

SDG COLUMN

Biodiversity preservation through sustainable dentistry: contextualising SDG 15



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In this SDG Column, **Mojtaba Mehrabanian**,^{*1} **Mojtaba Dorri**,² **Mina Afshar**³ and **Mehdi Mokhtari**⁴ highlight the importance of biodiversity and ecosystems within SDG 15: Life on Land, reflecting on how the dental industry's notable environmental impact currently presents challenges in fulfilling this goal.

As covered extensively in the previous volume of the *BDJ*, the United Nations (UN) introduced 17 Sustainable Development Goals (SDGs) in 2015 to transform the world by 2030. SDG 15, known as 'life on land', prioritises biodiversity and ecosystems. It is itself comprised of 12 targets, with the first nine concentrating on protecting ecosystems as vital biodiversity sites, sustainable forest management, land degradation, mountain biodiversity, threatened species, wildlife trade regulation, invasive species, and integrating biodiversity values into planning. Additionally, there are three means of implementation targets which aim to increase funding for biodiversity, support sustainable forest management, and combat illegal wildlife trafficking.^{1,2}

Sustainable dentistry follows the principles of Reduce, Reuse, Recycle, and Rethink, aiming to minimise resource usage, waste production and landfilling, while fostering innovation

for sustainable practices. It aims to reduce the environmental impact of dental procedures and promote the conservation of natural resources.^{3,4,5} Biodiversity is an important component of sustainable dentistry and encompasses the diversity of all living organisms, which is vital for ecosystem function and providing essential services like clean air, water, food, and medicine, benefiting human health. The loss of biodiversity impacts humans by reducing essential ecosystem services, as well as increasing disease spread, while also affecting the environment through ecosystem degradation and species extinction.⁶

One of the challenges in achieving SDG 15 is the limited awareness among the dental community about the potential adverse impacts of some of their practices on biodiversity and human health.⁷ Annually, dental practices, as reported by the Eco-Dentistry Association (EDA), produce 3.7 tonnes of mercury, 28 million litres of toxic radiograph fixer, 4.8 million lead foils from radiograph packets, over

680 million various disposable items, and 1.7 billion sterilisation pouches. In addition, the average dental practice consumes 57,000 gallons of water each year.³ These statistics firmly establish dentistry's significant environmental impact, highlighting the urgency of transitioning to more eco-friendly practices to reduce its environmental footprint, without risking patients' oral and general health.

While EU regulations on mercury that restrict the use of amalgam for tooth restoration and came into effect in the UK and EU on 1 January 2018,⁷ the profession has for many years been implementing means to reduce the escape of mercury into the environment. This is primarily through the use of amalgam separators which, when combined with chairside traps and vacuum pump filters, effectively remove about 98% of amalgam particles, mainly mercury, from wastewater. The collected amalgam waste can be recycled, reducing the release of mercury and other heavy

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◀ metals into the environment.⁴

Taking these steps continues to be of significant advantage as 'escaped' dental amalgam can lead to soil, water, and air pollution due to improper waste disposal, clinic effluents and vapour emissions, respectively, potentially affecting various organisms in the food chain and harming human health.⁸

The increasing use of digital radiographs helps eliminate previous environmental hazards by removing improper disposal of x-ray fixers and lead from films. When continuing to use non-digital technologies, recycling lead waste is vital to prevent the release of this heavy metal, reducing its environmental impact and fostering sustainable dental practices.⁴

The dental industry's consumption of non-reusable plastic materials, driven by lower cost and infection control measures, generates substantial clinical plastic waste with adverse environmental impacts. The total annual mass of single-use plastic waste in the UK amounts to 27 tonnes.⁹ Sustainable alternatives should therefore be investigated in order to shift from a linear plastic economy to a circular one.¹⁰ Additionally, the implementation of reduction strategies (such as promoting good oral health, emphasising prevention, and using durable treatments) and plastic recycling is imperative.⁹

As we are all aware, the COVID-19 pandemic significantly increased clinical waste, due to the necessary wearing of extensive personal protective equipment, including disposable, fluid-repellent gowns, gloves, eye/face protection, and respirator masks (eg FFP3 or FFP2/N95) to protect the clinical team and patients against risk of aerosol and in turn virus spread.¹¹ This again indicates the need for investing in more sustainable and efficient solutions such as NoPaS (Novel Patient Shield) to avoid polluting the environment in future pandemics, which seem inevitable.^{12,13}

On an individual level, outdoor green spaces surrounding dental practices can be transformed to enhance biodiversity, providing numerous advantages such

as improved air quality, flood and heat control, and reduced pollution. The promotion of wilder corners of gardens, avoidance of manicured lawns, and the use of pollinator-friendly plants which contribute to attracting diverse wildlife all help to foster a healthier ecosystem. Furthermore, creating specific habitats such as standing water, insect shelters, and bird feeders enhance biodiversity.¹⁴ Such efforts in sustainable construction and landscaping around dental practices not only preserve biodiversity but also offer emotional wellbeing and inspiration to dental teams and patients.¹⁵

As we have read throughout the *BDJ*'s green dentistry coverage, the greatest single contribution by dentistry to carbon emissions is through travel. These emissions, which significantly impact air quality and health, need to be reduced. Dental practices can minimise travel through teleconferencing and encourage sustainable commuting options. Additionally, energy management fulfils an essential function in dental emissions through improvements in lighting, insulation, and equipment upgrades.^{4,10} We should also consider the carbon footprint of different products and equipment that we use and make more sustainable choices.

In conclusion, UN SDG 15 highlights the importance of biodiversity and ecosystems. However, the dental industry's notable environmental impact presents challenges in fulfilling this goal. Effective disposal and recycling methods and use of more sustainable solutions are pivotal, urging an immediate shift towards eco-friendly practices. As dental practitioners, we have a substantial responsibility in preserving biodiversity, ultimately

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enhancing the overall health of both our patients and the planet. ■

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