SEA circular
solving plastic pollution at source

Marine plastic litter in East Asian Seas:

Gender, human rights and economic dimensions

UN environment programme

COBSEA
COORDINATING BODY ON THE SEAS OF EAST ASIA

SEI

Contents

Abbreviations and acronyms

Aarhus Convention	United Nations Economic Commission for Europe Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters
Agenda 21	Action plan produced at the 1992 Rio de Janeiro UN Conference on Environment and Development
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BPA	Bisphenol A
CBD	Convention on Biological Diversity
CEDAW	International Convention on the Elimination of All Forms of Discrimination against Women
COBSEA	Coordinating Body on the Seas of East Asia
COP	Conference of Parties
CRC	International Convention on the Rights of the Child
DBP	Dibutyl phthalate
DEHP	Di-(2-ethylhexyl) phthalate
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
EUR	Euro
FAO	Food and Agriculture Organization
GDP	Gross domestic product
ICESCR	International Covenant on Economic, Social and Cultural Rights
ILO	International Labour Organization
IORA	Indian Ocean Rim Association
kg	Kilograms
London Convention	Convention on the Prevention of Pollution by Dumping of Wastes and Other Matter
MARPOL	International Convention for the Prevention of Pollution from Ships
NGO	Non-governmental organization
PBDEs	Polybrominated diphenyl ethers
PCBs	Polychlorinated biphenyls
PET	Polyethylene terephthalate
POPs	Persistant organic pollutants
RAP MALI	Regional Action Plan on Marine Litter
Regional Seas	Regional Seas Conventions and Action Plans
SDG	Sustainable Development Goal
SEI	Stockholm Environment Institute
SIDA	Swedish International Development Cooperation Agency
UDHR	Universal Declaration of Human Rights
UNCED	United Nations Conference on Environment and Development
UNCLOS	United Nations Convention on the Law of the Sea
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
USD	United States Dollar

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Preface

This study was prepared by the Stockholm Environment Institute (SEI) under the SEA circular initiative implemented by the United Nations Environment Programme (UNEP) and the Coordinating Body on the Seas of East Asia (COBSEA), with support from the Swedish Government.

The SEA circular initiative works in partnership with governments, businesses, civil society, academia, development partners and other UN agencies in the East Asian Seas region to reduce plastic leakage into the marine environment by preventing plastic pollution at source. Waste management systems in the region remain largely inadequate to process increasing amounts of plastic waste, calling for improved plastic management at source. SEA circular focuses on upstream value chain stages of (i) production, (ii) use, and (iii) the collection, sorting and recycling of plastic. The initiative promotes market-based solutions and enabling policies to transform plastic value-chain management, aims to strengthen the science-based evidence for informed decision making, engages consumers and communities through targeted outreach, and leverages COBSEA's regional mechanisms to tackle transboundary challenges of pollution and to share lessons learned. The project follows a human rights based approach that respects the needs and interests of all groups of society, including disadvantaged and vulnerable groups such as informal waste pickers and coastal communities. The project includes all nine COBSEA countries, with particular focus on activities in Thailand, Malaysia, Indonesia, Cambodia, Vietnam and the Philippines.

This report provides insights on the gender, human rights and economic dimensions of marine plastic litter to inform project design and activities and to ensure a fair, equitable and ethically-sound course of action, that leads to more effective, appropriate and sustainable outcomes in the longer term. The analysis highlights initial findings and existing knowledge gaps and provides recommendations for more equitable decision making, while recognizing the need to strengthen the evidence base on issues discussed. The discussions in this report are not exhaustive but are an attempt to address the underexplored scope of social, economic and environmental implications of marine litter.

Find more information on the SEA circular project online at: **www.sea-circular.org**

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Find out more about COBSEA online at: **www.cobsea.org**

Executive summary

The East Asian Seas region is both a significant contributor to and impacted by the global problem of marine plastic litter. Inclusive action in this region will be critical to addressing this transboundary challenge.

Marine litter is defined as any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment. Slow degradation rates of marine litter items, such as plastics, and the growing quantity of litter discharged into the marine environment, continue to exacerbate the challenge of marine litter.

Marine plastic litter bears social, economic and environmental consequences as it makes its journey from manufacturers to the ocean. It can damage ecosystems and human communities, as well as economic sectors such as shipping, tourism and fisheries that rely on healthy and productive marine ecosystems. Compounds released during manufacture and use of plastic goods damage the health of both producers and consumers.

Vulnerability to the social, economic, environmental and health consequences of marine plastic litter differs among different societal groups. Risks are borne differently according to socio-economic characteristics and divisions such as class, caste, ethnicity, religion, age and gender. In cases of environmental pollution, such as marine plastic litter, disadvantaged and marginalized groups in society are the most vulnerable due to underlying socio-economic injustices that need to be identified and addressed through an inclusive approach. As the issue of marine plastic litter is a major challenge of our time, it will be up to the collective efforts of governments, businesses and consumers to recognize and internalize social, economic and environmental costs of marine pollution and identify pathways to address the differentiated repercussions litter on different groups.

States and businesses are the main duty bearers in addressing the problems posed by marine plastic litter from its production to its eventual leakage into the environment and ocean. As such, states are obligated to ensure that they comply with international human rights standards at all levels of government while integrating principles of accountability, access to remedies, participation and non-discrimination. States must also provide for procedural rights, ensure opportunities for public participation, and allow people rights and processes to seek remediation from environmental harm. Further, states must ensure that private sector actors respect human rights through due diligence and the principle of do no harm, including over and above what may be required of them by national law. Responsible private sector actors too must follow protocols set out by governments and ideally do their part beyond what is legally required to reduce the adverse effects of marine plastic litter.

This report fills and identifies some of the existing information gaps by providing a synthesis of social and economic impacts and their gender and human rights dimensions. Information emerging from this report is central to strengthening the science-based evidence necessary for inclusive action on marine plastic litter – action that internalizes the social, economic, environmental and rights-related costs of plastic mismanagement. The findings from this report, as well as further findings from the SEA circular initiative, will be used to leverage support from South East Asian intergovernmental mechanisms, engage stakeholders with a marine focus, and enable government partners in target countries to bridge existing policy gaps and address upstream sources of pollution.

The premise of the initiative and this report is that marine plastic litter needs to be tackled through a lifecycle approach with close consideration of gender equality and human rights issues, from plastic production on land and use by consumers to its disposal and possible leakage into the ocean. The focus lies on inclusive circular plastic management upstream in the plastic value chain to prevent plastic waste entering the environment. While removing existing marine litter is important, the downstream costs of clean-up and management may outweigh impact.

This report identifies human rights instruments that can potentially empower governments and businesses to address the adverse effects of mismanaged plastic. It includes a gender analysis of the plastic value chain from production through consumption, waste generation and management to leakage into the ocean environment.

Key Findings

Finding 1: Policies that advance, protect and promote gender equality and human rights while significantly addressing the challenges and effects of marine plastic litter are lacking at multiple scales.

At global and regional levels, the current policy environment on marine litter lacks explicit integration of gender equality and human rights principles. A strong network of champions is therefore needed to accelerate and move the policy integration of gender equality and human rights in creating safety standards in plastics production, social protection in the management of plastic waste, and prevention and mitigation of plastic marine litter and its adverse effects on coastal communities and economic sectors.

Finding 2: Manufacturing and handling plastics with hazardous materials could expose production workers, in particular women, to endocrine disruptors (bisphenol A, vinyl chloride, styrene, acrylonitrile and phthalates) that can cause serious health implications.

Findings in this report indicate emerging yet underexplored evidence that women workers in the plastics industry face higher exposure to hazardous chemicals from producing and handling plastics that can place their reproductive health at risk. Future and ongoing research exploring the health impacts of plastics production and handling should include gender-, age- and class-disaggregated patterns and effects of exposure. Results from this body of evidence should inform safety standards in the production of plastics.

Finding 3: As major consumers and users of plastic goods, women may be exposed to greater risks but can also be champions of mitigating the risk of marine plastic litter through responsible consumption and waste disposal practices.

Due to gender obligations and norms, women are usually the main consumers of household plastic products and are also exposed to plastic material in personal hygiene and cosmetic products. Their obligations also compel them to manage household waste and this potentially positions them to champion eliminating marine plastic litter. However, waste management and efforts to reduce marine plastic pollution should not be the sole responsibility of women but should aim at being a shared and equal responsibility of women and men in communities. Women who participate in recycling cooperatives should also receive a fair share of benefits from their involvement which not only includes economic benefits, but that they should be assured of joint domestic care obligations in their households and communities. Waste management should not add to their already long list of caring roles.

Finding 4: Informal waste workers, in particular women and children, face multiple disadvantages, such as low earnings, health risks and weak social protection measures. Their contributions to the recovery and recycling of valuable plastics are largely overlooked and unsupported.

Most South East Asian countries rely largely on informal structures of waste management that are dominated by doubly disadvantaged groups of the urban poor, namely women and children. Informal waste workers take on high levels of occupational health and safety risks by working in unsanitary conditions with limited access to education, healthcare and social services. Stepping up the exercise of labour and human rights and social protection measures will give dignity and protection to their important work and ensure that they receive fair benefits from their labour.

Finding 5: Marine plastic litter has both market and non-market repercussions, resulting in revenue losses and posing risks to the job security of those employed by the fisheries, tourism and shipping sectors. Members of coastal communities may be most at risk from marine litter pollution impacts.

Marine litter will incur significant revenue losses and employment risks in tourism, shipping and fisheries. Once plastic leaks to the ocean, the cost of clean-up becomes also more challenging due to natural phenomena such as tides, currents and storms. Costs are even greater once marine litter settles on the ocean floor. As most marine plastic litter comes from uncollected or mismanaged waste from open dumps, unsanitary landfills and littering, it is important to improve land-based waste management to minimize plastic leakage into the ocean.

Overall, economic, social, environmental and health implications underscore the urgency to meet the growing challenge to end the accelerating trend of marine plastic pollution. Plastic value chain management is complex and requires change on structural and systemic levels, and at every phase of the chain. Action is needed to develop circular economy policies, increase consumer awareness, and install sustainable waste management systems, as well as to reduce the fossil fuel-based production of single-use and difficult-to-recycle plastic products entering linear waste streams and polluting the natural environment. Identifying and addressing the needs and rights of vulnerable groups of society are key to ensuring collective action to tackle marine litter and plastic mismanagement is inclusive, fair, participatory, gender-responsive and sustainable in the longer term.

Marine plastic litter in East Asian Seas:

Gender, human rights and economic dimensions

Introduction

Estimates show that 8,300 million metric tons of virgin plastics have been produced as of 2015.[1] This breaks down to approximately 6,300 metric tons of plastic waste generated, of which around 9 per cent was recycled, 12 per cent incinerated, while a full 79 per cent accumulated in landfills or the natural environment. This has enormous implications on oceans and other water bodies where plastic accumulates and harms marine and aquatic species as well as human populations. Studies suggest that between 4.8 and 12.7 metric tons of plastic enter the world's oceans from land per year and plastic comprises three-quarters of marine litter.[2] Marine litter is defined as any anthropogenic, processed, or manufactured solid material in any size that has been disposed or abandoned in the environment and reached the sea. Throughout this document we use the term marine litter to describe marine debris as established by the Honolulu Strategy.[3] Different types of marine plastic litter and sources are described in the **Annex**.

Marine plastic litter affects communities and businesses. This impedes public health and well-being, as well as economic development through loss of income-generating activities and material investments in coastal areas. These consequences will not cease but will accelerate as plastic pollution increases. By directly affecting livelihoods and, food security, as well as increasing exposure to health risks, continuing plastic pollution will amplify the vulnerability of those already poor and marginalized social groups, such as fisherfolk and informal waste pickers, especially women and children in these communities.

The first part of the report will shed light on the unequal impacts of plastic pollution on groups of women, children, waste workers, and coastal communities. Their health, livelihoods, dignity, and overall well-being are placed under increasing risk due to marine plastic pollution, therefore infringing on their human rights. This then justifies a human rights-based approach to accelerate solutions for mitigating plastic pollution and reducing its adverse effects through enabling policies, governing institutions, and civil society action.

Gender inequality makes the adverse risks to marine plastic pollution unequal. People are exposed to plastics or marine plastic pollution in disproportionate and different ways, according to gender, ethnicity, age, class, geographical location. To elaborate on this, a gender analysis is conducted in each phase of the lifecycle of marine plastic litter in this report, from production on land and use and disposal as waste by consumers to its leakage to the ocean (see Figure 1). Safe and regulated production, use, consumption and disposal on land can ensure that plastic litter does not eventually pollute the oceans. Once plastic litter reaches the sea, the costs of clean-up and management become onerous and expensive.

Figure 1: Path followed by plastics along the value chain

The second part of this report will discuss the problem of marine plastic pollution and its economic implications. The report will show the potential revenue and employment losses to the fishing, shipping and tourism sectors within countries in the East Asian Seas region that are vulnerable to marine plastic litter. These findings will provide some evidence for major producers and managers of plastic – such as states and businesses – to act upon their duty to ensure sustainable and responsible production and consumption processes. Moreover, the analysis shows existing knowledge gaps and opportunities for further research to strengthen the evidence base for more equitable and effective decision making on marine litter. Results from this discussion will inform inclusive deliberative action and solution analysis through SEA circular project activities.

The report is based on a desk review of relevant research and grey literature on gender and human rights around marine plastic litter. A few key informant interviews with scholars and practitioners in the waste management sector were also conducted for contextual understanding on the impacts of marine plastic litter in selected Asian countries. The report also explores various human rights instruments that address gender equality and environmental protection to ensure an inclusive, just, safe and clean environment for all. A gender and human rights-based approach provides a framework for addressing marine plastic litter in an inclusive manner that in essence respects the rights of consumers, workers, and disadvantaged groups of society and does no harm. In what follows, gender equality and human rights will be discussed with reference to specific issues around marine plastic pollution. States and businesses can base their deliberative action on the appropriate human rights instruments that can help address the adverse effects of marine plastic litter.

HUMAN RIGHTS-BASED APPROACH

A human rights-based approach is a conceptual framework for the process of human development that is normatively based on international human rights standards and operationally directed to promoting and protecting human rights. It seeks to analyse inequalities which lie at the heart of development problems and redress discriminatory practices and unjust distributions of power that impede development progress.

1.1 Gender equality and human rights

Gender equality

The concept of gender equality is based on the concept that all human beings, regardless of their sex or gender identity, are free to make choices, to voice their interests in public decision-making and political deliberations, and to develop their abilities freely in society without being limited by stereotypes, gender roles, or prejudices that constrain their human potential, benefits and opportunities. Empowerment of women and other disadvantaged social groups is integral to achieving social justice, as well as gender equality.

In striving towards gender equality, it is important to understand that inequality results from multiple forms of discrimination where gender intersects with race, ability, class, age, ethnicity, and caste that result in particular experiences of privilege or marginalization caused by wider structures of economic, political and cultural power.[4, 5] In short, a poor, rural woman from an ethnic minority has a different experience of marginalization from more well-off rural women and men from other majority ethnic groups. Inequality is thus more complex and not binary, or simply between women and men.

Human Rights and Human Rights-based Approaches

Human rights, according to the Universal Declaration of Human Rights (UDHR), are "inalienable rights" that people have just by virtue of being human.[6] Human rights provide standards for people to meet fundamental and basic human needs such as for food, shelter and security with dignity, freedom and equality regardless of "race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status."[7] States and businesses are the main duty bearers responsible for providing these rights to people.

