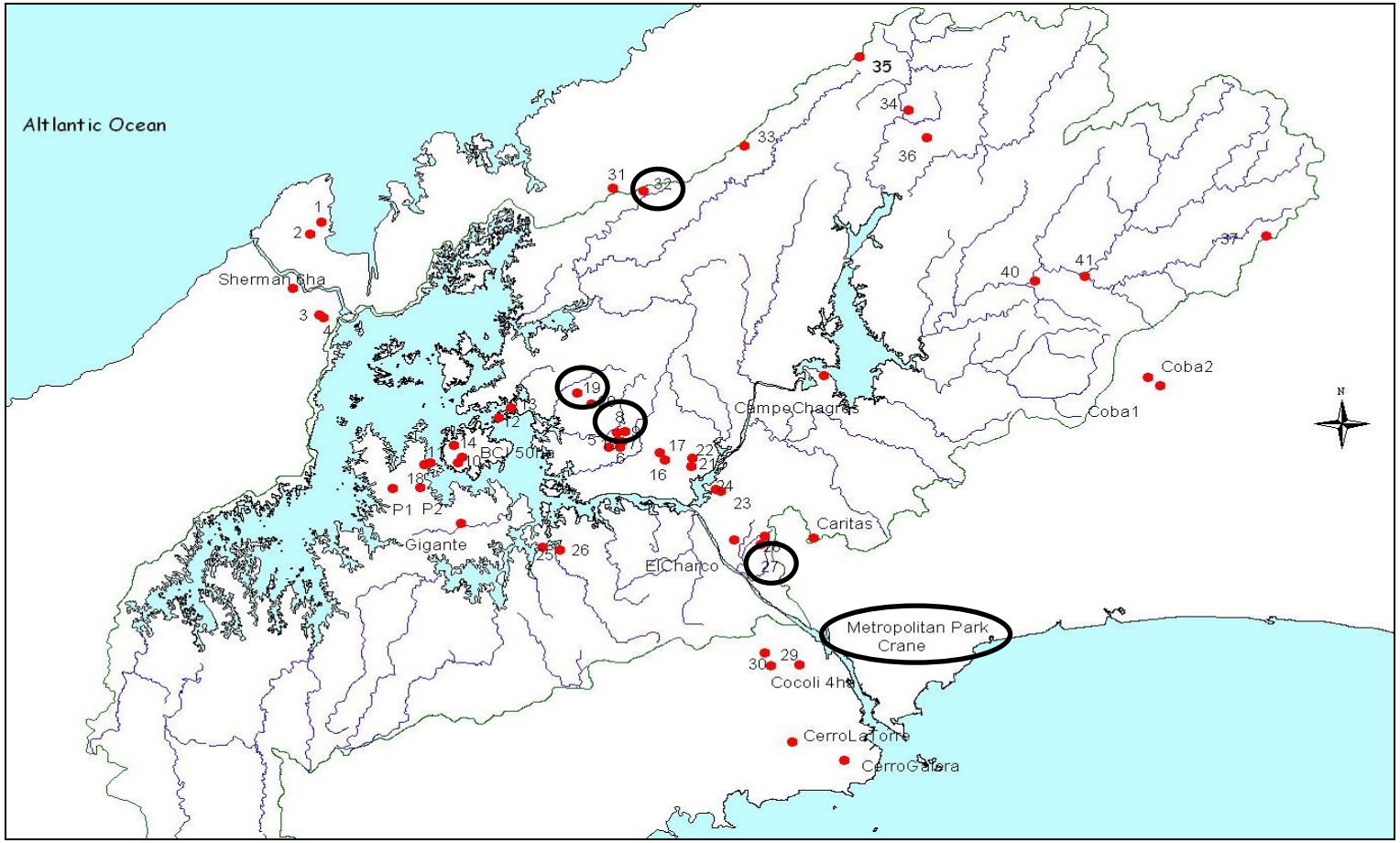
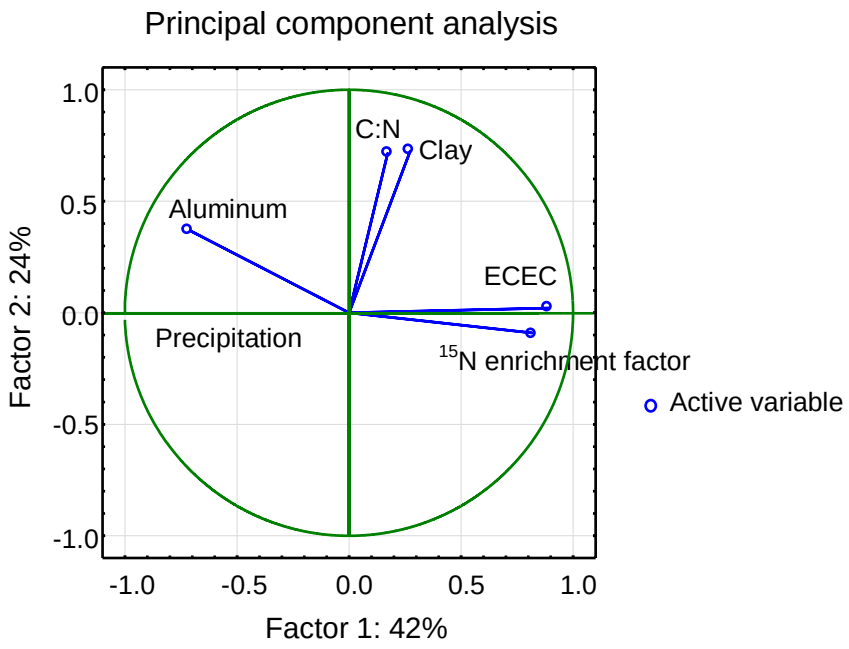


