

“Silent Spring” revisited: Implications for breast cancer care

In 1962, sixteen months before her death from metastatic breast cancer, the scientist Rachel Carson published the book “Silent Spring” [1] [Fig. 1]. The book title stemmed from the lack of bird song heralding spring, a consequence of biodiversity loss related to human activity. The book marked the dawn of the Anthropocene Era – one in which our activities are substantially altering the earth’s surface, atmosphere, oceans, and systems of nutrient recycling [2]. By the time of her death, one million copies of the book were sold, and President John F Kennedy commissioned an investigation by his Science Advisory Committee [1].

Seven decades later the biodiversity crisis identified by Rachel Carson has become interlinked with climate change and pollution in a Triple Planetary Crisis [3]. The losses she documented have magnified. Since 1980, one in six bird species have been lost [4]. Globally nearly half of all bird species are in decline. Described by some as a global health emergency [5], economic losses from climate change have been estimated at \$23 trillion due to premature mortality, healthcare expenditure and healthcare related work loss [6]. In the past two decades alone, climate change weather events have been considered to cause over 570,000 deaths [7]. They have also compromised cancer care delivery, with as yet unquantified impacts on cancer outcomes [8].

For patients with breast cancer this time period has also witnessed significant improvements in cancer care, and consequently life expectancy and quality of survival [9]. These developments would have transformed Rachel Carson’s life. However, healthcare is a major polluter responsible for more than 5 % of all global emissions and accounting for 4.4 % of greenhouse gases, 2.8 % of particulate matter emissions, and 3.4 % of nitrogen oxides [10,11]. The Lancet Commission has estimated that healthcare emissions globally account for 4 million disability adjusted life years (DALYs) [7]. A 77 % increase in breast cancer cases worldwide is predicted between now and 2050 [12]. If we continue healthcare as usual, emissions from how we practice could triple by then [10]. It is also evident that care for patients will become more challenging with projected increases in the frequency and intensity of extreme weather events [13].

As clinicians we wonder about how we can reconcile our duty of care to patients with our duty of care to the planet [14]? Would less patient care translate into less planetary trauma? What are the ethical dilemmas that stem from this intersection [15]? How much difference can one clinician make? Addressing the issue of climate change seems to be “like trying to catch a lion with a mousetrap”. In this context, the article by Mac and colleagues published in the journal resonated with us [16]. The authors conducted a scoping review of the literature, of the Cochrane Register of Controlled Trials and of the Cochrane Database of Systemic Reviews related to breast cancer and environmental impacts up to July

2025. Thirty six articles (dating from 1999 onwards) of 6772 identified were included for review; 19 of these were published in the last two years, suggesting growing momentum in this space. The majority of studies focused on breast cancer treatments, with one each focusing on screening and pathology and three on research. The authors identified five key themes regarding the environmental impact of how we treat breast cancer. These included greenhouse gas emissions associated with radiation therapy and those associated with travel for care, the ecotoxic effects of drugs and metabolites, surgery as a source of greenhouse gas emissions and plastic waste, and the unsustainable use of resources for drug manufacture. Crucially they focus on using this evaluation to provide recommendations for improving sustainability in breast cancer care.

What are the implications for clinicians from this scoping review? Firstly travel matters, and reducing patient travel either through mobile screening units, virtual assessments, or shortened treatment schedules has significant impacts on carbon emissions. In a study of 102 patients receiving a year of adjuvant trastuzumab patient travel led to 10.1 million kg of carbon emissions resulting in 4.6 excess deaths worldwide and 8.1 DALYs [17]. The benefits of telemedicine are evident in medical oncology appointments where 1.5kg of carbon emissions were observed per round trip [18]. Secondly, energy curation matters. This is evident when the sustainability impacts of machine off-times in radiation and surgery are measured. Thirdly, rethinking how we work such as using total intravenous anaesthesia to eliminate anaesthetic gas use has planetary health benefits. Fourthly, lifecycle analysis as performed in the studies analysed in the review can identify touch points for sustainability improvements in patient assessment, manufacture, procurement, treatment and waste management. In 2024, integrating similar touch points has been used to develop a decarbonising guide to bladder cancer care in the United Kingdom [19]. Finally, sustainability awareness is increasing.

Critically Mac and colleagues highlight gaps in our current assessments. These include the need to quantify emissions associated with the upstream and downstream processes of treatments. They emphasise the need for a greater understanding of the human health and socioeconomic impacts of the environmental waste including carcinogenic micro-plastic waste produced by breast cancer care [20]. Significantly, no study assessed the increasing environmental impacts of artificial intelligence [21,22]. Their findings are tumour agnostic, and they are also disease agnostic. Similar scoping exercises in lung or colorectal cancer care would reveal overlapping touch points with breast cancer care. Consequently, actions based on their findings offer the possibility of cascading into other disciplines, magnifying their impacts.