Core standards of the human rights-based approach relate to the range of basic needs of the human person, but they also show the interconnectedness (i.e. the right to adequate housing cannot be understood without considering issues such as access to clean water, sanitation, work, health) of substantive rights. For instance, the right to adequate housing cannot be understood without considering issues such as access to clean water, sanitation, work, health. These rights are obligations that governments have to people, including procedural rights that describe how governments must function to provide human rights protection. This includes the provision of processes that allow the public to participate in decision-making and to perform civic duty, such as the right to partake in decisions about environmental issues as set out in the United Nations Economic Commission for Europe Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention).[8]

1.2 The policy environment: Taking a gender lens and a human rights-based approach to marine plastic litter

The report takes a gender lens as it recognizes that gender inequality leads to the disproportionate burdens and effects that exposure to and management of plastics and marine plastic litter create in people's lives, especially for poor urban and rural women and girls. To complement this gender lens, a human rights-based approach to marine plastic litter also recognizes that the effects of marine plastic pollution on marginalized groups fundamentally infringe on their basic human rights to decent work, and a safe and healthy working and living environment.

In human rights language, people are referred to as "rights holders", while states and businesses are cast as "duty bearers", responsible for respecting, protecting and fulfilling the rights of people within their jurisdiction (which does not include international waters). A human rights-based approach compels duty bearers to prevent marine litter from causing any harm as they are accountable to citizens and people as rights holders. This rights-and-obligations relationship tends to be ignored during attempts to shift

responsibilities for production and management of marine plastic litter from the major producers and managers of plastic – that is, corporate enterprises as producers and governments as protectors – onto people as consumers. A human rights-based approach therefore holds states and producers of plastics accountable for the safety, health and well-being of consumers. Duty bearers – states as well as private sector – must use this awareness to take actions towards addressing the violations of the public and citizens' rights for a plastic-free and healthy environment.

Several non-legally binding international frameworks commit states in the South-East Asia region to address the issue of marine pollution, including the 2030 Agenda for Sustainable Development and Sustainable Development Goal (SDG) 14 on life below water. The SDGs explicitly call for the reduction of all marine pollution by 2025 in target 14.1, with indicator 14.1.1 supporting an index on floating plastic litter density. SDG 3 on good health and well-being calls for a substantial reduction in deaths and illnesses caused by water pollution under target 3.9. SDGs 11 and 12 are also of close relevance to the issue of reducing marine plastic litter as they call for commitments to "make cities and human settlements inclusive, safe, resilient and sustainable" and "ensure sustainable consumption and production patterns" respectively. Under each of these overarching goals are sets of more specific targets with relevance to reducing marine plastic litter and with a strong focus on prevention, reduce, recycle and reuse of waste and on protection and restoration of marine and coastal ecosystems. Some of the social and economic aspects are also addressed through a focus on "sustainable tourism that creates jobs and promotes local culture and products" (SDG 12.b) and on human health (SDG 12.4). SDG 5.4 aims to provide social protection services to women and girls, and promote shared responsibility in the household, which can also apply to waste management.

In 2017, the first UN Ocean Conference called for accelerated action to "prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine litter, plastics and microplastics"[9] with over 600 voluntary commitments registered globally by a range of public and private sector entities related to SDG target 14.1 at the time of writing this report.

As parties to important treaties and frameworks, as well as through customary law, many countries in the region have committed to considering gender and human rights when addressing marine plastic litter (see **Annex** for some relevant international policy instruments and agreements). For example, Article 207 of UNCLOS makes the point clearly: "States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment from land-based sources, including rivers, estuaries, pipelines and outfall structures, taking into account internationally agreed rules, standards and recommended practices and procedures." As such, states are obligated to ensure their compliance with international human rights standards at all levels of government while integrating principles of accountability, access to remedies, participation and non-discrimination. Further, states must also provide for procedural rights and ensure that processes for public participation are available, as well as allow people rights and processes to seek for remediation from environmental harm.

Additionally, businesses are also duty bearers responsible for preventing the impacts of plastic litter and considering gender and human rights concerns in their interventions. Private sector actors have a duty to follow state sanctioned protocols to respect human rights through due diligence and do-no-harm principles, over and above what may be required of them by national law.

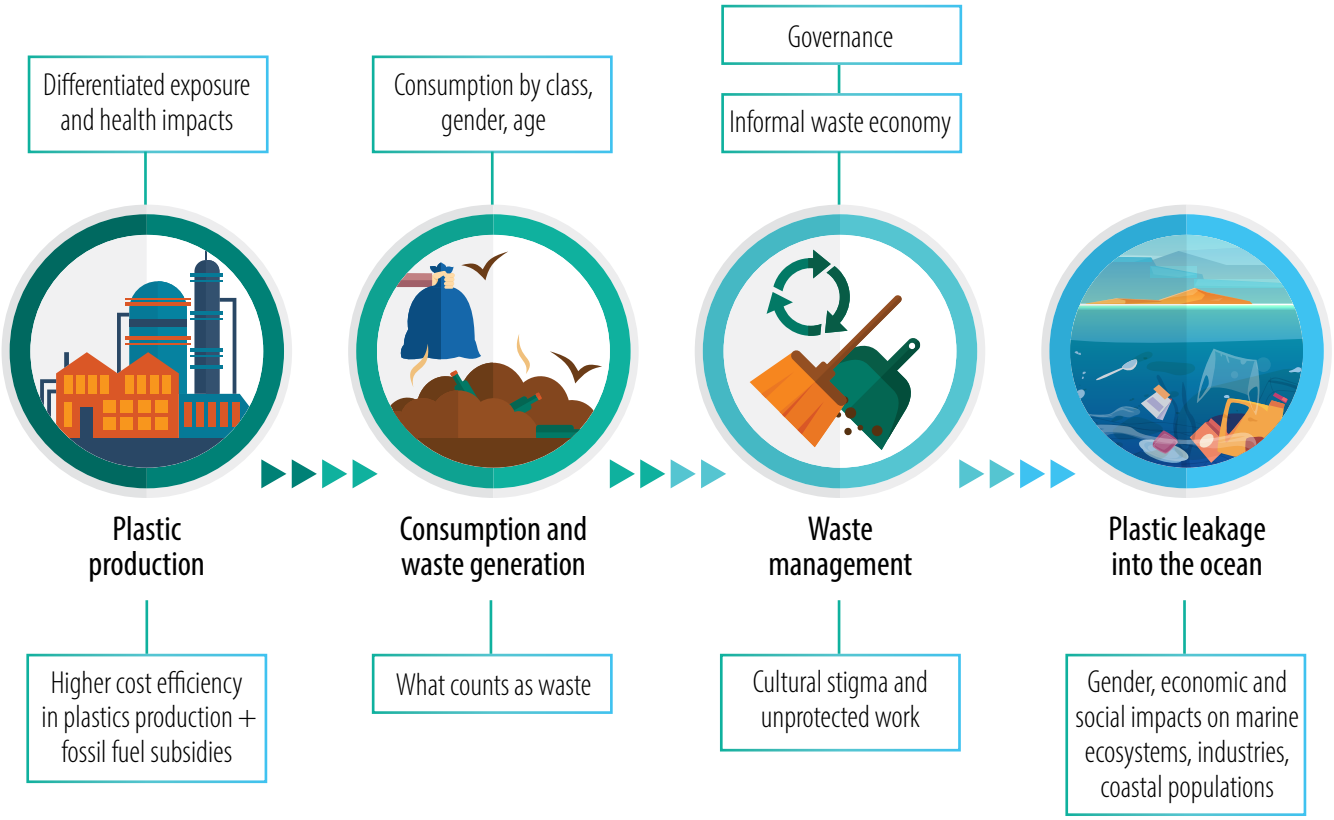
Lastly, human rights and gender considerations must be integrated with policies, business plans, processes and decision-making aimed at tackling the problem of marine plastic litter. To sufficiently ensure that human rights and the needs of women, girls and disadvantaged groups are considered, decision-making processes should also be supported by public services and health and safety protocols and social protection benefits as employees in the plastic waste management sector and as consumers of plastic materials.

PART 2:
Gender and human rights dimensions of plastic production, waste management and marine plastic litter

Human society is linked to plastic in several different ways. Our societies and cultures have assigned roles, unequal power status, and obligations shouldered by women and men based on their age, class, race, ethnicity, all of which define how they relate to and are exposed to plastic, through its production, consumption, and disposal when it eventually becomes waste. The cultural and economic values attached to waste also vary according to context, which eventually determine who and how plastic waste is handled and managed. The effects of people's exposure to plastics have gender-differentiated health and physical repercussions. These differences are heightened in large part due to the intensification of plastic consumption and pollution, which ultimately affect all living organisms in terrestrial and marine environments. These concerns therefore highlight the importance of addressing the prevention of plastic litter at source and as it makes its way to oceans that lead to adverse effects.

This section explores the gender and human rights dimensions of the flow of plastic to the ocean, tracing the gender and human rights implications of the production of plastics, how it is generated as waste through consumption practices, its management as waste, and its eventual destination in oceans (See Figure 2). The same trajectory is used in Part IV to demonstrate possible intervention points where civic and public policy action are of key relevance. It is important to bear in mind that this is a simplified illustration of a linear model of the production-use-disposal chain, and leakage of plastics into the ocean can occur at all stages. Often leakages are caused by inadequate collection and management of the waste.

Figure 2: Path followed by plastics along the value chain to leakage into the ocean environment and sub-components[10]



2.1 Health risks associated with plastic and marine plastic litter

2.1.1 Health effects of plastic ingestion and exposure

Possible adverse health effects can be traced to particle toxicity, the physical effects of plastic particles in human cells; to chemical toxicity, exposure to dangerous substances present in plastic particles; and to exposure to pathogens and parasites that are carried by plastic litter. Humans are physically vulnerable to fragments of plastic materials as well as to chemical substances from plastic litter. Further, discarded medical and personal hygiene wastes such as syringes, diapers, and condoms in the marine environment constitute a health hazard through direct contact.[11]

Particle Toxicity

Plastic particles, particularly very fine particles, can inflict lung and gut injury and can cross cell-membrane barriers such as blood, brain, and human placenta barriers. Health effects can include oxidative stress, cell damage, inflammation and impairment of energy allocation functions.[12]

Chemical Toxicity

Exposure to bisphenol A (BPA), a basic ingredient of plastic compounds, occurs through the ingestion of food and drinks contaminated with BPA as well as through drinking from bottles and cans coated with epoxy resins. BPA is used in the manufacturing of polycarbonate plastics and epoxy resins and it is known to be an endocrine disruptor that can interfere with individual human development.[13] There is some evidence suggesting that exposure to BPA is associated with obesity and cardiovascular disease

and also with reproductive and developmental damage, such as abnormal penile/urethra development in males and increases in breast and prostate cancers. For women, it can be associated with neuro-behavioural disorders including autism and early sexual maturation.[14] Indeed, this compound is present in the general South-East Asian population as one study found BPA present in urine samples of 94.3 per cent of the general population of China, India, Japan, Republic of Korea, Kuwait, Malaysia and Vietnam with no significant difference in concentration between men and women.[15]

Chemical exposure can also occur through ingestion of contaminated seafood and other common sources of nutritional needs. Research suggests that fish contaminated by microplastics can affect human health through the food chain accumulation.[16] This is particularly a concern with seafood such as mussels that are eaten whole, without removing the intestinal tract. In Indonesia, polychlorinated biphenyls (PCBs), a group of chemicals normally found in electronics and restricted by the Stockholm Convention on Persistent Organic Pollutants in 2011 due to its health impacts, is still prevalent and have been found in mussels in waters around Java Island.[17] Following reports of microplastic contamination in table salts from China, evidence of microplastics have been detected in table salts around the world.[18, 19] Open waste disposal sites have also been identified as potential sources of PCBs and other persistent organic pollutants in Cambodia, India, Vietnam and the Philippines.[20]

Additionally, biological distinctions between men and women – such as differences in body size, amount of adipose tissue, and hormones – may amplify the effects of toxic chemicals on the human body and their elimination from the body. The greater proportion of body fat in women allows for greater reserves of chemicals such as phthalates to be stored in those cells. The vulnerability of women to chemicals also changes at different stages in their lives. Pregnant women can be more sensitive to chemical exposure, and environmental chemicals such as phthalates, BPA and polybrominated diphenyl ethers can cause adverse birth outcomes in their children. Numerous studies suggest links between breast cancer with exposure to endocrine disrupting chemicals both in the womb and after birth. Further, natal exposure to phthalate plasticizers and BPA also may affect breast cancer diagnosis at adulthood. In addition to the gendered and social dimensions of plastic waste production, use and management, biological differences between men and women determine that women can be significantly more at risk to the health threats of marine plastic litter.[21]

While these and other health impacts caused by plastic additives and chemicals remain underexplored, these initial findings suggest that further research will need to take into account particular risks and exposure for women and men and other groups of society.

2.1.2 Health threats from marine plastic litter

The health threat from marine plastic litter stems from the accumulation and fragmentation of marine plastic litter in the world's oceans. Marine litter can contain toxic chemicals including BPA, antioxidants, UV-stabilizers, flame retardants such as polybrominated diphenyl ethers, and plasticizers including phthalates. As well, PCBs accumulating within in micro spaces in plastics are known endocrine disruptors that, even at very low doses, can damage human health.[22]

Pathogens and parasites can be carried on marine plastic litter that acts as a habitat for pathogens by providing surfaces for bacteria to colonize. Marine plastic litter can carry pathogens into drinking and bathing water to threaten human health.[23] Plastic litter can serve as breeding grounds for viruses such as Zika and dengue. Plastic particles enter the food chain as shown in a 2008 study, conducted between 2004 and 2006 in Singapore, of persistent organic pollutants (POPs) presence in 88 maternal adipose tissue samples. The study found that pesticide compounds were dominant contaminants in the samples, followed by plastic compounds such as PCBs ingested in the seafood diets of the Singapore population.[24]

Marine plastic litter has direct and indirect repercussions for fishing and other coastal communities as it degrades marine ecosystems and threatens marine mammals, birds, fish, and turtles by impairing their health and functions. Plastic particles bioaccumulate and toxic substances concentrate to weaken the ecological performance of individuals in a variety of ways including compromising the ability to capture food, digest food, sense hunger, escape from predators, and reproduce.[25] Species and ecosystem decline affects the livelihoods of marine dependent communities. Globally, coastal communities are experiencing rapid socio-economic and environmental changes from tourism, pollution and climate change. In one study, a coastal fishing community along Thailand's Andaman Sea ranked the "increased garbage in the ocean" the highest environmental stressor.[26]

In addition to the health consequences due to consumption of seafood and exposure to degrading plastics, fishing communities experience personal injuries from marine plastic litter, as well as fouled equipment and the additional time spent cleaning and repairing the damage. Damages to marine vessels are more prevalent in smaller vessels, those typically used by local fishers, because the motors and gears in these vessels are more exposed. For fishers, even minor decreases in fishing yield affect their ability to meet basic needs. This leads to consequences such as adoption of damaging practices, including the use of explosives, and abandonment of the fishing lifeway.

In artisanal or small-scale fisheries, women typically concentrate on shell and smaller fish while men catch offshore fish. Men and women also occupy different spaces with men catching fish offshore along reef edges, while both women and men use areas closer to the shore like estuaries and mangroves. Women are also more involved in time-consuming onshore tasks such as making and fixing nets, processing catches and taking fish to market. Further, in many parts of the work, women gather and glean shellfish.[27, 28]

The distinct roles and spaces imply different exposure to marine plastic litter for men and women. As women are involved in near-shore activities, beach litter poses a problem for fishers collecting shellfish which are harmed by the pollution. For male fishers, marine plastic pollution from lost or discarded fishing gear can cause economic losses.[29] Further, youth and children are also involved in the fisheries sector and they too could be impacted by marine plastic litter, however, there is a lack of data on their participation in this sector and it is difficult to discern their level of involvement.[30]

This limited evidence suggests that the socio-cultural and health effects of marine plastic produce a wide range of threats to the human rights of affected individuals and communities. First, marine litter as occupational hazards for those living in the vicinity or affected areas is a direct potential threat to people's right to life and security of person (UDHR Article 3). Immediate steps must be taken to ensure that local peoples' right to security of the person are not further endangered by marine plastic litter.

