"*HOW DO WE HAVE HOPE?*": SANDRA STEINGRABER'S *LIVING DOWNSTREAM* AND THE RELATION BETWEEN PERSONAL AND ECOLOGICAL HEALTH

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ABSTRACT

The aim of this article is to analyse and discuss Sandra Steingraber's *Living Downstream. An Ecologist's Personal Investigation of Cancer and the Environment* (1997) as an example of the intimate relationship between human health and the health of the environment. In the tradition of Rachel Carson's *Silent Spring* (1962), Steingraber's work, which combines the expertise of a biologist with the imagination of a poet, is an example of nature writing, a genre that has expressed human concern about the unprecedented pressures placed on the natural world.

The present analysis of Sandra Steingraber's work is grounded in the critical field of ecocriticism, which involves a close reading of the work to highlight not only the scientific information provided, namely, data on environmental pollution and its relationship to cancer, but also the author's personal story, her encounter with the dangers and benefits of water.

Keywords: *Living Downstream*; Sandra Steingraber; Ecocriticism; Nature Writing; Environment.

RESUMO

O objetivo desta reflexão é analisar e discutir *Living Downstream. An Ecologist's Personal Investigation of Cancer and the Environment* (1997), de Sandra Steingraber, enquanto exemplo da inter-relação entre a saúde humana e um ambiente saudável. Na senda de *Silent Spring* (1962), de Rachel Carson, o trabalho de Steingraber, que alia o conhecimento de um biólogo à imaginação de um poeta, é um exemplo de *nature writing*, um género literário que tem vindo a expressar preocupação pela ameaça que, sem precedentes, o ser humano tem exercido sobre o mundo natural.

A análise da obra de Sandra Steingraber tem por base uma perspetiva ecocrítica e como metodologia a leitura atenta do texto de modo a destacar não só a informação científica fornecida, nomeadamente, dados sobre a contaminação ambiental e a sua ligação com o cancro, mas também a história pessoal da autora e o seu encontro com os perigos e os benefícios da água.

Palavras-chave: *Living Downstream*; Sandra Steingraber; Ecocrítica; Escrita sobre a Natureza; Ambiente.

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1. *Living Downstream as an* environment illness narrative

In Sandra Steingraber's *Living Downstream*. *An Ecologist's Personal Investigation of Cancer and the Environment*, published in 1997, the author, a biologist with a love of modernist poetry who discovered she had bladder cancer at the age of twenty, develops a personal narrative in which she describes her personal battle with cancer. Parallel to this private story, Steingraber widens her subject to discuss the effects of environmental contamination on human health, searching for evidence between environmental exposure to pollution and rising rates of cancer. She realizes her work by linking the production and presence of toxins in the environment to patterns of illness among Americans, framing her research by drawing on a personal experience in central Illinois, surrounded by a landscape of fields of corn and soybeans as well as a river bordered by several industries. In her own words, and as a form of parable:

> There was once a village along the river. The people who lived there were very kind. These residents, according to parable, began noticing increasing numbers of drowning people caught in the river's swift current. And so they went to work devising ever more elaborate technologies to resuscitate them. So preoccupied were these heroic villagers with rescue and treatment that they never thought to look upstream to see who was pushing the victims in. This book is a walk up that river (Steingraber 2010a: ix).[1]

Steingraber's *Living Downstream* is in the tradition of Rachel Carson's *Silent Spring* (1965) and Terry Tempest Williams' *Refuge*. *The Unnatural History of Family and Place* (1991), works that interweave stories of vulnerable bodies and polluted water, highlighting the connection between environmental tragedy and human illness. Because these literary nonfiction works blend writing about nature—its natural patterns and its disruptions—, with reflections based on the writer's experience, they can be understood as part of the nature writing genre. According to Thomas Lyon, three general dimensions characterize it: "natural history information, personal responses to nature, and philosophical interpretation of nature"

[1] In 2010, Chanda Chevannes produced the documentary, "Living Downstream" based on Steingraber's work; in it, the filmmaker and Steingraber decided to focus on two chemicals: atrazine and PCBs, demonstrating the major link between a healthy environment and human health. Cf. (Steingraber 2010b): https://www.loe.org/shows/segments.html?programID=10-P13-00021&segmentID=6.

