

1 Will the Global Plastics Treaty break the plastic wave? The
2 beginning of a long discussion road

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11 Abstract

12 We are experiencing the effects of the triple planetary crisis—climate change, loss of
13 nature, and pollution—aggravated by plastic pollution. Despite widespread global
14 awareness of the adverse effects of plastic waste, the ongoing increase in pollution
15 remains persistent, with an annual increase in plastic consumption and incorrect
16 disposal contributing to this serious problem. In 2022, 175 nations agreed to begin
17 negotiations by the end of 2024 on a binding international agreement to control the life
18 cycle of plastics, including preventing marine pollution. To ensure the efficacy of the
19 Global Plastics Treaty for mitigating plastic pollution, the extensive participation of
20 researchers is imperative. The literature focuses on efforts in line with ongoing
21 negotiations. In this study, a systematic review of the Global Plastics Treaty was
22 conducted. The analyzed literature mainly focuses on the adverse effects of plastic

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23 pollution, legislation, governance, and the economy. The resulting comprehensive
24 overview of the subject can support ongoing negotiations and guide future research
25 about the Global Plastics Treaty.

26

27 Keywords: UNEA Resolution 5/14, plastic pollution, legislation, governance, economy.

28

29 Impact statement

30 The United Nations Environment Assembly (UNEA) approved Resolution 5/14, entitled
31 "End Plastic Pollution: Towards an International legally binding instrument." An
32 Intergovernmental Negotiating Committee (INC) was established to negotiate the Global
33 Plastics Treaty, which is expected to enter into force by 2025. This treaty is aimed to
34 reduce plastic pollution along the entire plastic life cycle.

35 The work of the literature and INC in the negotiations is critical to developing a
36 genuinely successful treaty that minimizes plastic pollution. This systematic review of
37 the Global Plastics Treaty provides an overview of the literature's contributions to the
38 negotiations. Among the crucial provisions and recommendations, the literature affirms
39 the significance of limiting global plastic production as the most effective measure for
40 mitigating plastic pollution.

41 **Introduction**

42 We are living in the “Plasticene” contemporary epoch (Alava *et al.* 2023; Haram *et al.*
43 2020), experiencing the effects of pollution and plastic production on the triple
44 planetary crisis of pollution, loss of nature, and climate change (United Nations
45 Environment Programme 2022a). An effectively designed global legislative treaty to
46 regulate plastics is necessary to mitigate the global crisis (Dauvergne 2023b).

47 The United Nations Environment Assembly (UNEA) approved the Resolution 5/14
48 entitled “End plastic pollution: Towards an international legally binding instrument” in
49 March 2022, which aims to address the issue of plastic pollution by implementing a
50 worldwide and legally enforceable treaty on plastics (Bergmann *et al.* 2022; Walker
51 2022), known as the Global Plastics Treaty. To conclude the treaty by the end of 2024,
52 an Intergovernmental Negotiating Committee (INC) was established, and the
53 negotiations are ongoing. (Tiller & Nyman 2018)(Tiller & Nyman 2018)(Tiller &
54 Nyman 2018)

55 To ensure the success of negotiations such as those of the Global Plastics Treaty and the
56 long-term efficacy of their results, extensive involvement of researchers is essential
57 (Wang *et al.* 2023), even if indirectly. The literature is essential for an in-depth
58 understanding of plastic pollution and its implications (Carratta & Jaeckel 2023), and is
59 the solid basis for discussion and decision-making.

60 In this study, a systematic review of the Global Plastics Treaty was performed based on
61 searches in the Scopus, Web of Science, and Google Scholar databases. As the main
62 focus of the analyzed literature, the adverse effects of plastic pollution, legislation,
63 governance, and the economy were briefly discussed. Based on this, a comprehensive
64 overview of the available literature is presented in the following pages, which may
65 support the negotiations and construction of an effective treaty, and guide future
66 research on the Global Plastics Treaty.

67

68 **Methodology**

69 A systematic review follows a protocol, a methodical technique known as *Preferred*
70 *Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) (Shamseer *et al.*
71 2015). Practice guidelines were formulated by compiling data from previous and

72 ongoing investigations. Appropriate keywords and inclusion criteria are determined
73 when the methodology is followed; this helps prevent biases and omissions, and
74 produces a more substantial review of the research issue (Neves *et al.* 2021). Thus, the
75 results may guide future research and, in this case, the development of the Global
76 Plastics Treaty.

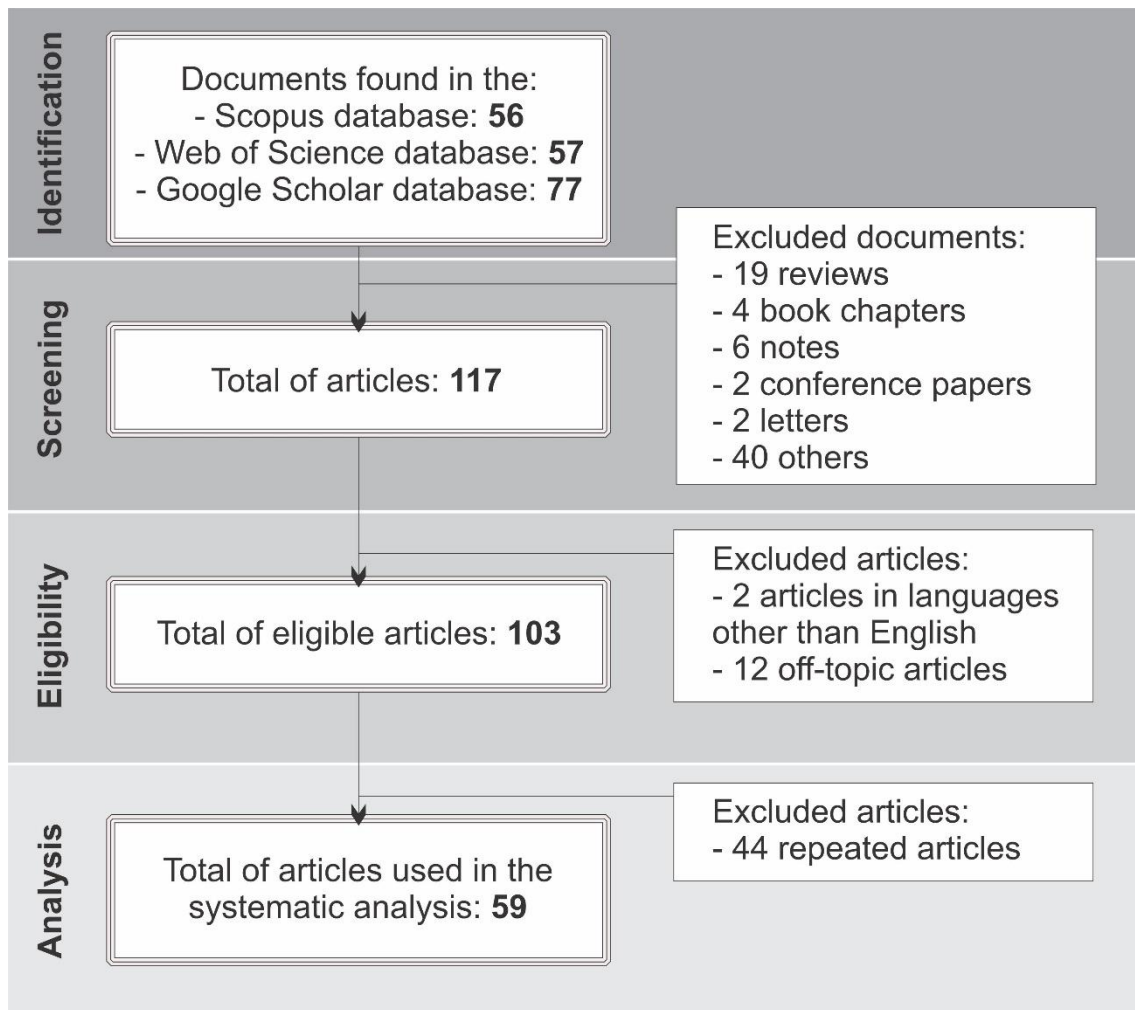
77 Three literature databases were selected: Scopus, Web of Science, and Google Scholar.
78 Both were accessed on December 6, 2023. The terms used in the searches were (global
79 plastic* treaty), search within article title, abstract, and keywords.