Second, government policies can result in discouraging traditional work and pushing members of coastal communities to adopt alternative livelihoods or to become dependent on a narrow range of livelihood sources. When fishing community members take employment in the tourism sector or when prices of local goods and services increase as a result of marine protection areas, those communities become even more vulnerable to degradation of natural resources due to marine plastic litter. This whole process is a critical threat to the injunction stated in the ICESCR that "In no case may a people be deprived of its own means of subsistence" (ICESCR Article 1(2)). As potential further threats to the right to just and favourable conditions of work (ICESCR Article 7) and adequate standards of living (ICESCR Article 11), these dynamics must be tackled.

2.1.3 Health implications of producing and handling plastics

In the plastics industry, workers can be exposed to a myriad of chemicals, some of which are hazardous to biological reproductive functions and abilities specifically. The multitude of toxic chemicals used in plastics production include styrene, acrylonitrile, vinyl chloride, phthalates, BPA, brominated flame retardants, heavy metals, a host of solvents, and complex chemical mixtures.[31]

Existing epidemiologic and biological evidence suggesting that women in the plastics industry are developing breast cancer and experiencing reproductive problems at increasing rates.[32] Women working in the plastic sector are potentially at more risk of occupational breast cancer from exposure to endocrine disruptors. Premenopausal women in the plastics industry may have much higher body burdens of hormone-disrupting chemicals such as BPA, phthalates, vinyl chloride, styrene and acrylonitrile than the general population. Women in other sectors working with plastic products, additives or ingredients – such as nurses, firefighters, rubber, food and beverage production – may also have elevated risk of occupational breast cancer. In Canada, where women hold a wide range of jobs in the plastic industry and women comprise a majority of workers in automotive plastics manufacturing, a study found that such had a five-fold elevated risk for breast cancer and reproductive disorders.[33]

A 2009 study examined the possible association between employment in the plastics industry and infertility in Denmark. It found that 107 cases of treatment for female infertility were observed among female plastic workers, whereas there were 49 cases of male plastic workers who sought fertility treatment. The increased incidence of infertility treatment in female plastics workers motivates more specific studies of reproductive occupational health in the plastics industry.[34] This study also referenced literature from the 1980s that investigated whether working in plastics was associated with reproductive toxicity. Notably two cited case control studies report marginally increased risks for spontaneous abortions in women working with specific production processes.

One recent study investigated time to pregnancy in partners of men exposed to di(2-ethylhexyl) phthalate while working at companies processing polyvinyl chloride. Time to pregnancy was not prolonged among couples with paternal exposure to di(2-ethylhexyl) phthalate. Moreover, a European study of male workers in reinforced plastics with exposure to styrene did not indicate deteriorated fecundability. In another study, the breakdown of workers into specific tasks in the industry further indicates that those workers most exposed to toxic substances are women.

The findings of increasing rates of breast cancer, spontaneous abortions, and other reproductive issues in women working in plastics manufacturing and handling point out that crucial steps must be taken to ensure women's equal rights to "protection of health and to safety in working conditions including the safeguarding of the function of reproduction" (CEDAW Article 11(f)). Currently all COBSEA countries are parties to the International Convention on the Elimination of All Forms of Discrimination against Women (CEDAW). There are also laws on occupational safety and health in these countries that are supported by the International Labour Organization (ILO). Equal access to healthcare must be guaranteed for affected workers and family members (CEDAW Article 12(1)). Meeting these human rights-related obligations includes ensuring access to health information, focused attention on reproductive health and treatment by manufacturing firms that employ female workers and strengthening standards of working conditions and occupational health regulations. These efforts must be matched by accountability measures strictly monitored by public health authorities. Finally, labour unions can also actively take up gender, reproductive health and rights, and occupational health and safety with employers as mandated by national laws and supported by international agreements such as the 1981 ILO Convention on Occupational Safety and Health.

The limited evidence presented here suggests a possible infringement on the human rights related to health and decent work of women and men working in plastic production and manufacturing, especially those exposed to working conditions with minimal occupational health regulations. Workers may be chronically exposed to substances that are potential carcinogens and endocrine disruptors and may have limited knowledge of possible impacts or access to appropriate protection or representation. The findings of higher rates of infertility for women workers in contrast with men point out that the specificities of women's bodies, and of their specific role in the plastic industry, must be taken into account when devising policy. Further research into this issue must be carried out to shed a light on health implications of handling and manufacturing plastic products to inform health and safety standards and mechanisms for redress and compensation.

2.2 Plastic consumption and waste generation

Studies in Europe show that women purchase domestic goods such as food, clothing, medicine, cosmetics and household items more often than men. In contrast, men purchase more expensive goods like cars and electronic equipment. In terms of global demand, about 21.7 per cent of plastic is used for household appliances, furniture, sports equipment and medical items.

While there is little information on gender differentiation in plastic consumption, especially in environments other than the household, it may be reasonable to extrapolate that women's use and purchase of household items – many of which are plastic or packaged in plastic – may make them greater users of plastic. For instance, women are the biggest users of cosmetics, making up for 85 per cent of the consumer base. These products can have plastic additives, such microbeads that are found in a variety of products: conditioners, shower gel, lipstick, hair colouring, shaving cream, sunscreen, insect repellent, nail polish, bubble bath, anti-wrinkle creams, moisturizers, foundation, hair spray, facial masks, eye shadow, and mascara. Women also are consumers of feminine disposable hygiene products such as tampons and sanitary pads as well as nappies for infants and the elderly.

Microplastics could be absorbed through the skin, mouth and nose and transferred to the lymph and circulatory systems, where they could damage human cells. Studies indicate that when microplastics are inhaled, they could cause allergic reactions such as asthma, cancer and heart disease.[35] A study identifying microplastics containing polyethylene in Beijing's personal care and cosmetic products found that 7.1 per cent of facial cleansers contained microplastics while 2.2 per cent of shower gel products contained microplastics.[36] As these products are largely used by women, they can be more vulnerable to the effects of exposure. Furthermore, research has found that women generate more waste, both recyclable and non-recyclable largely due to the waste generated by household goods that women may purchase and use due to their gender roles.[37]

Women's responsibility for waste management in households is deeply mediated by norms and beliefs around the gender division of labour as well as wealth and poverty, caste, and hereditary and age group status.[38] Gendered stereotypes have often considered women as closer to nature and characterized them as carers of the natural environment.[39] Other stereotypes link women to dirt and disorder.[40] These associations feed into accepted gender divisions of labour that, at least in the household, reserve the dirtiest and most demeaning tasks for women. In many cultures, this has been reinforced by notions of women's impurity.[41] Dealing with waste has traditionally been considered as part of traditional housewifery in many parts of the world. On the other hand, as in many industries, women are edged out of waste management activities if these become profitable enterprises. For instance, a case study from Latin America found that waste picker cooperatives have clear gender divisions and women lost out on opportunities to recycle valuable waste or occupy positions of authority due to their household responsibilities.[42]

Furthermore, consumption and disposal patterns linked to tourism is relevant to reducing marine litter. In a report that sought to identify tourists' pro-environmental characteristics from ecotourism studies showed that a higher level of education and higher incomes were key to pro-environmental behaviour and possibly to less littering. The report suggests that people who observe pro-environmental behaviour in tourist destinations are also environmentally friendly at home.[43] Another study[44] shows that gender intersects with class and income when looking more closely at results of the survey. In this case, positive attitudes towards the environment were most evident in the case of tourists who are older women, highly educated and higher income earners.

Generally, the primary pathways for waste entering the ocean include human mobility and behaviour, as littering or discarding; transport vehicles; wind; and water along rivers, creeks, streams and storm water. By far, density of human population is the most important factor in determining the debris load at coastal sites. Accordingly, behavioural theory argues that the three strongest predictors of debris at a site has

to do with economic wealth and social disadvantage in the population near the site, rendering them as potential areas for deliberative interventions.[45]

Another study suggests that in parts of Asia changing consumer habits, attitudes towards waste, and inadequate waste collection contribute to the plastic leakages into the ocean. Tourism behaviour also generates massive waste in coastal destinations – the top 10 types of litter collected during coastal clean-up campaigns are related to leisure activities.[46] Specifically, however, there is very little research on the gendered dynamics of generating plastic litter in coastal areas. A 2011 study exploring gender differences in environmental behaviour among 10,000 respondents in 10 countries suggests that differences between women and men in recycling, transport use, energy efficiency, organic food consumption and water-saving behaviours are minimal, overall.[47] Other evidence submits that women recycle more materials than men.[48] Other studies meanwhile concur that women exhibit more concern for the environment than men.[49, 50] A 2017 meta-study concludes that men resist green behaviour as it is considered feminine, but the analysis appeared to focus on samples of US university students.[51]

Generally, the degree to which waste is recycled depends on income levels, the existence of local and national markets, demand as secondary raw materials, level of financial and regulatory governmental intervention, prices of virgin materials, international trade in secondary raw materials and relevant treaties. In many countries, for example India and China, major industries have a strong dependency on the availability of secondary raw materials, either local or imported.[52]

From a human rights standpoint, such evidence suggests that further steps must be taken by countries in the South-East Asia region to ensure non-discrimination in men and women's access to education (ICESCR Article 13) and information (CEDAW Article 10) concerning waste generation, as well as equal opportunities to participate in efforts to understand and tackle waste generation and disposal at all levels. Differences between income groups in recycling and waste generation patterns in general suggests that crucial efforts must be made to ensure that access to recycling facilities, as well as information on waste generation, is provided without "discrimination of any kind as to race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status" (ICESCR Article 2(2)). Further targeted research into plastic consumption patterns of different social groups and monitoring of sources of waste leakage are needed to inform regulations, changes in product design, public education and outreach campaigns.

2.3 Informal waste management

This informal sector consists of small businesses and self-employed people who operate with low capital investments and with little or no state regulation. Its workers are often considered, inaccurately, to be poorly skilled. Yet, the informal waste recycling sector as a whole contributes significantly to a more circular plastic economy in many contexts. For instance, a recent ESCAP regional guide on informal waste workers stated that informal waste pickers generate huge savings for cities because they reduce the volume of waste that needs to be collected and brought to the landfills.[53] The regional guide presents examples such as in India, where informal waste collection saves Pune municipality an estimated USD 10 million yearly in labour costs, at statutory wage rates, and about USD 2 million in reduced waste transportation and processing costs. Other examples of cities include Lima (Peru), Cairo (Egypt), and Quezon City in the Philippines, where informal waste pickers are estimated to contribute to annual avoided waste collection and disposal costs of around USD 15.9 million, USD 13.7 million, and USD 3.9 million, respectively.[54]

Furthermore, this sector is one of the most dynamic and adaptive, catering to ever-changing market demands in plastic products. Informal waste workers rely on evolving and developing market forces to secure their income and are exposed to price volatility and undervaluation of plastic resources. Robust evidence on informal waste value chains in South-East Asia is needed to inform equitable pathways that

integrate and future-proof informal public services in a manner that addresses the needs and rights of informal waste workers and reduces waste leakage.

2.3.1 The informal waste sector: plastic waste and its collectors

The gender dimensions of waste management have been a subject of urban environmental research and policy intervention in developing regions for decades. Research in this area has largely concluded that poor women and children comprise the informal labour force in the collection and disposal of waste both in their households and communities where they may earn irregular earnings, or sometimes none.[55] On the other hand, paid employment in public waste collection and management usually favours men – but poor women, most likely from informal settlements, work at the bottom of the waste supply chain as street or house-to-house collectors.

The informal recycling sector is often highly skilled at collecting waste with high commercial value.[56] They collect waste and add value to them by sorting, cleaning, altering the physical shape to facilitate transport or by aggregating materials into commercially viable quantities.[57] Waste materials with good commercial value are plastics, paper, cardboard, glass, textiles, aluminium, steel and other metals.[58] Women and girls appear to be most vulnerable, not only because they collect the least valuable waste that generates very little income, but also because, from a far less powerful position, they are also embroiled in networks of reciprocity and relationships of interdependence. This applies both to the more exploitative arrangements, for example between pickers and middle dealers, as well as the more benign and supportive family and kinship networks.[59] A study in Bangalore found that the women and girls who picked waste in the city were often from female-headed households with no other sources of income. They were exposed to sexual harassment and moved in groups for social protection, only going out to pick after first light. As a result, they accessed the least valuable waste materials, left over after other pickers had finished.[60] It is therefore a situation of mutual reinforcement between the social status and identity of the waste picker and the type and value of waste collected.

Informal waste pickers are also exposed to increased risks as basic principles of occupational health and safety are disregarded. Waste picking in open dumps is considered to be the most detrimental to occupational health, which is highly risky because of manual handling and lack of protective clothing and/or equipment, resulting in direct contact with waste. In India and Mexico, informal recyclers have lower life expectancy and higher infant mortality rates compared to the general population. Informal recyclers also perceive that they have poor health: In Vietnam, 51 per cent of recyclers rated their own health as poor, or worse than what they considered for the national average.[61]

In Vietnam, China, Indonesia, Thailand and the Philippines, over 80 per cent of plastic waste from land-based sources is of low value, such as plastic shopping bags, and not typically collected by waste pickers. The value of these plastics does not merit the collection, transportation and sorting by either the informal or formal sectors. For this reason, only about 40 per cent of plastic waste is collected for recycling in these five countries. The remaining 60 per cent is neither collected nor sorted. In these countries, 85 per cent of the plastic extraction for recycling occurs at this stage, implying that sorting of plastic waste does not occur at the household level.[62] When the plastic waste does reach collection and sorting stages, waste pickers in these countries are relatively efficient at extracting high value plastics. In the Philippines for instance, polyethene bottles are extracted at a rate of 90 per cent while low-value plastics are not extracted as they cannot earn waste pickers enough wages. A waste picker may earn seven times more income from collecting polyethene bottles in a ten-hour workday than from collecting plastic bags.[63]

Waste leakage and environmental contamination also occur where no adequate spaces are available to sort, clean and store waste. At this stage, waste with such low value/density that it is not worth selling will likely be put aside or tossed where the material degrades and is transported by wind and water to the ocean. In terms of sorting and categorizing waste, initial design and manufacture of products

must include industry-harmonized information about the product's recyclability and must allow for easy identification of different materials. Waste pickers recognize the differences and also learn techniques like ripping or bending plastic to determine the material type that indicates whether it is recyclable, biodegradable, or neither.

It is mostly poor urban and rural women and children who pick and collect waste on an informal basis. For instance, in Hanoi, Vietnam, the number of female waste collectors has grown, and over time their wages have decreased. In the 1990s there was an even ratio of men and women waste collectors, but by 2006 women comprised 94 per cent of waste collectors. Women also collect more waste than men, averaging 39kg/day compared to men's 33.5 kg/day. In the 1990s, women made 89 per cent of men's salary rate, but in 2006, women made 61 per cent of men's salary rate.[64]

Waste picker incomes are very low, although they are not necessarily the lowest in society.[65] Their low income is due to their low position in the trade hierarchy for recycled materials. They are often badly exploited and paid very low prices for the materials they collect. This is particularly true in markets where only one buyer exists. Such conditions often prevail for wastes collected from dumps, where the distance to the city makes transport impossible for impoverished waste pickers. In some cases, the pickers have to pay for the right to access the waste and may also have to sell their materials to the same individual or organization.[66]

In a study of informal waste pickers in India and Pakistan, researchers found that the most important axes of inequality and interdependence relating to waste work in South Asian cities are those of class and caste. Everywhere that people are involved in waste work –street cleaning, waste collection, or waste picking – they do it because they have little choice and are stigmatized by virtue of the dirty work they do. They are often from marginalized groups such as ethnic or religious minorities or are rural migrants who compete for urban livelihoods.[67]

Hence there is a need to combat this stigma, to understand and acknowledge and support waste pickers' contribution to a public service. Efforts are needed to support waste pickers who can limit leakage during these processes and devise ways to improve their own livelihoods.