(Lyon 2001: 20). While Lyon's definition remains valid, other critics argue that a new generation of nature writers "aspire to see with a scientific eye and write with literary effect" (*apud* Philippon 2014: 402). As such, they are more aligned with an expression of responsibility in the face of the escalating devastation of nature and a shared sense that we are destroying our world. As Jos Smith has pointed out, we live in an age of excess:

> Between the years 1945 and 2000, figures show that atmospheric concentrations of CO2, acidification of the oceans, consumption of fertilizers and fuel, usage of water, and human population have all risen, on the planet as a whole, dramatically above Holocene levels. During the same period, figures also show that stratospheric ozone levels, biodiversity, tropical rainforest and woodland, coral reefs and areas of unexploited fisheries have likewise all seen a level of decline outside the parameters of the Holocene (Smith 2017: 13).

Steingraber is clearly part of this generation of nature writers who are aware of the environmental crisis and want to be part of the solution, which is why Ursula Heise sees nature writing as a genre that is "another way of expressing our concern for nature". (Heise 2014: par. 10). In this sense, Steingraber's work can be related to "the ethically and politically inclined perspective of ecocriticism" (Borg 2024: 3) and to the concept of planetary health, for *Living Downstream* seeks to shed light on the understanding that human health and human civilisation depend on flourishing natural systems and wise stewardship of those natural systems.[1] Considering the information contained in the Rockefeller Foundation-Lancet Commission on planetary health allows a better contextualisation of Steingraber's work, namely that toxic chemicals are polluting land and water ecosystems, thus reducing their function and thus affecting human health.[2] Moreover, when the context is the United States of America one has to consider that although artists, writers and historians endowed the landscape with abiding and metaphysical qualities, History has demonstrate a different version of that aspiration. The

1 Cf. The Rockefeller Foundation–Lancet Commission on planetary health – Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health: https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(15)60901-1.pdf.

[2] As demonstrated in Figure 20 of the aforementioned report, the notion of planetary health has the potential to provide the requisite coherence for the overarching statement of the SDGs. This is achieved by integrating the objective of sustainable improvements in human health and wellbeing with the preservation of key natural systems, supported by effective governance and appropriate policies.

landscape that Steingraber describes in her work is the result of an ecological crisis that Wendell Berry sees not only as the result of poor use of agricultural land, but also as the consequence of a crisis of character: "the possibility of the world's health will have to be defined in the characters of persons as clearly and as urgently as the possibility of personal 'success' is now so defined" (Berry 1997: 26).

Accordingly, this reflection examines thematic and stylistic issues present in Steingraber's work, in response to environmental crises, namely nuclear war, the depletion of precious natural resources, the population explosion, the spread of exploitative technologies, pollution, the extinction of species, among others. In this context, *Living Downstream* illustrates how literary and cultural theory has begun to address the environmental crisis as part of academic discourse, highlighting the contribution of narrative and storytelling in the Anthropocene and showing its impact on public discourse and policy.

Living Downstream is suffused with numbers, statistics, and rigorous sources, something that in general engulfs the human individual stories.[1] In contrast to Richard Mabey's approach to the natural world in *Nature Cure,* in which the author sees in nature the possibility of recovery and well-being—"what healed me was [...] a sense of being taken not out of myself but back *in,* of nature entering me, firing up the wild bits of my imagination" (Mabey 2008: 224)—, Steingraber's perspective focuses on the polluted natural world and its consequences for the human and nonhuman bodies. She agrees that there has to be a balance between the use of emotion and numbers as, for her, the narrative arc, that is, the personal story, "carries the water for the statistical scientific stories" (Steingraber 2015: 192). Thus, consciously, Steingraber uses human stories to connect with her readers, acknowledging that the ability to remember is "related to imagery and storytelling" (Steingraber 2015: 194). In the role of someone who has to persuade the reader to stay with the facts she presents throughout the work, Steingraber weaves together scientific data and a poetic observation of reality (namely the passing of the seasons, the snow, the running water, and the budding roses) to fulfil what she sees as her mission—her wish that statistics and embellished words may result in a positive impact on public health and on the protection of the environment.

