ONLINE RESOURCES 1: SUPPLEMENTAL METHODS AND RESULTS.

Sensitivity analysis

We assessed the sensitivity of our Approximate Bayesian computation model outputs to our choice of priors. We varied the distributions and values of the priors and compared the posterior distributions using R package overlapping. The parameterisations used in the sensitivity analysis had the following priors:

1. Original parameterisation: $\alpha \sim Uniform(-30, 30)$; $\beta \sim (0, 30)$; and $\sigma \sim Uniform(0, 30)$.
2. Alternative parameterisation 1: $\alpha \sim Uniform(-50, 50)$; $\beta \sim (0, 50)$; and $\sigma \sim Uniform(0, 50)$.
3. Alternative parameterisation 2: $\alpha \sim Normal(0, \text{sd} = 20)$; $\beta \sim (0, 50)$; and $\sigma \sim Uniform(0, 30)$.

Figure A1. Pairwise overlaps between the posterior distributions of model parameter α obtained using different prior distributions.

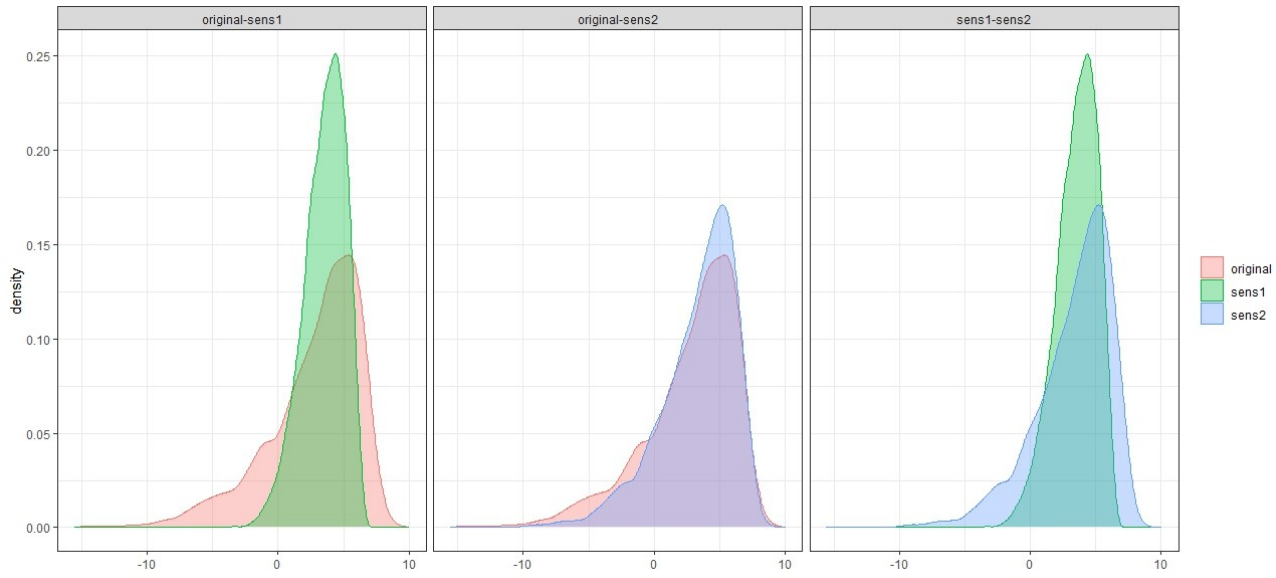

Figure A2. Pairwise overlaps between the posterior distributions of model parameter β obtained using different prior distributions.

