

# Corrections

## SUSTAINABILITY SCIENCE

Correction for “Exploring global changes in nitrogen and phosphorus cycles in agriculture induced by livestock production over the 1900–2050 period,” by Lex Bouwman, Kees Klein Goldewijk, Klaas W. Van Der Hoek, Arthur H. W. Beusen, Detlef P. Van Vuuren, Jaap Willems, Mariana C. Rufino, and Elke Stehfest, which appeared in issue 52, December 24, 2013, of *Proc Natl Acad Sci USA* (110:20882–20887; first published May 16, 2011; 10.1073/pnas.1012878108).

The authors note that Table 1 appeared incorrectly. The corrected table appears below. Additionally, the authors note that on page 20886, left column, first paragraph, lines 2–4, “In 2000, about 50% of the N surplus (138 Tg) was lost through denitrification (67 Tg) (Table 1)” should instead appear as “In 2000, about 50% of the N surplus (138 Tg) was lost through denitrification (67 Tg including N<sub>2</sub>O and NO emissions) (Table 1).” Both the online article and the print article have been corrected.

**Table 1. Global input terms (fertilizer, manure excluding NH<sub>3</sub> emission from animal houses and storage systems, biological N<sub>2</sub> fixation, and atmospheric N deposition), soil budget (total, arable land, and grassland) and the various loss terms for N [NH<sub>3</sub> volatilization, denitrification (excluding N<sub>2</sub>O and NO), and N<sub>2</sub>O and NO emission], nitrate leaching and runoff, and P runoff for 1900, 1950, 2000, and 2050 for the baseline and five variants**

Input/output balance term	Year scenario or variant*								
	1900	1950	2000	2050 base	2050 EX	2050 FE	2050 ST	2050 IM	2050 DI
<b>N, Tg·y<sup>-1</sup></b>									
N fertilizer	1	4	83	104	103	109	104	82	104
N manure <sup>†,‡</sup>	33	48	92	139	143	130	142	153	133
N <sub>2</sub> fixation	14	23	39	54	55	56	54	55	53
N deposition	6	13	35	49	51	49	49	49	48
Total N inputs	54	89	248	347	352	344	350	340	337
N withdrawal	34	52	110	176	183	180	178	184	172
N budget	20	36	138	170	169	165	172	156	165
Arable land	6	12	93	119	117	114	121	104	116
Grassland	14	24	45	52	52	51	51	51	49
NH <sub>3</sub> volatilization	4	7	24	36	34	34	37	33	33
Denitrification (N <sub>2</sub> )	6	12	48	55	55	54	56	51	55
N <sub>2</sub> O emission <sup>§</sup>	3	4	7	9	9	9	9	9	9
NO emission	1	1	2	3	3	3	3	3	3
N leaching + runoff	6	12	57	68	67	66	68	60	66
NH <sub>3</sub> emission from animal houses and storage systems <sup>‡</sup>	2	4	10	15	15	14	11	18	15
<b>P, Tg·y<sup>-1</sup></b>									
P fertilizer	0	3	14	23	23	24	23	18	23
P manure <sup>†</sup>	6	9	17	26	27	25	26	29	25
Total P inputs	6	11	31	49	50	49	49	47	48
P withdrawal	6	9	19	31	32	31	31	31	30
P budget	0	2	12	18	18	17	18	16	18
Arable land	0	2	11	16	16	15	16	14	16
Grassland	1	1	1	2	2	2	2	2	2
P runoff	1	1	4	6	6	6	6	6	6

\*IAASTD projection serves as the base; EX, 10% of the production in mixed systems is moved to pastoral systems; FE, 10% lower excretion rates in mixed and industrial systems; ST, 20% reduced emissions from animal houses and ST systems; IM, recycling of animal manure that is used as fuel or building material or is unused manure in the baseline and with better integration of animal manure in mixed systems in countries where manure contributes less than 25% total N or P inputs in crop production; DI, as in IAASTD projection but with 10% of ruminant meat production replaced by poultry meat.

<sup>†</sup>Excluding manure that is not recycled in the agricultural system, such as manure stored in lagoons or manure used as fuel.

<sup>‡</sup>Excluding NH<sub>3</sub> emission from animal houses and storage systems, which is presented separately.

<sup>§</sup>N<sub>2</sub>O emissions include direct emissions and indirect emissions from leached N and atmospheric N deposition.

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## ENVIRONMENTAL SCIENCES

Correction for “Enduring legacy of a toxic fan via episodic redistribution of California gold mining debris,” by Michael Bliss Singer, Rolf Aalto, L. Allan James, Nina E. Kilham, John L. Higson, and Subhjit Ghoshal, which appeared in issue 46, November 12, 2013, of *Proc Natl Acad Sci USA* (110:18436–18441; first published October 28, 2013; 10.1073/pnas.1302295110).

The authors note that on page 18440, left column, second full paragraph, line 8 “Hg mass (~200 kg)” should instead appear as “Hg mass (~200 t).”

[www.pnas.org/cgi/doi/10.1073/pnas.1321091110](http://www.pnas.org/cgi/doi/10.1073/pnas.1321091110)