Several examples of success show how city governments, the private sector and waste workers themselves have improved conditions for waste workers by formalizing informal waste work. In Colombia, a waste picker cooperative diversified their services to include cleaning services in addition to waste picking. In Bogota, the waste pickers organized and filed a lawsuit that provided them the right to participate in the bidding process for the city's municipal waste collection services. In some cities, bidding processes are purposefully set up with prejudicial thresholds such as high financial baselines or financial assurances that make it difficult for waste pickers to participate. Yet, cities can benefit vastly from allowing informal waste pickers to participate as they have lower operating costs. The state can also show its support for waste workers by making concerted efforts to legally recognize and support them. In Brazil, former President Luiz Inácio Lula da Silva, who was a blue-collar worker himself, created laws and programmes to recognize nearly 500 waste worker cooperatives in Brazil. His government not only urged businesses to work with these cooperatives but also provided training and financial support to them.[68]

The informal waste sector is fraught with human rights violations and is often a setting for social and gender injustices. Women informal waste workers are more vulnerable to gender-based violence due to the intersection of their gender and insecure working conditions in streets, dumps, and landfills.[69] Earnings are low, and they are not covered by social protection policies and programmes. Additionally, there is poor implementation of any health and safety programmes for informal waste collectors. For instance, their collection activities involve exposure to hazardous substances such as cadmium, lead, and brominated flamed retardants, tasks that are frequently performed by women and children.[70] One common method of processing waste amongst waste workers is to throw equipment into open fires to melt away plastics and non-valuable metals. This releases carcinogens and neurotoxins in the air, contributing to smog and noxious fumes that nearby workers inhale.

The management of waste and plastic is therefore embedded in a complex web of power relations and hierarchies that intersect with gender, class, caste, and sexuality and has its share of human rights transgressions. Waste management can be degrading, exploitative, competitive, risky and lucrative, depending on who does it and who ultimately benefits.

2.3.2 Women as agents of change in reducing plastic pollution

A growing interest in harnessing women's participation in plastic collection and recycling is rising as a response to plastic pollution. One study indicates that both women and men can be agents of change in reducing the consumption of plastics, depending largely on gender-specific consumption patterns. For instance, one way for women to do this is to be more discriminating in the use of personal care products that use microplastics.[71] There are also increasing numbers of cases with women's awareness of the adverse effects of plastics inspires them to become active in managing plastic waste.

A study in Bamako, Mali, pointed out that women market vendors are aware of the adverse effects of the use of plastic bags. The vendors were concerned with the spread of mosquitos due to the increase of plastic bag waste or flood risks due to the obstruction of drainage by plastic waste. However, women were excluded from government policymaking despite their potential to be agents of change. Excluding them created obstacles for initiatives to reduce plastic bags pollution to gain the attention and support of plastic bag users.[72] There is a growing campaign to include women's groups in the discontinuation of plastic bag use in other places, in large part because of women's central role in the consumption of household goods and their shopping patterns.[73]

In Cambodia, where the government has announced a plan to cut plastic use by half within 2019 and by 70 per cent in 7 years, women are coming up with creative ways to reuse plastic. In Siam Reap a social enterprise called Rehash Trash, set up in 2015, teaches disadvantaged local women from 24 families the techniques to turn plastic bags into household items and accessories that are sold in the organization's shop. Around 5,000 plastic bags are converted weekly into crafts for sale in the shop. The organization also provides literacy lessons and access to medical services to their employees.[74] In the capital of Cambodia, Phnom Penh, two 21-year-old women students, Sokanha Ly and Bunhourng Tan, founded a start-up called Eco-Plastic that aims to use Plastic Asphalt Concrete, a product they designed from plastic scraps and bitumen for building roads.[75]

Box 1: Progress in the Philippines' Waste Sector

The Manila Women's Balikatan Movement created the Linis Ganda programme that formalized a system of scavengers and itinerant buyers of recyclables into cooperatives. By formalizing the work of scavengers, the programme has helped to reduce the stigma towards scavengers, who are now called 'Eco aides.' The formalization of the cooperatives also allows them to access low-interest and collateral-free loans from the Philippine Department of Trade and Industry and from the Land Bank.[76]

Another case study in the Philippines concerns the city of San Fernando in the Province of Pampanga. A local NGO worked with the municipality on a scheme to hire scavengers as civil servants. The hired scavengers collect food scraps and pre-sorted recyclables from every house daily and bring it to one of the 35 waste warehouses throughout the city. This costs about 80 per cent less than the use of garbage trucks and has enabled the city to now recycle more than 75 per cent of its waste compared to 13 per cent before the scheme.[77] Despite such positive outcomes, research is still lacking on the gendered impacts of such schemes.

In coastal Yucatán, Mexico, Hanson studied the activism of local women in managing plastic waste in coastal areas.[78, 79, 80] Weak state response to environmental health issues surrounding the growing urban sprawl in these areas has led to poor waste collection and management services. Solid wastes and lack of drainage facilities resulted in outbreaks of cholera, dengue and rotavirus. To remedy this, the state prioritized large-scale coastal conservation programs through biodiversity protection, sustainable fishing and ecotourism to boost economic development that largely recruited men from these coastal communities. The local coastal town women began to advocate for stronger community-based waste management services because they often shouldered the burden of caring for family members who fell sick from waste-related illnesses. Finally, the women created their own recycling cooperative, *Chen Kople 'Lob*, that collects bottles and other recyclable materials including plastic products from households and brings them to a station where these materials are directed to a recycling centre. They also organize yearly wetland and beach clean-up campaigns. They have been recognized nationally and generated incomes from their collection and recycling efforts. Now their coastal communities also have fewer cases of disease outbreaks. Although the women themselves created this cooperative out of their own volition, policy dialogues with local authorities would have benefited from a stronger government response to the issues and would have opened channels of cooperation with the women's group.

More and more women's recycling and coastal management groups are emerging. For instance, in Africa, All Women Recycling in South Africa and Waste Aid in the Gambia are gaining significant traction for their awareness-raising efforts and coastal clean-up campaigns.[81, 82] Ninety women, young people and people with disabilities will benefit from direct training on plastics recycling, with broader health, environmental and economic benefits. In many other places, efforts to support women to manage coastal areas are growing such as in the Philippines, where capacity development on conservation is on the rise.[83] Again in the Gambia, women oyster harvesters are being trained about sustainable harvesting and the delicate mangrove ecosystem and in sub-Saharan Africa, for the first time, women are granted exclusive rights to a fishery.[84]

Box 2: Women in South-East Asia's Tourism Sector

Women in the tourism sector can be champions in tackling the issue of marine plastic litter as many are employed by the sector and many also work in leadership roles. Revenue in the tourism sector is entirely dependent on healthy and clean marine environments and coastlines.

The tourism sector, with its emphasis on soft skills over technical expertise, offers an attractive employment opportunity for women and for the youth who are less likely than men to receive formal education. Indeed, many women in South-East Asia are opting to work in tourism, and from 2007-2017 women's share of employment in the tourism sector grew the more in South-East Asia's emerging economies than in the region's G-7 economies. In Indonesia, the share of women employed in the tourism sector grew by 4 per cent while the share in China grew by 2.4 per cent.[85] In tourism, women are twice as likely to be employers than in any other sector. In the COBSEA countries of Indonesia, Malaysia, Thailand and the Philippines, more than half of tourism enterprises are run by women.[86]

However, the dependency of many women on tourism as a source of their livelihoods also means they are more suspectable to the economic damages marine plastic litter poses for the sector. Women are more likely than men to be released by their employers when downsizing begins, because women are more likely to be in positions with fewer career development opportunities. As well, the women, youth and poor in the tourism sector are less likely to find opportunities elsewhere. For these reasons, women in tourism are highly vulnerable to demand fluctuations that would result from marine plastic pollution on beaches and in coastal waters. These shared interests suggest that more tourism sector women should be involved in eliminating the threat from marine plastic litter.[87]

In Australia, the 1millionwomen movement envisages empowering women to act on climate change through the way they live. Women make 85 per cent of the consumer decisions that affect Australian households' carbon footprint, so their mission is to influence every dollar women spend and choices they make, including reducing consumption of plastics and recycling plastics as much as possible.[88]

From a human rights standpoint, no one should be excluded from government policymaking on the issue of waste management on the basis of their identities. Women's participation must be facilitated to ensure women's right to "participate in the formulation of government policy and the implementation thereof" (CEDAW Article 7(b)) and in recognition of the principle of 'leaving no one behind' (2030 Agenda for Sustainable Development).

Development pathways chosen by relevant authorities must be non-discriminatory and hence special attention must be paid to the ways in which men and women benefit from large versus small and community-scale projects when devising development priorities and projects.

The involvement of women in reducing plastic pollution is cause for celebration and, indeed, gains must be highlighted and amplified. Studies reviewed in this chapter have generally shown that women have a greater interest and propensity towards leading environmental health and sustainability initiatives. Inadvertently, the implicit justifications that relegate poor women to take up informal waste management with its stigma and unprotected conditions also apply when women lead recycling efforts and coastal area clean-ups. Waste seems to be the purview of women. Lessons can be learned from historical research on gender and environment practices and programmes.[89, 90, 91, 92] They remind us that plastic waste reduction and many other environmental-care responsibilities tend to be disproportionately assigned to and shouldered by women, particularly if there is little economic benefit to gain. This tendency allows men, governments and private companies to shirk their responsibilities, leaving the responsibilities with women. At local and community levels, environmental health adds to the long list of women's roles as carers.

At the same time, women are often entangled in power relations in their households, kinship clans and communities, so their involvement in recycling and clean-up initiatives requires negotiating their traditional roles with trade-offs in their time and reputations. In the face of widespread power relations and gender roles in households and the waste management sector in South-East Asia, the aim of this report is not to belittle or discourage women who lead recycling and waste management initiatives, but rather to recognize the underlying structures of inequality that may affect women's ability to exercise their human rights to equal voice and equal benefits in waste recycling management and any related economic benefit.

Despite the clean-up of coastal areas, manufacturers continue to produce and package their products in "disposable" plastic. State-driven regulatory processes and incentives have the capacity to encourage the design, production, and use of commercial products that are more environmentally sustainable. The research on women market vendors in Bamako, Mali, for example, drew attention to the possibility of tax breaks and subsidies for companies who purchase equipment that produce sustainable goods without the use of plastic.[93] Local people and organizations of women and men can and do actively advocate for this. Finally, social protection measures that recognize women's rights to health services and insurance in waste management contexts also serve to enable women to safely participate in managing plastic waste in coastal areas.

PART 3:
The effects of marine plastic litter on economic sectors

As presented above, marine plastic litter imposes numerous environmental and social costs upon society. In addition to these costs, marine plastic litter bears economic costs resulting mainly from the destruction of marine environments and threat to ecosystem services they provide. The marine environment provides opportunities for society and offers non-market values for recreation and cultural uses, as well as market value for subsistence and transportation. Economic impacts of marine litter result from deterioration of the quality of life, reduced recreational opportunities, loss of aesthetic value and the loss of non-use value.

The economic effects of marine plastic litter can be categorized under direct or indirect costs and can be measured by the decrease in opportunities to use the marine environment for profit and recreation. Direct economic costs can be readily measured and are costs associated with damage to an industry or an economic activity, for example, the costs of vessel downtime because of marine litter entanglement on a vessel propeller. Indirect economic repercussions are less readily measured as they can be less obvious. Examples include the decreased demand on tourism when marine plastic litter degrades the environment.[94]

In this section we provide an overview of the economic importance of the marine economy globally, as well as the South-East Asian region. The section focuses on the socio-economic consequences for fishing, shipping and tourism sectors as they are the most affected by financial losses resulting from marine plastic litter. Those sectors are also the greatest exploiters of marine ecosystems. The possible economic consequences of marine plastic litter on these sectors and the means to address these outcomes are also discussed.

The Value of the Marine Economy

The marine economy provides lucrative economic opportunities for many countries. The estimated value of the global marine ecosystem in 2015 was USD 16.5 trillion.[95] Many countries in the East Asian Sea region are dependent on the marine economy and regional trends suggest further growth in this sector. Primary industries in the marine economy include supplying products and services to and from coastal and marine areas, as well as fisheries and aquaculture, shipping, tourism, energy development, marine biological resources and mining industries.

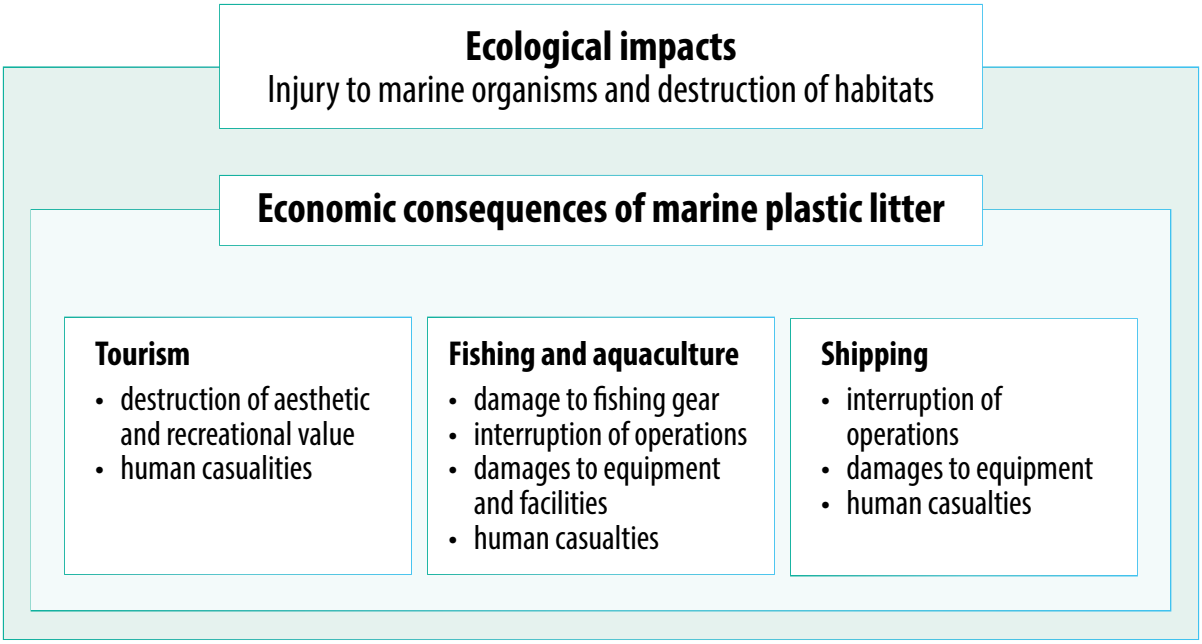
In 2015, estimates placed the marine economy's worth around USD 1.5 trillion for Cambodia, China, Indonesia, Malaysia, Philippines, Republic of Korea, Singapore, Thailand, Vietnam and Timor Leste.[96] For China alone, its share of GDP from the marine economy has risen steadily from 2001 to 2012 from 8.68 per cent to 9.65 per cent.[97] For some of the other COBSEA countries the marine economy accounted for a significant share of GDP with 13 per cent for Indonesia in 2008, 5.35 per cent for the Philippines averaged from 2011-2013, and 3.7 per cent for Republic of Korea averaged from 2008-2011.[98]

Countries in the region have, through a number of fora, recognized the opportunities provided by sustainable blue economy development, including the 2018 Sustainable Blue Economy Conference in Nairobi,[99] the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA) , the Changwon Declaration Toward an Ocean-based Blue Economy: Moving Ahead with the Sustainable Development Strategy for the Seas of East Asia[100] and the Declaration of the Indian Ocean Rim Association on the Blue Economy in the Indian Ocean Region.[101]

Given the tremendous economic value of the marine economy, the damages from marine plastic litter can have substantial economic repercussions. Estimates show that globally, marine plastic litter damage costs reach USD 13 billion annually for marine ecosystems, including costs to the fisheries and tourism sector as well as the cost of clean-up.[102] When including other non-market values of marine ecosystem services—such as cultural, subsistence, recreational and aesthetic values – the potential economic damage would be much greater. These costs also vary greatly by region and context, based on the resilience of countries' economies and their reliance on the marine environment. To date, there have been very few studies that comprehensively estimate the actual direct and in indirect economic consequences of marine plastic litter within each country context.