My argument is that Steingraber uses literary strategies to convey her perception of the relationship between environmental pollution and

[1] *Living Downstream* incorporates a substantial list of "further resources", as impressive data gathered in "source notes".

human rights because, for her, the threatening stories created by the reckless pollution of the living world require the courage "to imagine an alternative future" (Steingraber 2010a: 278). In this sense, *Living Downstream* illustrates ecocritical "triple allegiance to the scientific study of nature, the scholarly analysis of cultural representations, and the political struggle for more sustainable ways of inhabiting the natural world" (Heise 2015: 166). It also shows that Steingraber speaks in recognition "of human beings as ecologically and environmentally embedded" (Buell 2005: 8). Above all, Steingraber's rhetorical strategies and the symbolic and emotive language she uses are important literary tools for the message she wants to emphasise, which will hopefully influence and change the reader's response to a global concern for the natural environment. As already mentioned, and in order to show how the human and non-human worlds are connected, the author juxtaposes the abundant data with personal stories, namely that of her friend Jeannie Marshall, who didn't survive cancer.

In "Nature Cures? Or How to Police Analogies of Personal and Ecological Self", Greg Garrard compels readers to reflect on health as an important metaphor, a rhetorical bridge between the individual human subject and the ecological web: "From assessments of individual ecosystems to representations of the whole Earth, the metaphor of health provides us with a readily understood, emotive way to comprehend matters of stunning complexity such as climate change, biodiversity, and ecological resilience" (Garrard 2012: 494). For the critic, Steingraber's *Living Downstream* is an example of an 'autopathography' (Garrard 2012: 494), a work that blends life writing with reflections on illness and death, but also shows a "combination of scientific and emotional intensity" (Garrard 2012: 494), illustrating the metaphorical relationship between personal and ecological health. On the other hand, for Lawrence Buell *Living Downstream* is understood as an "environment illness narrative" (Buell, 2005: 119), because it includes "bodily as well as psychic wounding, of both individual and community" (Buell 2005: 119).[1] In parallel to Steingraber particular focus on how the unrestrained use of synthetic chemical pesticides, namely DDT (dichloro-diphenyl-trichloroethane), is dangerously unbalancing ecosystems, she demonstrates the relevance of nature writing in the sense that it examines both the most essential needs of humanity and the condition and fate of

[1] The other two texts analyzed by Garrard in this article are: *Nature Cure* (date) by Richard Mabey and Catriona Sandilands' "Eco Homo: Queering the Ecological Body Politic" (date).

the earth and its nonhuman creatures independent of those needs, as well as the balancing "if not also the reconciliation of the two" (Buell 2005: 127). It is interesting to note that Daniel Philippon asserts that the discourse of sustainability as a concern for future generations is approached primarily by women. "who use their identity as mothers to inform, convince, and persuade their readers about the need for change" (Philippon 2014: 402). Philippon refers to Steingraber's *Having Faith: An Ecologist's Journey to Motherhood* (2001)—a text in which the author reaffirms the relevance of our myriad connections to the biosphere, and in particular explores the effects of toxic chemicals on her developing fetus—, but the critic's aim is to highlight Steingraber's ability to interweave poetic and personal narrative with her interpretation of scientific information for a non-specialist audience, exploring the connections between the human body and the world outside.

It is important to note that although *Living Downstream* deals with illnesses resulting from water, air and soil pollution, Steingraber deliberately plays with language, because, as a writer, she knows that she has to seduce the reader, and she does this by focusing on affect and specificity, that is, on her own case.

