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Time to Retire Rubber Crumb: How Soft Fall Playgrounds are Threatening Australia's Great Barrier Reef

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Abstract : Rubber crumb is a physical and chemical pollutant of concern for the environment and human health, warranting immediate investigations into its pathways to the environment and potential impacts. This emerging microplastic is created by shredding end-of-life tyres into 'rubber crumb' particles between 1-5mm used on synthetic turf fields and soft-fall playgrounds as a solution to intensifying tyre waste worldwide. Despite having known toxic and carcinogenic properties, studies into the transportation pathways and movement patterns of rubber crumbs from these surfaces remain in their infancy. To address this deficit, AUSMAP, the Australian Microplastic Assessment Project, in partnership with the Tangaroa Blue Foundation, conducted a study to quantify crumb loss from soft-fall surfaces. To our best knowledge, this is the first of its kind, with funding for the audits being provided by the Australian Government's Reef Trust. Sampling occurred at 12 soft-fall playgrounds within the Great Barrier Reef Catchment Area on Australia's North-East coast, in close proximity to the United Nations World Heritage Listed Reef. Samples were collected over a 12-month period using randomized sediment cores at 0, 2 and 4 meters away from the playground edge along a 20-meter transect. This approach facilitated two objectives pertaining to particle movement: to establish that crumb loss is occurring and that it decreases with distance from the soft-fall surface. Rubber crumb abundance was expressed as a total value and used to determine an expected average of rubber crumb loss per m2. An Analysis of Variance (ANOVA) was used to compare the differences in crumb abundance at each interval from the playground. Site characteristics, including surrounding sediment type, playground age, degree of ultra-violet exposure and amount of foot traffic, were additionally recorded for the comparison. Preliminary findings indicate that crumb is being lost at considerable rates from soft-fall playgrounds in the region, emphasizing an urgent need to further examine it as a potential source of aquatic pollution, soil contamination and threat to individuals who regularly utilize these surfaces. Additional implications for the future of rubber crumbs as a fit-for-purpose recycling initiative will be discussed with regard to industry, governments and the economic burden of surface maintenance and/ or replacement.

Keywords : microplastics, toxic rubber crumb, litter pathways, marine environment
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