Estimates of damages from marine litter on the Asia-Pacific Economic Cooperation (APEC) region's fishing, shipping and tourism sectors reach about USD 1.265 billion.[103] The ecological impacts of marine plastic litter lead to economic losses both direct and indirect in the tourism, fisheries and shipping sectors reliant on the marine resources. Direct financial losses are incurred from the decline in commercial species and habitat destruction while indirect financial losses come from human deaths and injuries from entanglement in marine plastic litter, interruptions to operations and increased operational costs and damage to equipment and facilities (Figure 3). Despite the loss and damages from marine litter on these sectors, they are contributors to marine plastic litter themselves.

Figure 3: Economic consequences of marine plastic litter



3.1 Fisheries

The fishing industry is one of the most vulnerable industries to the hazards of marine plastic litter as the sector is entirely reliant on healthy populations of the species and ecosystems that are harmed by marine plastic litter.[104] There are very few studies that attempt to attribute economic losses in the industry to marine plastic litter, making it difficult to quantify the relevant economic implications of marine plastic litter.

Despite this, it is possible to estimate that the magnitude of marine plastic litter damage is vast, due to the heavy dependency that the GDP of many countries in East Asian Seas region have on the fishing sector. In capture-fish production, China, Indonesia, Vietnam, the Philippines, Republic of Korea, Thailand and Malaysia are among the top 25 marine capture producers globally.

Dependency on the sector by countries in the East Asian Seas region is only expected to grow over time to meet rising demand, placing additional pressures and competition to fish in an increasingly resource limited and plastic polluted environment. Table 1 shows that between the periods of 2013 and 2014, China, Indonesia, Vietnam, the Philippines, and Republic of Korea increased their production.[105] This increase is to meet rising demand from Asia where a World Bank estimate suggests that by 2030, Asia will account for 70 per cent of global fish consumption.[106]

Table 1: Selected Asian countries within the top 25 marine capture producers and change in production between 2013 to 2014[107]

	2013 Catch (metric tons)	2014 Catch (metric tons)	Percentage change	Change between 2013 and 2014 (metric tons)
China	13,967,764	14,811,390	6	843,626
Indonesia	5,624,594	6,016,525	7	391,931
Vietnam	2,607,000	2,711,100	4	104,100
Philippines	2,130,747	2,137,350	0.3	6,603
Republic of Korea	1,586,059	1,718,626	8.4	132,567
Thailand	1,614,536	1,559,746	-3.4	-54,790
Malaysia	1,482,899	1,458,126	-1.7	-24,773

Economic consequences for the fishing industry threaten the livelihoods of those employed in the sector. FAO estimates that globally, 56.6 million people, both men and women, are employed in the fisheries sector. These figures suggest that women account for around 19 per cent of people engaged in the fisheries and aquaculture sector. Men's and women's roles in the fisheries sector are distinct regardless of the scale of operation.[108]

There is a declining trend of employment in the sector: between 2010 and 2014, the number of workers in Asia's fisheries sector decreased by over 1.6 million, a 3.3 per cent decline.[109] Despite the decline, the fisheries sector in Asia remains as the world's largest and employs 84 per cent of people in the global fisheries and aquaculture sectors. Asia's fishing fleets also account for 68 per cent of the global fishing fleet with around 3.5 million vessels.[110] Though there is no evidence to link the decline in employment in the fishing sector to marine plastic litter, it is likely that economic losses in the sector stem from declining marine resources as a result of ecosystem decline from pollution and do lead to unemployment.

Marine litter can damage active fishing gear and facilities, cause human injury and contaminate seafood, resulting in direct economic loss. With damages to fishing gear, marine plastic litter can become entangled in propellers and incur repair costs and can reduce the number of days they are available for operation. Plastic and rope entanglement to bow thrusters and propellers can cause seal damage and vessel flooding.[111]

While a recent study on the economic effect of marine plastic litter on ships in the East Asian Seas region does not exist, examples from elsewhere demonstrate that the consequences include large annual losses in revenue to the industry. A case from Japan in 1985 estimated that the cost of damages to ships from collision with marine litter, entanglement with floating objects by propeller blades and water intake cooling systems was around USD 18.45 million or 3 per cent of the total annual national fishery revenue.[112] For the Scottish fishing industry, a 2010 study estimated that the cost incurred each year from marine plastic litter was up to USD 14 million per year or about 5 per cent of the annual revenue.[113]

However, the fishing sector is one of the major ocean-based sources of marine litter, with fisheries and fishing vessels contributing around 20 per cent of marine plastic.[114] Derelict fishing gear – nets, wires and traps – continues to snare fish long after abandonment in the water. As it reduces the fish stock and therefore the potential harvestable catch, abandoned gear can have long-term economic consequences on the industry.[115] To give an example, in the Republic of Korea, 48 per cent of the marine litter found in

Korean seas was derelict fishing gear; 5 per cent of which were Styrofoam buoys used in aquaculture facilities. According to one figure, as much as 60 per cent of the fishing nets used in the Republic of Korea are abandoned at sea. The problem was recognized as reducing the blue crab catch and the country's Navy removed 235 tons of nets between 2008 and 2010, resulting in a twofold increase in blue crab catch.[116]

The costs associated with marine plastic litter effects on fishing vessels are also incurred for vessels in the shipping sector. Damages caused by marine plastic litter to shipping is estimated to cost USD 279 million dollars annually in the APEC region.[117] Countries in the East Asian Seas region have some of the largest economies based on shipping and the economic implications of marine plastic litter could affect the GDP of countries reliant on shipping and employment of people in this sector. China, Singapore and Republic of Korea are among countries with the top 10 busiest by volume of container ports in the world. Shanghai ranks as the world's busiest port, followed by Singapore at second.[118]

Marine litter can pose a significant navigational hazard for shipping. Though there are few examples from the East Asian Seas region, in the United Kingdom there are increasing numbers of coast guard rescues to vessels with fouled propellers. In 2008, these coast guard rescues cost approximately USD 2.8 million.[119]

Marine plastic can also cause injury and human to crews and passengers in the short term. Marine plastic litter that entangles propellers endanger the lives of the crew and passengers. In 1993, the Shahe Ferry in the Republic of Korea capsized as its propeller became entangled in derelict rope, ultimately claiming the lives of 292 passengers.[120]

3.2 Shipping

Ripple effects on employment could also be felt from economic losses associated with marine plastic litter. Globally, the shipping sector provides more than 4.2 million jobs.[121] Many jobs in the maritime workforce in shipping, cruise or passenger ships are dominated by men. In 2018 only 2 per cent of the workforce were women, who were mainly employed on cruise ships or passenger ferries.[122] Job security in the shipping sector is subject to volatile market shocks. A survey conducted in early 2019 of employees in the industry found that 62 per cent were concerned about job security and increased from the 56 per cent that were concerned about the same issue in 2018. Further 54 per cent of employees in 2019 were also actively looking to change jobs. Equity and discrimination issues are also prevalent in the workforce and around 70 per cent felt their employer could do more to improve diversity and inclusion at work while 25 per cent felt they had been discriminated at work based on gender, race, nationality, age or education.[123]

Lastly, economic impacts on the sector could potentially have serious implications on the costs of essential goods and services which society relies upon. With 90 per cent of goods in the world transported via shipping, the industry provides numerous benefits to society as it delivers food, technology and medicine across the world. Disruption and losses incurred within the sector could mean increases in prices of essential goods to consumers, particularly affecting economies heavily reliant on imported goods.[124]

Marine plastic litter's effect on the tourism sector can be significant, particularly in coastal tourism regions. Marine litter is estimated to cost the tourism sector in Asia-Pacific rim countries around USD 622 million per year.[125] In the short term, marine plastic litter can make beaches less attractive and reduce the aesthetic value of a beach and make it less desirable for recreational activities such as surfing, fishing, swimming and diving.[126] The consequences lead to revenue losses to businesses in the tourism industry – including hotels, restaurants, museums, theatres, and other local attractions – and to sustained losses if marine plastic litter issues are not addressed. Notably, 80 per cent of all tourism is concentrated in coastal areas and for this reason, the entire industry is particularly sensitive to the repercussions of marine plastic litter.[127]

For the East Asian Seas region, tourism is a considerable source of revenue and impediments to the industry could lead to severe economic losses. In 2016, the GDP benefit from tourism for the Asia-Pacific region was USD 714 billion which was greater than the GDP contribution from mining, chemicals manufacturing and autorotative manufacturing sectors and accounted for about 9 per cent of the region's GDP.[128] Revenue from tourism is also on a growth trajectory in the East Asian Seas region, signalling countries' growing dependency on an increasingly fragile marine environment. The World Travel and Tourism Council predicts that by 2025 Indonesia, Thailand and China will be among the fastest growing tourism destinations.[129]

In 2016, the tourism industry sustained about 159.2 million direct and indirect jobs, making up for more jobs than the banking, mining, financial services and auto manufacturing sectors.[130] In Thailand, tourism contributed to USD 83 billion or 20.6 per cent of Thailand's GDP in 2016 and supplied 5.7 million direct and indirect jobs, accounting for more jobs than in banking, financial services, mining and auto manufacturing.[131] As mentioned in Part 2, the sector provides ample opportunities for women and youth and leadership opportunities for women, particularly in the South-East Asia region.

As with fishing, although the tourism industry suffers economic losses from marine plastic litter, it itself is a significant contributor to the problem. A 2009 global survey by Ocean Conservancy found that shoreline and recreational activities accounted for 64 per cent of total marine litter items collected worldwide, while a 2014 Ocean Conservancy survey found that the top three items collected in international clean-ups that year were cigarette butts made with plastic, plastic food wrappers, and plastic beverage bottles.[132]

An example from Bali, Indonesia shows the magnitude of marine plastic litter damage to the industry. Tourism is the largest economic sector in Bali which was severely affected by the accumulation of marine plastic litter on beaches left by rising tides. In 2017, Indonesian authorities declared a 6km stretch of beach an emergency zone to clean up the accumulation of plastic litter to protect tourism. Despite pledges to clean up oceans by the government and to reduce plastic pollution by 75 per cent by 2025, Indonesia is still anticipated to increase visitors to from 9.7 million in 2015 to 20 million by 2020.[133] Similarly, on the Republic of Korea's Geoje Island, a phenomenon that resulted in the pile up of marine litter in July 2011 was estimated to have cost the tourism industry nearly USD 37 million in revenue loss from tourist rejection.[134] The number of people visiting the island decreased by 63 per cent between 2010 and 2011, and it is estimated that 70–100 per cent was due to marine litter pollution.[135]

For the fishing, shipping and tourism industries, the costs associated with the clean-up of marine plastic can be a severe economic setback. Further, clean-up only serves as a short-term solution without addressing the problem at source and improving waste management systems. In the fishing and shipping sectors, costs associated with clean-up include damages to equipment, operation interruptions, cleaning marine plastic from harbours and marina. While there are no examples from the East Asian Seas region, a study in the UK in 2010 estimated that ports and harbours in the UK spent approximately USD 2.6 million annually in clean-up costs.[136] The costs associated with clean up and disposal of marine plastic litter can be particularly high during bad weather periods such as heavy rain which can cause plastic litter to flow from land into ports or aquafarms. In Japan for example, typhoon 1 in 2018 initiated a flow of garbage that blocked a harbour and prevented fishing boats from sailing.[137]

In the fishing sector, the cost of cutting fishing nets from reefs by hand is estimated to be in the millions of dollars annually in the United States alone.[138] In Taiwan, the removal of derelict fishing gear is estimated to cost between USD 65/ton to USD 25,000/ton. The 2010 study of Scottish fishing vessels found that the direct costs of marine litter cost each vessel between USD 19,000 and USD 21,000 annually for the industry, due to time dedicated to cleaning litter from nets, repairing fishing gear, value of dumped catch and fouling incidents. Of that, 66 per cent were indirect costs calculated by hours incurred by operation time lost in vessels clearing litter from nets.[139]

The economic cost to coastal municipalities of marine litter include the direct cost of keeping beaches clear of litter and its wider implications for tourism and recreation. Direct costs include the collection, transportation and disposal of litter, and administrative costs such as contract management. In addition, it should be noted that voluntary organizations also often play a significant role in litter removal, and that some value should be attributed to volunteers' time. A 2011 study extrapolated estimates of the cost of cleaning up the UK's coastline to generate a theoretical global cost of USD 69 billion (EUR 50 billion) per year to keep all 34 million km of global coastlines clean.[140]

3.3 Tourism

In the tourism sector, direct costs associated with beach clean-up come from transportation, collection removal and disposal of marine plastic litter. These costs can be extremely high and though there are few examples from the East Asian Seas region, the global estimate of clean-up costs for coast lines estimated in 2011 was USD 55 billion per year at an approximate annual cleaning rate of USD 1670 per km of coastline.[141] In the APEC region, the cost of cleaning marine plastic litter in 2007 was estimated to be around USD 1500/metric ton of waste.[142]

These costs are typically borne by local businesses or by communities. Ocean hotels and resorts also bear the costs of maintaining their property for guests for aesthetic reasons. Therefore, the burden of clean-up of these plastics shifts from the states and plastic producers to local actors and businesses, which can prove costly and time-consuming.[143] In some cases, countries may seek remediation from the source of marine plastic litter. Japan is potentially seeking redress from Republic of Korea for plastic litter with Korean lettering that pollutes its western coast every winter.[144]

This section has outlined the potential impacts that marine plastic litter can have on three main sectors: fishing, shipping and tourism. These sectors are reliant on healthy and unpolluted marine environments to sustain their businesses. Marine plastic litter have both market and non-market effects resulting in revenue losses to the industry and posing a risk to the job security of those employed in these sectors. Further, marine plastic litter can also cause injuries and deaths among employees, as well as other users of coasts and the ocean.

As the economies of many countries in the East Asian Seas are heavily dependent on the marine economy to sustain their GDP and employment, the potential economic consequences of marine plastic litter will be enormous. This section's focus on economic implications for the shipping, fishing and tourism sectors only cites a fraction of the costs of marine plastic litter on the economies in the region. The lack of comprehensive studies quantifying both the direct and indirect effects of marine plastic litter for all marine-related sectors in the East Asian Sea countries hides the true costs of marine plastic litter to the region.

Indeed, many studies fail to clearly disaggregate the indirect costs of labour and time associated with repairs and clean-up of marine plastic litter from the direct costs associated with the removal of plastic litter itself and direct revenue losses. Men and women involved in the maritime sector all over the East Asian Seas region incur costs associated with time spent cleaning marine plastic litter from nets, propellers and blocked water intakes and replacing nets that were torn or wrapped around fragments of floating marine plastic litter. It is important to understand and address these costs – direct and indirect, paid and unpaid. Further, as women and men often have very different roles in clean-up and repair, data disaggregating time burden by gender is also necessary to understand economic implications of this burden.

Lastly, it is also imperative that responsible industry actors and states mobilize to address marine plastic litter before the repercussions become more dire and lead to greater revenue losses, unemployment and ecosystem destruction. As demonstrated in this section, while clean-ups are important, the associated costs are high and could pose an unfair burden on residents of coastal communities. To adequately address the socio-economic consequences of marine plastic litter, governments and relevant companies need to internalize all costs associated with plastic production and management to prevent marine plastic litter further upstream. To solve such problems and optimize waste management along the value chain, states and the private sector should support interventions that will address the interrelated social, ecological and economic consequences of marine plastic litter.

PART 4:
Findings and recommendations

Taking a gender lens and a human rights-based approach to addressing marine plastic pollution enables planners and decision makers to, firstly, understand the unequal distribution of adverse effects and burdens of marine plastic pollution; and secondly, it holds duty bearers – defined as state institutions and private plastic production firms – accountable to ensuring the rights to decent work, health, safety and social protection and setting up production and labour standards, social protection and regulatory mechanisms for decent work in waste management and to mitigating harmful effects on communities.

Marine plastic litter has social and environmental impacts at every stage of the pathway from its production source to its leakage to the ocean. At the production stage – the manufacturing of plastic – the chemical compounds used, and the physical properties of plastic particles can damage human health. Women workers in particular are at risk for increased rates of breast cancer, endocrine disruption and reproductive system failures from exposure to plastics.