2. *Living Downstream*: Disruptive Data and Healing Words

Living Downstream is divided into twelve chapters, their titles evincing target, intensity and poetic effect, namely: trace amounts; silence; war; animals; earth; air; water; fire; our bodies, inscribed; ecological roots. However expressive, the titles disclose unpleasant aspects of contemporary life in the Western world, in the United States of America in particular, specifically, as aforementioned, the relationship between cancer and the environment, and synthetize Steingraber's plea for greener reengineering and greener chemistry. Steingraber is unswerving in her convictions: "The most direct way to prevent cancer is to stop putting cancer-causing agents into our indoor and outdoor environments in the first place" (Steingraber 2010a: xxiv). Her method consists of enhancing her point of view expressing personal narration and weaving it with scientific data and report results, namely her medical condition as a bladder cancer patient, the ethanol plant and the wind turbines across the road from her cousin's farm, the toxic landfill, her mother's backyard swing, and her aunt Ann's pear tree. For her, however, the two modes of discourse should stand different, as she is aware that personal testimony speaks in a distinctive mode from the

scientific analysis. Importantly, as Greg Garrard concludes, her key trope is "trespass" (Garrard 2012: 507), for her incitement is clear: readers should collectively "divorce our economy from its current dependencies on toxic chemicals known to trespass inside our bodies" (Steingraber 2010a: xxi). Most relevant, Garrard's image of trespassing meets Wendell Berry's idea about the divorce between farmers and the soil they nurture; for Berry, "we have given up the understanding—dropped it out of our language and so drop out of our thought—that we and our country create one another, depend on one another, are literally part of one another; that our land passes in and out of our bodies just as our bodies pass in and out of our land" (1997: 22). In the case of Steingraber, her words focus on disorder and chaos due to carcinogens that are no longer confined to the workplace [...] [but] have speed into the general environment, where we all come into intimate and daily contact with them" (Steingraber 2010a: 31). However, the author does not give up on presenting healthy and lively environments, showing modes of resistance and survival, as the one she notes when observing small salt ponds, places where only noteworthy plants survive: "life thriving among bitterness" (Steingraber 2010a: 23).

Steingraber places her story in a geographical and historical context, as she explains: "As a biologist, I will tell you that my Illinois home is utterly unexceptional: as in many other communities, the dramatic transformation of its industrial and agricultural practices that followed World War II had unintended environmental consequences" (Steingraber 2010a: xv). For her, as described in the chapter "War", the Second World War stimulated the transformation from a carbohydrate-based economy to a petrochemical-based economy, a situation synthetized as follows: "The historical picture of pesticide use in the United States closely resembles the graphs of synthetic chemical production: a long, gentle rise between 1850 and 1945 and then, like the side of a mesa rising from the desert, the lines shoot up" (Steingraber 2010a: 97). Like Rachel Carson's *Silent Spring* (1962), whose words reveal that the pathways that lead to cancer are the same pathways along which pesticides and other related chemical pollutants "operate once they enter the internal spaces of the human body" (Steingraber 2010a: 32), Steingraber seeks to expose how unstoppable development after the Second World War has compromised the health of both bodies and land.

In the first pages of *Living Downstream, Steingraber* describes Illinois as a healthy agricultural landscape**:** "About 87 percent of Illinois is cropland", adding: "you could say that we are standing at the beginning of a human

food chain. The molecules of water, earth, and air that rearrange themselves to form these beans and kernels are the molecules that eventually become the tissues of our own bodies" (Steingraber 2010: 3). This statement becomes so much more relevant when contrasted with another assertion: "Illinois soil holds darker secrets" (Steingraber 2010a: 4), such as the one Steingraber unveils: to the 87 percent of Illinois that is farmland, an estimated "54 million pounds of synthetic pesticides are applied each year", the most abundantly used being the weedkiller atrazine" (Steingraber 2010a: 5), a pesticide which remains the most frequently detected in water throughout the United States of America. In terms of human and environmental history, her statement is challenging: "Ten thousand years of tallgrass prairie have left a fainter trace on the place I call home [Illinois] than twenty-seven years of DDT, forty-six years of PCBs, and fifty years of atrazine" (Steingraber 2010a: 15), concluding: "[f]rom dry-cleaning fluids to pesticides, harmful substances have trespassed into the landscape and have also woven themselves, in trace amounts, into the fibers of our bodies" (Steingraber 2010a: 15). This information, along with Steingraber's description of Illinois as home, illustrates the balanced formula between quantitative and narrative discourse that Scott Slovic and Paul Slovic have identified; for them, the "emotional and informational equilibrium" (Slovic 2015: 8) inspires audiences and shapes "our moral compass" (Slovic 2015: 9). For these scholars, language, especially narrative language, should help readers, be they academics or ordinary people, to understand and appreciate society's dilemmas.

