

Table 1. Global Nr creation and distribution, Tg Nyr⁻¹

	1860	Early-1990s	2050	Notes
<i>Nr creation</i>				1
Natural				
Lightning	5.4	5.4	5.4	
BNF-terrestrial	120	107	98	
BNF-marine	121	121	121	
Subtotal	246	233	224	
Anthropogenic				
Haber-Bosch	0	100	165	
BNF-cultivation	15	31.5	50	
Fossil fuel combustion	0.3	24.5	52.2	
Subtotal	15	156	267	
Total	262	389	492	
<i>Atmospheric emission</i>				2
NO _x				
Fossil fuel combustion	0.3	24.5	52.2	
Lightning	5.4	5.4	5.4	
Other emissions	7.4	16.1	23.9	
NH ₃				
Terrestrial	14.9	52.6	113	
Marine	5.6	5.6	5.6	
N ₂ O				
Terrestrial	8.1	10.9	13.1 ± ?	
Marine	3.9	4.3	5.1	
Total (NO _x and NH ₃)	13.1	46	82	
<i>Atmospheric deposition</i>				3
NO _y				
Terrestrial	6.6	24.8	42.2	
Marine	6.2	21	36.3	
Subtotal	12.8	45.8	78.5	
NH _x				
Terrestrial	10.8	38.7	83	
Marine	8	18	33.1	
Subtotal	18.8	56.7	116.1	
Total	31.6	103	195	
<i>Riverine fluxes</i>				4
Nr input into rivers	69.8	118.1	149.8	
Nr export to inland systems	7.9	11.3	11.7	
Nr export to coastal areas	27	47.8	63.2	
<i>Denitrification</i>				5
Continental				
Terrestrial		67	95	
Riverine		47.8	63.2	
Subtotal	98	115	158	
Estuary and shelf				
Riverine nitrate	27	47.8	63.2	
Open ocean nitrate	145	145	145	
Subtotal	172	193	208	

Table 1. Continued

	1860	Early-1990s	2050	Notes
Open ocean	129	129	129	
Total	125	163	221	

Notes

1. Nr creation

'BNF-terrestrial' – based on Cleveland et al. (1999) as discussed in the text.

'BNF-marine' – Table 9 (average of the minimum and maximum values).

'Lightning' – Lelieveld and Dentener (2000).

'Haber-Bosch' – early-1990s (Kramer 1999); 2050 (see text).

'BNF cultivation' – based on Smil (1999; pers. comm.)

'Combustion' – Klein Goldewijk and Battjes (1997); van Aardenne et al. (2001).

2. Atmospheric emission

'NO_x (other emissions)' – Klein Goldewijk and Battjes (1997); van Aardenne et al. (2001).

'NH₃' – see text.

'N₂O' – see text.

3. Atmospheric deposition

'NO_x and NH_x' – see text.

4. Riverine fluxes

'Nr inputs into rivers' – assumed to be twice riverine discharge. Range is 30–70% (Seitzinger et al. 2000).

'River fluxes' – see text and Appendix II.

5. Denitrification

'Terrestrial' – 1860, no storage; 1990s, natural denitrification reduced, 0.25 of anthropogenic Nr is denitrified, and excess river N is discharged.

'Riverine' – assumed to be equal to difference between 'river input' and 'river discharge'.

'Estuary and Shelf' – Shelf estimate (Table 9) minus 1860 'riverine discharge'.