Figure S1 Five lowland forest sites along orthogonal gradients of annual precipitation (from 1700 mm yr^{-1} to 3400 mm yr^{-1}) and soil fertility in the Panama Canal watershed, central Panama.



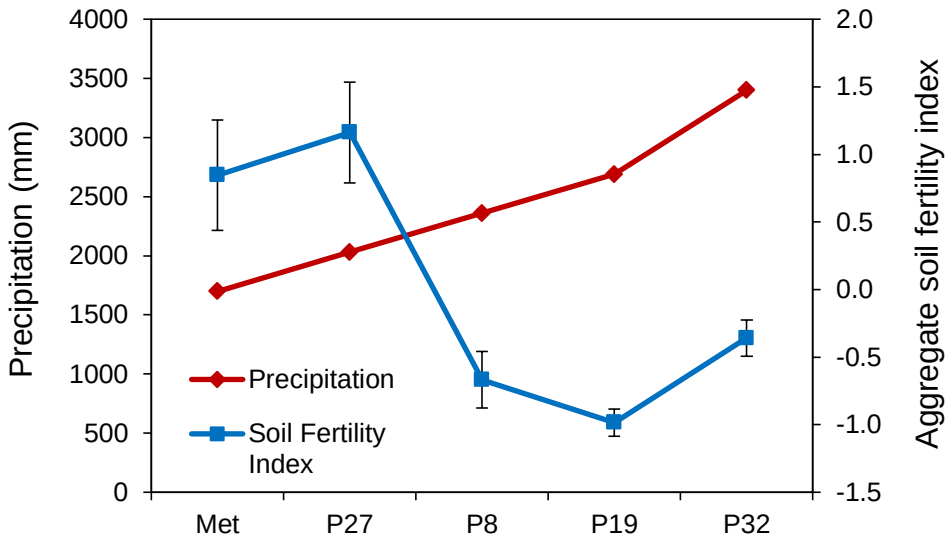


Figure S2 *above* - the factor 1 and 2 scores of the five variables (δ^{15}N enrichment factor, effective cation exchange capacity (ECEC), exchangeable soil aluminum, soil C:N ratio and % clay content) included in the principal component analysis for determining an aggregate soil fertility index for each site; *below* - the five lowland forest sites along orthogonal gradients of annual precipitation and soil fertility in the Panama Canal watershed, central Panama. Standard error bars of soil fertility indices are determined from four replicate plots per site.

Table S1 Spearman correlations of soil biochemical characteristics[a] and annual (measured in 2011) soil trace gas fluxes in the **(a)** dry season and **(b)** wet season, from five lowland tropical forests along orthogonal precipitation and fertility gradients in the Panama Canal watershed, central Panama.

(a)	ECEC	BS	Fe	pH	Clay	CO_2	CH_4	N_2O	NO
^{15}N sig.	-0.87**	-0.67**	-0.52	-0.62**	-0.15	0.18	-0.60**	-0.11	0.48
ECEC		0.80**	0.76**	0.76**	-0.12	-0.05	0.68**	0.33	-0.32
BS			0.61**	0.96**	-0.12	0.06	0.78**	0.19	-0.35
Fe				0.52	-0.51	0.13	0.61**	0.58**	0.06
pH					-0.03	0.14	0.73**	0.18	-0.32
Clay						-0.13	-0.20	-0.42	-0.67**
CO_2							0.24	0.02	0.12
CH_4								0.34	-0.13
N_2O									0.41

(b)	BS	Mn	Al	pH	CO_2	CH_4	N_2O	NO
^{15}N sig.	-0.67**	0.68**	0.42	-0.62**	0.16	-0.42	0.57**	0.09
BS		-0.72**	-0.87**	0.96**	-0.21	0.70**	-0.42	-0.49
Mn			0.54	-0.73**	0.00	-0.38	0.60**	0.27
Al				-0.87**	0.05	-0.75**	0.28	0.45

pH	-0.18	0.70**	-0.36	-0.48
CO_2		-0.01	0.17	0.19
CH_4			0.02	-0.45
N_2O				0.11

** $P < 0.01$, $n = 20$ (4 replicate plots in each of the 5 forest sites)

[a] Soil parameter abbreviations: ^{15}N natural abundance signature (^{15}N sig.), effective cation exchange capacity (ECEC) and base saturation (BS).