Steingraber proceeds showing that human and non-human bodies are influenced by the archetypal elements of earth, air, water and fire, to which she devotes her attention and analysis. In "Earth", Steingraber uses an epigraph from the Book of Isaiah, "All flesh is grass", to highlight how human lives are linked to the soil from which food is produced. Once again, as so many times throughout *Living Downstream*, she uses Rachel Carson's *Silent Spring* to establish a frontier between agriculture before and after the 1960s, reminding us that agriculture, 6,000 years old, has been practiced as an organic activity until the middle of the twentieth century.[1] It was at this time that synthetic fertilisers and herbicides began to radically alter the agricultural landscape, a transformation that affected not only the physical landscape but also the human body: "Given this level of certitude

[1] To demonstrate Carson's continuing relevance, it is worth noting that a new translation of *Silent Spring* was published in Portugal in February 2023. The editors underlined Carson's viewpoint, message and sensitivity in understanding our own contaminated and naturally degraded environments.

on cancer risk and food, does it not follow that we should examine our systems for making that food? Should we not ask, how does the landscape of Illinois influence the landscape of cancer?" (Steingraber 2010a: 153). Furthermore, in the chapter entitled "Air" she reminds her readers that the air connects each one of us with people and practices unknown to us; the air we breathe brings with it marks of faraway environments, some of them extremely polluted. In this sense, some of the chemical contaminants we carry in our bodies are pesticides sprayed by farmers "we have never met, whose language we may not speak, in countries whose agricultural practices may be completely unfamiliar to us" (Steingraber 2010a: 175). About this topic, Steingraber offers more data: "according to the International Agency for research on Cancer, ambient air in cities from industrial areas typically contains a hundred different chemicals known to cause cancer or genetic mutations in experimental animals" (Steingraber 2010a: 175). In addition, she states: "all 285 million U. S. residents have elevated cancer risks from exposure to air pollution" (Steingraber 2010: 178). My purpose is to suggest that when Steingraber provides data, she also gives her readers words that will persuade them to think with her about fundamental issues: "Respiration is an ecological act. We inhale a pint of atmosphere with every breath" (Steingraber 2010a: 175).

Filled with data, mainly on the United States reality, and particularly on the state of Illinois, her considerations on water—the one we drink, but also the polluted water of oceans, rivers and groundwater—mostly intend to direct the reader's attention to the natural resources, arguing that their healthy existence offer an opportunity for healthy environment and healthy bodies: "ecologically speaking, everyone drinks from aquifers: all running surface water was at one time groundwater, aquifers being the mother of rivers" (Steingraber 2010a: 210). Although rivers, oceans and aquifers should enhance health, their liquid bodies have been contaminated throughout the years, and thus the chance of everyone becoming contaminated is real, Steingraber contends. If *Living Downstream* is specifically interested in demonstrating the relationship between environment and cancer, from a general point of view, Steingraber's work explores how the loss of natural environments and ecosystems are increasingly responsible for the degrading of human health and well-being, offering her view that humans would care more for water landscapes if they knew better, if they imagined them more profoundly, as she states emphatically:

> Cultivating an ability to imagine these vast basins beneath us is an imperative need. What is required is a kind of mental divining rod that would connect this subterranean world to the images we see everyday day: a kettle boiling on the stove, a sprinkler bowing over the garden, a bathtub filling up. Our drinking water should not contain the fear of cancer. The presence of carcinogens in groundwater, no matter how faint, means we have paid too high a price for accepting the unimaginative way things are (Steingraber 2010a: 211).