80

81 **Results from the data collection**

82 In the diagram presented in Figure 1, gray shades represent the steps of the PRISMA
83 protocol. In the identification step, 190 documents were found in the three databases.
84 Some document types were excluded during the screening step, such as reviews, book
85 chapters, notes, conference papers, and letters, resulting in 117 articles. Some articles
86 were excluded in the eligibility step, such as those published in languages other than
87 English and off-topic articles. Finally, 44 repeated articles were excluded, resulting in
88 59 articles. These articles were analyzed, and the results will be given from now on.

89



90

91 Figure 1: Steps of the systematic analysis of the Global Plastics Treaty.

92

93 Literature about the Global Plastics Treaty is interdisciplinary. In the literature
 94 analyzed, authors focused on the adverse effects of plastic pollution in general (Jahan
 95 2021; Karasik *et al.* 2023; Prior & Seck 2023; Smith *et al.* 2023), legislation and
 96 governance (Cowan *et al.* 2023a, 2023b; Dauvergne 2018; Jahan 2021; Khan 2020;
 97 Kirk 2020; Kurniaty *et al.* 2023; O'Meara 2023a, 2023b; Prior & Seck 2023; Ralston *et al.*
 98 2023; Stöfen-O'brien 2022; Telesetsky 2021; Tiller *et al.* 2022; Tiller & Nyman
 99 2018), and the economy (Börger *et al.* 2023; Grabiél *et al.* 2022; Karasik *et al.* 2023;
 100 Tang 2023; Tilsted *et al.* 2023). Some articles may be classified into various categories.

101 As the primary objective of this study was to provide a comprehensive summary of the
 102 current literature's contribution to ongoing negotiations, the following issues will be
 103 examined from this point: plastic pollution (it is crucial to assess the magnitude of the

104 problem), adverse effects of plastic pollution, the economy, and international legislation
105 and governance.

106 It is important to note that the subsequent sections do not aim to provide an exhaustive
107 review of all challenges; instead, they emphasize critical points raised in the literature so
108 far.

109

110 **Plastic pollution**

111 Numerous social, economic, and environmental advantages can be attributed to plastic,
112 including extending the lifespan of food to prevent food waste and safeguarding
113 medicines; lightweight plastic packaging and plastics in cars, using less fuel to move
114 people and goods (UNEP and Mindereroo Foundation 2022), among many others. Its life
115 savior role became apparent during the COVID-19 pandemic (de Sousa 2020, 2021b).
116 Moreover, it is relevant to achieve the 2030 Agenda for Sustainable Development,
117 which sets out the Sustainable Development Goals (de Sousa 2021c, 2023c). However,
118 the production, use, and disposal of plastic is not sustainable and causes serious harm to
119 the environment, human health, and economy, along with profound societal inequalities
120 (Landrigan *et al.* 2023a).

121 The main reasons for exacerbating the negative impacts of plastic are a virtually
122 exponential and continuous rise in worldwide plastic production, inadequate rates of
123 collection and recycling, and the prolonged persistence of plastic waste in the
124 environment (Landrigan *et al.* 2023a). Global plastic production reached 390.7 million
125 tons in 2021 (Statista 2023). Packaging accounts for approximately 40% of all plastic
126 produced, becoming waste in a lifespan of about six months on average (Zamora *et al.*
127 2020).

128 Only approximately 12% of the total plastics generated have undergone incineration,
129 and 9% have been recycled (OECD 2022; UNEP 2021). Approximately 22% is
130 improperly managed (OECD 2022) and has either been disposed of in landfills or in the
131 ecosystem. Annually, it is estimated that approximately 20 million metric tons of plastic
132 residues are mismanaged (Bergmann *et al.* 2022).

133 Approximately 60-90% of marine debris is plastic, with more than 9 million metric tons
134 entering the oceans in 2015. This amount is equivalent to 5-6 grocery bags of plastic for

135 every foot of coastline (Jambeck *et al.* 2015). If no significant measures are taken,
136 plastic waste reaching aquatic environments will increase almost three times, from
137 approximately 11 million tons in 2016 to over 29 million tons in 2040 (UNEP 2021).
138 Literature indicates that China and India/South Asia are the sources of roughly half of
139 the marine plastic pollution worldwide (Boucher & Friot 2017), with five Asian
140 countries—China, Vietnam, Thailand, the Philippines, and Indonesia—accounting for
141 around 60% of this pollution (Ocean Conservancy and the McKinsey Center for
142 Business and Environment 2015). Plastic pollution has been much more noticeable
143 since the COVID-19 outbreak, even though it is a life savior (de Sousa 2020, 2021b).
144 Litter from consumer packaging and products, including shopping bags, straws, cling
145 wrap, food containers, beverage bottles, and bottle caps, is the primary cause of this
146 plastic pollution (Dauvergne 2018). Nearly 50% of all plastic marine litter comprises
147 single-use plastics (European Union 2019). Abandoned and discarded fishing
148 equipment also contributes to the accumulation of plastic waste (Dauvergne 2018).
149 Around 27% of the overall plastic marine litter consists of fishing-related things
150 (European Union 2019). Annually, smokers discard over 4.5 trillion cigarette butts,
151 which accounts for approximately 75% of all cigarettes sold (Gould 2015).
152 Understanding how plastic spreads and its consequences is essential to developing the
153 strategies needed to deal with this worldwide threat, which is plastic pollution (Pinheiro
154 *et al.* 2023). Thus, the adverse effects of plastic pollution will be addressed in the
155 following section.

156

157 **Adverse effects of plastic pollution**

158 Plastic pollution can adversely affect human health and the biodiversity of both animals
159 and plants (de Sousa 2023b). The plastic itself (different plastic sizes) and the chemicals
160 (or additives) present in plastic formulations can impact them. However, regarding size,
161 the literature focuses mainly on the adverse impacts of microplastic (MP) pollution (de
162 Sousa 2023b). The literature emphasizes the importance of including MPs and additives
163 in the ongoing negotiations of the Global Plastics Treaty (Dey *et al.* 2022; Landrigan *et al.*
164 *et al.* 2023b; Maes *et al.* 2023; Wang *et al.* 2023; Wang & Praetorius 2022). Beyond this,
165 plastic influences climate change through greenhouse gases (GHG) emissions

166 (Andersen *et al.* 2021) in all the stages of its life (three main stages are comprised in the
167 plastic life cycle: manufacture, use, and disposal (Landrigan *et al.* 2023a)).

168 Another significant point highlighted in the studies is the correlation between plastic
169 pollution and human rights, as plastic pollution disproportionately affects the most
170 vulnerable communities (Karasik *et al.* 2023; Landrigan *et al.* 2023a).

171 Concerning territory, particular emphasis is placed on the detrimental impacts of plastic
172 pollution in the Arctic due to its unique and highly vulnerable ecosystem (Cowan *et al.*
173 2023a, 2023b; Prior & Seck 2023).