Within the waste generation stage, consumers of plastic goods are exposed to the health effects during use of products containing plastics. It is likely that women as consumers are more exposed to the health hazards of plastic as they process and handle more domestic goods such as food, clothing, cosmetics and household items that are typically made of or packaged in plastic. Cosmetic products are particularly concerning as they may contain microplastics, which can be readily absorbed into cells and damage health when used by humans and persist when flushed into the environment. Further research on the health impacts of plastic materials and their additives is required, including possible differentiated risks to women, men and other groups of society, linked to biological characteristics or patterns of exposure.

In South-East Asia, the informal waste sector plays a key role in the recycling and management of plastic waste. Women and children are highly concentrated in unprotected, unregulated, low-earning and insecure occupations in waste collection and recycling. The workers are primarily poor women and children who take on high levels of occupational health and safety risks such as exposure to highly unsanitary conditions and intensive manual labour. At the same time, informal waste value chains remain underexplored and informal contributions are largely unrecognized and exploited, manifesting structures of inequality, social stigma and poverty.

When plastic litter leaks to the ocean, it threatens marine ecosystems as well as human health. Specific sectors, like tourism, shipping and fisheries can generate marine plastic litter, though they are also at risk from the ecological damages of plastic litter in the marine environment. Shipping, fishing and tourism sectors rely on productive and healthy marine ecosystems; thus, the effects of marine plastic litter can potentially reduce their revenue. Plastic litter can damage facilities and equipment as well as stall operations through repair, causing financial losses that burden small-scale fisheries operations in particular. Plastic litter also harms employees and clients of these sectors such as tourists, divers, swimmers and consumers of seafood.

Marine plastic litter can harm coastal communities and small-scale fisheries as their livelihoods are heavily reliant on the health of the marine ecosystem. These communities reside in areas contaminated by plastic pollution and eat seafood that is likely contaminated with harmful plastics. Populations living in remote and poor areas with limited income opportunities and poor waste management systems, such as islands, are particularly vulnerable to pollution from marine plastic litter that can contaminate scarce drinking water sources. As plastic can travel long distances and persist in the environment for hundreds of years, the repercussions of our plastic dependency go beyond local sources of contamination, reaching into every corner of the world and across generations.

Ultimately, action is needed to develop circular economy policies, increase consumer awareness, and install sustainable waste management systems, as well as to reduce the production of single-use and difficult-to-recycle plastic products from virgin material that enters linear waste streams and the natural environment.

Key findings, knowledge gaps and recommendations

The problem of marine plastic litter needs to be tackled from source and at every stage of its journey from land to its leakage to the ocean with close consideration of the gender and human rights issues at each stage. Plastic management to prevent plastic pollution on land is critical and it is very expensive to manage plastic litter once it is at sea. In this report, a gender analysis was conducted along the plastic value chain, from production to consumption, through waste generation and management, to leakage into the ocean. This report identifies existing knowledge gaps where further research is required to fully understand the gender, human rights and economic dimensions of marine litter. It calls for and contributes to strengthening the evidence for inclusive action on marine plastic litter that internalizes social, economic and environmental costs of plastic mismanagement. On the basis of these initial findings, the report includes recommendations and intervention points for private, civil society and public policy action. A summary of knowledge gaps and recommended interventions discussed below.

This report investigated gender and human rights dimensions at each stage of the plastics value chain to identify entry points for interventions and recommendations. The trajectory of the gender analysis followed this chain:

Knowledge gaps

Production

Analysis of the specificities of women and men's needs, roles, and vulnerabilities in the plastic industry in South-East Asian countries is lacking. Additionally, research on enabling conditions within successful cases where local women's organizations and other civil society organizations were able to curb plastic production can promote women's leadership in addressing marine plastic litter. Finally, consolidated information on fossil fuel subsidies that support and lower the costs of plastic production is needed to inform decision-makers and to highlight the multiple harmful effects of these to the environment and people's health.

Consumption and waste generation

The need for data on gender differences in plastic consumption, especially in environments other than the household, is significant in South-East Asian countries. This type of research on the gendered dynamics of generating plastic litter behaviour can help to fully understand and address the direct and indirect health impacts of plastic materials and additives and implications of gendered risks and exposure patterns. This data is particularly sparse in coastal areas where exposure to marine plastic litter might be greater due differences in diets, waste management and livelihoods.

Waste management

In general, research on the contributions of informal waste management operations to formal waste management systems and the social and economic impacts of informal waste management systems in South-East Asia is needed. This research combined with gender-specific data on employment in both formal and informal waste management sectors can be used in formulating gender-responsive policies. Basic baseline data such as information on existing examples of women's recycling cooperatives and informal waste collection/ recycling networks is scarce in the region. Such data could be used to formulate policies which respond to the needs of workers and provision of social protections.

While there is growing visibility of women's leadership in recycling activities and waste management, there is need to know men's activities and roles in this domain, how supportive they are of women's leadership, and whether women are able to exercise their rights to social protection, safety and fair economic benefits. For instance, little is known about the uneasy processes that women experience in negotiating latitude for their new roles and the trade-offs incurred. Knowing more about this will indicate the favourable and enabling conditions for women's leadership in waste management and inform social protection policy.

Plastic leakage into the ocean

Data in South-East Asia identifying the direct and indirect cost of damages from marine plastic litter to specific sectors such as shipping, tourism and fisheries can be used to ensure accountability and interventions by the industry in addressing marine plastic litter.

There are also knowledge gaps in understanding the efficacy of policy interventions (e.g. plastic bag bans, plastic bag fees…etc.) in addressing the gender and human rights impacts of marine plastic litter on vulnerable groups. Further, data on the cost-effectiveness of different mitigation measures at different stages of the plastic value chain is also helpful in designing effective policy interventions.

Key findings on the gender and human rights impacts of marine plastic litter

1. **Inclusive policies:** Policies that advance, protect and promote gender equality and human rights while significantly addressing the challenges and effects of marine plastic litter are lacking at multiple scales.

2. **Health impacts:** Manufacturing and handling plastics with hazardous materials could expose workers to endocrine disruptors (bisphenol A, vinyl chloride, styrene, acrylonitrile and phthalates) that could cause serious health implications.

3. **Women champions:** As major consumers and users of plastic goods, women may be exposed to different and greater risks but can also be champions for mitigating marine plastic litter through responsible consumption and waste disposal practices.

4. **Contributions of informal waste workers:** Women and children working in and sustained by the informal waste sector face multiple disadvantages and are exposed to health and social protection threats posed by mismanaged plastic waste. Their contributions to the recovery and recycling of valuable plastics are largely overlooked and unsupported.

5. **Economic impacts:** Marine plastic litter has both market and non-market repercussions, resulting in revenue losses and posing risks to the job security of those employed by the fisheries, tourism and shipping sectors. Members of coastal communities may be most at risk of marine litter pollution impacts.

Recommendations based on key findings:

Finding 1: Develop inclusive policies

- Integrate gender equality and human rights principles and relevant human rights norms in the identification of the issue, as well as policies and decision-making processes to tackle the issue.

- Ensure that governments as well as private sector actors respect gender and human rights principles when conducting their activities, in line with the United Nations Guiding Principles on Business and Human Rights and other standards.

- Create a network of gender and human rights champions in both the public and private sectors to strategically initiate an enabling and inclusive policy environment.

- Develop close collaboration among responsible state institutions, national women's ministries, the private sector and non-governmental organizations to embark on a gender analysis of strategies and to make specific recommendations that ensure these strategies will lead to gender-equal and inclusive results and benefits.

- Ensure provision of procedural rights by states to ensure rights and processes for public participation and for seeking remediation from environmental harm.

Finding 2: Addressing health impacts

- Put in place safeguards and social protection measures for plastic workers such as free access to healthcare for women and their families; childcare services to avoid the presence of children at work sites; and strengthen occupational health and safety protection in the workplace.

- Create and maintain a baseline of gender-specific data on employment in this specific field in Asian countries for local public health and social protection institutions to use in responding to the needs of affected women, men and families.

- Develop state-initiated incentives and regulatory mechanisms, such as tax breaks and subsidies, in support of circular economic development and green engineering.

- Provide science-based evidence and information on hazardous plastic materials to workers and state authorities to provide adequate guidance on proper handling and precautionary measures in the interim prior to phase out. Further investment in respective research on health impacts of plastics and risks for disadvantaged groups could inform action.

Finding 3: Supporting women champions

- Ensure all people have equal access to recycling and waste management facilities in their neighbourhoods and communities.

- Support local government authorities and commercial establishments to connect consumer and environmental groups to advance concerted and sustained awareness-raising action

- Raise awareness, through formal and informal education, on the need to re-shape and re-orient consumption practices and patterns, especially by helping people understand the environmental and health risks of particular plastic products on their food and in their bodies, and also to ensure that women and men equally meet the challenges of reducing plastic waste and managing the process in sustainable ways.

- Provide information on specific damages from plastic bags, single-use plastic items and plastic microbeads in cleaning and personal care products to consumers.

- Enhance the awareness about the human rights infringements of marine plastic litter – from production source to oceans – among organized women's and civil society organizations as agents of change in mitigating the risks of plastics and marine plastic litter.

Finding 4: Recognizing and empowering waste workers

- Recognize informal waste pickers and include them in any transition to more sustainable formal waste management systems. When designing waste management policies and systems, policymakers should consult representatives of informal groups, learn from their experience, and design inclusive models to improve both existing workforce-based infrastructure and the prospects of future informal livelihoods.

- Recognize as a public service and legitimize waste work as a respectable occupation for both women and men. This should involve creating structures to protect workers' rights and to give them a collective voice through the creation unions or cooperatives, to negotiate sufficient earnings, access to adequate sorting facilities, and provision of health and safety equipment.

- Ensure appropriate curricula and education are available for all groups of society, including women and girls, to engage in work opportunities in both waste management and the public services sector in general.

- Tackle the stigmatization of waste pickers and other informal waste workers through positive media and communication strategies and by legitimizing their contributions such as by providing identification cards, income from collection fees and adequate equipment.

- Address the needs of workers in social protection policies. These should include improved health services and measures that ensure the security of women and young girls by tackling police harassment, insecurities, patterns of dependencies, and exploitation, as well as government labour protections and good company practices.

- Understand and consider schemes to avoid livelihood displacement when designing market-based solutions such as extended producer responsibility.

- Create capacity building programmes, particularly within existing waste picker networks, that enable equal involvement of both women and men as technical experts to support Asian countries in need of waste management system expertise that can optimize techniques in plastic litter capture and recycling.

- Establish infrastructure through government and private sectors that can facilitate easy collection, transport and sorting, meeting waste pickers' needs, such as installing waste collection points, providing vehicles to transport waste, and providing adequate spaces for sorting and storage.

Finding 5: Addressing economic impacts

- Engage the shipping, fisheries and tourism sectors and plan for mitigating the effects of marine plastic litter through joint action.

- Ensure that policies aimed at protecting the natural environment do not have adverse effects on the livelihoods and well-being of individuals in coastal communities.

- Implement water and sanitation programmes to safeguard coastal communities from the threats that marine litter poses.

- Develop policy, legislative and enforcement measures to use ocean-friendly fishing gear and programmes to prevent loss.

- Internalize costs of plastic production and avoidable pollution to protect the human rights of all groups of society to a clean environment, including disadvantaged groups.

ANNEX

1.1 Types of marine plastic litter and sources

Types of Marine Plastic Litter

Polymers are derivatives of petroleum or natural gas with long-chain molecules, and plastic is a type of synthetic polymer.[145] Plastic is valued for its versatility, malleability, durability and low-costs.[146] In most places, plastic waste management practices at the end of its life cycle are energy recovery through incineration, pyrolysis or decomposition at high temperatures, recycling or landfilling. Plastic types are labelled from numbers 1-7 and each number represents a different chemical composition of the plastic material, use and recyclability (Annex table 1).[147] Steps for recycling plastic involve collecting, sorting, shredding, washing, melting and pelletizing.[148] Although most polymers can be reused after melting, additives to plastic interferes with the quality of the plastic, making it difficult to return to its original state. The type of polymer or type of plastic product determines its stability after melting. Plastics 1, 2, 3 and 5 are the most economically suitable to recycle. For the plastic industry, removal of residue in mixed plastics, as well as sorting, poses a major challenge to the recycling industry.[149]

Annex table 1: Plastic types and identification codes (Table adapted from Devasahayam et al.)[150]

Number	Acronym	Full name and typical uses
1	PET	Polyethylene terephthalate- soda cans, drink bottles and frozen meal packages
2	HDPE	High-density polyethylene- milk bottles and detergent bottles
3	PVC	Polyvinyl chloride-food trays, ceramic wrap
4	LDPE	Low density polyethylene- grocery store bags and black rubbish bags
5	PP	Polypropylene-microwavable meal containers
6	PS	Polystyrene- Styrofoam, plastic cutlery, hot meal containers
7	Other	Other types of plastic that do not fall in the other categories

The size of plastic particles is relevant as different sizes allow for different types of sampling and collection and have differing implications for ocean life as well as for human well-being and health in coastal communities. A common classification by size identifies four types of plastic: mega- and macro-sizes that can be directly observed, meso-size that can be sampled through sieving, micro-size plastic that requires towed plankton-nets for sampling, and nano-size plastics that can be sampled through filtration only.[151]

Though marine plastic litter comes from both land and sea-based sources, the land-based source is the primary contributor of plastic into the oceans.[152] Factors such as a country's socio-economic status, population density, plastic production, and waste mismanagement determine contributions of marine plastic litter into oceans.[153] Globally, 75 per cent of land-based sources of marine plastic pollution is from uncollected waste and 25 per cent comes from leakages in the waste management systems. The majority of the waste generated from land-based sources is low-value waste: only about 20 per cent is considered high value enough for waste pickers in COBSEA countries to focus their efforts on.[154] Marine activities also contribute to plastic pollution on land and it is estimated that marine activities contribute 30 per cent of coastal marine plastic litter.[155]

Rivers can also be significant transporters of plastic waste to oceans. Estimates show that 0.79-1.52 million metric tons of plastic reach oceans via rivers.[156] Asian river basins account for an estimate 67 per cent of the global total of marine plastic litter from river basins. Of the world's 20 most polluting rivers, 10 are located within COBSEA countries; namely in China, Indonesia and the Philippines.[157] Indeed, plastic waste near waterways is a major concern as every metric ton of uncollected waste near waterways results in 18 kg of plastic entering the ocean.[158]

Landfills adjacent to the ocean also contribute to waste on beaches and marine plastic litter. A study of waste composition in Hamadi and Holtekang beaches near the capital of Papua Province in Indonesia found that most of the waste was from Jakarta's rivers and landfills adjacent to the ocean. Plastic bags, footwear and polystyrene blocks accounted for 90 per cent of the recorded litter on these beaches.[159] This is similar to cases from around the world where landfills next to the ocean contribute to the majority of waste on beaches. A study of the composition of waste on Teluk Kemand beach and Pasir Panjang beach in Malaysia also found that the majority of waste on the beaches was plastic waste.[160]

1.2 Relevant international and regional policy instruments, agreements and frameworks: marine protection, human rights and gender equality

Specific to protection of the marine environment, South East Asia regional and global agreements and frameworks call for such protection through the management of pollution and species protection as follows.