As Steingraber underlines, each human life is related to water in many and vital ways, but due to the lack of connections with nature in general, and with water in particular, humans have either polluted it or remained indifferent and unimaginative towards that source of life. If her personal story follows the Illinois River downstream, Steingraber courageously goes upstream to find her ecological roots, forcing her "way 'upstream' toward the sources of pollution, which are often also the loci of immense social and political power" (Garrard 2012: 509). In parallel with her interest in establishing deep connections between human health and the environment, Steingraber consciously uses literary strategies to express her theme more persuasively, namely by juxtaposing generally gloomy data with particular places and stories. For instance, she brings to light studies which show that the closer women live to chemical plants, the greater the chance they have of developing breast cancer (Steingraber 2010a: 79). To capture the reader's attention, she relates the general information available to the specifics of Cape Cod, a region that in her imagination, and probably in the reader's, is associated with Henry David Thoreau's walks and his stimulating descriptions. However, in the 1980s that place became a threat for residents as the area had been drenched with DDT for several years during the 1950s in a failed campaign to eradicate the gypsy moth, and other environmental hazards, including pesticide used in cranberry bogs and golf courses as well as groundwater and air contamination from a nearby military reservation.

Steingraber may be convinced of her aesthetic choices—a giant incinerator in the silent cornfields with its fleets of ash trucks and refused-filled railcars was "disorienting, virtually impossible to accept" (Steingraber 2010a: 223)—, but mostly her rejection of such a structure reveals her opposition to the great toxic fire sending "traces of dioxins and furans into the air". As they move downwind, these chemical contaminants "sink back to the earth or are washed out with rain" and are then consumed by us "directly or first concentrated in the meat, milk and eggs of farmed animals" (Steingraber 2010a: 223). Approaching her subject as an ecological

investigation, Steingraber reveals the effect of contaminants not only in her body, but also in the environment and their impact on the ecology of water, soil, air and animals. Indeed, in the chapter "Animals" she develops one of the most interesting examples when she uses the data about the beluga population of the St. Lawrence River to show that belugas inhabiting areas of the St. Lawrence polluted waters have a higher incidence of cancer than the belugas living in the Arctic Ocean. According to the researchers' data: "these observations suggest that a human population and a population of long-lived, highly evolved mammals may be affected by specific types of cancer because they share the same habitat and are exposed to the same environmental contaminants" (Steingraber 2010a: 135). The fact that belugas love to eat eels and travel as far as the Sargasso Sea, a place that accumulates seaweed, debris, and chemical pollutants from all over the Atlantic, from the United States and Caribbean coasts, signifies that their bodies transmit contaminated substances that they pass onto belugas, killing them. However, Steingraber does not explicitly describe this process; on the contrary, and "like an accomplished novelist or clever advertiser" (Garrard 2012: 506) she leaves the white space between disparate elements to be filled with the reader's own conclusions. At the end of "Animals", Steingraber proposes a pilgrimage in which people with cancer would travel to different bodies of water inhabited by animals with cancer—Cobscook Bay in Maine, the Duwamish River in the Puget Sound, the Fox River. This assemblage of bodies would not only illustrate "our intertwined lives" (Steingraber 2010a: 141), but would also serve as evidence of how toxic trespass violates human and nonhuman bodies. In this sense, I agree with Garrard's suggestion that the key trope in *Living Downstream* is 'trespass' (2022: 507), a verb that shows "the involuntary use of one's body as a receptacle for someone else's chemicals" (Steingraber 2010a: 279). The imagined pilgrimage would end at Buffalo Rock, a place that for decades remained "a landscape of jagged escarpments that funneled acidic runoff into the river" (Steingraber 2010a: 141) and that the artist Michael Heizer, inspired by ancient Native American earth mounds, reclaimed in the 1980s. Heizer carved thirty-foot furrows in the shape of five river animals, over which rye grass now grows. For Steingraber, cancer survivors would gather on the backs of these monumental animals and "in a place of damage and reclamation, bear witness" (Steingraber 2010a: 141). Importantly, Steingraber's position demonstrates the relational focus that defines ecocriticism, for rethinking human agency towards other species helps to build a future in which humans and more-than-humans

will hopefully have learned to live together— attentively, respectfully and ecologically.