174 All these items will be briefly discussed in the sequence.

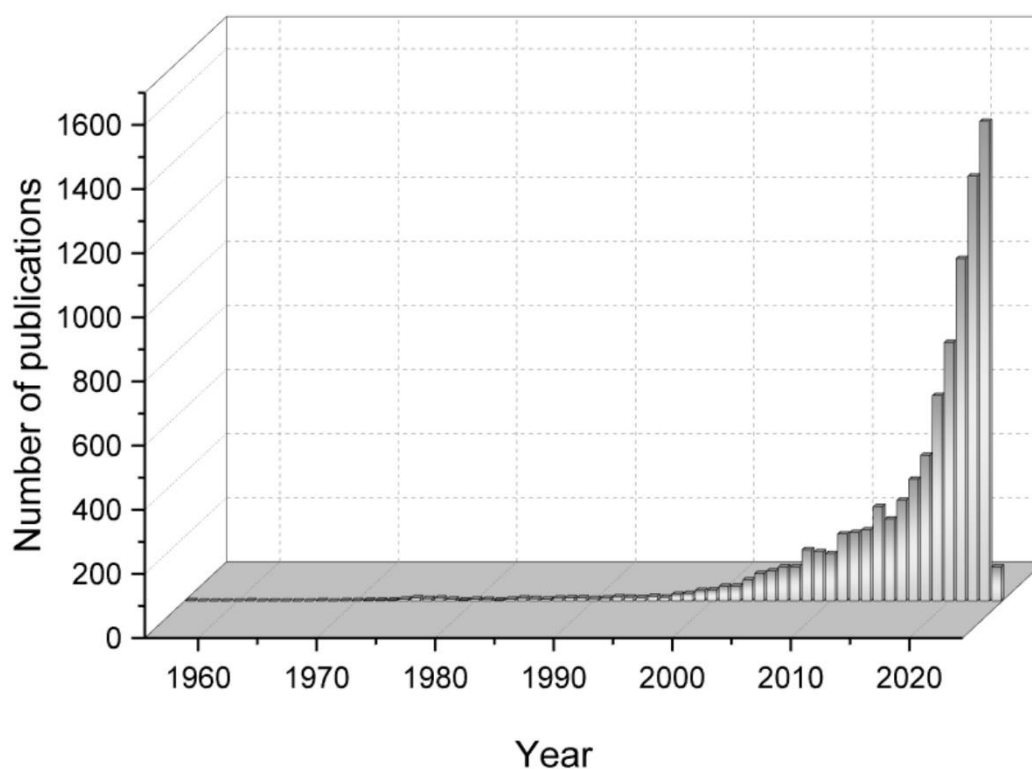
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176 *Chemical additives*

177 Chemical additives are incorporated in plastic formulations to enhance or alter their
178 characteristics. Plastics contain many chemicals, including monomers, additives in
179 general, processing agents, and non-intentionally added organic or inorganic
180 compounds (Filella & Turner 2023; Landrigan *et al.* 2023a). More than 13,000
181 chemicals are used in various plastic applications. Over 3,200 monomers, additives,
182 processing aids, and unintentionally added substances could be dangerous because of
183 their properties (Weber *et al.* 2023).

184 These compounds are the primary cause of plastics' well-documented adverse effects on
185 human and planetary well-being (Landrigan *et al.* 2023a). Literature has provided ample
186 evidence of additives' adverse effects on human health. A basic search in the Scopus
187 database, using the terms (chemical additive* OR chemical* OR additive*) AND
188 (plastic* OR polymer*) AND (human health), within the article title, abstract, and
189 keywords, provided a total of 9,124 publications, ranging from 1956 to December 29,
190 2023 (Figure 2).

191



192

193 Figure 2: Number of publications per year about the effect of chemicals on human
194 health.

195

196 Humanity is exposed to the leakage or migration of dangerous additives from
197 production (mainly workers) to plastic disposal, reuse, or recycling. They are released
198 and transferred to the environment and organisms (Walker 2022). In 2022, the president
199 of UNEA 5 stated that chemicals connected to plastics were evidenced in his blood after
200 having his blood drawn, including chemicals known to be harmful to humans (Tiller *et*
201 *al.* 2022).

202 Some hazardous additives are endocrine-disrupting chemicals (EDCs), such as
203 bisphenols, brominated flame retardants, alkylphenol ethoxylates, perfluorinated
204 compounds, phthalates, UV stabilizers, and metals. EDCs may have harmful effects on
205 the reproductive, metabolic, thyroid, immunological, and neurological systems (Flaws
206 *et al.* 2020).

207 Furthermore, certain additives, such as pro-degrading agents, affect recycling by
208 degrading the quality of the recycled materials. Using them, the chemical structure of

209 fossil-based polymers is broken down more easily, producing molecules of lower
210 molecular weight and inorganic particles that damage the environment and are not
211 biodegradable. These additives can degrade the polymer matrix during the recycling
212 process, thereby lowering the technical quality of the recycled materials (European
213 Commission 2018; Hann *et al.* 2016).

214 Efforts to mitigate the dangers of plastics must focus on the potentially hazardous
215 chemicals associated with plastics (Landrigan *et al.* 2023a). Thus, the issue of additives
216 must be closely aligned with the Global Plastics Treaty and the subject included in the
217 negotiations. According to Wang and Praetorius (Wang & Praetorius 2022), "to
218 successfully end plastic pollution, holistic action is required to address chemicals
219 present in plastics, including (1) reducing the complexity of chemicals in plastics, (2)
220 ensuring the transparency of chemicals in plastics, and (3) aligning the right incentives
221 for a systematic transition." In addition, further examination of chemical regulation and
222 assessment of the necessity of additive use should also be considered (Maes *et al.*
223 2023): "Global leaders and policy mechanisms such as this are needed to support the
224 development of National Action Plans (NAPs) on marine litter and plastic pollution,
225 promoting universal bans of harmful substances, aligning chemicals of concern lists,
226 agreeing to threshold limits for substances of concern in use, as well as aligning testing
227 methods to evaluate the safety of substances and products." Alternative choices that
228 reduce risks to individuals and the environment should be encouraged, such as eco-
229 friendly additives (Zanchet *et al.* 2016, 2018a, 2018b). These additives can be derived
230 from renewable sources or residues, optimizing their economic viability and making
231 them sustainable additives.

232 Due to hazardous additives, the use of recycled plastics in specific applications (such as
233 toys and food packaging) should be avoided (Geueke *et al.* 2023). Consequently,
234 specific formulations are less likely to be recycled, contributing to plastic pollution.
235 Reviewing additive use is therefore necessary to ensure that recycling and the use of
236 recycled plastics are not compromised. The indiscriminate use of additives may also
237 impact the circular economy, which is crucial for mitigating plastic pollution. Therefore,
238 a comprehensive treaty must address every interconnected issue associated with plastic,
239 as it is an integral component of the problem, including chemical hazards (Dey *et al.*
240 2022).

241

242 *Greenhouse gases*

243 Throughout their entire life cycle, from extraction to end-of-life, plastics emit GHG
244 (Ford *et al.* 2022). According to the authors (Ford *et al.* 2022), the impact of plastic on
245 climate change (measured in carbon-dioxide-equivalent (CO₂e)) can be classified into
246 three distinct categories: (1) plastic production, transport, and use; (2) plastic disposal,
247 mismanaged waste and degradation; and (3) bio-based plastics.

248 The end-of-life of plastics contributes approximately 9% of the total GHG emitted over
249 their lifetime (Zheng & Suh 2019). This stage usually consists of three processes that
250 produce different GHG emissions: incineration, landfill, and recycling (Ford *et al.*
251 2022). Although recycling is sustainable, it is expensive, energy-intensive, and can
252 produce low-quality plastics. It is possible to reduce GHG emissions by 77% when
253 using only renewable energy (Zheng & Suh 2019). Most common plastics (such as
254 polyethylene) emit methane and ethylene during degradation when exposed to ambient
255 solar radiation, producing direct and indirect GHG indefinitely. Polyethylene is the most
256 common emitter of both gasses (Royer *et al.* 2018). Concerning bio-based plastics,
257 when improperly disposed of in the marine environment, biodegradable plastics pollute
258 like fossil fuel plastics. Under these conditions, the degradation rate of polylactic acid
259 (PLA) is equivalent to that of high-density polyethylene (HDPE) (Chamas *et al.* 2020).
260 Therefore, it is necessary to be aware of plastic use and disposal, reducing its use
261 whenever possible (de Sousa 2021a).

