

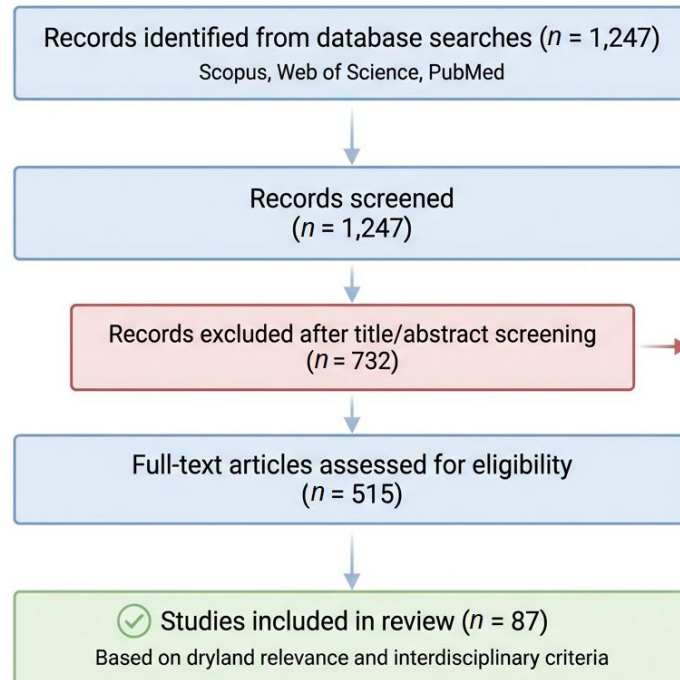


Fig. S1 PRISMA 2020 flow diagram

Table S1 Evidence strength matrix across research domains (2016–2026, $n = 87$ studies)

Domain	Strong (≥ 3 field studies)	Moderate (lab + 1 field)	Weak (lab/extrapolated)	Key citation
Degradation kinetics	UV-driven rates (12)	Thermal cycling (5)	Wind abrasion (2)	[18]
Vector capacity	Metal sorption (15)	POP partitioning (9)	Nano-vector effects (3)	[19]
Plastisphere	ARG enrichment (8)	Nitrogen cycling (7)	Pathogens (4)	[20]
Transport	Aeolian deposition (6)	Runoff flux (3)	Infiltration (1)	[21]

Note: Strong = at least 3 field studies; moderate = laboratory plus 1 field study; weak = laboratory or extrapolated evidence.

Table S2 Comparative studies of plastic mass fractions in dryland open dumpsites and temperate landfills used in the synthesis

S/N	Citation	Country/City	Climate Classification	Waste Facility Type	Plastic Fraction (% total mass)	Sampling Year	Sample Size
1	Gyabaah et al. ^[46]	Sunyani, Ghana	Semi-arid/Sub-humid dryland	Open dumpsite (urban)	24.5–28.1%	2021–2022	50 kg per depth/zone
2	Gyabaah et al. ^[46]	Nsoatre, Ghana	Semi-arid/Sub-humid dryland	Open dumpsite (small town)	5.4–8.5%	2021–2022	50 kg per depth/zone
3	Afuno & Rabiū ^[55]	Kano, Nigeria	Semi-arid dryland (BSh)	Open dumpsite (urban, ×4 sites)	27.9–29.2%	2012–2013	~100 kg per site
4	Al-Khatib et al. ^[56]	Nablus, Palestine	Mediterranean semi-arid	Open dumpsite/informal	10.1%	2021–2022	60 samples, 5 districts
5	World Bank ^[44]	Tehran, Iran	Semi-arid dryland (BSk)	Open dumpsite/unmanaged	~6.0%	2015–2016	Municipal-level survey
6	Golhosseini & Ghazizade, ^[57]	Iran (nationwide)	Predominantly arid/semi-arid	Open dump (>90% of waste)	~7.0%	2018–2022	31 provinces
7	Mallick ^[58]	Khamis-Mushyet, Saudi Arabia	Arid dryland (BWh)	Open dumpsite/landfill	5–17%	2015–2019	City-level survey
8	Kloettschen et al. ^[59]	Nairobi, Kenya	Semi-arid/sub-humid	Open dumpsite	11.8%	~2018	Citywide characterization
9	Ahmad et al. ^[60]	Karachi, Pakistan	Arid dryland (BWh)	Open dumpsite	~18% (plastics dominant fraction after organic)	2019–2020	Seasonal, multi-district
10	Kaza et al. ^[61] , World Bank Waste	Sub-Saharan Africa (LIC	Dryland-dominant (arid/semi-arid)	Open dump (93% of waste)	7–11%	2016	Regional aggregate

		aggregat e)					
11	Kaza et al. [61]. World Bank Waste	USA/Eu rope (HIC aggregat e)	Temperate (Cfb/Dfb)	Engineered landfill	~12% of all MSW	2016	Global aggregate
12	USEPA [45]	United States	Temperate (various)	Sanitary landfill	12.0%	2007 – 2013	National MSW characterizat ion

Note: Values are reported as percentage of total waste mass unless otherwise indicated. Climate classification follows the site description used in each study.