3. Conclusions: Imagining a Future for Our Common Home

Interestingly, in "Ecological Roots", the final chapter of *Living Downstream*, and after the troubling data Steingraber has presented throughout her work, the author concludes the chapter—and the book—by calling readers' attention to the need to cultivate the capacity to imagine, to "summon courage to imagine an alternative future" (Steingraber 2010: 278). According to the author, part of that future lies in recognizing that the story of "cancer's ecological roots is a story of disconnections" (Steingraber 2010a: 283). Following this assertion, Steingraber suggests ways in which we can better understand our ecological roots:

> it means learning about the sources of our drinking water [...], about the prevailing winds that blow through our communities, and about the agricultural system that provides us food. It involves visiting grain fields, as well as cattle lots [...]. It demands curiosity about how our apartment buildings are [...]. It means asserting our right to know about any and all toxic ingredients in products such as household cleaners, paints, and cosmetics. It requires a determination to find out where the storage tanks are located [...] what was and is being sprayed along the roadsides (Steingraber 2010a: 279).

The author believes that her work, which combines environmental data and autobiographical details, will show how "the history of the body is read as history of chemical exposures" (Steingraber 2010a: 279). Her suggestion is that, aware of our ecological roots, we may begin to examine our own time through a "human rights perspective" (Steingraber 2010a: 279)—one that respects human life and that accordingly recognizes that the deaths caused by known or suspected carcinogens released into air, water, and soil by industries should require strong regulation. After considering the risks and losses that people have endured from chemical carcinogens, she proposes that the reader begins "to imagine a future in which our right to an environment free of such substances is respected" (Steingraber 2010a: 281). If complete elimination of these substances is unlikely, reducing the carcinogenic burden we all bear would avert considerable suffering and loss of life, which Steingraber argues requires both determination and imagination.

Throughout *Living Downstream,* the word "silence" stands for great

pain, as when Steingraber and her sister-in-law mention that they had "lost their vocabulary" (Steingraber 2010a: 259) to name the pain caused by cancer, or when they recall Rachel Carson's warning against the use of pesticides because they would extinguish "a chorus of living voices—those of birds, bees, frogs, crickets, coyotes, and ultimately us" (Steingraber 2010a: 19). The lack of words to describe these silences suggests that Steingraber and her readers need new words to help them imagine a better future, and so Steingraber quotes poets and prophets, namely Walt Whitman and Robert Frost, two American poets who cultivated strong feelings for nature in their poetry. Whitman's lines: "And the fish suspending themselves so curiously below / there and the beautiful curious liquid / And the water plants with their graceful flat heads, all / became part of him" (Whitman *apud* Steingraber 2010a: 187), and Robert Frost's verse: "What to make of a diminished thing?" (Frost *apud* Steingraber 2010a: 191) are part of a rhetorical strategy to combine emotion with abundant scientific data. Steingraber also turns to John Knoepfle's "Confluence", an elegiac poem about the ravaged landscape that man has created, and how the result of human action is clearly destructive and unsustainable for communities: "this world in peace / this laced temple of darkening colors / it could not have been made for shambles" (Knoepfle *apud* Steingraber 2010a: 213). As a result, the "lost vocabulary" (Steingraber 2010a: 259) stands for all the species that have been lost, such as the ducks that left Illinois when the herbicides killed the aquatic plants they depended on—wild celery, coontail, and sago, species that thrived in Peoria Lake, and had all disappeared "in the 1950s, along with the birds that ate them" (Steingraber 2010a: 188).