Annex table 2: International frameworks relevant to marine litter, human rights and gender

The Universal Declaration of Human Rights (UDHR, 1948)
International Covenant on Economic, Social and Cultural Rights (ICESCR, 1966)
Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention, 1972)
Convention for the Prevention of Pollution from Ships (MARPOL, 1973/78)
United Nations Convention on the Law of the SEA (UNCLOS, 1982)
United Nations Conference on Environment and Development (UNCED) and the Rio Declaration on Environment and Development (Rio Declaration, 1992)
Convention on Biological Diversity (CBD, 1992)
FAO Code of Conduct for Responsible Fisheries (1995)
Jakarta Mandate on the Conservation and Sustainable Use of Marine and Coastal Biological Diversity (1995)
United Nations Economic Commission for Europe Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention, 1998)
Manila Declaration for the Protection of the Marine environment (2012)
United Nations Environment Assembly resolutions
2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs, 2015)

United Nations Ocean Conference Call for Action (2017)
COBSEA Regional Action Plan on Marine Litter (COBSEA RAP MALI, 2019)
Association of Southeast Asian Nations (ASEAN) Framework of Action on Marine Debris (2019)

UN Convention on the Law of the Sea

Of legally binding commitments, the United Nations Convention on the Law of the Sea (UNCLOS, 1982) is notable as it provides the overarching framework, within which all the activities in the oceans and the seas must be carried out.[161] Part XII of UNCLOS 1982 deals with the "Protection and preservation of the marine environment" and requires states to take, individually or jointly as appropriate, all measures consistent with UNCLOS that are necessary to prevent, reduce and control pollution of the marine environment from any source. Article 140 of the Convention specifically mentions that the treaty is for the benefit of mankind.

Further obligations relating to the management of oceans and seas and marine pollution are set out in the Convention on the Prevention of Pollution by Dumping of Wastes and Other Matter (London Convention, 1972)[162] and by the International Convention for the Prevention of Pollution from Ships (1973/78) wherein MARPOL Annex V forbids the discharge of garbage from ships of any kind into the ocean unless explicitly permitted.[163] The Convention on Biological Diversity 2016 decision XIII/10 urges parties to "to develop and implement measures, policies and instruments to prevent the discard, disposal, loss or abandonment of any persistent, manufactured or processed solid material in the marine and coastal environment."[164] The CBD 1995 Jakarta Mandate on the Conservation and Sustainable Use of Marine and Coastal Biological Diversity is also legally binding.[165] Lastly, the UN Charter and its principle of cooperation between states to resolve world environmental, social and economic issues is also legally binding.

UNEA resolutions

Other frameworks include the United Nations Environment Assembly (UNEA) resolutions which provide a framework for addressing several different aspects of addressing marine plastic litter.

Annex table 3: Relevant UNEA resolutions on marine plastic litter

UNEA resolution 1/6 Marine plastic debris and microplastics
UNEA resolution 2/7 Sound management of chemicals and waste
UNEA resolution 2/8 Sustainable consumption and production
UNEA resolution 2/11 Marine plastic litter and microplastics
UNEA resolution 3/7 Marine litter and microplastics
UNEP/EA.4/RES.6 - Marine Plastic Litter and Microplastics
UNEP/EA.4/RES.7 - Environmentally Sound Management of Waste
UNEP/EA.4/RES.8 - Sound Management of Chemicals and Waste
UNEP/EA.4/RES.9 - Addressing Single-use Plastic Products Pollution
UNEP/EA.4/RES.11 - Protection of the Marine Environment from Land-based Activities

There is also increasing acknowledgement and recognition within international frameworks that sustainability and environmental management require gender-responsive approaches to address the needs of disadvantaged groups including women and indigenous peoples. In its Fourth Session in 2019, the UNEA adopted the first resolution on "Promoting gender equality and the human rights and empowerment of women and girls in environmental governance," taking important steps to strengthen gender equality and women's rights in the area of international, regional and national policymaking on environmental issues.[166]

COBSEA Regional Action Plan on Marine Litter (COBSEA RAP MALI)

The Regional Seas Conventions and Action Plans (Regional Seas) encourage cooperation and coordination among countries sharing common resources. In 2019, COBSEA participating countries adopted a revised version of the 2008 COBSEA RAP MALI[167] to consolidate, coordinate, and facilitate cooperation, and implement the necessary environmental policies, strategies and measures for sustainable, integrated management of marine litter in the East Asian Seas region. The COBSEA RAP MALI recognizes the transboundary nature of marine litter and the need for intra- and interregional cooperation and supports participating countries in delivering SDG target 14.1. The Action Plan is intended to guide national action and address national priorities, to enable a harmonized regional approach to address marine litter across four action areas: (1) marine litter from land-based sources, (2) marine litter from sea-based sources, (3) development of regionally coherent monitoring programmes in line with global standards and methodologies, and (4) the establishment of enabling policy and institutional conditions in line with other country commitments in the region, such as the ASEAN Framework of Action on Marine Debris.

ASEAN Framework of Action on Marine Debris

In 2019, ASEAN Member States adopted the Framework of Action on Marine Debris[168] to guide national and regional action toward combatting marine litter. The Framework outlines four priority areas, namely (1) Policy Support and Planning; (2) Research, Innovation, and Capacity Building; (3) Public Awareness, Education, and Outreach; and (4) Private Sector Engagement. Each priority area consists of actions and suggested activities for further collaboration in the ASEAN region and among ASEAN and its partners in combating marine litter.

FAO Code of Conduct for Responsible Fisheries

The 1995 FAO Code of Conduct for Responsible Fisheries also contains a series of provisions and standards, some of which are relevant to marine litter, such as the provision of port-reception facilities; storage of garbage on board; and the reduction in abandoned, lost, or otherwise discarded fishing gear.[169] The 2012 Manila Declaration for the Protection of the Marine environment also addresses issues around marine pollution and marine plastic litter.[170] While gender and women's issues were notably absent from FAO's 1995 Code of Conduct for Responsible Fisheries, this gap has been addressed more recently. Gender-equality principles have in fact been included in FAO's 2010 Phuket Consensus: a re-affirmation of commitment to the Bangkok Declaration, FAO's landmark 2012 Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, and FAO's 2012 zero draft of the voluntary International Guidelines for Securing Sustainable Small-Scale Fisheries. Those additions are essential in triggering the political will for a gender and human rights-based approach in a field which sees the high involvement of women and children in activities often at risk from marine plastic litter.

United Nations Ocean Conference

At the first UN Ocean Conference in 2017, member States emphasized the need to address marine litter and other threats to the health of the ocean. The resulting Call to Action recognized the importance of gender equality in achieving SDG 14 on life below water and the crucial role of women and youth in the conservation and sustainable use of the ocean.[171]

UNCED in Rio and its outcomes

In addition to honouring commitments in international treaties, states must also respect customary law principles, or legal norms that have developed between countries overtime. Pertinent principles of customary law applying to marine plastic litter relate to cooperation amongst states on transboundary environmental impacts. These principles are evident in the 1992 Rio Declaration on Environment (Principle 19): "States provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith."[172] Articles 8 (j) and 10 (c) of the Convention on Biological Diversity that was opened for signature at the 1992 UNCED provide for the legal rights of indigenous and local communities in conservation and sustainable use of biodiversity.[173]

Annex table 4: Major international human rights-related binding instruments

International Human Rights Instruments
International Covenant on Civic and Political Rights
International Covenant on Elimination of all Forms of Racial Discrimination
Covenant on Economic, Social and Cultural Rights
International Convention on the Rights of Persons with Disabilities
International Convention on the Elimination of All Forms of Discrimination against Women
International Convention on the Rights of the Child
International Convention Protection of the Rights Migrant Workers and Members of Their Families

Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)

A gender equality and rights-based approach encompasses substantive inclusiveness and empowerment through the acknowledgement of equal rights and responsibilities within a society. These principles are reflected in the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) by emphasizing equality and sets out measures to achieve equality of results. In particular CEDAW ensures that in their efforts to tackle the issue of marine plastic pollution, states must take all appropriate measures to "eliminate discrimination against women in the field of employment in order to ensure, on a basis of equality of men and women, the same rights" (CEDAW, Article 11(1)) including the "right to the same employment opportunities" (CEDAW, Article 11(1-a)); "the right to free choice of profession and employment, the right to promotion, job security and all benefits and conditions of service and the right to receive vocational training" (CEDAW, Article 11(1-b)); "the right to equal remuneration, including benefits, and to equal treatment in respect of work of equal value" (CEDAW, Article 11(1-d));"the right to social security, (CEDAW, Article 11(1-e)); and "the right to protection of health and to safety in working conditions, including the safeguarding of the function of reproduction" (CEDAW, Article 11(1-f)). Sections K and L of the 1995 Beijing Platform of Action are also crucial. CEDAW also offers protections for waste workers' families and children in its provisions for maternal protection and childcare, in article 5 as "a proper understanding of maternity as a social function" and demanding shared responsibility for raising children by both sexes. CEDAW also calls for society to provide social services and childcare facilities so that both men and women can work, as well as combine their family responsibilities.

Endnotes

[1] Geyer, R., J.R. Jambeck, and K.L. Law, 2017. "Production, use, and fate of all plastics ever made." *Science advances* 3, no. 7.

[2] Jambeck, J.R. et al, 2015. "Plastic Waste Inputs from Land into the Ocean," *Science* 347, no. 6223: 768–71.

[3] UNEP/NOAA, 2001. *The Honolulu Strategy. A global framework for prevention and management of marine debris.*

[4] Marion Sharples, 2018. "Gender, Development, and the Challenge of Intersectionality," *Views and Voices* (blog), August 3 2018, https://views-voices.oxfam.org.uk/2018/03/gender-development-intersectionality/

[5] Azocar, M.J. and M.M. Ferree, 2016. "Engendering the Sociology of Expertise," *Sociology Compass* 10, no. 12: 1079–89.

[6] UN General Assembly, 1948. *Universal Declaration of Human Rights*, 217 (III) A (Paris), http://www.un.org/en/universal-declaration-human-rights/

[7] See 6.

[8] United Nations Economic Commission for Europe (UNECE), 1998. *Aarhus Convention.*

[9] United Nations General Assembly resolution 71/312, *Our ocean, our future: call for action*, A/RES/67/97 (14 December 2012), https://undocs.org/A/RES/71/312

[10] Adapted from Jambeck, J.R. et al., 2018. "Challenges and emerging solutions to the land-based plastic waste issue in Africa," *Marine Policy* vol. 96, October: 256-263.

[11] Niaounakis, M. 2017. "2 - Environmental, Social, and Economic Impacts," in *Plastics Design Library, Management of Marine Plastic Debris*, William Andrew Publishing: 57–126.

[12] Wright, S.L. and F.J. Kelly, 2017. "Plastic and Human Health: A Micro Issue?," *Environmental Science & Technology* 51, no. 12: 6634–47.

[13] Mikołajewska, K., J. Stragierowicz, and J. Gromadzińska, "Bisphenol A – Application, Sources of Exposure and Potential Risks in Infants, Children and Pregnant Women," *International Journal of Occupational Medicine and Environmental Health.*

[14] Galloway, T.S., 2015. "Micro- and Nano-Plastics and Human Health," in *Marine Anthropogenic Litter*, ed. M. Bergmann, L. Gutow, and M. Klages (Cham: Springer International Publishing): 343–66.

[15] Zhang, Z. et al., 2011. "Urinary Bisphenol A Concentrations and Their Implications for Human Exposure in Several Asian Countries," *Environmental Science & Technology* 45, no. 16: 7044–50.

[16] Ryan, P.G., 2015. "A Brief History of Marine Litter Research," in *Marine Anthropogenic Litter*, ed. Melanie Bergmann, Lars Gutow, and Michael Klages (Cham: Springer International Publishing), 1–25.

[17] Monirith, I. et al., 2003. "Asia-Pacific Mussel Watch: Monitoring Contamination of Persistent Organochlorine Compounds in Coastal Waters of Asian Countries," *Marine Pollution Bulletin* 46, no. 3: 281–300.

[18] Yang, D. et al., 2015. "Microplastic Pollution in Table Salts from China," *Environmental Science & Technology* 49, no. 22: 13622–27.

[19] Kim, J. S., H.J. Lee, S.K. Kim and H.J. Kim, 2018. "Global pattern of microplastics in commercial food-grade salts: sea salt as an indicator of seawater MP pollution," *Environmental science & technology*, 52 (21): 12819-12828.

[20] Minh, N.H. et al., 2006. "Contamination by Persistent Organic Pollutants in Dumping Sites of Asian Developing Countries: Implication of Emerging Pollution Sources," *Archives of Environmental Contamination and Toxicology*, vol. 50, no.4: 474-81.

[21] Lynn, H., S. Rech, and M. Samwel-Mantingh, 2017. *Plastics, Gender and the Environment, Lifecycle of Plastics and its Impacts on Women and Men, from Production to (Marine) Litter*, Main Findings of a Literature Review. Utrecht: WECF.

[22] See 21.

[23] Zettler, E.R., T.J. Mincer, and L.A. Amaral-Zettler, 2013. "Life in the 'Plastisphere': Microbial Communities on Plastic Marine Debris," *Environmental Science & Technology* 47, no. 13: 7137–46.

[24] Tan, J. et al., 2008. "Multivariate Data Analyses of Persistent Organic Pollutants in Maternal Adipose Tissue in Singapore," *Environmental Science & Technology* 42, no. 7: 2681–87.

[25] Secretariat of the Convention on Biological Diversity and the Scientific and Technical Advisory Panel—GEF, 2012. Impacts of Marine Debris on Biodiversity: Current Status and Potential Solutions, Montreal, *Technical Series* No. 67.

[26] Bennett, N.J., P. Dearden, and A.M. Peredo, 2015. "Vulnerability to Multiple Stressors in Coastal Communities: A Study of the Andaman Coast of Thailand," *Climate and Development* 7, no. 2: 124–41.

[27] See 21.

[28] Food and Agriculture Organization of the United Nations (FAO), 2016. *Promoting gender equality and women's empowerment in fisheries and aquaculture*, www.fao.org/3/a-i6623e.pdf

[29] See 21.

[30] See 28.

[31] DeMatteo, R. et al., 2016. "Chemical exposures of women workers in the plastics industry with particular reference to breast cancer and reproductive hazards," *New Solutions: A Journal of Environmental Law and Occupational Health Policy*, vol. 2, issue 4: 427-48.

[32] See 31.

[33] See 21.

[34] Hougaard, K.S. et al., 2009. "Increased Incidence of Infertility Treatment among Women Working in the Plastics Industry," Reproductive Toxicology 27, no. 2: 186–89.

[35] See 21.

[36] Lei, K., et al., 2017. "Microplastics releasing from personal care and cosmetic products in China," *Marine pollution bulletin*, 123(1-2): 122-126.

[37] Linderhof, V., et al., 2001. "Weight-based pricing in the collection of household waste: the Oostzaan case," *Resource and Energy Economics*, 23, 359-371.

[38] Beall, J., 2009. "Thoughts on Poverty from a South Asian Rubbish Dump: Gender, Inequality and Household Waste," *IDS Bulletin*, 28 (3).

[39] Shiva, V., 1989. *Staying Alive: Women, Ecology and Development*, London and Delhi: Zed Books/Kali.

[40] Douglas, M., 1966. *Purity and Danger: An Analysis of the Concepts of Pollution and Taboo, London and New York:* Routledge.

[41] See 38.

[42] See 21.

[43] Dolnicar, S., 2010. "Identifying tourists with smaller environmental footprints," *Journal of Sustainable Tourism*, vol. 18(6): 717-734.

[44] Leonidou, L.C. et al., 2015. "Drivers and Outcomes of Green Tourist Attitude and Behavior: Socio-demographic Moderating Effects," *Psychology & Marketing*, 32(6): 635-650.

[45] See 10.

[46] See 21.

[47] Dalen, H. M. and B. Halvorsen, 2011. *Gender differences in environmental related behaviour*. Oslo: Statistics Norway

[48] Reschovsky, J.D. and S.E. Stone, 1994. "Market Incentives to Encourage Household Waste Recycling: Paying for What You Throw Away," *Journal of Policy Analysis and Management*, 13: 120-139.

[49] Dietz, T., L. Kalof, and P.C. Stern, 2002. "Gender, Values, and Environmentalism," *Social Science Quarterly* 83, no. 1: 353–64.

[50] Xiao, C., and A.M. McCright, 2015. "Gender differences in environmental concern: Revisiting the institutional trust hypothesis in the USA," *Environment and Behavior*, 47(1): 17-37.

[51] Brough, A. R., et al., 2015. "Is eco-friendly unmanly? The green-feminine stereotype and its effect on sustainable consumption," *Journal of Consumer Research*, 43(4): 567-582.

