved ortho-P	0.8	Inorg	0.4	Meybeck 1982; 1993
Dissolved organic P[a]	1.2	Org	0.6	
Total dissolved P	2.0		1.0	Meybeck 1982; 1993
Particulate organic-P	8.0	Inorg	?	Meybeck 1982; 1993
Particulate inorganic-P[a]	12.	Org	?	
Total particulate P	20.0		?	Meybeck 1982; 1993
Total output	22		>1	
Reactive P output[b]	5			See text
P in rain + dry deposition to land				
Soil particle origin	3.0		0.2	Graham and Duce 1979
Industry, combustion	0.21		0.21	Graham and Duce 1979
Sea salt	0.03			Graham and Duce 1979
Total rain and dry deposition	3.2		0.41	
Rain only to land	1.0		—	Meybeck 1982

[a] Calculated by difference from total; no data.

[b] Total dissolved P plus 15% of particulate P (after Berner and Rao 1994).

Berner and Berner, "Global Environment"

N and P cycle in inorganic and organic forms (bound in organic compounds).

N and P cycle in dissolved and particulate forms.

Anthropogenic (pollutive) fluxes of both elements are ~50% of today's total N and P cycles.