262 The process of plastic manufacturing requires a large amount of energy and has a
263 substantial impact on climate change. Certain plastics use ozone-depleting substances
264 (ODSs) and hydrofluorocarbons (HFC) as raw materials, most of which are potent
265 GHG, contributing to climate change. It would be ideal to substitute these dangerous
266 raw materials with more environmentally friendly alternatives (Andersen *et al.* 2021).

267 Plastic production generates GHG emissions of 1.96 gigatons CO₂e annually (Landrigan
268 *et al.* 2023a). Plastic use is expected to nearly triple by 2060 (OECD 2022).
269 Consequently, GHG emissions from conventional plastics are expected to grow to 6.5
270 gigatons CO₂e by 2050 (Zheng & Suh 2019). Growing output means expanding effects
271 on the environment across numerous planetary boundaries (Galán-Martín *et al.* 2021).

272 Plastics are linked to 4.5% of GHG emissions worldwide during their life cycle
273 (Cabernard *et al.* 2021). Plastic manufacturing is responsible for approximately 3.7% of

274 global GHG emissions. If the existing patterns persist without intervention, this
275 proportion will rise to 4.5% by 2060 (Landrigan et al. 2023a). While it is an important
276 signal and supportive force for change, compensating for GHG emissions during the
277 manufacturing phase is insufficient to change how fossil fuels are used (Bauer et al.
278 2020).

279

280 *Microplastics*

281 There is an urgent need for global action and solutions because an estimated 170 trillion
282 plastic particles, mainly MPs, float in all of the world's oceans (Eriksen *et al.* 2023).

283 The primary contributors to MP contamination are the laundering of synthetic clothes
284 (such as polyester and nylon) and wear of tires on roads. Approximately 55% of all
285 textile fibers are made of polyester (more than twice that of cotton fiber), which is the
286 largest source of MP contamination from clothing (TextileExchange 2016). Another
287 notable cause of pollution is small fragments of plastic generated by urban activities
288 ("city dust"), such as the wear and tear of running shoes and artificial turf (Boucher &
289 Friot 2017).

290 Humans are exposed to microplastics mainly through food, but also through dermal
291 contact and inhalation. Research has confirmed that the ingestion of microplastics by
292 humans leads to many harmful consequences, primarily associated with diverse forms
293 of inflammation (Huang *et al.* 2022, 2021; Junaid *et al.* 2022; Liu *et al.* 2022; Nikolic *et*
294 *al.* 2022; Prata *et al.* 2020; Rawle *et al.* 2022; Tong *et al.* 2022; Weber *et al.* 2022; Xu
295 *et al.* 2021; Yang *et al.* 2021; Yuan *et al.* 2022; Zhao *et al.* 2021; Zheng *et al.* 2021).

296 The Global Plastics Treaty must establish criteria for recyclability and classify MP as
297 hazardous chemicals. It should promote evidence-based scientific decision-making and
298 enforce obligatory regulations for reporting and sharing information (Dauvergne
299 2023b).

300

301 *Effects of plastic pollution in the Arctic*

302 The literature is of specific concern regarding the effects of plastic pollution in the
303 Arctic (Cowan *et al.* 2023a; Meyer *et al.* 2023; Prior & Seck 2023).

304 Despite its remote location, the Arctic is still affected by several types of pollution
305 caused by human activities, such as persistent organic pollutants (POPs), carbon black,
306 mercury, and plastics, which affect its fragile ecosystems (Cowan *et al.* 2023a; Meyer *et al.*
307 *et al.* 2023). For instance, some authors (Meyer *et al.* 2023) analyzed plastic debris from
308 14 remote Arctic beaches on the Spitsbergen archipelago and found plastic residues
309 from all parts of the globe. Plastic pollution sources have local and global origins,
310 moving northward through ocean currents, rivers, and winds.

311 These pollutants can substantially affect the Arctic ecosystems and their inhabitants.
312 Therefore, pollution has been a critical focus of Arctic environmental governance since
313 the 1990s (Prior & Seck 2023). The Arctic Ocean has one of the most significant
314 concentrations of surface microparticles worldwide (Barrows *et al.* 2018).

315 Ships operating in the Arctic experience more prolonged periods of operation and
316 expand their range further north because of global warming, including a decrease in sea
317 ice extent and shorter periods of sea ice covering (Meyer *et al.* 2023). Ships
318 substantially contribute to the spread of plastic waste in the Earth's waters (Kurniaty *et al.*
319 *et al.* 2023).

320 According to Osmundsen (Osmundsen 2023), the definition and characterization of port
321 reception facilities (PRFs) in global agreements must be revised and more precise. It is
322 an essential component of global legal and policy frameworks that focuses on
323 preventing plastic waste discharge from ships to marine ecosystem. Additionally, the
324 current direct fee procedure may not encourage ship operators to properly dispose of
325 waste. The implementation of indirect cost regulations for waste disposal at ports along
326 with enhanced law enforcement can encourage the adoption of appropriate waste
327 management procedures (Kurniaty *et al.* 2023). All of these measures will help reduce
328 plastic pollution in the Arctic (Osmundsen 2023).

329

330 *Human rights*

331 Some authors (O'Meara 2023a) argue for including a human rights perspective in the
332 draft Global Plastics Treaty, especially by emphasizing the right to health and a healthy
333 environment.

334 Numerous developed nations continue to export their plastic waste to low-income
335 countries, especially countries in the Global South, tiny island nations, and marginalized

336 regions in the Global North (Landrigan *et al.* 2023b). Because of inadequate waste
337 management in many of these areas, mainly the most vulnerable communities are
338 exposed to plastic pollution and its consequences. The groups most severely impacted
339 by the negative implications of plastics and plastic pollution are poor, disempowered,
340 and marginalized populations, including workers, racial and ethnic minorities,
341 "fenceline" communities, indigenous groups, women, and children. These groups,
342 which had minimal involvement in causing the current plastics crisis, need more
343 political influence and resources to tackle this issue effectively (Landrigan *et al.* 2023a).
344 In addition, the gender dimension must be considered as well. According to some
345 authors (Prior & Seck 2023), focusing a higher priority on the gender dimension of
346 plastic pollution can provide valuable insights to guide policy decisions addressing
347 plastic pollution worldwide.

348 The social and environmental justice (SEJ) principles must reverse these unfair burdens,
349 ensuring that no particular group bears an excessive proportion of the negative
350 consequences of plastics. In addition, those who profit economically from plastic should
351 bear an equitable number of expenses currently not accounted for (Landrigan *et al.*
352 2023a). The economic advantages of plastic are rarely used to lessen or minimize the
353 health risks it causes, which widens the gap between those who gain and those who
354 suffer (Karasik *et al.* 2023).

355 Combating plastic pollution, accelerating climate action, protecting ocean ecosystems,
356 and protecting human rights would all be facilitated by incorporating human rights
357 considerations through a precautionary and preventative approach, transferring
358 responsibility to polluters, and expressing concern for intergenerational equal rights
359 (O'Meara 2023a).

360

361 **Economy**

362 The plastics, chemicals, and fossil fuel sectors are closely connected (Tilsted *et al.*
363 2023). The contribution of these groups amplifies the expenses associated with plastic
364 pollution.