[52] Interview with Martin Medina, Senior International Affairs Specialist, NOAA, research specialist on informal waste workers.

[53] United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), 2019. Closing the Loop. Innovative Partnerships with Informal Workers to Recover Plastic Waste, in an Inclusive Circular Economy Approach, Regional policy guide (Bangkok, Thailand: ESCAP), p.30.

[54] See p.53.

[55] Binion, E., and J. Gutberlet, 2012. "The effects of handling solid waste on the wellbeing of informal and organized recyclers: a review of the literature," *International Journal of Occupational and Environmental Health* 18: 43–52.

[56] Wilson, D.C., C. Velis, and C. Cheeseman, 2006. "Role of informal sector recycling in waste management in developing countries," *Habitat International* 30: 797–808.

[57] Scheinberg, A., 2001. *Financial and economic issues in integrated sustainable waste management. Tools for decision-makers. Experiences from the Urban Waste Expertise Programme*. The Netherlands: WASTE.

[58] Haan, H. C., A. Coad and I. Lardinois, 1998. *Municipal waste management: Involving micro-and-small enterprises. Guidelines for municipal managers*. Turin, Italy: International Training Centre of the ILO, SKAT, WASTE.

[59] See 38.

[60] See 38.

[61] See 55.

[62] Ocean Conservancy, 2015. *Stemming the tide: Land-based strategies for a plastic-free ocean*. Washington, D.C: McKinsey, Ocean Conservancy.

[63] See 62.

[64] Mitchell, C.L., 2008, "Altered landscapes, altered livelihoods: The shifting experience of informal waste collecting during Hanoi's urban transition," *GeoForum*, vol. 39 issue 6: 2019-2029.

[65] Medina, M., 2000. "Scavenger cooperatives in Asia and Latin America," Resources, Conservation and Recycling 31: 51–69.

[66] See 56.

[67] See 38.

[68] See 52.

[69] Women in Informal Employment: Globalizing and Organizing (WIEGO), 2018. *Violence and Informal Work*. Briefing Note.

[70] Heacock, M., et al., 2018. "Prevention-intervention strategies to reduce exposure to e-waste," *Reviews of Environmental Health*, 33(2): 219-228.

[71] See 21.

[72] Traore, A. S., 2013. *Gender and plastic bag pollution: Consumption, globalization and environmental justice in Mali*, Unpublished MA thesis, Department of International Studies, Graduate School of the University of Oregon.

[73] Adane, L. and D. Muleta, 2011. "Survey on the usage of plastic bags, their disposal and adverse impacts on environment," *Journal of Toxicology and Environmental Health Services*, Vol 3(8): 234-248.

[74] Black, E., 2017 "This Social Enterprise Capitalises on Cambodia's Plastic Problem to Empower Local Women," News, *Southeast Asia Globe Magazine* (blog), December 28, 2017, http://sea-globe.com/plastic-fantastic/

[75] Promchertchoo, P., "Young Cambodian Women on Green Mission to Build Roads with Plastic Waste," News, CNA, July 8, 2018, https://www.channelnewsasia.com/news/asia/cambodian-women-on-green-mission-build-roads-with-plastic-waste-10396120

[76] See 65.

[77] McDermott, Amy, 2017. "This Philippine city is fighting ocean plastic with a clever solution to trash," *Oceana*, September 14, 2017, https://oceana.org/blog/philippine-city-fighting-ocean-plastic-clever-solution-trash

[78] Hanson, A-M.S., 2015. "Women's ecological oral histories of recycling and development in coastal Yucatán," *Gender, Place & Culture*, vol. 23 issue 4: 467-483.

[79] See 78.

[80] Hanson, A-M.S., 2015. "Shoes in the seaweed and bottles on the beach: global garbage and women's oral histories of socio-environmental change in coastal Yucatán," in S. Buechler and A-M.S. Hanson (eds), *A Political Ecology of Women, Water, and Global Environmental Change*. Oxon: Routledge.

[81] United Nations Framework Convention on Climate Change (UNFCCC), 2019. "All Women Recycling - South Africa," https://unfccc.int/climate-action/momentum-for-change/activity-database/all-women-recycling

[82] Zoë Lenkiewicz, 2018. "UK Aid funds WasteAid to recycle ocean-bound plastics in the Gambia," UKaid, November 15, 2018, https://wasteaid.org/uk-aid-funds-wasteaid-to-recycle-ocean-bound-plastics-in-the-gambia/

[83] Eisma-Osorio, R.L. et al., 2012. *A Sourcebook on Mainstreaming Gender into Coastal Resources Management in the Philippines, Cebu*: Coastal Conservation and Education Foundation.

[84] UNEP, 2015. *Blue Economy: Sharing Success Stories to Inspire Change*. Nairobi: UNEP

[85] World Travel and Tourism Council (WTTC), 2019. *Travel & Tourism: Driving Women's Success*.

[86] World Tourism Organization (UNWTO) and the United Nations Entity for Gender Equality and the Employment of Women (UN Women), 2011. *Global Report on Women in Tourism 2010: Preliminary Findings*.

[87] Baum, T., 2013. *International Perspectives on Women and Work in Hotels, Catering and Tourism*. Working Paper. Geneva: International Labour Organization (ILO).

[88] Newman, S., 2016. "How to recycle plastic packaging," 1millionwomen (blog), April 25, 2016. https://www.1millionwomen.com.au/blog/how-recycle-plastic-packaging/

[89] Leach, M., 1992, "Gender and environment: Traps and opportunities," *Development in Practice*, vol. 2 no. 1: 12-22.

[90] Jackson, C., 1994. "Gender analysis and environmentalisms," in M. Redclift and T. Benton (eds), *Social theory and the global environment*: 113-149, London: Routledge.

[91] Pearse, R., 2016. "Gender and Climate Change," *WIREs Climate Change*, vol. 8 issue 2.

[92] Resurrección, B., 2013. "Persistent Women and Environment Linkages in Climate Change and Sustainable Development Agendas," *Women's Studies International Forum* 40: 33–43.

[93] See 72.

[94] McIlgorm, A., H.F. Campbell, and M.J. Rule, 2011. "The economic cost and control of marine debris damage in the Asia-Pacific region," *Ocean & Coastal Management* 54: 643–651.

[95] Newman, S. et al., 2015. "Chapter 14: The Economics of Marine Litter," in *Marine Anthropogenic Litter* (Springer Open): 367-94.

[96] Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), 2015. *Blue Economy: Initiatives in the East Asian Seas*.

[97] Whisnant, R., and Reyes, A. 2015. *Blue Economy for Business in East Asia: Towards an Integrated Understanding of Blue Economy*. Quezon City, Philippines: PEMSEA.

[98] Ebarvia, M. C. M., 2016. "Economic Assessment of Oceans for Sustainable Blue Economy Development," *Journal of Ocean and Coastal Economics*, 2(2) article 7.

[99] Sustainable Blue Economy Conference Technical Documentation Review Committee, 2018. *Report on the Sustainable Blue Economy Conference*, 26th-28th November 2018, Nairobi, Kenya, http://www.blueeconomyconference.go.ke/wp-content/uploads/2018/12/SBEC-FINAL-REPORT-8-DECEMBER-2018-rev-2-1-2-PDF2-3-compressed.pdf

[100] PEMSEA, 2012. *Changwon Declaration Toward an Ocean-based Blue Economy: Moving Ahead with the Sustainable Development Strategy for the Seas of East Asia*. Fourth Ministerial Forum on the Sustainable Development Strategy for the Seas of East Asia, http://www.pemsea.org/publications/agreements-and-declarations/changwon-declaration-toward-ocean-based-blue-economy-moving

[101] Indian Ocean Rim Association, 2017. *Declaration of the Indian Ocean Rim Association on the Blue Economy in the Indian Ocean Region*, https://www.iora.int/media/8218/jakarta-declaration-on-blue-economy-final.pdf

[102] UNEP (2014) Valuing Plastics: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry.

[103] See 94.

[104] See 11.

[105] FAO, 2016. The State of World Fisheries and Aquaculture 2016: Contributing to Food Security and Nutrition for All. Rome: FAO.

[106] See 96.

[107] Adapted from UNEP, 2017. Marine Litter Socio Economic Study, United Nations Environment Programme, Nairobi. Kenya.

[108] See 28.

[109] See 105.

[110] See 96.

[111] See 94.

[112] See 94.

[113] Mouat, J., R.L. Lozano, and H. Bateson, 2010. *Economic impacts of marine litter*. Kommunenes Internasjonale Miljøorganisasjon.

[114] See 62.

[115] Newman, S. et al., 2015. "The economics of marine litter," in: M. Bergmann, L. Gutow, M. Klages (eds.), *Marine anthropogenic litter*. Cham, Springer International Publishing, p. 367–94.

[116] NOWPAP MERRAC, 2013. *Negative impacts of marine litter in the NOWPAP region*: case studies.

[117] Fabres, J. et al., 2016. *Marine Litter Vital Graphics*, Technical report.

[118] See 96.

[119] See 11.

[120] See 116.

[121] Business for Social Responsibility (BSR), 2010. Sustainability Trends in the Container Shipping Industry. A Future Trends Research Summary.

[122] Berti, A., 2018. Industry views: addressing gender inequality in the maritime sector, *Ship Technology*, August 9, 2018, https://www.ship-technology.com/features/industry-views-addressing-gender-inequality-maritime-sector/

[123] Lian, L.H., Decreasing confidence in shipping jobs market: survey, Seatrade Informa Markets, March 27, 2019, https://www.seatrade-maritime.com/news/americas/decreasing-confidence-in-shipping-jobs-market-surv

[124] See 121.

[125] See 94.

[126] See 107.

[127] See 96.

[128] WTTC, 2017. *Asia Pacific Summary*, London: WTTC.

[129] See 96.

[130] See 128.

[131] See 128.

[132] See 62.

[133] Wright, T., 2017. "Indonesia Vows to Tackle Marine Pollution," *The Conversation*, March 9, 2017, http://theconversation.com/indonesia-vows-to-tackle-marine-pollution-74038

[134] Jang, Y.C. et al., "Estimation of Lost Tourism Revenue in Geoje Island from the 2011 Marine Debris Pollution Event in South Korea," *Marine Pollution Bulletin* 81 (2014): 49–54.

[135] See 134.

[136] See 95.

[137] NOWPAP MERRAC, 2013. *Negative impacts of marine litter in the NOWPAP region: case studies*, Japan.

[138] Pichel, W.G. et al., 2017. "Marine debris collects within the North Pacific Subtropical convergence zone," *Marine Pollution Bulletin* 54(8): 1207–11.

[139] See 107.

[140] Wurpel, G., J. Van den Akker, J. Pors and A. Ten Wolde, 2011. *Plastics do not belong in the ocean. Towards a roadmap for a clean North Sea.* Amsterdam: IMSA.

[141] See 140.

[142] See 107.

[143] See 11.

[144] See 62.

[145] Devasahayam et al., 2019. "Plastics—Villain or Hero? Polymers and Recycled Polymers in Mineral and Metallurgical Processing—A Review," *Materials* 12, no. 4: 655.

[146] Rick LeBlanc, 2019. "An Introduction to Plastic Recycling and the Plastic Recycling Process," *The Balance Small Business*, June 25, 2019, https://www.thebalancesmb.com/an-overview-of-plastic-recycling-4018761.

[147] See 145.

[148] See 146.

[149] See 146.

[150] See 145.

[151] GESAMP (2015). "Sources, fate and effects of microplastics in the marine environment: a global assessment" (Kershaw, P. J., ed.). (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 90, 96 p.

[152] Wang, J., L. Zheng, and J. Li, 2018. "A critical review on the sources and instruments of marine microplastics and prospects on the relevant management in China," *Waste Management and Research*, 36 (10): 898-911.

[153] Löhr, A. et al, 2017. "Solutions for global marine litter pollution," *Current Opinion in Environmental Sustainability* 28, 90–99.

[154] See 62.

[155] Lahens et al., 2018. "Macroplastic and Microplastic Contamination Assessment of a Tropical River (Saigon River, Vietnam) Transversed by a Developing Megacity," *Environmental Pollution*. vol. 236: 661-671.

[156] Lebreton, L.C.M. et al., 2017. "River plastic emissions to the world's oceans," *Nature Communications* 8, article 15611.

[157] See 156.

[158] See 62.

[159] Nash, A., 1992. "Impacts of marine debris on subsistence fishermen. An exploratory study," *Marine Pollution Bulletin* 24: 150-156.

[160] Khairunnisa, A.K., S.H. Fauziah, P. Agamuthu, 2012. "Marine debris composition and abundance: A case study of selected beaches in Port Dickson, Malaysia," *Aquatic Ecosystem Health & Management* 15: 279-286.

[161] United Naitons General Assembly, 1982. *Convention on the Law of the Sea*, 10 December 1982, https://www.refworld.org/docid/3dd8fd1b4.html

[162] International Maritime Organization (IMO), 2006. *1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, 1972, http://www.imo.org/en/OurWork/Environment/LCLP/Documents/PROTOCOLAmended2006.pdf

[163] IMO, 1973/78. MARPOL - *International Convention for the Prevention of Pollution from Ships* http://www.mar.ist.utl.pt/mventura/Projecto-Navios-I/IMO-Conventions%20%28copies%29/MARPOL.pdf

[164] Convention on Biological Diversity, 2016. *Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity*, CBD/COP/DEC/XIII/10, https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-10-en.pdf

[165] Convention on Biological Diversity, 1997. *Introduction to the Jakarta Mandate on Marine and Coastal Biodiversity, including the terms of reference of the Meeting of Experts on marine and coastal biodiversity*, UNEP/CBD/JM/Expert/I/2, https://www.cbd.int/doc/meetings/mar/jmem-01/official/jmem-01-02-en.pdf

[166] UNEP, 2019. *Promoting gender equality and the human rights and empowerment of women and girls in environmental governance*, United Nations Environment Assembly of the United Nations Environment Programme Fourth session, UNEP/EA.4/L.21.

[167] COBSEA, 2019. *Regional Action Plan on Marine Litter 2019*. Bangkok: COBSEA..

[168] ASEAN, 2019. *ASEAN Framework of Action on Marine Debris*. Bangkok: ASEAN.

[169] FAO, 1995. *Code of Conduct for Responsible Fisheries*. Rome: FAO.

[170] UNEP, 2013. *Manila Declaration on Furthering the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities*, Intergovernmental Review Meeting on the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities Third session, UNEP/GPA/IGR.3/CRP.1/Rev.1.

[171] See 9.

[172] United Nations Conference on Environment and Development (UNCED), 1992. *Rio Declaration on the Environment and Development*.

[173] See 164.

The United Nations Environment Programme (UNEP) is the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment. Our mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.

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COORDINATING BODY ON THE SEAS OF EAST ASIA

The Coordinating Body on the Seas of East Asia (COBSEA) is a regional intergovernmental mechanism and one of 18 Regional Seas programmes. It is the decision-making body for the East Asian Seas Action Plan, bringing together nine countries – Cambodia, People's Republic of China, Indonesia, Republic of Korea, Malaysia, the Philippines, Thailand, Singapore and Vietnam – in protection and sustainable development of the marine and coastal environment in the East Asian Seas region. Our efforts focus on addressing marine pollution, advancing ecosystem-based marine and coastal planning and management, and strengthening ocean governance through regional collaboration. The COBSEA Secretariat is hosted by Thailand and administered by the United Nations Environment Programme.

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Stockholm Environment Institute (SEI) is an international non-profit research and policy organization that tackles environment and development challenges. We connect science and decision-making to develop solutions for a sustainable future for all. Our approach is highly collaborative: stakeholder involvement is at the heart of our efforts to build capacity, strengthen institutions, and equip partners for the long term. Our work spans climate, water, air, and land-use issues, and integrates evidence and perspectives on governance, the economy, gender and human health. Across our eight centres in Europe, Asia, Africa and the Americas, we engage with policy processes, development action and business practice throughout the world.

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