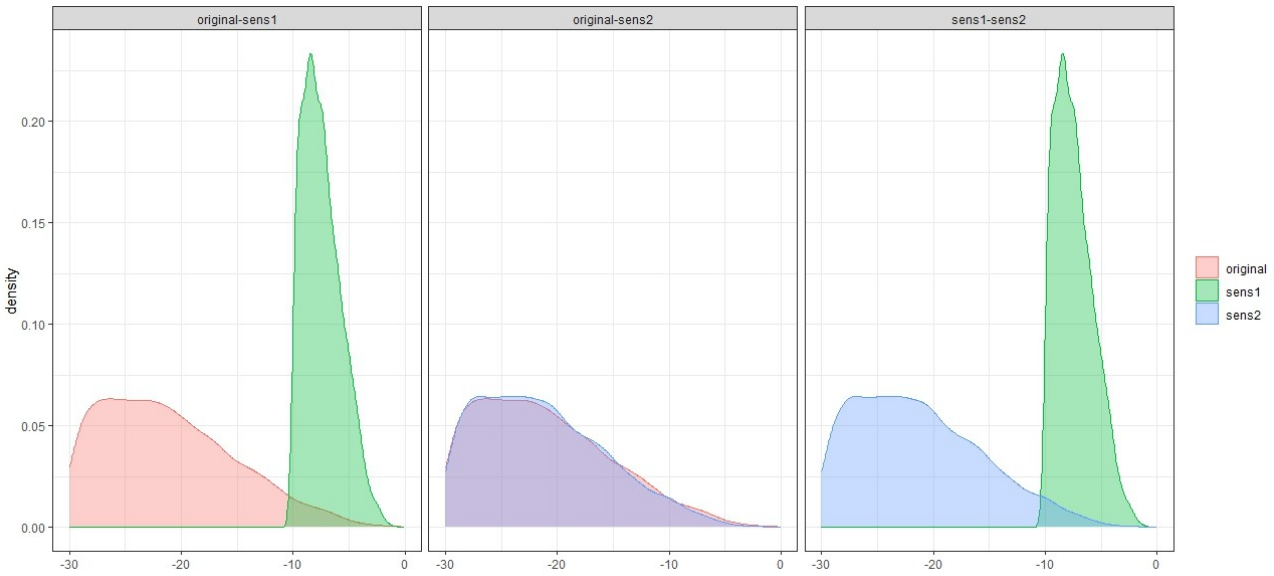

Figure A3. Pairwise overlaps between the posterior distributions of model parameter σ obtained using different prior distributions.