365 The minimum economic costs attributed to plastic pollution in the marine environment
366 alone were estimated to range from US\$3,300 to US\$33,000 per year, encompassing
367 expenses related to clean-up efforts and the decline in tourism. However, this estimation

368 does not consider the valuation of impacts on human health or the deterioration of
369 marine ecosystem services (Beaumont *et al.* 2019). Approximately US\$100 billion is
370 spent annually on the socioeconomic consequences of plastic waste worldwide (UNEP
371 and Minderoo Foundation 2022).

372 The adverse effects of plastic on human health lead to substantial economic costs. In
373 2015, global health-related expenses associated with plastic manufacturing were
374 predicted to surpass US\$250 billion. In the United States, the costs of disease and
375 disability caused by plastic-related chemicals exceeded US\$920 billion. Over 85,000
376 premature deaths each year, 1.5 million occurrences of cardiovascular disease, and
377 US\$675 billion in medical expenses are attributed to chemicals that leach out of plastic
378 and plastic waste in the USA (Landrigan *et al.* 2023b).

379 New plastic business models should ideally address economic and social sustainability
380 through methods that support capacity building, R&I, and the formation of new
381 profitable companies and new jobs (Tang 2023). As an example of accomplishment,
382 Spanish tuna freezer companies use end-of-life fishing nets as a raw material to produce
383 textile items (Andrés *et al.* 2022). In addition, companies should strive to adopt more
384 sustainable practices in their operations.

385 To tackle the global plastic life cycle effectively, involving the industry in the
386 negotiations is crucial. This will allow industry actors to be part of the process of
387 creating commitments right from the beginning. The active participation of the plastic
388 and chemical sectors should serve as a crucial foundation for the new instrument.
389 However, it is essential to carefully consider the sector's involvement concerning the
390 interests of other stakeholders, such as non-governmental organizations (Stöfen-O'Brien
391 2022). "Because domestic structures and actors play a critical role in the negotiators'
392 decision to join or reject an agreement, relevant stakeholders must be involved in the
393 negotiation process, including the private sector, non-profit organizations, and
394 academia" (Tessnow-von Wysocki & Le Billon 2019).

395 Package industries must adopt 'Design for Recycling Guidelines' to encourage multiple
396 recycling cycles (Wang & Praetorius 2022). As an example, the European PET Bottle
397 Platform (EPBP) has recently created a set of design guidelines that focus on improving
398 the recyclability of food-grade opaque white PET (polyethylene terephthalate) bottles
399 (RECYCLING magazine 2023). Nevertheless, the current situation, in which virgin
400 fossil feedstocks like naphtha and ethane are so inexpensive, makes it extremely

401 difficult for alternatives like bio-based or recycled feedstocks and materials to compete
402 with virgin fossil ones. While not all plastic is recyclable, the failure to recycle
403 recyclable plastic results in substantial losses. Nevertheless, a viable economic case for
404 alternatives is required (Bauer *et al.* 2020).

405 For industries, the most challenging topic will be the limitations of plastic production.
406 The scientific community is very clear about this: a global cap on plastic production
407 should be a core provision of the treaty (Bergmann *et al.* 2022; Landrigan *et al.* 2023b,
408 2023a; Simon *et al.* 2021; Walker 2023). In addition, determining which categories of
409 polymers fall within the instrument's scope will represent an additional complex topic.
410 Considering the extensive range of plastics, which includes 4,000 distinct compounds
411 used alone in plastic packaging and over 5,300 commercially accessible polymer
412 formulations, determining the material reach of this instrument is crucial (Groh *et al.*
413 2019). Other difficult points will be: which plastic industry sectors will be involved?
414 Will E-waste plastics be involved? Will the petrochemical sector be involved? And how
415 about ships and ports?

416 With over 50 member nations, the High Ambition Coalition on Plastic Pollution has
417 highlighted the need for legally-binding commitments. Meanwhile, those involved in
418 the plastic and petrochemical industries, with different interests, persist in advocating
419 postures that restrict the treaty's scope (Tilsted *et al.* 2023).

420 Fossil fuel-based plastics business interests and strong power hierarchies are at odds in
421 the relationship between fossil fuels and plastics (Tilsted *et al.* 2023). The recent
422 COP28 meeting in Dubai, the 28th UN Climate Change Conference (the official name
423 for Climate Conferences of the Parties), made the economic effects of fossil fuels very
424 clear. With respect to the imperative to phase out fossil fuels to constrain global
425 warming within 1.5 degrees Celsius, the President Sultan Al Jaber of COP28 argued
426 against the validity of such measures, positing a dearth of scientific support and
427 cautioning against their implementation due to potential impediments to sustainable
428 development, unless one intends to regress society to a primitive state reminiscent of
429 "taking the world back into caves." The COP28 president also controls the state oil
430 company of the United Arab Emirates (Carrington & Stockton 2023). Nevertheless, the
431 COP28 can be considered a triumph as it was the inaugural historical event to tackle the
432 issue of fossil fuels and their effects on climate change. An open debate occurred, and a

433 resolution was adopted. The COP28 was the inaugural effort in the history of COPs to
434 limit the usage of fossil fuels.

435 Another economic issue is the equity and sharing of abatement costs in forming
436 international environmental agreements (Börger et al. 2023). This issue refers to the
437 expenses associated with achieving international environmental agreements' objectives,
438 which are not always uniformly distributed among the participating nations. Additional
439 considerations, such as politics, may influence the decision to contribute to cost-sharing.

440

441 **International legislation and governance**

442 Literature (Carratta & Jaeckel 2023) indicates that it is crucial to coordinate several
443 governmental levels: International law, regional legislation, and measures at the national
444 and local levels. The authors cite numerous significant environmental laws. A concise
445 discussion will be provided on the legislation that established the core of the literature
446 for the Global Plastics Treaty, with a particular emphasis on international laws.

447

448 *International legislation*

449 According to Dauvergne (Dauvergne 2023b), five particular principles of justice must
450 guide the formulation and implementation of the Global Plastics Treaty:

451 (1) Distributive justice: Negotiators, policymakers, and implementors must prioritize
452 distributive justice, considering the compelling evidence that plastic pollution is causing
453 disproportionate harm to vulnerable populations, mainly in developing nations;

454 (2) Procedural justice: implementing the principles of procedural justice, guaranteeing
455 the active and meaningful participation of Indigenous peoples and marginalized
456 populations;

457 (3) Justice across all governance levels and scales: at all levels of government, aim for
458 environmental justice by rejecting policies, incentives, and market mechanisms that
459 worsen social injustices or violate human rights;

460 (4) Corporate controls, transparency, and accountability: implementing stringent
461 regulatory measures, such as trade and investment limitations, is necessary to improve
462 corporate transparency and accountability regarding plastic pollution and environmental
463 injustices;

464 (5) Justice-oriented financial and technical assistance: offering technical and financial
465 support to shift disadvantaged communities toward an environmentally friendly global

466 plastics economy. This approach aims to prevent additional financial burden on low-
467 income countries while holding high polluting and economically capable countries
468 responsible.