How can the breast cancer care community build on this scoping

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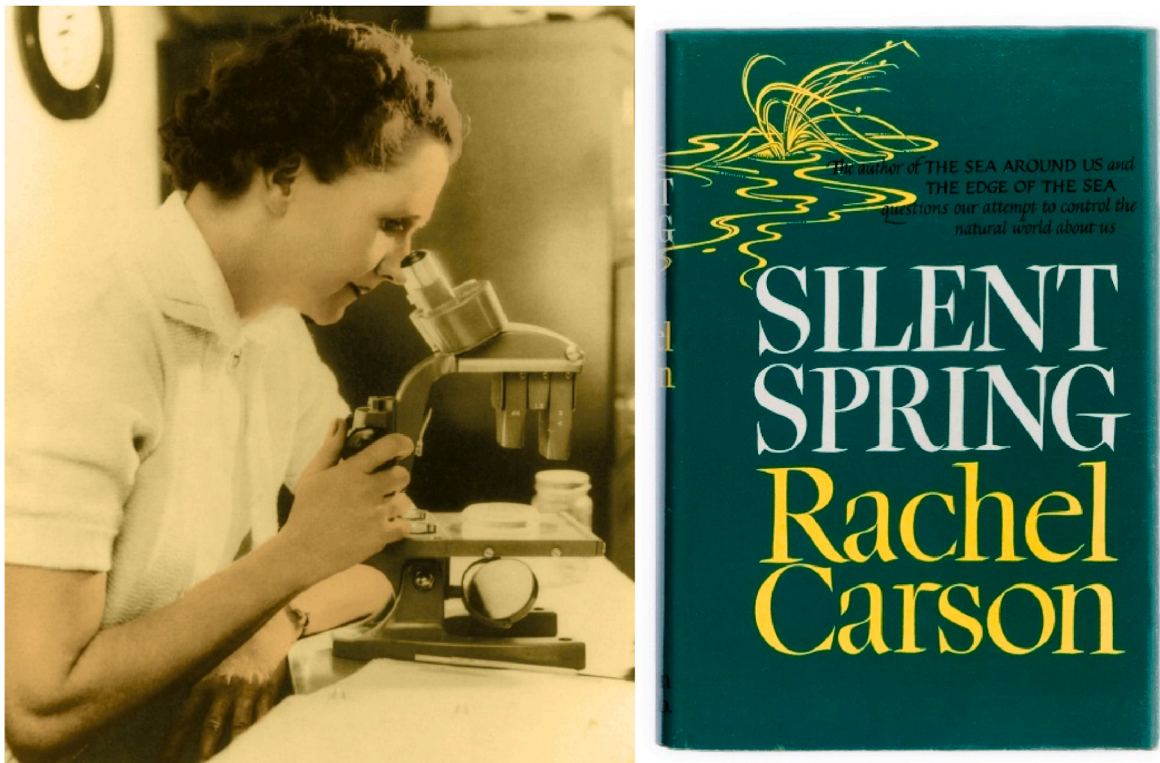


Fig. 1. Silent Spring by Rachel Carson, photocredit: Science History Images/Alamy.

review to reduce the environmental impact of how we work ? Integrating the challenges of our new environmental reality in Table 1 we have listed clinically relevant action points. These include promotion of cancer screening and prevention, climate adaption measures to address the challenges of providing cancer care with extreme weather events [23], to reflective prescribing [13], toolkit integration [reviewed in 24], leveraging clinical research [25], education [26], and advocacy [27].

Seven decades ago Rachel Carson presciently wrote “we stand now where two roads diverge but unlike the roads in Robert Frost’s familiar poem, they are not equally fair. The road we are travelling on is deceptively easy. but at its end lies disaster”. She subsequently outlined a second road “less travelled by others but one that offers our only chance to reach a destination that assures the preservation of our earth”.

Table 1
Integrating climate awareness into breast cancer care.

Intervention	Rationale [References]
Climate Adaption	Reduce the impact of extreme weather events on care [23,24]
Promote Screening and Prevention	Reduce cancer burden and associated treatment [24]
Integrate Sustainability Toolkits	Evidence based guidelines for sustainable care [24]
Reduce Patient Travel Burden	Travel to care is a major source of healthcare related greenhouse gas emissions [14,17–19]
Practice Reflective Prescribing	De-prescribing/formulation substitution can reduce emissions and plastic waste [14,24]
Reduce Plastic Waste	Plastics pollute the environment and use fossil fuels as a seed material [14,20,24]
Leverage Clinical Trials	Optimisation strategies developed through trials offer less care without compromising outcomes [24,25]
Integrate Planetary Health in Education	Education sets the basis for behaviour [26]
Promote Lifestyle and Exercise Medicine Advocacy	Planetary health diets reduce carbon emissions and are associated with reduced cancer mortality [14] Many persons fundamentally support climate awareness, but advocacy can put the topic higher on the priority list [27]

Since those words were written, breast cancer outcomes have been transformed through multi-disciplinary care, screening and treatment advances, and will be further transformed in the lifetime of those reading this editorial. Rachel Carson died in 1964, a year when cancer also seemed an insurmountable problem, just as our current triple planetary crisis seems today. The paper by Mac and colleagues demonstrates how a similar interdisciplinary focus can reduce the environmental impacts of how we practice [16], and provide us with road maps to take the path that Rachel Carson has directed us to, and from which our patients and our planet will benefit greatly.

CRediT authorship contribution statement

Seamus O’Reilly: Writing – original draft, Supervision, Funding acquisition, Formal analysis, Conceptualization. **Hans Wildiers:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Conceptualization. **Alexandra Thomas:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization.

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