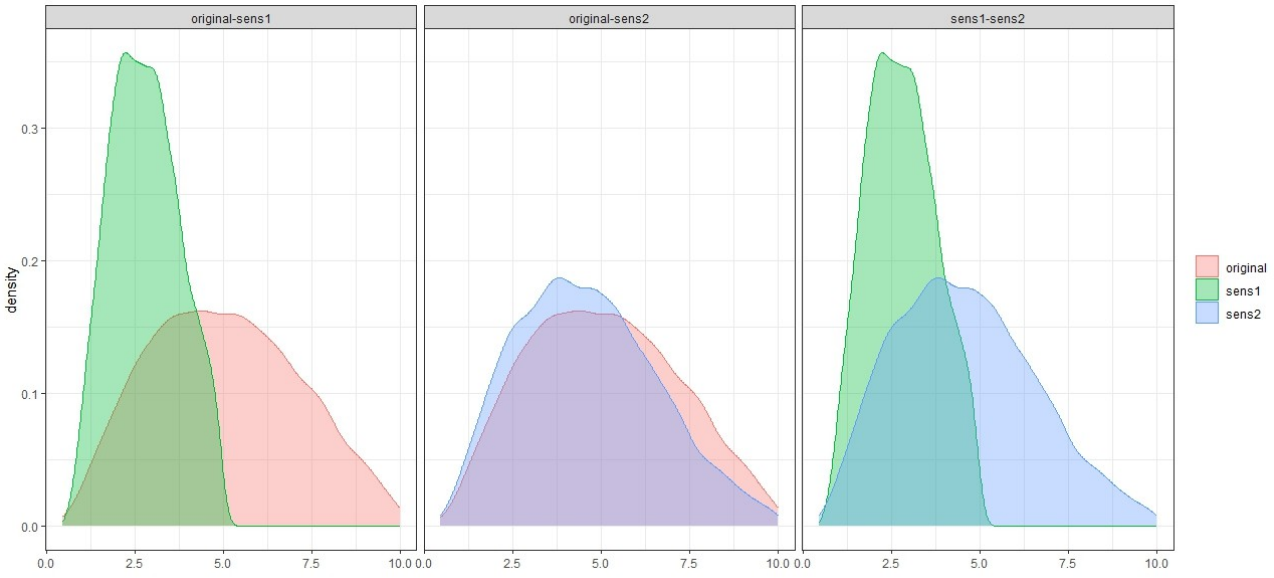

Table A1. Unweighted Spearman's partial correlations (ρ; maximum a posteriori probability estimate ± standard deviations, and 95% highest density intervals) between the predicted mean annual Biological Oxygen Demand (BOD) and six environmental and socio-economic weighted covariates in the 17 departments of the province of Tucumán (Argentina) in 1980, 1991, 2001, 2010, and 2019. Compare with Table 3 in the main text that presents the weighted partial correlations.

Covariate/Year	**1980**	**1991**	**2001**	**2010**	**2019**
Leaf Area Index of High Vegetation	0.13 ± 0.16 (-0.26, 0.40) $P(\rho \neq 0) = 0.25$	0.14 ± 0.18 (-0.32, 0.37) $P(\rho \neq 0) = 0.35$	0.22 ± 0.21 (-0.29, 0.58) $P(\rho \neq 0) = 0.18$	0.03 ± 0.23 (-0.48, 0.42) $P(\rho \neq 0) = 0.48$	0.07 ± 0.24 (-0.43, 0.50) $P(\rho \neq 0) = 0.38$
Mean total annual precipitation	-0.26 ± 0.18 (-0.50, 0.16) $P(\rho \neq 0) = 0.11$	-0.01 ± 0.19 (-0.33, 0.41) $P(\rho \neq 0) = 0.43$	0.34 ± 0.17 (-0.01, 0.68) $P(\rho \neq 0) = 0.04$	0.08 ± 0.21 (-0.29, 0.54) $P(\rho \neq 0) = 0.29$	-0.19 ± 0.25 (-0.56, 0.34) $P(\rho \neq 0) = 0.28$
Mean surface temperature	0.11 ± 0.16 (-0.15, 0.47) $P(\rho \neq 0) = 0.17$	0.37 ± 0.16 (0.05, 0.66) $P(\rho \neq 0) = 0.02$	0.39 ± 0.17 (0.03, 0.70) $P(\rho \neq 0) = 0.03$	0.48 ± 0.18 (0.07, 0.74) $P(\rho \neq 0) = 0.01$	0.42 ± 0.23 (-0.13, 0.75) $P(\rho \neq 0) = 0.09$
Population density	0.42 ± 0.17 (0.05, 0.72) $P(\rho \neq 0) = 0.03$	0.25 ± 0.16 (-0.06, 0.58) $P(\rho \neq 0) = 0.06$	-0.04 ± 0.21 (-0.43, 0.40) $P(\rho \neq 0) = 0.47$	0.36 ± 0.25 (-0.27, 0.67) $P(\rho \neq 0) = 0.18$	0.02 ± 0.27 (-0.54, 0.53) $P(\rho \neq 0) = 0.48$
Precarious housing	-0.06 ± 0.16 (-0.41, 0.24) $P(\rho \neq 0) =$	0.01 ± 0.19 (-0.30, 0.45) $P(\rho \neq 0) = 0.43$	-0.31 ± 0.20 (-0.68, 0.12) $P(\rho \neq 0) = 0.09$	-0.36 ± 0.19 (-0.62, 0.11) $P(\rho \neq 0) = 0.09$	-0.57 ± 0.17 (-0.86, -0.23) $P(\rho \neq 0) = 0.01$
Density of industries	0.14 ± 0.18 (-0.25, 0.50) $P(\rho \neq 0) = 0.19$	0.03 ± 0.17 (-0.06, 0.58) $P(\rho \neq 0) = 0.48$	0.30 ± 0.20 (-0.17, 0.59) $P(\rho \neq 0) = 0.11$	0.19 ± 0.23 (-0.27, 0.62) $P(\rho \neq 0) = 0.26$	0.49 ± 0.21 (0.03, 0.83) $P(\rho \neq 0) = 0.04$

Supplemental References: Full citations for R and Python packages and libraries used in the analyses.

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