469 Additionally, the literature emphasizes the importance of considering existing
470 agreements during INC meetings (Senathirajah *et al.* 2023), since adjusting current legal
471 instruments is just as important as creating a new treaty specifically for plastic pollution
472 (Börger *et al.* 2023). Several international instruments are mentioned, such as Montreal
473 Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) (Andersen *et*
474 *al.* 2021; Grabiell *et al.* 2022; Kirk 2020; Tessnow-von Wysocki & Le Billon 2019),
475 Kyoto Protocol (Tang 2023; Tessnow-von Wysocki & Le Billon 2019), International
476 Convention for the Prevention of Pollution from Ships, commonly referred to as
477 MARPOL Annex V (Cowan *et al.* 2023b; Kurniaty *et al.* 2023; Prior & Seck 2023;
478 Stöfen-O'brien 2022), Paris Agreement (Cowan *et al.* 2023b; Kirk 2020; Tang 2023),
479 the United Nations Convention on the Law Of the Sea (UNCLOS) (Kurniaty *et al.*
480 2023; Ortuño Crespo *et al.* 2020; Telesetsky 2021), Basel Convention (Carratta &
481 Jaeckel 2023; Khan 2020; Prior & Seck 2023), the treaty on the Protection of
482 Biodiversity in areas Beyond National Jurisdiction (BBNJ) (Tiller & Nyman 2018),
483 Declaration on the Human Environment (the Stockholm Declaration) (Carratta &
484 Jaeckel 2023; Kurniaty *et al.* 2023; Prior & Seck 2023), World Charter for Nature
485 (Kurniaty *et al.* 2023), Washington Declaration on the Protection of the Marine
486 Environment from Land-based activities (Kurniaty *et al.* 2023), Rio Declaration
487 (Kurniaty *et al.* 2023), the United Nations Convention on the Law of the Sea (Kurniaty
488 *et al.* 2023), Convention of the Protection of the Marine Environment of the Northeast
489 Atlantic (Kurniaty *et al.* 2023), Protocol to the Convention on the Prevention of Marine
490 Pollution by Dumping and other matter (Kurniaty *et al.* 2023), Honolulu Strategy
491 (Kurniaty *et al.* 2023), Rotterdam Convention (Carratta & Jaeckel 2023), and the United
492 Nations Framework Convention on Climate Change (UNFCCC) (Tang 2023).

493 In UNEA Resolution 5/14, some international conventions are also cited: the
494 International Convention for the Prevention of Pollution from Ships of 1973, Basel
495 Convention on the Control of Transboundary Movements of Hazardous Wastes and
496 Their Disposal, Rotterdam Convention on the Prior Informed Consent Procedure for
497 specific Hazardous Chemicals and Pesticides in International Trade, Stockholm
498 Convention on Persistent Organic Pollutants, United Nations Convention on the Law of

499 the Sea, Convention on the Prevention of Marine Pollution by Dumping of Wastes and
500 Other Matters of 1972, Strategic Approach to International Chemicals Management,
501 United Nations Framework Convention on Climate Change, Convention on Biological
502 Diversity (United Nations Environment Programme 2022b), among others.

503 During the Global Plastics Treaty negotiations, it is crucial to consider current
504 legislation. The various rights and wrongs of this legislation have been extensively
505 discussed in the literature. Some examples are as follows:

506 According to Tang (Tang 2023), "learning from the shortcomings of the Kyoto Protocol
507 and Paris Agreement, the international treaties for the plastic economy could push for
508 more ambitious goals progressively and garner more active participation from the
509 developing countries, which are also major plastic producers and consumers."

510 "Almost 40 years after the creation of the UNCLOS, we have a second opportunity as a
511 global community to better address the conservation of living resources and the study,
512 protection, and preservation of the marine environment beyond national boundaries"
513 (Ortuño Crespo *et al.* 2020).

514 "While amending UNCLOS might be considered politically impractical, even a
515 rudimentary conversation on amending the treaty would provide much-needed political
516 focus on critical ocean topics where there are present governance gaps" (Telesetsky
517 2021).

518 Literature suggests that the problem of plastic pollution should be considered through
519 the lens of disaster risk reduction. This is especially true when implementing the
520 precautionary principle in many international legal instruments. The Paris Agreement
521 guidelines could be used to lead the Global Plastics Treaty, driven by national action
522 plans, the potential to offset, and mandatory reporting requirements (Senathirajah *et al.*
523 2023).

524 The literature also discusses the power and importance of activism in governing plastics
525 (Dauvergne 2023a). This involves implementing laws governing single-use plastics,
526 funding waste infrastructure, expanding recycling initiatives, and developing policies to
527 promote circular economies for plastics; media influencers alerting people about the
528 adverse health and environmental effects of burning, disposing of, and littering plastics;
529 community organizations campaigning for government legislation prohibiting the
530 manufacturing, use, and import of "harmful" plastics; and a host of other initiatives
531 (Dauvergne 2023a). Each person's involvement is crucial in combating plastic pollution.

532 Some authors (Carratta & Jaeckel 2023) analyzed the shortcomings of international
533 environmental law at every stage of the plastic life cycle, indicated possible revisions,
534 and also the crucial elements that the forthcoming plastic treaty should focus at. "The
535 upcoming plastic treaty can offer a more comprehensive regulation of plastic pollution.
536 It should promote sustainable production and consumption of plastic items, improve
537 waste treatment systems, and encourage effective domestic plastic waste management.
538 Furthermore, the treaty should address environmental protection strategies and the
539 impact of MPs and other small plastic particles on a wider range of ecosystems"
540 (Carratta & Jaeckel 2023).

541 Some authors call for a reevaluation of the involvement of non-state actors to facilitate
542 more accessible access to meaningful participation in the design, negotiation, and
543 subsequent implementation of the proposed Global Plastics Treaty and to create more
544 opportunities for such participation (Akrofi *et al.* 2022). Furthermore, the plastic treaty
545 under consideration might serve as the initial multilateral environmental accord to
546 implement Principle 10 of the Rio Declaration. This principle delineates the following
547 fundamental elements of environmental democracy: access to information, participation
548 in decision-making processes concerning environmental matters, and access to justice
549 on environmental issues.

550 Furthermore, INC must include representatives of these groups in the treaty negotiation
551 and implementation processes to ensure that the agreement is fair and protects the health
552 and human rights of vulnerable populations, including but not limited to children,
553 pregnant women, waste pickers, individuals residing in fenceline communities adjacent
554 to plastic industries, Indigenous populations, and others (Landrigan *et al.* 2023b).

555 Some authors have questioned whether existing regulations, such as the Montreal
556 Protocol or the Paris Agreement, can work as examples for the new Global Plastics
557 Treaty (Kirk 2020). Other authors, motivated by the Montreal Protocol, provided
558 evidence for and advantages of a gradual approach to international regulation of virgin
559 plastic production and consumption (Grabiel *et al.* 2022). Experts (Denta 2022)
560 proposed that regulatory measures alone are insufficient to address plastic pollution.

561 Agreements have been established to deal with marine litter, including the London
562 Convention and Protocol and MARPOL Annex V (Xanthos & Walker 2017). Despite
563 their existence, establishing a new international treaty on plastics is considered

564 necessary. Why is this so? Is the plastic "frightening enough" (Tiller & Nyman 2018) to
565 be inserted into other current regulations? Nevertheless, "do we have time to wait for
566 the international community to come together to ratify a treaty text on this, with the
567 required years of negotiations in between?" (Tiller & Nyman 2018).

568 However, according to some experts, "there is no space for choosing between amending
569 the existing legal instruments and adopting a new one. To regulate the full life cycle of
570 plastics on a global scale, the two strategies should coexist and support each other"
571 (Carratta & Jaeckel 2023). According to some authors (Carratta & Jaeckel 2023), the
572 Global Plastics Treaty will be the first international environmental agreement to
573 encompass all the stages of the plastics' life cycle. Other environmental accords
574 emphasize particular phases of the plastics' life cycle, such as the Stockholm and
575 Rotterdam Conventions (which indirectly address the production and manufacturing
576 phases) and the Basel Convention, which primarily addresses the waste management
577 stage.