Steingraber's demonstration of the complex interdependence between rivers, earth, air, and human bodies is a view shared by Anthony McMichael, a scholar and epidemiologist, who is committed to understanding the impact of the environment on human health, and the relationship between public health deficits, biodiversity loss and environmental degradation: "disruptions of ecosystems and losses of species and local populations of species affect human biological and psychological functioning". This, according to McMichael, fosters "the advent and progression of disease processes, and measurable outcomes—deaths, hospitalization, disabling injuries, and serious mental health disorders" (McMichael, 2018: 221). In the face of bodily and environmental disruption, Steingraber seeks balance; in the final chapter of *Living Downstream,* as she drives to the site of a planned incinerator near Illinois River, her home place, she listens to music on the radio: Vaughan

William's *Fantasia on a Theme by Thomas Tallis.* As she listens to the music, she weighs the impact of the incinerator against the harmony of the music, and begins to imagine the river redhorse, an endangered fish species, resting quietly in a stream of water. The confluence of the image of the fish in the clean water and the musical notes creates an imaginative, healthy landscape, a place where humans interact peacefully, serenely and beautifully with the environment, with all living things. Throughout the chapter, this imagined balanced world, an ecological world of fluidity and harmony, is presented as an alternative world, a possibility that may challenge each reader to dare to imagine a future in which the right to an environment free of toxic substances is a reality. To imagine such a possibility is an act of attentiveness and responsibility towards the world. It helps to answer Steingraber's initial question: "how do you have hope?" (Steingraber 2010a: xxi); for the author, this idea is crucial: "we can change our thinking. Rather than viewing the chemical adulteration of our environment and our bodies as the inevitable price of convenience and progress, we can decide that cancer is inconvenient and toxic pollution archaic and primitive" (Steingraber 2010a: xxi). At a time when stories of environmental destruction abound, *Living Downstream* is a vehicle for the expression of hope. At its best, the work combines an interest in polluted nature with literary strategies that open up a critical space for readers to question the ethical dilemma we face today. Questioning can become an important moment in the process of moving away "from an extractive mindset, towards kindness, care and respect for other species" (Jones 2021: 195). Questioning can become a relevant way of embracing a new relationship with the Earth, one that positions us as "co-tenants with wildlife and rivers and mountains and trees" (Jones 2021: 195). These are the right things to do, as Steingraber has demonstrated and as scientists and ecologists have emphasised. It is clear that she embraces the idea that promoting a healthy natural world and encouraging cooperation between species is good for people's physical and mental well-being.

To conclude, and as I have attempted to demonstrate, Sandra Steingraber's *Living Downstream* is an example of how nonfiction literary texts are powerful instruments which help reinforce public concern about the fate of the earth, about humanity's responsibility to act, about the shame of environmental injustice, and about the importance of vision and imagination in changing minds, lives, and policies. My suggestion is that if, on the one hand, *Living Downstream* proves that "ecological issues are situated at a complex intersection of politics, economy, technology, and

culture" (Heise 2015: 173), on the other hand, as Steingraber shows, humans "cannot do without thought-experiments and language-experiments which imagine a return to nature [...] our survival as a species may be dependent on our capacity to dream it in the work of our imagination" (Bates *apud* Buell 2005: 107). In the same vein, given our need to foster a more relational interaction with the rest of nature, Cecilia Åsberg argues that we need words that can "story the possibility of hope" and of "getting along, living, playing and dying together, coexisting, with some grace" (Åsberg 2024: 269). Words that contain a sense of hope. For Steingraber, as human beings, we can dare to dream of healthier environments and bodies, a hope that is expressed through literary aesthetics, art or musical metaphor; this is the case in the last chapter, when she invites her readers to trespass into the realm of music: "it is time to play *The Save the World Symphony*, a vast orchestral piece in which you are not required to play a solo, but to figure out what instrument you hold and play it as well as you can" (Steingraber 2010a: 289).

In an interview conducted in 2015, when asked to comment on the public health implications of her work and its effect on the environment, Steingraber stated: "just because we can't see forward to the impact that our actions have doesn't mean we should stop. We can redouble our efforts maybe, but it doesn't mean they are futile" (Steingraber 2015: 199). In this sense, and paraphrasing Wendel Berry quoted at the beginning of this article, I would like to suggest that, in line with the ecocritical lens, Steingraber's *Living Downstream* makes us think about how land (and rivers) are connected to our bodies, and how our bodies are connected to land (and rivers). This approach eventually—desirably—stimulates further reflection on the natural environment, encouraging readers to imagine it as a living entity that can be cared for in a manner that is beneficial to both humanity and the planet.

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