578 To effectively regulate and reduce marine plastic pollution, legal regulations and
579 policies under international water law and marine environmental law must align and
580 coordinate with each other (Finska & Howden 2018). The successful implementation of
581 the Global Plastics Treaty necessitates coordinating and supplementing international
582 efforts with national, regional, and local interventions (Landrigan *et al.* 2023a). This can
583 be a strategy to mitigate pollution in international watercourses and oceans (Finska &
584 Howden 2018). Production controls are a prerequisite for achieving sustainable
585 production and consumption of virgin plastic polymers (Grabiel *et al.* 2022). Novel and
586 alternative solutions are also necessary (Denta 2022).

587

588 *Governance*

589 A comprehensive definition of governance is the direction that public and private
590 authorities give to actions. This includes state laws, business codes of conduct,
591 international organizations, non-profit standards, and social conventions regarding what
592 is right and wrong (Dauvergne 2018). Concerning plastics, the wide range of pollution
593 sources makes global governance challenging (Dauvergne 2018).

594 Based on some authors (Bauer *et al.* 2020), plastic governance should have an accurate
595 focus. Governance frameworks regarding plastics and plastic pollution have
596 traditionally concentrated on the challenges of improving recycling (Nielsen *et al.* 2020)

597 and waste management (Bauer *et al.* 2020; Nielsen *et al.* 2020). The governance
598 panorama reflects industry efforts to oppose government regulation, transfer
599 responsibility, and silence criticism. It also represents industry support for corporate
600 self-regulation and consumer responsibility as basic governance concepts (Dauvergne
601 2018). The absence of an integrated understanding of plastic pollution has fostered a
602 fragmented decision-making process at all levels of governance (Carratta & Jaeckel
603 2023). Bottom-up governance of industries has become less effective globally, partly
604 because the industry may need to take advantage of the fragmentation of authority to
605 avoid responsibility, limit the scope of reforms, and create loopholes (Dauvergne 2018).
606 "While recognizing the severity of plastic pollution, the industry does not point the
607 finger at plastics *per se*, especially single-use plastic, but rephrases the narratives by
608 steering attention to plastic waste" (Akrofi *et al.* 2022). Implementing a globally
609 binding method could effectively address certain obstacles in the governance of marine
610 plastics (Tessnow-von Wysocki & Le Billon 2019).
611 Nevertheless, many crucial elements need to be considered, including the dependency
612 on fossil fuels, the climate impact of plastics, the fundamental political and economic
613 dynamics of the petrochemical sector, and the long-term trajectory of conventional
614 plastics (Bauer *et al.* 2020). A robust global governance agreement to address all
615 sources of plastic pollution still needs to be reached (Walker 2022). The management of
616 oceans needs to be improved to safeguard marine biodiversity at a worldwide level
617 (Dauvergne 2018). The plastic industry must take responsibility for the damage to
618 society and the environment that has resulted from its selfish nature and profit policies.

619

620 **Other important remarks**

621 As stated in this manuscript, the literature focuses on contributing to the ongoing
622 negotiations on the Global Plastics Treaty. The authors proposed the following
623 recommendations to be included in the negotiations and final treaty (some of which had
624 previously been discussed):

625 (a) MPs (Ambrose & Walker 2023; Eriksen *et al.* 2023; Landrigan *et al.* 2023b, 2023a;
626 Stöfen-O'brien 2022);

627 (b) Chemicals incorporated in plastics (Dey *et al.* 2022; Filella & Turner 2023; Grabieli
628 *et al.* 2022; Kurniaty *et al.* 2023; Landrigan *et al.* 2023b, 2023a; Maes *et al.* 2023;
629 Stöfen-O'brien 2022; Tilsted *et al.* 2023; Wang *et al.* 2023; Wang & Praetorius 2022);

- 630 (c) Decrease the chemical complexity of plastic products, establish health-protective
631 criteria for plastics and plastic additives, mandate sustainable, non-toxic materials,
632 ensure full disclosure of all components, and implement traceability of components.
633 International collaboration will be crucial for the implementation and enforcement of
634 these standards (Grabriel *et al.* 2022; Landrigan *et al.* 2023b, 2023a; Maes *et al.* 2023;
635 Tilsted *et al.* 2023; Wang & Praetorius 2022). Moreover, a broader definition of plastics
636 as a substance composed of chemicals would be employed to govern the usage and
637 disposal of plastic additives by law (Maes *et al.* 2023);
- 638 (d) Attribute the PBT criteria to plastics (i.e., be classified as a persistent,
639 bioaccumulative, and toxic (PBT) pollutant) under the precautionary principle (Alava *et*
640 *al.* 2023);
- 641 (e) A clause that prohibits or significantly limits the production and use of superfluous,
642 preventable, and troublesome plastic products, particularly single-use and synthetic
643 microbeads (Andersen *et al.* 2021; Grabriel *et al.* 2022; Landrigan *et al.* 2023a; Smith *et*
644 *al.* 2023; Tilsted *et al.* 2023);
- 645 (f) Taxation of virgin plastic pellets (Bauer *et al.* 2020);
- 646 (g) Quotas for recycled and biobased feedstocks in newly manufactured plastic goods
647 (Bauer *et al.* 2020);
- 648 (h) Recognize and encourage mass-balance techniques in primary production that
649 incorporate recycled and biobased feedstocks, with a growing minimum percentage of
650 these inputs to promote progressive transformation (Bauer *et al.* 2020);
- 651 (i) Regulations about extended producer responsibility (EPR), which hold fossil carbon
652 producers, plastic producers, and producers of plastic items responsible for the safety
653 and proper disposal of all the materials they produce and sell, legally and financially
654 (Carratta & Jaeckel 2023; Farrelly & Chitaka 2023; Khan 2020; Landrigan *et al.* 2023b,
655 2023a);
- 656 (j) Ban the burning of plastic in any form (Landrigan *et al.* 2023b);
- 657 (l) Achieve zero emissions and decouple from dependence on fossil fuels by putting out
658 industry and firm-level roadmaps (Bauer *et al.* 2020);
- 659 (m) Regulate the implementation of plastic clean-up technologies (Falk-Andersson *et al.*
660 2023);

661 (n) Integrate dynamic management in the high seas as area-based management tools
662 (Ortuño Crespo *et al.* 2020);

663 (o) Build standardized monitoring systems (Aliani *et al.* 2023; Eriksen *et al.* 2023), and
664 harmonized methods and datasets (Hurley *et al.* 2023) to track global trends and
665 mitigate emissions of plastic pollution effectively;

666 (p) Address social and environmental justice solutions at every stage of the plastic life
667 cycle and community knowledge gaps; promote equitable distribution and procedural
668 fairness, including human rights (Carratta & Jaeckel 2023; Dauvergne 2023b; Jahan
669 2021; Karasik *et al.* 2023; Landrigan *et al.* 2023a; O'Meara 2023a; Prior & Seck 2023).

670 In line with items (f-j), Simon *et al.* (Simon *et al.* 2021) proposed three fundamental
671 objectives for establishing a global agreement on plastic pollution. The objectives
672 include reducing the production and consumption of virgin plastic (Goal 1: Reduce),
673 supporting a circular plastic economy that follows waste hierarchy principles (Goal 2:
674 Reuse – Repair – Recycle), and eradicating plastic pollution in the environment (Goal 3:
675 Remove). Also, in line with items (f-h), Tang (Tang 2023) describes that participating
676 countries can take several measures to decrease plastic pollution. Firstly, they can limit
677 the production of conventional plastics by setting targets, similar to how carbon
678 emissions are limited. Secondly, they can create market-based instruments that help
679 achieve these production targets. Thirdly, they can progressively set more ambitious
680 targets over time. Lastly, they can promote the development of environmentally friendly
681 plastic alternatives, similar to the efforts to develop renewable energy to reduce carbon
682 emissions.

683 As previously listed in item (o), with the establishment of international accords such as
684 the Global Plastics Treaty, it is crucial to build standardized monitoring systems (Aliani
685 *et al.* 2023; Eriksen *et al.* 2023), and harmonized methods and datasets (Hurley *et al.*
686 2023) to track global trends and mitigate emissions of plastic pollution effectively. For
687 example, Ambrose and Walker (Ambrose & Walker 2023) identified the potential for
688 Caribbean Small Island Developing States (SIDS) to establish a standard framework for
689 monitoring MPs and mesoplastics. This data collection might support the ongoing
690 discussions for the Global Plastics Treaty. Caribbean SIDS include Antigua and
691 Barbuda, The Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic,
692 Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent and the
693 Grenadines, Suriname and Trinidad and Tobago. MPs and waste debris are

694 transboundary at their shorelines due to their combined proximity to subtropical gyres.
695 Their unique ecological, cultural, and economic characteristics, with a strong focus on
696 tourism and marine-related businesses, have been adversely affected by plastic
697 pollution.

698 Personally, given that the primary objective of the Global Plastics Treaty is to reduce
699 plastic pollution, the treaty must include provisions to promote education. Depending on
700 their awareness and knowledge, each individual may or may not contribute to plastic
701 pollution (de Sousa 2023a). As previously observed, recycling contributes to climate
702 change by emitting GHG. Hence, the most effective approach is to reduce the use of
703 plastics. Through education, conscientious consumers can refuse basic items such as
704 plastic bags in their everyday routines, thus contributing to the mitigation of plastic
705 pollution.

706 Moreover, the design of treaties significantly influences the success of environmental
707 regulatory regimes. Robust design treaties encourage involvement, promote adherence,
708 and discourage non-compliance among all parties (Tessnow-von Wysocki & Le Billon
709 2019). Thus, the literature proposes seven treaty design aspects for improving the
710 effectiveness of a future legally binding method to address marine plastic pollution
711 (Tessnow-von Wysocki & Le Billon 2019), as follows:

- 712 (a) The acceptance of a principle of common but distinct responsibilities;
- 713 (b) A comprehensive scope that encompasses both land and sea sources, as well as
714 chemical additives and all stages of the plastic's life cycle;
- 715 (c) A connection between the issue and the international plastics trade;
- 716 (d) A financial mechanism to support the implementation of measures;
- 717 (e) Inherent flexibility to adapt to changes;
- 718 (f) Efficient monitoring, reporting, and review methods; and
- 719 (g) Enforcement through promoting compliance and preventing non-compliance.

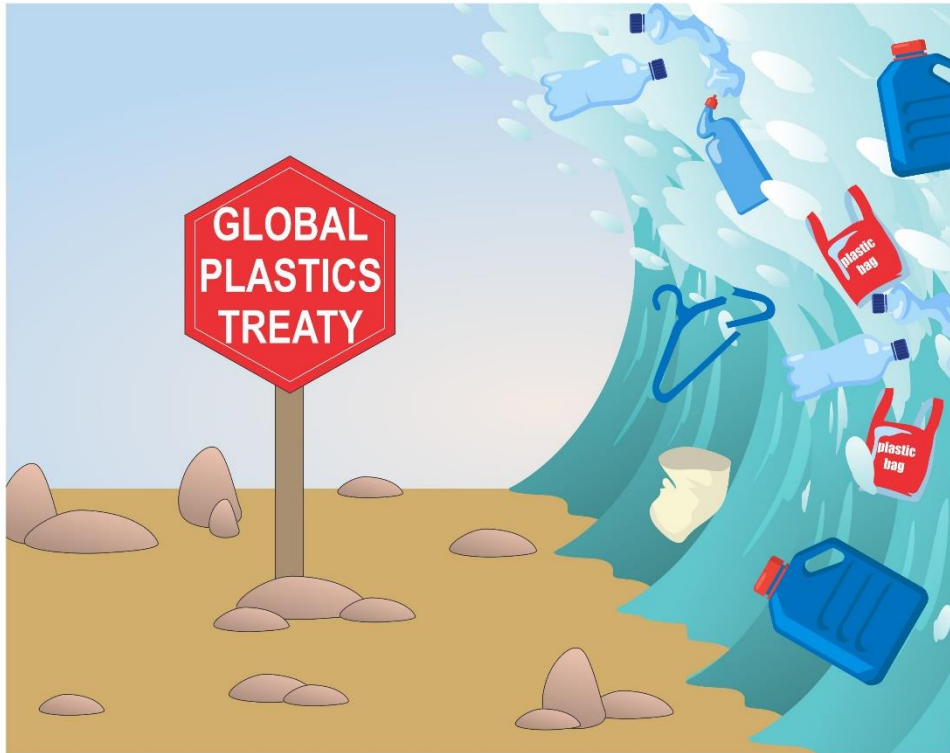
720 "Since a change in social practices may be encouraged by effective lawmaking, a closer
721 give-and-take between behavioral scientists and policymakers is desirable to shape
722 broad and long-term strategies" (Carratta & Jaeckel 2023). Additionally, it is crucial to
723 comprehend how families use plastic products to facilitate the development of accurate
724 legislation (Northen *et al.* 2023). For instance, specific directives, including the Single-
725 Use Plastics Directive (European Union 2019) and the Packaging and Packaging Waste
726 Directive (European Commission 1994) have impacted changing plastic consumption

727 patterns. As evidenced by the successful examples of some African nations, it is
728 imperative to enhance waste management systems, allocate resources for research, and
729 mobilize regional funds for plastic management, emphasizing the local context and
730 motivating behavioral change (Shomuyiwa *et al.* 2023). Consumers are essential in
731 mitigating the adverse consequences caused by plastic-related issues. However, a lack
732 of knowledge and/or awareness hinders it (de Sousa 2023a). Whether and to what
733 degree people fear the problem will determine how effective a legally binding treaty to
734 control plastic pollution will be. Because it is unclear how plastic pollution may affect
735 human health, the public will become aware of it (Tiller *et al.* 2022).

736 In conclusion, achieving a consensus regarding the Global Plastics Treaty will take
737 work. It is only possible to satisfy some stakeholders, as they all have unique interests.
738 However, we must consider the future of the world that we bequeath to future
739 generations. Stakeholders need to come together for the sake of humanity.

740 May there be no more dead whales with tons of plastic in their bellies, turtles with
741 straws extracted from their nostrils, or dolphins that perish after getting entangled in
742 fishing nets in the future. As told Inger Andersen, Executive Director of the UN
743 Environment Program, the global plastics treaty is “the most significant environmental
744 multilateral deal since the Paris Accord...an insurance policy for this generation and
745 future ones, so they may live with plastic and not be doomed by it” (Landrigan *et al.*
746 2023b). As a polymer researcher, I agree with his words and trust in the success of the
747 Global Plastics Treaty. May the Global Plastics Treaty break the plastic wave (Figure
748 3).

749



750

751 Figure 3: Will the Global Plastics Treaty break the plastic wave?

752

753 **Conclusions**

754 Plastic pollution has reached unsustainable levels. In an effort to reduce plastic
755 pollution, an INC has been established by UNEP to reach a resolution by the end of
756 2024. Subsequently, an ambitious treaty to reduce plastic pollution, known as the
757 Global Plastics Treaty, is expected to be enforced in 2025.

758 A systematic review was performed on the Global Plastics Treaty. The analyzed
759 literature mainly focuses on the adverse effects of plastic pollution, legislation,
760 governance, and the economy. The literature supports restricting worldwide plastic
761 production as the most effective strategy to address plastic pollution.

762 This comprehensive summary of the current literature can contribute to the ongoing
763 negotiations and guide future research on the Global Plastics Treaty.

764

765 Author contribution

766 F. D. B. de Sousa wrote and proofread the manuscript for language editing.

767

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770

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773

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776

777 Data availability statement

778 Not applicable.

779

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